The DigiCULT Report

Technological landscapes for
tomorrow´s cultural economy
Unlocking the value of cultural heritage

Full report

For the contractor

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I FOREWORD

Europe's cultural and memory institutions are facing very rapid and dramatic transformations. These transformations are not only due to the use of increasingly sophisticated technologies, which become obsolete more and more rapidly, but also due to a re-examination of the role of modern public institutions in today's society and the related fast changing user demands. These trends affect all the functions of the modern cultural institution, from collection management and scholarly study through restoration and preservation to providing new forms of universal and dynamic access to their holdings.

Technological innovation plays a major role in the way our cultural institutions develop strategies for valorising their collections. It equally impacts directly on all those industries that provide products and services to, or with, the cultural sectors. Traditional demarcation lines between different types of institutions, between different skill and competence profiles and between different stages in the creation and management of collections are fading away.

In this context, the way Europe's cultural institutions should approach technology-driven mutation has to be assessed and options and recommendations provided. This is why the European Commission decided to fund the study entitled "Technological Landscapes for Tomorrow's Cultural Economy".

With the help of a Steering Committee, the European Commission was able to identify and agree on the themes to be covered in the study, to make sure that the methodology was adequate, and ensure that the conclusions obtained were properly validated. The objective was to capture and make visible the opinions of Europe's cultural institutions and actors, and to provide recommendations for policy making in both the cultural institutions themselves and the public authorities directly responsible for funding those institutions.

The European Commission would like to acknowledge all those who provided input and commentary, and in particular those who participated in the workshops, interviews, online Delphi, and case studies.

The work has been performed by a reliable independent consortium of researcher, academics and cultural institutions, and there is no doubt that the readers and authorities will find valuable information in this report. The study should help improve the way Europe's cultural actors prepare for the inevitable changes that will take place in the next five years.

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II INTRODUCTION
Empowering cultural heritage institutions to unlock the value of their collections

Husqvarna price-currant for bicycles, 1931

Being digital for many European archives, libraries and museums (ALMs) is no longer an option but a reality. They have turned into "hybrid institutions" that take care of both, analogue as well as digital cultural resources. The conversion of all sorts of cultural contents into bits and bytes opens up a completely new dimension of reaching traditional and new audiences by providing access to cultural heritage resources in ways unimaginable a decade ago. As Paul Fiander, Head of BBC Information and Archives, UK, brings it to the point: "The dividend from investment into going digital is substantial." (DigiCULT SC Meeting, November 19, 2001)

And it promises even greater returns in the future.

II.1   The digital promise

In the emerging knowledge society, there will be an increasing demand for high quality, enriched digital content as life-long learning is no longer a buzz word and continuous education has already become a must. Cultural heritage institutions are in a prime position to deliver the kind of unique learning resources that are needed at all educational levels.

Information and communication technologies will play a major role to create and deliver these new contents, which goes far beyond the current stage of providing access to information about cultural heritage objects. In the future, users of cultural resources will be able to enjoy new interactive cultural heritage services and products that relate to their personal lives. They will be able to manipulate digital artefacts online and participate in communities of interest. They will be supported by intelligent tools and agents that help them to locate the desired information to create their own stories. In addition, deeply immersive environments will make museum visitors dwell on in amazement in view of virtual worlds they could not experience anywhere than in the digital realm.

According to David Bearman, AMICO, USA, offering highly interactive and rich environments will become a competitive factor within the cultural heritage community. "

In the future, we will expect that you can manipulate digital images in many ways, turn them around, look at the bottom, etc. Those resources that you cannot manipulate, will be perceived as second rate. (...) Moreover, the museums they come from will be perceived as second rate." (DigiCULT Interview, August 8, 2001)

As such, cultural heritage institutions can utilise information and communication technologies (ICT) as effective instruments to direct public interest back to the original objects in their trust, by providing contextual information, enlightened with narratives and visualisations with computer-aided renderings and displays. As experience has shown, appropriate use of ICT does increase the interest in the original collection, and cultural heritage institutions should not leave this opportunity unused to add value to their holdings.

Yet, technology alone will not suffice to meet the growing user expectations. Equally important, it will require the knowledge and the intellectual "capital" that rests within the cultural heritage institutions themselves to create these kinds of new and highly desired content that increase the usage of cultural heritage material. Thus, European cultural heritage institutions not only hold the key to a treasure chest of unique resources, they also have the potential to turn the key to unlock the true value of our rich cultural heritage.

At present, however, these high promises are not yet fulfilled.

II.2   Why this study and for whom?

Today, archives, libraries and museums all over Europe face similar challenges as they try to take advantage of the enormous potential the use of information and communication technologies promises for memory institutions. These challenges are not only technical in nature, but affect cultural heritage institutions at their very core:

– How do new technologies affect the core business and how can they be best integrated into the current workflow?

– Which new technologies can be expected and how can cultural heritage institutions avoid to jump on the wrong technological bandwagon?

– What kind of institutional changes are needed to adopt and adapt
 new technologies?
– How can small institutions manage to participate in the emerging
 Information Society?
– What is the potential to commercially exploit cultural heritage resources
 and what are the future markets?
– What is needed to make cultural heritage services sustainable?

These are some of the questions that form the basis of this strategic study. Providing a roadmap for orientation on the future trends in the European cultural heritage sector in the next five years, the study aims to help decision makers how to best face the future challenges related to building and exploiting a digital cultural landscape within the Information Society.

Conceptualised as a tool for future planning for decision makers in European archives, libraries and museums, as well as national governments, regional authorities and the European Commission, this study:

– provides an in-depth analysis of the state-of-the art of technologies, organisational
 situation, cultural services and applications as well as (user) demand in European
 archives, libraries and museums;
– highlights the surrounding legal and policy framework that sets the conditions for
 technological developments, organisational changes and economic opportunities in
 the cultural heritage sector;
– draws conclusions and gives recommendations on measures to be taken in order to
 exploit the opportunities and to overcome current technological, organisational and
 legal impediments.

To reach a broad "institutional" consensus across the cultural heritage sector, more than 180 international experts from archives, libraries and museums, as well as policy makers and representatives from special interest groups and research facilities in Europe, the United States, Canada and Australia were involved in the study over the past seven months. In 29 interviews, 6 Expert Round Tables (ERT), and an online Delphi survey, they gave their opinions on future trends in the cultural heritage sector. Furthermore, they provided recommendations that allow actors in the institutions as well as policy makers to take appropriate measures to create favourable conditions for the future development of the cultural heritage sector.

II.3   Future key challenges

The experts involved identified the following key challenges that will drive the development in the cultural heritage sector in the future:

– Value of cultural heritage
– Education as the key market for digital cultural heritage products and services
– Co-operation and co-ordination as key to operating in a networked environment
– Strengthening small cultural heritage institutions by increasing competence and capacity
– Born digital resources and long-term preservation as key drivers of technological
 development
– Methodological and co-ordinated approach to digitisation

Value of cultural heritage

In the last years, the cultural heritage sector has gained much political attention due to its economic potential and its importance for market development in the Information Society. The expectations that cultural heritage institutions will become active players in the emerging information economy are high, even within national governments and regional authorities. Yet, to measure cultural heritage in economic terms alone would miss its true value. As Jim McGuigan remarks: "The notion that a cultural product is as valuable as its price in the marketplace, determined by the choices of the 'sovereign consumer' and by the laws of supply and demand, is currently a prevalent one, albeit deeply flawed. Its fundamental flaw is the reduction of all value, which is so manifestly various and contestable, to a one-dimensional and economistic logic, the logic of 'the free market'."[1]

The true value that cultural heritage institutions deliver to society is often indirect and non-financial as they strive to provide intellectual enjoyment and raise awareness about the importance of cultural and historical knowledge. Added revenue or the ability to generate revenue often happens indirectly, for other sector economies, i.e. regional development, tourism or the publishing and media industries. As primary funding bodies, national governments and regional authorities should be aware that what they are financing goes far beyond the economic value, but is a cornerstone of establishing a society's cultural identity.

Education as the key market

In the future education will be the most promising and therefore most significant market for cultural heritage. The experts participating in the DigiCULT study suggested that education should be the focus of every digitisation programme and a central point in every cultural heritage policy. Information and communication technologies are an effective channel to deliver new learning resources to the educational community and empower cultural heritage institutions to fulfil their educational as well as social functions.

To Mark Jones, Director of the Victoria and Albert Museum, UK, education is so important that it should become part of the core business of every archive, library and museum (ALM): "ALM resources are vastly undervalued and underused as an educational resource. It's not all about money. ALMs should be doing this as part of their core business, it improves collection management as well as access." (DigiCULT Interview, August 9-10, 2001)

Therefore, when selecting material for digitisation and producing new cultural heritage resources, memory institutions should follow a multipurpose approach and always keep the educational purpose in mind.

Co-operation and co-ordination

In the networked world, the demand for unique cultural heritage resources does not stop at the institutional walls, but highlights the need for co-operation and co-ordination. As Jennifer Trant, AMICO, USA, noted: "It's a major technology thing, that technology demands collaboration." (DigiCULT Interview, August 8, 2001)

Therefore, archives, libraries and museums need to enter into new relationships with their environment, other institutions across sectors, private businesses, intermediary organisations and new user groups. Major objectives of these partnerships are to collaborate in the cost-effective creation of new services, to co-ordinate digitisation programmes, define standards and structures to provide seamless access and to share resources. Networks with other institutions across sectors will be an essential component of every organisation. The governing principle of these networks will not be competition but partnership.

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[1] McGuigan quoted in Throsby, David (1999): Economic and Cultural Value in the Work of Creative Artists. In: The Getty Conservation Institute (2000). Values and Heritage Conservation. http://www.getty.edu/conservation/resources/valuesrpt.pdf (download 12-03-2001).

As Andreas Bienert, Prussian Heritage Foundation, State Museums of Berlin, brings it to the point: "There will be network services or no services at all. ... If we do not achieve a very new quality of information by using information and communication technologies, then we cannot legitimise expensive and very time consuming efforts in this field. ... It is absolutely necessary to achieve this kind of co-operation." (DigiCULT ERT, Berlin, July 5, 2001)

Ultimately, what it comes down to is the need to not only integrate technological systems but people.

Strengthening small cultural heritage institutions by increasing their competence and capacity

Looking at Europe's memory institutions from the viewpoint of their awareness of new technologies, we are confronted with a wide spectrum with regards to the adoption and exploitation of the benefits information and communication technologies offer to these organisations. On the one end, there are the pioneer institutions and early adopters of information technologies among libraries, archives and museums. These institutions have a clear plan for digitising their collections and spearhead market development by thinking of innovative ways of how to better exploit their digital collections also commercially on the world wide web. On the other end of the spectrum, we find mostly small archives, libraries and museums, which are neither aware of the new technologies and their possibilities nor do they possess the financial as well as human resources to actively participate in the new development.

In the future, it will be a challenge for the European Commission as well as national and regional governments to increase the capacity and competence in small cultural heritage institutions and create the conditions that allow those under-resourced organisations to participate in the Information Society.

"As a curator in a small institution, I feel the lack of employee expertise in technological areas is one of the most pressing problems for adoption of new technologies. Definitions of work practices are focused on exhibition and research development, placing technological expertise low on the list of qualifications for employment. In a small institution, where no staff are hired specifically to perform these functions, the responsibility falls on individuals to develop policies and programs often with scant knowledge of development in other cultural institutions. Individual achievements are all wrought in the face of either instructing and training other staff members while, at the same time, needing to keep abreast of technological developments and carrying out the duties for they are employed." (Geoff Barker, University of Sydney, Macleay Museum, Australia; DigiCULT Delphi, May 22, 2001)

Long-term preservation and born-digital objects as key drivers of technological development

As ever shorter technological innovation cycles replace existing technologies at a breathtaking pace of 2–5 years, the urgency to address long-term preservation to avoid the inevitable loss of our cultural heritage becomes ever more pressing. Current methodologies of long-term preservation such as technology preservation, migration and emulation are regarded as insufficient methods to preserve digital objects over the long term. In fact, they are considered short-term solutions to a long-term problem. As Greg Newton-Ingham, British Universities Film & Video Council, describes this disadvantage of digital techno-logies: "It is a technology with the minus that it self-combusts." (DigiCULT ERT, Stockholm, June 14, 2001)

Although cultural heritage institutions face high risk related to the uncertainty about the rapid changes in technology, taking a "sit back and wait" approach would be the wrong strategy. Instead, they should develop sound principals and policies for the creation and acquisition of digital material. In addition, national and regional policy makers need to take immediate action and formulate strategies for digital preservation as part of a national information policy.

Immediate political action is also needed with regards to the ever increasing volume of born-digital material. Born digital material are resources that have been created with the help of information technologies and demand particular hard- and software for reading and viewing. The explosion of electronically published material currently puts enormous pressure on cultural heritage institutions, as they lack the regulatory framework that entitles them to properly collect, store, make accessible and preserve these resources that are published on the World Wide Web. Given the fact, that many web resources disappear within a short time period, without such legislation or other mechanisms that allow cultural institutions to collect these data, a vast amount of our future cultural heritage will inevitably be lost.

Methodological and co-ordinated approach to digitisation

Today, the volume of material to be digitised is the most pressing digitisation issue, and related to that, the need to select. With growing scale, the nature of object digitisation changes considerably and poses problems to cultural institutions that are not yet solved, such as mass digitisation, integration of metadata at the point of digitisation, the internal transfer and storage of huge amounts of data and, of course, the exploding costs related to all these tasks. Volume and scale of future digitisation highlight the need for automated processes and integration of object digitisation into the overall workflow within cultural heritage institutions.

This requires the establishment of comprehensive selection policies that are driven by a clear understanding of the why and for whom material should be digitised. Organisational policies for digitisation should be directed by a national digitisation programme to set priorities and avoid the duplication of work.

As Erland Kolding Nielsen, The Royal Library, Denmark, points out: "I could see that unless we started from above discussing what should be digitised – what are the objectives, what are our responsibilities and what are not – then you could spend a lot of money on small projects everywhere and commit the Danish sin, as I call it: a little bit of everything, for everybody, everywhere." (DigiCULT Interview, June 28, 2001)

III OVERVIEW OF RECOMMENDATIONS

A small songbook for use in churches, Amund Laurentsson (Printer), Stockholm, 1548?

The following section gives an overview on the recommendations for the different addressees of the study, decision makers of European archives, libraries and museums (ALMs) on the one side, and policy makers at the European, national and regional level, on the other side. A more detailed description of the recommendations and overall conclusions follows in the second part of this Executive Summary.

We would like to point out that the study consortium is very aware of and recognises the differences that exist between institutions in the various cultural heritage sectors regarding their size, the subject matters that they cover, their missions and purpose, as well as in what might be called their horizons, whether they are local, national, international, where their funding comes from and where they are positioned in public perception. These distinctions make a difference in what ALMs see as success in any part of their ventures including the digital world. Therefore, the decision makers of ALMs need to interpret the following recommendations within the framework of their institutions, to fit their own requirements.

III.1   Archives, libraries and museums

Key Challenge 1: Raise the competence in cultural heritage institutions

Cultural institutions should put human resources development high on their priority list.

– Cultural heritage associations and educational institutions should set measures to speed up the transfer and integration of knowledge into professional training and develop special courses for key areas such as digital management and preservation.

– With regard to basic qualifications, cultural heritage associations and institutions should promote the adoption of the European Computer Driving License as an important requirement for continuing professional development.

Key Challenge 2: Co-operation at all levels is key to marketing to new target groups

Cultural heritage institutions should actively seek the co-operation and partnership with other institutions across the sector, research centres, networks of excellence, intermediary organisations, and commercial businesses to reduce risk, avoid market failure and waste of resources. Co-operation should be sought in order to:

– build enriched, interactive environments and new cultural services that customers will demand in the future;

– present and/or market their products and services on common virtual cultural heritage platforms as well as tourism networks that aggregate visitors and users;

– provide packaged material (e.g. course material) for the educational sector;

– digitise and manage cultural heritage resources;

– negotiate licensing models that involve creators and owners of digital cultural surrogates as well as distributors and licensees that work closely with various target groups;

– build protected environments and enable the academic and educational communities to use licensed digitised resources.

Key Challenge 3: Strive to better exploit your own strengths and core competencies

Cultural heritage institutions should build on their strengths, authenticity, knowledge-based interpretation and contextualisation, and use new technologies to develop their own niche markets for licensed resources.

Key Challenge 4: Become methodical

Anchored in national digitisation programmes, cultural heritage institutions should formulate organisational digitisation policies that transparently state selection criteria based on:

– user demands,

– the quality of the source material, and

– future management of digitised material.

III.2   National and regional governments

Key Challenge 1: **Develop a methodological and co-ordinated approach to digitisation**

National governments and regional authorities should formulate clear digitisation programmes enabling cultural heritage institutions to formulate their own organisational digitisation policies.

Instead of funding individual digitisation projects in separate cultural heritage institutions, national governments, regional authorities and other funding bodies should invest in comprehensive digitisation programmes.

National governments and regional authorities should build on ongoing co-ordination initiatives for digitisation programmes. They should strive to establish an information exchange infrastructure or interface connecting top-down initiatives vertically with regional initiatives, as well as horizontally, with other Member States.

Key Challenge 2: **Empowerment of small ALM-institutions and regional cultural heritage initiatives**

National governments and regional authorities should develop mechanisms allowing small and under-resourced memory institutions to participate.

National and regional governments should ensure that small cultural heritage institutions can participate in all e-culture initiatives and make full use of the opportunities provided by new technologies.

Key Challenge 3: **The educational market is a key area for cultural heritage**

National governments and regional authorities should see the educational use of digital cultural heritage information as a key target in any national digitisation programme.

National and regional governments should support the establishment of virtual protected environments as the most relevant future platforms for cultural e-learning.

Key Challenge 4: **Take care of and ensure access to born-digital cultural heritage resources**

In those European Member States that have a legal deposit system, national governments should expand the legal deposit to include electronic and born-digital material. In countries without a legal deposit system, national governments and regional authorities should nevertheless appoint trusted organisations to collect, make accessible and preserve born digital cultural resources. These trusted organisations should then enter into negotiations with content providers to decide on rights agreements for deposit and future use.

Key Challenge 5: **Secure access to cultural heritage material also in the future**

National governments need to take immediate action on long-term preservation and formulate a digital preservation strategy as part of their national information policy. The strategy should involve the creation of a network of certified organisations that will archive and preserve digital cultural resources.

Key Challenge 6: Establish a supportive infrastructure for cultural heritage institutions (slip stream model)

Governments and other funding bodies should invest in specialised organisations that support small and medium sized archives, libraries and museums in the setting up and managing of digital collections (e.g. digitisation, collection management, online registration of users, licensing, and transactions).

National and regional governments should support cultural heritage institutions in developing digital on- and off-line products that bring the richness of their collections to a broader public. This includes creating conditions favourable to partnerships with private businesses as well as sponsorship.

Key Challenge 7: Set up effective co-ordination and dissemination mechanisms for cultural heritage know-how

National governments and regional authorities should set up a co-ordination and dissemination infrastructure that helps cultural heritage institutions to make informed decisions on future technological developments.

III.3 The European Commission

Key Challenge 1: Enable small and under-resourced cultural heritage institutions to participate in future Research & Development (R&D) programmes by narrowing the existing technology gap

The European Commission should ensure that small cultural heritage institutions can participate in all e-culture initiatives and make full use of the opportunities provided by new technologies.

The European Commission needs to lower the entry barriers for small memory institutions and develop a slip-stream model for R&D participation.

The European Commission should find a good balance between the funding of innovative, high risk projects and R&D programmes that allow smaller cultural heritage institutions to catch up.

The European Commission should fund the dissemination of best practice information on digitisation and ensure that this information is readily available to ALMs Europe-wide.

Key Challenge 2: Raise awareness for the potential of cultural heritage in the educational market

The European Commission should fund a current assessment of the educational market as one of the key markets for digital cultural heritage information, and disseminate best practice in the field of educational-cultural projects.

Key Challenge 3: Raise awareness for the use of standards

The European Commission as a primary funding body should actively promote the use of announced or open standards by making standards compliance a requirement for future funding for proposers of cultural heritage (and all other) projects.

Key Challenge 4: Future R&D

In the 6th Framework Programme for Research, Technological Development and Demonstration Activities, the European Commission should solicit proposals for projects in the following areas:

Area 1: Intelligent user guidance and navigation

– Development of intelligent narratives and contextualisation tools for cultural heritage data;
– Automated image analysis tools for historical pictorial data.

Area 2: Digitisation automation and mass storage

– Best practice cases in mass storage;
– Automated mass digitisation;
– Metadata capturing at the point of digitisation and integration of digitisation with collection management.

Area 3: Long-term preservation of complex digital resources and research related to dynamic digital objects

– Long-term preservation strategies for complex digital cultural heritage resources;
– Best practice cases in emulation as a long-term preservation strategy;
– Preservation solutions for dynamic digital objects;
– New approaches to naming on the web and further development of persistent identifier systems;
– Raise awareness for long-term preservation issues outside the cultural heritage community.

Area 4: New tools

– High productivity tools for non-technical users (e.g. knowledge based authoring);
– Interactivity through a wide range of human-machine interfaces;
– Collaborative tools supporting various modes;
– Intelligent systems supporting users at different levels;
– Research in the usage of advanced technologies within cultural heritage applications.

Area 5: Intelligent Cultural Heritage and Knowledge Technologies

Cultural heritage provides an excellent testbed for future knowledge technologies. The European Commission should therefore foster the use, adaptation and adoption of knowledge technologies by cultural heritage institutions, and encourage further exchange of expertise between cultural heritage experts and knowledge technologists.

IV SITUATION ANALYSIS
Present state and perspectives of the cultural sector: 1996 – 2001 – 2006

Gratiosus Benincasa composuit, Ancona, 1480

In the mid-90s, the European Commission launched a remarkable programme to boost the use of information and communication technologies (ICTs) in the emerging Information Society. The programme promised economic growth, a growing employment market and an overall increase of quality in all aspects of our lives. Triggered by Al Gore's "White Paper for Building a National Information Infrastructure"[1] in December 1993 and the Bangemann Report, "Europe and the Global Information Society"[2], in June 1994, the new technologies were considered as one of the key drivers of future prosperity. In 1996, all possibilities to realise this potential were open.

[1] Source: http://ibiblio.org/pub/academic/political-science/internet-related/NII-white-paper
[2] Source: http://www.medicif.org/Dig_library/ECdocs/reports/Bangemann.htm

Between 1996 and 2001, the European Commission and national governments created regulatory frameworks removing some of the obstacles to the accessibility of the future e-business markets – breaking up the national telecommunication monopolies to lower access costs, for example.

The cultural sector, particularly the publishing and entertainment industries as main content providers, were seen as key players for the development of new products and services to be delivered over digital networks. The future appeared to be "rosy" and anything seemed possible.

However, in the last two years, the initial enthusiasm for the new economy has been severely dampened and there has also been a rude awakening for the content providers in the cultural sector. The fact that people expect Internet content to be free of charge, together with the continuing lack of effective legislation on international copyright, created major barriers for commercially successful ventures on the Internet. As a consequence, in many cases the expected return on investment did not materialise and since the year 2000, some companies of the new economy were forced to close down.

However, this will only be temporarily, and given European youth's embracing of the new technologies, it is quite evident that better times can be expected in the future. Moreover, demand for quality content remains high.

For the cultural heritage institutions, it will become increasingly clear on how to market their unique resources especially to the educational community. A clear digitisation policy will enable memory institutions to create digital cultural heritage resources efficiently, for future access over computer and mobile networks. The key to success will be co-operations and strategic partnerships at all levels with other memory institutions across the sector, intermediary organisations as well as commercial companies. Thus, cultural heritage institutions can reduce risk and avoid wasting resources as the cost of valorising cultural heritage resources commercially will remain high. Staff in cultural heritage institutions will be more versatile and better trained, with the necessary information management and project management skills to develop the personalised services and highly interactive environments that future users will demand. Trained personnel and growing digital collections will be the key to success.

The following situational analysis provides an overview of the situation in the cultural sector presently and potentially by 2006 (if our recommendations in the DigiCULT study find followers). This analysis should also help to develop a clearer picture on what to expect in the cultural heritage sector in the future.

Cultural Sector 1996	Cultural Heritage Sector 2001	Cultural Heritage Sector 2006
Visions and perspectives		
– "Rosy Future" – Visions / assumptions / high expectations: new (economic) frontier with immense potential	– "Dreary Future" – Expectations not fulfilled – vision missing	– "Some sunshine" – Clear view of the benefit / value of cultural heritage
Markets		
– "Multimedia and internet hype": Decreasing traditional markets entice publishers to enter new markets with high commercial value – Assumed "killer applications": Broadband services like video on demand	– Rude awakening: No new mass markets in electronic publishing (video on demand etc.) – Few examples of success in the cultural industries, and even fewer in the cultural heritage sector	– No mass market – but some niche markets – Realistic view of market potentials instead of "killer applications"
Cost of market entry		
– Cost of market entry thought to be low	– Cost for building up sustainable services are higher than expected	– Cost of entry remains high; services need clear focus on users to produce some revenues
User demands		
– Assumption: Consumers look for quality and interactivity	– Uncertain about demands due to lacking data about user demands and expectations	– Users want high value for money, yet information in the public interest is expected to be free – No mass markets, but mass users in specific fields
Services		
– Value added, MM-rich products and services delivered over broadband networks	– Unclear how to sell value added services; users are used to "free rides" on the internet – Only a few business models that work – Some cultural heritage and educational services	– Commercially exploitable services and products: personalised, highly interactive services and "culture communities"; users can "package" their own products – Funded services: scholarly, educational services, etc. – Institutions increasingly co-operate with intermediary organisations to create new services and bring them to the market – Value-added cultural heritage services available that are not dependent on public funding
(National) policies and initiatives		
– EU driven policy – Policy makers bought into the hype of new IT and multimedia based markets – Strong influence of policy on market development	– Today, it is more difficult to sell IT and multimedia to politicians – Cultural heritage ranks low on the scale of political priorities (and needs to compete with health sector, social security, etc.) – Few countries with a clear strategy for digitisation	– Proven commitment of national governments to cultural heritage – Awareness that both culture and education cost money - yet willingness to pay as benefits for society are essential – Substantial influence in building markets through thematically focused cultural heritage policy

Cultural Sector 1996	Cultural Heritage Sector 2001	Cultural Heritage Sector 2006
Regulations		
– Deregulation of telecom monopolies has positive effect on consumer markets	– Regulations for born-digital objects needed, i.e. in the area of IPR and regulation of e-deposit	– Regulation for scientific and educational uses (framework to create protected environments) – Legislation that regulates the responsibilities for born digital resources is in place
Employment opportunities		
– Expectations for new employment opportunities are high – Multimedia and IT-skills can provide higher-value jobs	– Overall % of growth relatively low for cultural industries, and particularly for cultural heritage sector – Dramatic lay-offs in the IT-sector – Threat for maintaining the scale of employment in cultural heritage institutions	– Overall, a slight job increase in the cultural industries; increasing interest from Member States, decreasing interest at EU-level – Cultural heritage sector: job opportunities are still low, but can be stimulated by investing in cultural industries that make use of cultural heritage collections – The number of administrative staff has decreased, but by re-training staff cultural heritage institutions succeed in increasing the number of highly skilled, creative employees
Economic and Financial issues		
– Favourable investment climate – Easy access to venture capital – Policy did not have to pay for deregulation	– Cultural industry: much money spent, but no return on investment – Cultural institutions depend for 90-95% on public funding that is decreasing – Threat of "sale" of potentially profitable cultural heritage resources. (e.g. Corbis) – Less money for cultural heritage institutions but more tasks to accomplish	– Pragmatic ventures: clear under-standing of return on investment – Still 85-90% public financing – Professional fundraising and sponsor acquisition are widely used ways for cultural heritage institutions to obtain additional finances
Delivery Infrastructure		
– Fast technological development expected: from (narrow band) internet to broadband, video on demand, interactive digital TV, etc.	– Technologies with no marketable applications yet – Broadband still not available (and not requested) in private homes	– Broad use of narrowband technologies (inclusive mobile for applications with clear cultural heritage value); in some countries, broadband available inprivate homes, while in other countries, "islands" of use (on site)

Cultural Sector 1996	Cultural Heritage Sector 2001	Cultural Heritage Sector 2006
Tools		
– Electronic publishing, multimedia tools	– Efficient but still rather complex tools with low usability – Besides collection management systems, not many tools for cultural heritage sector	– New generation of easy to handle tools for domain experts and other target groups (e.g. teachers) – Co-operative authoring tools – Tools for defining automated workflows and data capturing in integrated systems
Content		
– Content not yet adapted for new technologies – Therefore, highest potential for content owners	– Digitisation of cultural objects/collections without focus ("accidental digitisation")	– Clear digitisation policy and strategies focused on particular themes (clear concepts: which collections, how: methods & standards, e.g. of documentation)
Management and organisation		
– Promising new organisational structures: "flat virtual enterprises" with networked creative knowledge workers – Cultural industries will easily adapt to electronic production and delivery	– Cultural heritage institutions rely on traditional hierarchical structures – They lack business view and competency – New media & IT-skills often missing	– Traditional institutions: still relatively inflexible (generation gap) – Some transfer through partnerships with businesses – New competencies & skills incorporated through new personnel, best practice examples – New types of cultural heritage organisations: cultural networks, service providers
Strategic partnerships and co-operation		
– Mergers, mergers, mergers – Need to position oneself in the new (e-publishing) markets as soon as possible	– Cultural heritage institutions enter into partnerships mostly within own sector: e.g. libraries co-operate on union catalogues	– Clear cross-sector partnerships on key issues, e.g. standards – Technical support organisations – Strategic partnerships with new types of cultural organisations and businesses – Well established co-operative frameworks across sectors

V OVERVIEW OF KEY ISSUES

C. Mardefelt, Plan of the Swedish camp in Bröhrau, 1643

The DigiCULT Report features four thematic areas:

– National policies and initiatives: Maximising the impact
  of a nation´s investment

– Organisational change

– Exploitation: Valorising cultural heritage resources

– Technologies for tomorrow's digital cultural heritage

The DigiCULT Report is based on the analysis of expert opinions in the cultural heritage sector. This includes a number of expert round table discussions, the advice from a Steering Committee of knowledgeable experts and "practitioners", interviews with experts on the various facets of the digital landscape and a very successful online Delphi survey that elicited thoughtful views from a variety of international sources. Case studies involving professionals in the cultural sector, policy makers and the actors of the cultural heritage community completed the basis for this research.

Each section of the DigiCULT Report highlights a key issue based on a specific set of research results followed by concise recommendations on policy, administrative, economic and technological issues faced by the memory institutions and society at large.

The following figure provides an overview of the key issues addressed in the four thematic areas that are the focus of this study.

National policies & initiatives: Maximising a nation´s investment	Organisational change	Exploitation: Valorising cultural heritage resources	Technologies for tomorrow´s digital cultural heritage
Key issue 1: A vision for cultural heritage	Key issue 1: Becoming hybrid institutions	Key issue 1: Online user attention	Key issue 1: Providing seamless access
Key issue 2: Methodologies for digitisation	Key issue 2: Human capital is key	Key issue 2: E-retailing - physical products	Key issue 2: Mass digitisation
Key issue 3: Strengthening small institutions	Key issue 3: Developing cooperation capital	Key issue 3: Digital product development	Key issue 3: Long term preservation
Key issue 4: Low-barrier access to CH	Key issue 4: Supportive infrastructure	Key issue 4: Digital commerce (licensing)	Key issue 4: Born digital resources
Key issue 5: CH resources for education	Key issue 5: Protected environments	Key issue 5: Shared themes	Key issue 5: New tools in the box
Key issue 6: Sustainable cultural heritage	Key issue 6: intermediaries to reach users	Key issue 6: Subscription-based services	Key issue 6: The widening technology gap
			Key issue 7: Future R&D compass

While it is not exhaustive, the DigiCULT Report is a guide for understanding the present state of European cultural heritage in the Information Society and lays out a roadmap for action in the years to come. We believe that this is a reasonable view of how the cultural landscape will unfold.

VI NATIONAL POLICIES & INITIATIVES
Maximising the impact of a nation's investment

Bibel of Evert van Soudenbalch (central Netherlands), Utrecht, around 1460

With some delay in comparison to the cultural industries, European national governments have acknowledged the importance of the culture heritage sector as being a vital component in building a democratic Information Society. As "guardians" of our rich cultural heritage and therefore potential providers of digital content, cultural heritage institutions are considered an important factor in the knowledge society, and the key to a treasure chest of cultural resources that is simply waiting to be opened and used.

In the last few years, national governments all over Europe have started to unlock that treasure chest. Building on the opportunities provided by digital technologies to bring digital cultural heritage resources to the attention of a far wider audience, they have launched large-scale digitisation programmes to make digital cultural resources more easily and widely accessible. Substantial resources have been spent on the creation and acquisition of digital material, yet in many cases, without paying sufficient attention to future use and maintenance of those digitised objects.

Last but not least because of growing budget constraints, national governments are now forced to rethink their approach to digitising cultural heritage resources. They have realised the need to develop a systematic and co-ordinated method of implementing cultural heritage policies, one in which the digitisation of resources is only one in a list of objectives to unlock Europe's rich cultural heritage. The objectives of such a comprehensive cultural heritage policy are to:

– build a critical mass of digital cultural heritage resources (digitisation policy);

– transfer know-how to less enabled institutions and actively promote regions;

– make cultural heritage resources more widely available (access policy);

– stimulate usage through different target groups (usage policy);

– create and develop new markets for cultural heritage resources (market development policy);

– secure availability and accessibility of cultural heritage resources also in the future (preservation policy).

In addition, it is also national governments who are responsible for the implementation of these policies by:

– creating a favourable legal framework, and

– making available the necessary finances.

These primary objectives of a comprehensive cultural heritage policy are pointed out in the following graphic, including what could be one of the main drivers for future development in the cultural heritage sector: Education.

Source: Salzburg Research, 2001
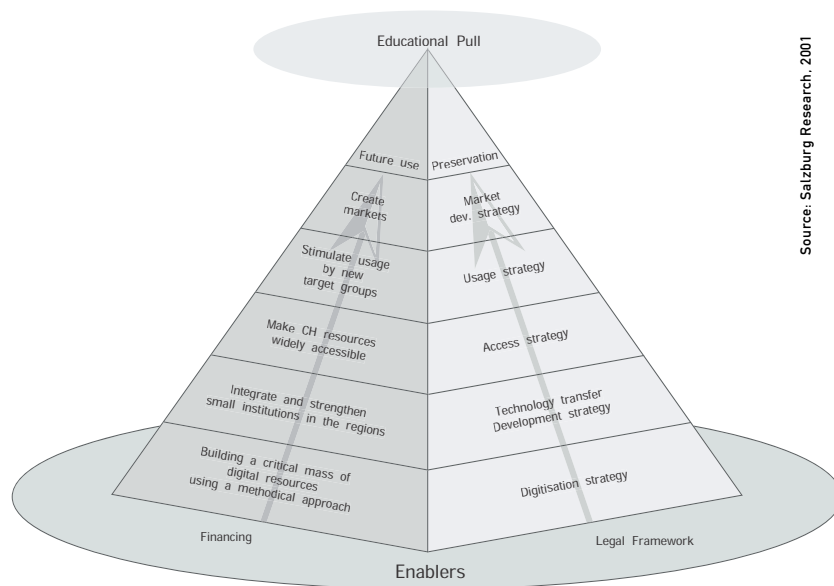
Due to their diverse national administrative structures and funding mechanisms, the European Member States have developed very different approaches to reach these objectives, with varying results. Thus the question remains: What do national governments need to consider when drawing a national cultural heritage policy, and what lessons can be learned from experiences in the European Member States?

The experts participating in the DigiCULT study identified several challenges they think a national cultural heritage policy should address in order to reach national policy objectives. These challenges are:
- the need for a diverse and multilingual approach to cultural heritage;
- the need for a systematic, comprehensive and transparent methodology to digitisation;
- the need to integrate small cultural heritage institutions across the sectors and in the regions;
- the need for low-barrier access;
- the need for an understanding of new target groups and markets;
- the need for a methodology for future use of cultural heritage materials.

Although some Member States address some of the above mentioned challenges very actively and rigorously, the experts participating in the study also sense the need for an over-all vision to function as a "bracket", holding the various strategies together and providing a focus for all national activities and initiatives. Such a vision would be of great importance to cultural heritage institutions, as it would provide a frame of reference also for institutional policies and action. Such a vision:
- (re)defines the mission and core functions of archives, libraries and museums in the emerging Information Society;
- provides the criteria for a focused, goal-oriented and future-oriented digitisation programme for cultural heritage resources;
- establishes the framework for future decisions on cultural organisation;
- and allows for the development of measurable indicators and quality criteria with respect to digitisation practices, methodology and project documentation.

Consequently, there is a vital need for national visions and strategies for ICT implementation and use in the cultural and scientific heritage sectors. Such visions would serve as orientation guides for future development of both, the cultural heritage sector in general and memory organisations in particular.

The following chapter addresses the challenges that have been identified by the DigiCULT experts as important issues to be addressed by every national cultural heritage policy. Ultimately, the goal should be to support actions and measures that aim at sustainability. Only thus can national governments maximise the impact of their investment in the cultural heritage sector.

VI.1   Providing vision: A diverse and multilingual cultural heritage as integrating factor

Culture is – in its broadest sense – a "product" of our everyday life. It is a performance which fades into memory and finally slips away. Consequently, if there are no mechanisms that keep and maintain records of cultural "production", these cultural products are lost. What we have to keep in mind, however, is that there is no cultural heritage per se. What counts and can ultimately survive as cultural heritage is an outcome not of universal ideas and objective criteria, but of selections which are motivated by particular political, social and cultural interests, academic disciplines and professions (e.g. arts & humanities) as well as market mechanisms. These selection criteria decide whether there is "a future for the past" for particular cultural artefacts. (cf. Peacock, 1994)

Yet, in the past decades, the meaning of "culture" has undergone a far-reaching change with the effect that today there is no shared agreement in society that can serve as an authoritative definition of what we mean by cultural heritage. This raises the question: What are we going to maintain as our collective memory for the next generations? – or more importantly: What will be left out from our future cultural heritage?

The changing meanings of culture: Towards a socially integrative cultural heritage policy

As Paul Streeten of Boston University, World Development Institute, describes this "dilemma": "More than thirty years ago ‚culture' stood for the *values* we thought all of humanity shared. Today it has come to mean almost the opposite: what every little group, regional, sexual, ethnic, religious, differentiates from others, asserts its identity. The transition from ‚Culture' to many cultures or from a global culture to many minicultures has meant a change from universal humanity to the diversity of subcultures, every one often highly antagonistic and hostile to others." (Streeten, 2000: p. 42) Streeten points to a clash of cultures within a society, but there are also cultural contradictions in the global perspective. (see: Barber, 1996; Jameson, Miyoshi, 1998; Wilson, Dissanayake, 1996)

Furthermore, the traditional canon of "high" vs. "low" cultural artefacts is questioned. As Daniel Bluestone, Director of the Historic Preservation Program at the University of Virginia, has pointed out: "The preservation and conservation field tends to be imprecise in its arguments because, for a long time, we assumed that there was total agreement on the values and benefits of our work. We adopted a somewhat high-style, canonical approach to cultural benefits. But this sense of a shared appreciation based on art-historical values has fractured in the last fifteen to twenty years." (Bluestone et al, 1998: p. 21)

Of course, the "democratisation" of cultural expression due to the explosion of online publishing will put a heavy burden on memory institutions: "Digital cultural artefacts are not the *property* of cultural elites, for this medium is profoundly democratic – millions of people are creating cultural artefacts in intangible forms, using computers and networks. Neither are they archived by the traditional cultural institutions organised nor funded by cultural elites." (Lyman, Kahle, 1998) In the future, many different "micro-cultures" will demand to be present in society's memory with their own cultural record.

Similarly, as the traditional canon of valuable cultural artefacts and the basic distinction between "high"- vs. "low" culture becomes increasingly blurred, popular, everyday, regional or community-based elements of cultural heritage will become an important part of our future cultural heritage. It also has to be kept in mind that with regards to exploitation collections of popular culture items might be more interesting than high culture resources.

The experts participating in the DigiCULT study identified a clear need for national governments to develop a vision of cultural heritage responding to the need to provide a diverse cultural heritage, and that takes into account both the changing social structures in the Member States and the crumbling dominance of a traditional canon of high vs. low culture. Similar to education, such a broad and open vision of culture could become a driver for social integration by giving room to a diverse, multilingual, in many respects non-traditional cultural heritage that acknowledges the plurality of cultures in our societies.

This implies the need to respond to the fact that nations themselves become increasingly multilingual. In many European countries, there exist more than one official language. In addition, any cultural heritage policy needs to acknowledge the fact, that in the digital era, national governments are no longer acting in isolation, but within a global community. This stresses the need for a multilingual approach in an increasingly global society that regards globalisation not as a threat, but as a chance to communicate one's own national identity.

Clearly, such a vision of an increasingly diverse, plural and multilingual cultural heritage has a direct impact on cultural heritage institutions, i.e. with regard to the selection policy for digitising cultural heritage objects and how these objects are presented. As a result, archives, libraries, museums and other actors in the cultural field have to come to terms with the changing meanings of culture – changes that will undoubtedly have consequences for the general orientation and work of the memory institutions.

The DigiCULT navigator to cultural diversity and multilingualism

Memory institutions largely depend on political frameworks and clearly shaped national cultural policies to realise the full value of (digital) cultural heritage resources. Yet, planning and definition of concrete implementation programmes requires political vision. This vision will set the parameters for possible action as it:

– (re)defines the mission and core functions of memory institutions;
– provides the criteria for selecting and digitising past, present and future cultural heritage resources;
– establishes the framework for future decisions of cultural organisations;
– and, supplies best practice guidelines with respect to digitisation practices, methodology, and project documentation.

However, the DigiCULT study found that such a vision is clearly lacking in many European Member States. It may be the role of the European Commission to help foster this vision.

01 **The European Union and national governments will need to develop a clear vision concerning the future of the cultural heritage sector and its role in society.** This vision should address:

– the role and value of cultural heritage in European society;
– the criteria used for including or excluding resources from future cultural heritage collections, such as issues of social inclusiveness, or the inclusion of new forms of cultural expressions;
– multilingual access as a means to communicate to an increasingly pluralistic society and the global community;
– the changing role, objectives and scope of the activities of cultural heritage institutions,
– and, the position of education as part of cultural policy and as primary pillar within the Information Society.

Such a vision would then form the basis for national governments to support cultural heritage in the future.

VI.2   Methodologies for digitisation

"Policy makers need to understand the relationship between methodology and cherry-picking as general trend: Commercial companies pick what is important to them."

Seamus Ross, HATII, University of Glasgow (DigiCULT ERT, Vienna, June 25-26, 2001)

Which leaves us with the question: Who is taking care of those remaining cultural heritage resources that are ignored by commercial companies because of their inability to promise an immediate profit? In the Information Society, in the long run, only the digital will survive in the memory of a nation as it is more readily available and accessible than analogue cultural heritage resources. This may sound provocative at a time when museums and libraries are still centres of communication, yet there are already examples that prove that usage of resources is directly related to ease of access. For example, it was only around 1961 that flagship world newspapers moved from microfilm storage of back issues to computerised access. As a result, today, searching of back issues rarely delves into the world before 1961. In addition, we are facing changing trends in media consumption especially among the younger generations, that primarily focus on digital media, the Internet and mobile phones as primary information and communication channels.

To deliver to them and following generations the richness of our cultural heritage by building a critical mass of digital resources that reflect the richness, diversity and plurality of a society's memory is one of the primary responsibilities of national governments with regards to cultural heritage. However, governments who want to live up to this claim are not in the position of cherry picking neither can they afford a universal approach to digitise everything. Instead, facing an increasing volume of cultural heritage material that waits to be digitised on the one side, and limited financial and human resources on the other side, they need to be highly selective. Therefore, national governments are challenged to develop a sound methodology with regards to digitisation that offers both transparent criteria for content selection as well as guidelines for memory institutions on how to do it best. Only thus can national governments reach their goal in the most cost-effective and resource-efficient way.

The 5 most fatal digitisation myths*

Digitisation is cheap to do and does not cost a lot.

A whole library can be digitised.

You do it once and that is it.

Digitisation is for preservation.

Digitisation does not need government attention.

(* Statements from experts participating in the DigiCULT study)

Developing methodologies for digitisation

"I could see that unless we started from above discussing what should be digitised - what are the objectives, what are our responsibilities and what are not - then you could spend a lot of money on small projects everywhere and commit the Danish sin, as I call it: a little bit of everything, for everybody, everywhere."

Erland Kolding Nielsen, The Royal Library, DigiCULT Interview, June 28, 2001

At present, European Member States take different approaches towards digitisation, based on their governmental structure and different funding mechanism they apply. Spain, for example, although a federal state implements a central approach to digitisation, with the Ministry of Culture setting the priorities. France takes a similar approach with clear priorities set by the Ministry of Culture as the central authority, and cultural institutions following a strict digitisation policy.

Other national governments in Europe, however, have not yet defined any digitisation policy, and hence decisions on what to digitise are left to the archives, libraries and museums themselves. In those cases, selection criteria for digitisation are not always transparent, which is one reason why digitisation has happened more or less ad hoc and accidentally, without any prior planning or a clear notion of future use. Such an approach bears the high risk of wasting resources as work might be duplicated, or of materials being digitised without complying to any compatible standard. Therefore, national governments should approach digitisation plans in a systematic and methodological manner, and develop sound models and guidelines as well as evaluation criteria to measure the impact of their actions.

Developing models

The experts participating in the DigiCULT study see the task of providing models, guidelines and examples of best practice for digitisation as a primary responsibility for national governments. Developing methodologies and guidelines is necessary to ensure a resource-efficient, comprehensive approach to digitisation offering a mechanism through which informed decisions can be made. Such a methodology should provide a model for setting digitisation priorities based on:

- user-focused selection of material;
- future conservation requirements and preservation needs;
- public access and future use;
- appropriateness of content for digitisation and privileged domains (some collections are not suitable to be digitised);
- the requirement of scalability, to be also an appropriate model for small institutions with less resources.

Of course, these models, guidelines and best practice cases need to be actively promoted and made widely accessible to be adopted and adapted by cultural heritage institutions.

Evaluation criteria for digitisation projects

Yet such models can only be effective if they are supplemented by a set of criteria and mechanisms that allow national governments to measure the success of implemented actions. Therefore, national governments need to define criteria that supplement models and guidelines of best practice to:

- monitor and measure the impact of implemented projects;
- have users evaluate projects (user evaluation strategies);
- evaluate the accessibility of e-content produced;
- monitor the use of suggested standards;
- assure quality.

Depending on the overall objectives of a national cultural heritage policy, such evaluation mechanisms measuring the impact of national action could be further extended to other areas, for instance, to include impact measures for regional development, know-how transfer to small institutions, or any other targets that a national policy might want to achieve.

In many European Member States, such mechanisms supporting a systematic and methodological approach to digitisation are already in place. In France, for example, the national government has clearly defined priorities of what should be digitised first. These priorities are centred around the question of "Why digitise?". When applying for project funds for digitisation, cultural institutions need to provide a business plan that answers the question of why certain materials should be digitised. With regards to developing methodologies for organisations, the French government runs a central help desk to support cultural institutions in developing digitisation policies, and to ensure a methodological approach is followed also at the institutional level. To implement cultural policy on a national level, a common methodology offers a clear advantage.

Spain, on the other hand, has various mechanisms in place to measure the impact of cultural heritage projects. Publicly funded projects are evaluated, if project objectives have been achieved. The Spanish digitisation plan, for example, clearly focuses on future access and use, and funded projects are evaluated, if they have reached their goals in terms of meeting user needs. The *Archivo de Cinde*, a documentary archive in Sevilla consulted mostly by researchers, for example, digitised only 8% of its collection, yet is able to satisfy 60% of the user requests. In the case of the Archivo, former lending statistics of the library helped to reach such a high user rate.

Yet in other countries, such as Denmark, digitisation guidelines that also set clear selection priorities have been developed at institutional level, but are not operational at the national level.

Developing selection criteria for a digitisation policy – The Royal Library, Denmark

Convinced that the approach to digitisation has to be synchronised at the national level to avoid a duplication of effort, Erland Kolding Nielsen, Director General of the Danish Royal Library in Kopenhagen, has drafted guidelines for a national digitisation policy, including selection criteria on what should be digitised.

As a first step, a national digitisation policy needs to justify and make transparent, the reason for digitising analogue resources. Kolding Nielsen identified five criteria to select material for digitisation:

- the use of the documents you want to digitise: the focus is on number of users or number of hits on the web,

– the value of the material, including the share value: "When we bought an unknown manuscript of H.C. Andersen (…) we digitised it very fast because there was such a great public interest in the manuscript and the way we acquired it (...)",
– the research interest of the documents: the focus is on the content,
– the cultural heritage interest: The focus is on the symbolic, historical, political interests in the documents,
– the preservation situation of the individual material: Using digitisation to preserve a particular object that is too fragile to allow direct access to the original.

In addition, there are several other criteria that need to be considered when selecting material for digitisation which are closely related to the question of what constitutes a nation's cultural heritage. Those secondary criteria are:

– Provenance: Should national governments digitise and preserve only the nation's cultural heritage or also resources of foreign provenance? As Kolding Nielsen explains the approach of the Danish Royal Library: "Normally we will answer that we are only responsible for Danish documents. We cannot expect others to digitise those. The Inca Chronicle is an exception because it's a unique document and it is only published on paper, so we have considered it to be a responsibility of the Royal Library towards the world." Otherwise, the definition of what is Danish cultural heritage is based on a historical interpretation and comprises also materials from areas that formerly belonged to Denmark.
– Digitisation at different levels of abstraction: Whether one should digitise the contents alone for instance through OCR-scanning techniques or the object as such, so to give an impression about the look and feel of the original cultural object. The level of abstraction influences the scanning technique.
– Digitisation scope: Do you digitise the whole object or selected parts?
– Description of digitised objects: How or at what level will the scanned material be commented and described (metadata)? Should it be catalogued, should it be described, which indexes are used, how "deeply" should the digitised material be described?

Finally, in addition to those selection criteria, a national policy should also function as a tool for prioritising what should be digitised first. Kolding Nielsen outlined five areas or types of collections and documents, with clear priorities for the different collection types:

– Collections and documents of national provenance should be more important and should come first compared to material of foreign provenance;
– Material for which you could expect a high frequency of use should be given precedence over collections that will be used less;
– Collections or documents which have a high interest of larger target groups should be prioritised over material that only draws a small number of users;
– Collections which could be used for several purposes have to be given precedence over material that can be used only in a narrow context;
– Material within the other four criteria that could be used after being digitised using mass digitisation methods should be given precedence over material that needs to be handled individually.

Based on those criteria and priorities, a sensible national digitisation policy should be outlined.

In Denmark, such a national digitisation policy is now discussed within the Danish library community together with the Board of the National Electronic Library, consisting of representatives from the Ministries of Education, Culture and Research, as well as

representatives from research institutions. Such a national policy, however, is not yet operational, but only exists as a digitisation plan in the Royal Library, which began discussing digitisation criteria in 1998 and which has now created a catalogue of selected material to be digitised as soon as funds become available.

Erland Kolding Nielsen, The Royal Library; DigiCULT Interview, June 28, 2001

As the primary funding bodies, national governments are in a strong position to require cultural institutions to follow particular guidelines. This position should be used to promote as best as possible the use of coherent guidelines and models. Yet, on the other side, this authority, should not be overextended. As Phillippe Avenier, of the French Ministry of Communication and Culture, stresses, the state should not be perceived as an entity that imposes rules on cultural institutions but as someone to offer help to cultural institutions with regards to defining their missions, long-term action, and requirement specifications. (DigiCULT ERT, Vienna, June 25-26, 2001)

A co-ordinated approach to digitisation: The Lund Principles[3]

A methodological and systematic approach to the creation of a critical mass of digital cultural heritage resources also requires national governments to co-ordinate and synchronise initiatives and projects that are already operative. Otherwise, resources will be wasted due to the duplication of work or to a lack of understanding of how digitised resources will be used in the future. The Belgian experience serves as a good example to demonstrate the need to co-ordinate digitisation programmes regionally as well as across sectors.

EXAMPLE

Overcoming language community and regional barriers – the Belgian experience

Cultural policy in Belgium relies on a decentralised model where the responsibility for culture and art is split between the three language communities, the Flemish, the French and the German speaking community. While some matters such as the arts, letters and the audio-visual production are community matters, others such as monuments for example are within the responsibility of the three regions the Flemish, the Wallonien and Brussels-Capital. This federal approach that distinguishes between the language communities on the one side, and the various regions on the other side, poses an essential barrier to a co-ordinated approach to cultural heritage and digitisation programmes. Thus, any initiative which has bearings on the other domains raises competence issues between the different communities and regions. Taking into account that certain matters are within federal responsibility, e.g. the museum for fine arts, the Cinémathèque Royale, etc., this scenario and the chance for a more effective implementation of policies becomes even more complex.

So far, any attempts to gain an overview and draw a complete picture on Belgian initiatives and policies in the area of cultural heritage, have been extremely difficult because of the lack of co-operation between the regions and the language communities. In 1999, the Royal Institute of the Artistic Heritage (IRPA), launched a similar study, yet found it problematical to obtain answers, even more so as the study contained questions related to budget issues.

The requirement to conduct a survey on national digitisation policies within the framework of the eEurope initiative so as to allow benchmarking between the Member States, has again caused severe difficulties. Initiated by the French community, today there is a collaboration process on its way to bring together experts from the different communities and regions, and to conduct a survey that will form the basis for an inventory of digitisation policies and related Internet activities in Belgium. Nevertheless, without ongoing co-operation, it remains difficult to draw a complete picture of all initiatives within the Belgian cultural heritage sector.

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[3] The Lund Principles: Conclusions of the expert meeting, Lund, Sweden, April 4, 2001. The initiative to create a coordination mechanism for digitisation programmes feed into the eEurope Action Plan, and is directly related to Objective 3(d) of the Action Plan, to stimulate European content in global networks.

As a result, the situation in Belgium concerning cultural heritage policy can be compared to the "chicken-and-egg-principle". On the one hand, the lack of reliable data on the status quo of digitisation policies and initiatives at the various levels makes it difficult for the Belgian government to draft and implement a balanced and well-structured policy for digitising cultural heritage resources. On the other hand, while there is the wish on the part of cultural institutions and some parts of the administration to digitise their collections, there are also complaints about lacking the resources and the qualified experts to do so.

However, the situation may change in the future as the need to co-operate more closely for the benefits of all has been realised and born fruit in projects that bring the various players closer together. For example, the Ministry of Culture for the French Community has recently signed an agreement with the Association Musées et Societé in Wallonia for a project which aims to put the collections of all the museums of the French community on the Internet by the year 2004.

Philippe Allard, Consultant to the Belgian Ministry of Culture,
DigiCULT ERT, Vienna, June 25-26, 2001

At the national level, co-ordination of digitisation programmes could be facilitated in various ways, for example through central national help desks, as practices in France, or organised decentralised, through cultural heritage competence and research centres or centres of excellence that are located within traditional institutions. Providing the necessary information on projects and ongoing initiatives should be part of the funding requirements of projects, and could be solved by using new technologies to accumulate information in a central national repository. Again, France already has such a database in place where information about digitised collections is stored to avoid duplicating the effort.

However, in the age of digital global networks, the need for a co-ordinated approach to digitisation is not restricted to the national level, but crosses national boundaries.

Realising, that the promise and potential – economic, social and cultural - of digital heritage resources is being threatened by the fragmentation of current digitisation initiatives and by a lack of synergies, a group of representatives of the cultural Ministries of the various Member States and other cultural decision makers are currently discussing the possibility of establishing a pan-European co-ordination mechanism. Known as the *Lund Principles,* the group has published a set of recommendations to be implemented throughout the Member States in the coming year in order to effectively address current barriers limiting the delivery of e-contents over global networks.

These barriers are related to:
- highly fragmented digitisation programmes,
- inappropriate technologies and standards,
- the lack of simple, common forms of access for citizens,
- the unclear intellectual property rights situation, as well as
- the lack of synergies between cultural and new technology programmes.

Therefore, national governments should commit to:
- creating an *ongoing forum for co-ordination* with one representative of each member state to develop a framework for ongoing discussions and exchanges, as well as foster the communication from member-state level to the European level and vice versa,
- supporting and developing a European view of policies and programmes by establishing *web sites* with current, publicly accessible and easily understandable information on the various governments' policies and programmes; these web sites

should be accessible through a central portal,
– promoting and supporting good practice as well as its harmonisation and optimisation within Member States and across the EU by establishing a qualitative and quantitative benchmarking framework,
– accelerating take-up of good practice and of appropriate skills,
– making European cultural and scientific content visible and accessible by setting up national inventories of projects or selected contents.

The Lund principles, and the request that Member States establish appropriate mechanisms for a regular information exchange with bodies at the European level, could be a first step in creation of a cultural heritage information-exchange infrastructure that would encompass both the European and national levels, and for the benefit of all communities interested in cultural heritage.

Creating a cultural heritage information interface
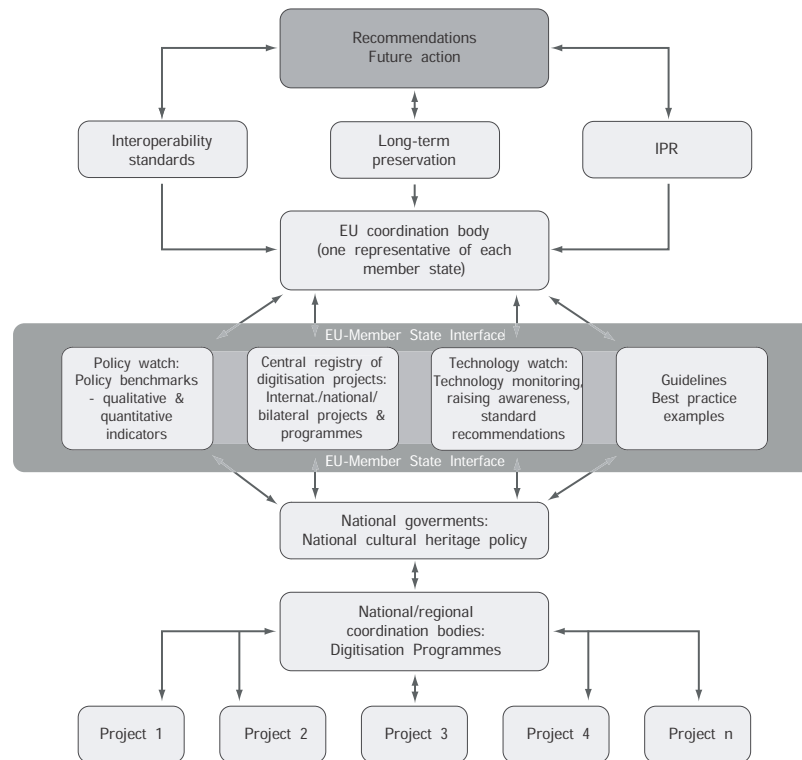
Source: Salzburg Research, 2001

Such a central information exchange infrastructure could be organised as distributed services, thus serving both EU decision makers as well as national cultural heritage decision makers. On the one hand, national governments would report to this cultural heritage information infrastructure all information on current and planned digitisation programmes that has been collected either at the regional level, through regional support centres, or through a central national body responsible for co-ordinating national digitisation programmes. This input could be technological in nature and also involve examples of best practice that have been evaluated according to agreed-upon quality criteria. This nationally

collected information could then be used to discuss those issues that demand a co-ordinated approach across all Member States, such as intellectual property rights or interoperability issues. This kind of work would be co-ordinated by a central European body consisting of cultural heritage representatives of all Member States.

Therefore, the European Commission as well as the Member States should actively create a cultural heritage information exchange infrastructure to facilitate communication in both directions, from the regional level to the national and international levels, and downwards, from the EU-level, to national and regional co-ordination bodies.

The DigiCULT navigator to a methodological approach to digitisation

In the Information Society, in the long run, only the digital will survive in the memory of a nation as it is more readily available and accessible than analogue cultural heritage resources. Therefore, creating digital material and e-content to be delivered over global networks is a primary responsibility for national governments. Yet, the increasing volume of cultural heritage material on the one side, and the limited financial and human resources on the other, demand that a highly selective approach be taken in digitising cultural heritage material.

To use the limited resources most effectively, national governments are challenged to develop sound models and guidelines to ensure a comprehensive and systematic approach to releasing the value of (digital) cultural heritage resources. Providing such models, guidelines and examples of best practice as basic decision-making tools for cultural heritage institutions is the prime responsibility of national governments. National governments, as the primary financiers of cultural heritage institutions, are in a key position to significantly influence the quality of the projects intended to increase the value of cultural heritage resources.

Creating a critical mass of digital cultural heritage contents demands a co-ordinated approach to avoid wasting resources. Such co-ordination mechanisms are currently established as part of the *e*Europe initiative. In April 2001, Member State representatives agreed to co-ordinate national digitisation policies to avoid a duplication of effort, known as the "Lund principles". Nevertheless, it will take the mutual effort of European, national and regional authorities to guarantee an effective information exchange bottom-up, from the regional to the national and European levels and top-down, from the European bodies to the national and regional levels.

However, all national governments are not equally endowed with financial resources to support methodology development and to provide guidelines. It therefore falls to the responsibility of the European Commission to ensure that there is adequate information available for use on a country by country basis.

02   **The European Commission should fund a study of best practice information on digitisation and ensure that this is readily available to ALMs Europe-wide.**

03   **National governments and regional authorities should use their position as primary financiers to encourage best practice in cultural heritage institutions. They should strive for the highest quality to be delivered by projects.**
To do so, national governments should consider the following strategies:
- support the development and publishing of methodologies as a basis for institutional digitisation policies,
- publish and demand compliance with technical and quality standards and guidelines, evaluate cultural heritage institutions on the basis of their adherence to these best practice guidelines,

– issue criteria and measure impact and quality of digitisation projects,

– issue certifications to cultural heritage projects that follow or employ best practice guidelines and fulfil certain quality criteria,

– and, finally, mark institutions with a quality seal on national cultural portals.

04 **National governments and regional authorities should build on ongoing co-ordination initiatives for digitisation programmes. They should support the establishment of an information exchange infrastructure or interface that connects top-down initiatives vertically with regional initiatives, but also horizontally, with other Member States.**

VI.3   Know-how transfer and collaboration: Strengthening regions and small institutions

"Make funders understand that you get double benefit from recognising the synergy and substantial degree of overlap between the need of institutions to manage their collections effectively and the need they have to make them accessible."

Seamus Ross, HATII, University of Glasgow, DigiCULT ERT, Vienna, June 25-26, 2001

An estimated 95% of all cultural heritage institutions in Europe are not in the position to participate in any kind of digital cultural heritage venture. They not only lack the financial resources to participate, but also have a shortage of staff, essential skills, and the necessary technologies. Facing this situation, a comprehensive cultural heritage policy that claims to provide cultural heritage for all would need to address the issue of how to strengthen small heritage institutions and regions who play an important role on the local level as they are the holders of materials that is valuable to the community.

Lacking staff, lacking skills, lacking training

On the one side, there is a challenge for policy makers to invest in the technological infrastructure of small ALMs, yet, on the other side, and regarded even more important by the experts participating in the DigiCULT study, it demands to invest in people and their skills. As Mark Jones, Director of the Victoria and Albert Museum, UK, stressed: "Funding should focus on building capacity. The biggest impediment in this area is the lack of capacity in the sector. Project funding on its own does not necessarily achieve the results advertised if you do not have the core capacity in your organisation. [Cultural heritage institutions] will not be able to apply for the money in first place or delivering effectively in the second place." And he concludes: "The consistent failure of organisations (…) to take full advantage, is not because people are lazy or bad but because they simply have neither the time nor energy to chase down another source of funding for a project that will be additional to what they are doing anyway (…)". (DigiCULT Interview, August 9, 2001)

To the experts, the lack of staff in small cultural heritage institutions is the most important factor that hampers small organisations to participate in the Information Society. Hence, they advise national governments to invest in raising the capacity of institutions by increasing the number of staff. National governments should invest in people, and not in projects.

In addition, in the second step that is needed is staff training that allows them to also handle new technologies. There is urgent need for modern training programmes in ALM institutions that respond to the lacking ICT skills among the staff of cultural heritage institutions. To this purpose, the DigiCULT experts suggested setting up regional information centres or centres of excellence that would help small organisations develop the basic skills needed to participate in the digital age. National as well as regional governments would need to make sure that these information service centres would owe the authority by granting them the status of an official and "trusted" resource. Running these centres should be a pronounced responsibility in each member state, and the implementation of this policy should also be validated. As explained in more detail in the Chapter Technology, these centres would provide training in areas such as project management, digitisation, life cycle management of digital resources, and other technology issues.

Strengthening regions

The DigiCULT study found that there is a changing trend from a centralised to a decentralised approach, with regions becoming more actively involved in cultural heritage projects. ALM institutions are developing a vast array of digitisation projects, all regionally defined and sometimes in concert with local authorities. This is in the context of local and regional heritage, as well as educational and tourist development plans. The central cultural authorities more often focus on providing support services and technical advice on these projects. As well, central cultural authorities attempt to define standards so that there is interoperability between projects for ease of access.

Both in Europe and in North America we can see that there is a trend towards a decentralised model with a common methodology for digitisation, but with the initiative in the cultural heritage inventory coming from regions and local authorities. The central (among others) becomes the arbitrator or reference point on the actions of the regions and local authorities. However, due to economies of scale, there is a tendency for centralised housing of digital collections from the regions.

With regards to strengthening regions, the experts participating in the DigiCULT study identified urgent need to stimulate co-operation between cultural heritage institutions, and encourage projects where small institutions could piggy-back with experienced cultural organisations in common projects to foster knowledge transfer. National governments should actively foster these kinds of (cross-sector) collaboration by making co-operation a funding requirement for projects. In addition, project success could also be measured in terms of successful knowledge transfer between participating institutions. This issue of building the "co-operation capital" within small institutions is described in more detail in the Chapter 7, Organisational Change.

The DigiCULT navigator to a participatory heritage

With up to 95 percent of European cultural heritage institutions being small entities, valorisation and exploitation by means of information technologies also means enabling these institutions to participate by setting up supportive organisations and virtual infrastructures (e.g. networks, platforms, and more advanced environments). Both in Europe and in North America we can see that there is a trend towards a decentralised model with a common methodology for digitisation, but with the initiative in the cultural heritage inventory coming from regions and local authorities. It can be expected that the success of this model will become increasingly evident. More and more European countries will see that the way to unlock the value of cultural heritage is to expand the number of digitised collections and providing for their access and to support small cultural heritage institutions by providing centralised centres of expertise.

It can also be expected that central governments will increasingly focus on providing new and established centres of expertise, advice and assistance as well as standards information and ensuring the wide access and use of this information. These organisations and infrastructures would primarily fulfil two functions: On the one hand, they serve as information transfer centres that provide training and further support small institutions with developing the skills of their staff. On the other hand, such infrastructures would allow small institutions to become more visible in the information society and "market" their activities, collections, services and products.

05 **The European Commission as well as national and regional authorities should ensure that in all e-culture initiatives small cultural heritage institutions can participate and make full use of the opportunities provided by the new technologies.**

06 **National governments and regional authorities should develop mechanisms that allow small and under-resourced memory institutions to participate.**
This includes:
- investing in the capacity of institutions by raising the number of staff,
- ensuring the availability and take up of an appropriate range of possibilities for professional, and continuing education as well as training in the cultural heritage sector,
- providing easy access to best practice examples, methodologies and guidelines,
- establishing a support infrastructure in the form of cultural Research & Development centres, (virtual) information service centres or specialised centres of excellence to foster know-how transfer.

07 **National governments and regional authorities should further support initiatives to make small cultural heritage institutions and regions more visible.**
This includes:
- setting up online networks and platforms where small cultural heritage institutions become more visible and market their activities, collections, services and products in co-operation with cultural tourism agencies and educational institutions,
- getting small institutions on board of larger projects and initiatives.

08 **The European Commission should carry out an in-depth analysis and monitoring of the development of different strategies for digital cultural heritage in the European Member States. For reasons of synergy, the knowledge gained should be brought to the notice of the Ministries of Culture and the cultural heritage institutions of Member States.**
The analysis should focus on the effectiveness of centralised vs. decentralised models to assess their applicability to nation states with differing political frameworks.

VI.4   Cultural heritage for all:
Low-barrier access to cultural heritage

An open and integrative approach to cultural heritage not only demands that a multitude of cultures should be represented in a nation's cultural memory, but equally important, it highlights the need to provide easy and affordable access to the cultural heritage resources. Therefore, an effective cultural heritage policy needs to address the various aspects that determine ease of access to cultural heritage resources, including cost of access, the technical barriers but also the intellectual and physical impediments that may prevent citizens from accessing digital cultural heritage resources. These aspects partly interlock with challenges of a larger Information Society policy.

No cost/low cost access to digital cultural heritage resources

Providing access and keeping cultural heritage resources accessible is first and foremost a political matter as it demands a clear commitment from national governments to make sure that *all* citizens can have access to cultural heritage resources. This implies making sure that access to cultural heritage resources is, if not free of charge, so at least affordable.

In most European Member States, the notion prevails, that citizens should have free access to public cultural heritage resources. Especially the Scandinavian countries hold a strong opinion that access to information and resources in the custody of public cultural institutions should be free of charge. This notion is anchored in a philosophy of enlighten-ment and the fundamental principle that access to information is the basis for a free and democratic society. For many cultural heritage institutions this has been the guiding principle so far, yet it implies that if it is not the users who pay, a third party needs to carry the cost. Recently, however, in the emerging digital cultural economy, national governments seem to be putting increasing pressure on cultural heritage institutions to charge for cultural services. Of course, this creates a conflict between a vision of free access for all and the desire to recover at least some of the money that has been invested.

Experience from the museum world shows, for example, that charge fees is one of the best ways to shut out citizens. As Oliver Watson, Victoria and Albert Museum, London, UK, knows from experience: "We were an institution that granted free access completely. Now, we have the experience that putting up charges at the door, our visitor figures dropped dramatically. [Yet,] even at the best that raises something like 5% of your running costs per year." (DigiCULT ERT, Edinburgh, July 24, 2001) For a museum, whose budget in most cases is closely tied to the number of visitors that come through the door, such a drop in visitor figures can be detrimental.

On the contrary, there are even examples where national governments seriously discuss options to extend the idea of providing universal services for all citizens to the Internet. At present, the Danish government is discussing a cultural service on the Internet to become a universal public service with the same status as public broadcasting." It is highly important to draw a clear line between what should be available as public service and what not. In Denmark, for the time being, the entire public service concept is being discussed in the sense of how a public service can be managed on the Internet", explains Pia Vigh, Manager of KulturNet Denmark. (DigiCULT ERT, Edinburgh, July 24, 2001) Obviously, the Danish Ministry of Culture considers the Internet a public medium that is as important as television or radio, and a cultural service on the Internet being of similar importance to broadcasting to be worth public funding.

Thus, national governments are facing the challenge to find the right balance between cultural services being charged for and those being offered free.

Lowering the technical barriers to providing access

Besides access costs, a national cultural heritage policy also needs to address the technical challenges that currently hamper access to cultural heritage resources. On the one side, this implies the availability of affordable, high-speed Internet access for all citizens, on the other hand, it addresses the technical issues of providing access to digital resources via networks which is primarily a question of convergence and interoperability.

Cheaper and faster Internet access even to the smallest village is the first objective of the *e*Europe Action Plan which was launched in December 1999 by the European Commission and agreed by the Heads of State and Government in Feira in June 2000. With the ratification of the action plan, the European Member States committed themselves to realise the objectives of faster and cheaper Internet access by implementing new tariff models and lowering the price for high-speed multimedia Internet access made available by new technologies such as xDSL, cable, optical fibre and digital TV, and next generation mobile. In addition, national governments are also obliged to make the up-take of new technologies a key element in regional development agendas, to help provide the necessary infrastructure to make high-speed Internet available also in less favoured regions where private investment alone cannot be profitable. Through the *e*Europe initiative, creating cheaper and faster Internet access is well on its way in all EU Member States. (see *e*Europe Initiative: Council of Europe, Commission of European Communities, 2000)

The second technological barrier that currently hampers access to digital cultural heritage resources are related to difficulties users encounter when they try to search cultural heritage databases almost seamlessly, across institutional and sector boundaries. The primary issues with seamless access are closely related to the need to agree and use commonly shared metadata standards for object description, and, as standards are products of consensus, the collaborative process to reach such an agreement. These issues and the recommendations that also demand action from national governments are described in more detail in Chapter 9, "Technologies for tomorrow's digital cultural heritage".

Equal access to cultural heritage resources

As David Dawson, Senior ICT Advisor at Resource, the British council for museums, archives and libraries remarked, a national cultural heritage policy that propagates access for all also needs to take active steps to include visually impaired or otherwise disable persons.

Again, there is a connection with the *e*Europe initiative, that expects national governments to draft policies to avoid "info-exclusion" of people who need special attention due to some disability. Similar to providing special constructions for disabled people to enter public buildings, national governments need to take precaution that disabled people are not excluded from the information society as more and more public sector information becomes available online and in the future, many services will exclusively be delivered via the Internet. As stated in the *e*Europe Action Plan: "Public sector web sites and their content in Member States and in the European Institutions must be designed to be accessible to ensure that citizens with disabilities can access information (...)." (Council of the European Union, Commission of the European Communities, 2000)

Of course, this remains also true for cultural heritage information offered over computer networks, which should comply to "Design for all" standards for accessibility as currently developed within the *e*Europe initiative.

Providing access: Culture portals and gateways

Within the last years, many European Member States have developed different approaches to enable citizens to gain access to cultural heritage resources using ICT, with greatly varying results. Depending on the approach, government commitment reaches from setting up physical central access within existing traditional institutions to establishing new access points, often only in the virtual realm, that offer new services online. One example is Espaces culture multimédia (ECM), a French initiative that helps citizens to both receive training in using ICT and gain easier access to cultural heritage resources by setting up physical access points in regional cultural heritage institutions.

EXAMPLE

Espaces culture multimédia (ECM)

Since 1998, the Ministère de la Culture et de la Communication has developed the programme "Espaces Culture Multimédia" (ECM), which aims at making cultural and social institutions into access points for online multimedia resources for the broad public. The programme is executed jointly with the Délégation au Développement á l'Action Territoriale (DDAT) and the Directions Régionales des Affaires Culturelle (DRAC), and, with respect to the libraries, in cooperation with the Direction du Livre et de la Lecture (DLL).

The programme "Espaces Culture Multimédia" addresses the issue of the "digital divide" within society, and includes activities of awareness raising, basic training in the use of computers, the Internet and multimedia, and projects which foster the broad use of the new technologies.

Furthermore, the Ministry of Culture supports the artistic dimension of the new media and the set up of centres of excellence in this field which also serve as providers of cultural content for the Internet. Therefore, the ECM are not only public access points for online multimedia resources but also centres where new cultural forms and practices are developed and experimented with.

The funding of ECM can be up to 50 percent of the total costs, but not more than 200.000 Francs annually. As of 2001, more than 130 "Espaces culture multimédia" have been established throughout France, including for example 52 libraries, 29 cultural centres of cities, 12 cinemas and audiovisual centres, or 9 art centres and schools. The broad range of institutions involved supports inter- and multi-disciplinary approaches and exchanges. In 2001, the number of ECM will expand and give priority to the areas of professional training and production of cultural multimedia resources. The ministry also has invited the local governments to make the public access to the Internet via the libraries one of their priorities for the period until 2003.

The evaluation of the ECM programme includes seven thematic studies which include many illustrative examples as for example "Partenaires institutionnels et usages collectifs" (12/1999) and "Ateliers de création et de pratiques artistiques" (05/2000).

The seven studies are available at:

<http://asp.medias-cite.org/2000/acces_public_general/culture/ecm_lieux.html>

Source: Ministère de la Culture et de la Communication, 2001

Another commonly used strategy to join up cultural resources at a national level is to build portals or common gateways to provide a single point of access to digital cultural heritage resources. There is a range of examples throughout Europe for these kinds of central access points, yet these national initiatives vary considerably with regard to the scope and depth of information that is offered. Publicly supported single points of access differ with regards to:

- scope of service: from a simple link list to "one-stop-shops" for visitors that integrate a whole range of services along the content delivery value chain,
- depth of content: from information about resources (discovery service) to access to actual objects (e.g. picture repositories or central databases to host digital collections) or tailored, "pre-packaged" content for particular target groups,
- focus of content: broad coverage of themes to thematically focused access points,
- geographic reach: national portals as well as region or local portals,
- objectives: supporting existing traditional cultural services to building new services,
- economic orientation: commercial or non-commercial service (universal access, free of charge).

Cultural Gateway	Cultural Network
Defintion	
– a centrally co-ordinated web-portal which offers access to accredited web sites with limited original content	– a centrally co-ordinated network of digitised resources collated from a number of participating organisations all directly accessible through the central point
Function	
– to provide access to cultural heritage through a number of online services: calendar of events, extensive database linking to other cultural web sites, etc – to facilitate implementation of digitisation initiatives of other cultural institutions – not responsible for digitising	– access to cultural heritage – responsible for collating and digitising
User	
– aimed more widely at the general user	– primary aim is educational or other target groups
Costs	
– less resources intensive	– costs of creating and maintaining extremely high
Finances	
– state funded	– towards self-sufficiency; existing exploitation models, extends its userbase beyond cultural and educational institutions
Access to Content	
– free of charge	– not free of charge
Content	
– not under one interface; limited original content: users have to leave gateway and enter the homepage of a particular cultural institution to access cultural contents	– under one interface: users do not need to leave the network to access original content
Content	
– Various CultureNets, Australian Cultural Network, CHIN	– SCRAN, AMICO

Addressing the different levels of scale, complexity, sophistication and objectives, QUEST distinguishes between cultural gateways and cultural networks (QUEST, 2000: p. 33):

– Cultural gateways are defined as "centrally co-ordinated web-based gateways which offer access to accredited web sites with limited original content or other resources available at the gateway site. One example for a cultural gateway is KulturNet Denmark, which serves as a case study later in this chapter.

– Cultural networks, on the other hand, are "centrally co-ordinated networks of digitised resources collated from a number of participating organisations all directly accessible through the central portal. It allows 'deep linkage' and searching across a number of sites."

The main difference between the gateways and networks, is on the side, the resources necessary to set up and maintain those services, and on the other side, the level of complexity. While cultural gateways can be set up and run with relatively little investment, cultural networks are fully integrated services that initially demand large investments to build up a critical mass of digital material to be offered on the network. The following figure provides an overview of the different models of national access points to culture and gives examples for each model.

Access Points to Cultural Heritage

Examples

Level of complexity		Examples
high	**High Level Comlexity Cultural Networks** — Are centrally co-ordinated "networks" of digitised cultural artefacts, collated from a number of participating organisations, all directly accessible. Provide "deep linkage" and e-learning facilities.	Scottish Cultural Resources Network (SCRAN) *www.scran.ac.at*
	Medium Level Complexity Cultural Networks — Offer a significant amount of cultural content that is not fully integrated in the portal, i.e. at a certain level users need to leave it and access the website of the content owner.	Picture Australia *www.pictureaustralia.org*
	Low-Medium Level Complexity Cultural Networks — Offer a central access point to a selection of institutional websites as well as own content and features: news, articles, bulletin board, discussion groups etc. Do not offer cultural heritage resources (e.g. digital images) but refer to it.	CultureNet Norway *http://www.culturenet.no* 24Hour Museum, UK *www.24hourmuseum.org.uk* L'Internet Culturel, France *www.portail.culture.fr*
low	**Low Level Complexity Cultural Networks** — Serve as central access points to a selection of institutional website, i.e. provide a search engine or link lists and serve as jump-page. Offer no or only very limited own content.	Austrianmuseums.net *www.austrianmuseums.net* CultureNet Canada *www.culturenet.ca*

Source: Salzburg Research, 2001

In the future, these cultural networks and portals will be of growing importance to provide low-cost access to cultural heritage resources for citizens. However, the demands of the users will increase too, and hence, these central gateways for culture will feel increasing pressure from users to provide more and more sophisticated services on their sites. A link list alone is the best way to create a portal that will soon be abandoned. As will be mentioned in the Chapter 9, "Technology for tomorrow's digital cultural heritage", there is a great need to offer personalised and highly interactive cultural services that allow citizens to contribute their own story to the cultural memory, which is in line with a vision for a diverse, multicultural and multilingual cultural heritage vision.

The DigiCULT navigator to low-barrier access to cultural heritage

To realise an Information Society for all, digital cultural heritage resources need to be easily available and accessible for all citizens. Therefore, an effective cultural heritage policy needs to address the various aspects that determine easy access to cultural heritage resources, including:
- cost of access,
- the technical barriers,
- intellectual and physical impediments that may prevent citizens to access digital cultural heritage resources.

Although most Member States advocate the view that access to cultural heritage resources should be free of charge, there seems to be an increasing pressure from national governments to charge for cultural heritage resources. Such a trend needs to be evaluated carefully, as it is a fact that, with increasing costs to receive access, the number of users drops, while there is marginal return for the institutions. On the other side, there are also examples in Europe where national governments consider offering access to cultural heritage resources over the Internet as a universal service, along the lines of public service broadcasting.

Whatever model national governments select, they need to find the right balance between fee-based cultural services and free services.

09 **National governments and regional authorities should create favourable conditions that allow all citizens to gain access to digital cultural heritage resources.**
This implies to:
- ensure that the access to resources of general public interest is free of charge,
- develop criteria to make transparent why specialised services must be charged for,
- lower the technological barriers by offering cheap and fast Internet access for all,
- foster equal access by developing and publishing guidelines for creating digital cultural heritage resources for the visually impaired and persons with other disabilities,
- create central, low-barrier access points to cultural heritage,
- co-operate and enter into partnership with other Member States to establish a network of national access points to culture.

VI.5   Case Study: KulturNet Denmark –
Online culture as public service obligation[4]

Initiated by the Danish Ministry of Culture, KulturNet Denmark (KND) is a portal to Danish culture on the Internet that has become a role model for similar national initiatives in all the Nordic European countries. Through the KulturNet Denmark gateway, citizens have access to the 74 public cultural institutions of Denmark and their collections that are administered by the Ministry of Culture.

History

KulturNet Denmark was started in 1995 as an initiative of the Danish Ministry of Culture as one of the priorities in the government's IT Political Action Plan, "From Vision to Action – Info-Society 2000". The action plan paved the way for a Cultural Network Denmark for pilot projects to provide Danish citizens online access to the holdings of Danish public libraries, museums and archives.

"The presentation of culture *by electronic means* is aimed at supplementing and increasing the communication of cultural experience and cultural knowledge. All cultural institutions should gradually become participants in an *interconnected cultural electronic network* offering the citizen electronic access to electronic cultural services." (The Ministry of Research and Information Technology, 1995)

The focus of this Cultural Network Denmark was always to serve the citizens, stipulating that the role of cultural institutions is that of intermediaries that, in the information age, should help the public to navigate through the increasing flood of information. Already then, the Danish Ministry of Culture set up a committee to review the future tasks and conditions of public libraries as primary access providers to information, and especially to examine urgent issues on copyright and a legal deposit for electronic publications.

In 1996, in the updated Action Plan entitled "Info-Society for all - the Danish model", the Danish cultural Ministry re-confirmed the initial plan to build a Cultural Network Denmark, and in contrary to the first plan, already put forward a rough concept for a "KulturNet Danmark" and specifies the goals of this national initiative, "to broaden information efforts between institutions in the field of culture and to simplify access to cultural information for the individual and for other institutes, through the application of the potential of infotech". The overall objective was to reach a wider circle of institutions and individuals by overcoming geographical and time limitations by electronic means. (cf. The Ministry of Research and Information Technology, 1996)

By the end of 1996, the plan financed eight pilot projects promoting and expanding the diverse cultural-historical information available on the Internet. The pilots included:
  – historical cultural periodicals,
  – historical sound recordings,
  – sheet music,
  – genealogy "from the living room",
  – cultural-historical registries in museums,
  – the Danish Art index,
  – architectural images, and
  – historic film.

Based on these action plans, KulturNet Denmark was launched as a pilot project in 1997.

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[4] Information for this case study was derived from the following resources: the KultureNet Denmark web site: http://www.kulturnet.dk; Interview with Pia Vigh, Manager, KulturNet Denmark on July 24, 2001, Edinburgh, UK. Digicult Online Delphi Survey, July 22, 2001

Aims and Visions

"CultureNet Denmark will provide Danish citizens who are interested in culture with integrated Internet access to the official Danish cultural collections. In addition, CultureNet Denmark will also provide access to user-friendly information about current and forth-coming cultural events, as well as the activities of the official Danish cultural institutions. CultureNet Denmark will also contain references to cultural activities that are external to the official cultural institutions.

The use of CultureNet Denmark will be free of charge.

CultureNet Denmark is based on a collaboration between the cultural institutions under the Ministry of Culture. The individual institutions are responsible for their own contributions in accordance with the general guidelines for CultureNet Denmark." (KulturNet Denmark web site)

KulturNet Denmark serves as the public front end of a public service obligation defined by the Ministry of Culture. This public service obligation obliges the Danish cultural heritage sector to not only archive cultural heritage resources but to digitise, make available to the public and communicate cultural content over the Internet, free of charge.

The KulturNet Model

KulturNet Denmark stands as an example of a whole range of initiatives within the cultural sectors to link up online resources by developing both the necessary infrastructure and content based around the concept of developing a central "portal" to cultural resources online.

There are two basic portal models that vary in scale as well as objectives:

– "Cultural Gateways" are centrally co-ordinated web-based gateways which offer access to accredited web sites, with limited original content or other resources available at the gateway site.

– "Cultural Networks" are also centrally co-ordinated networks of digitised resources collated from a number of participating organisations all directly accessible through the central portal. The portal owner manages the digital resources and enables searching across a number of sites. (cf. QUEST, 2000: p. 33)

KulturNet Denmark falls under the first category of portals that serve as central access point to the cultural institutions that are under the auspices of the Danish Ministry of Culture. KulturNet Denmark is based on a very decentralised model, and informal working relationship between the KulturNet Secretariat and the member organisations.

As such, the member institutions of KulturNet are responsible for their own contributions, in accordance with general guidelines. One of the advantages of a decentralised model is that the member institutions still remain autonomous, yet if particular objectives such as cross-sector search are to be realised, such a decentralised model may act as an obstacle. Yet, in Denmark the model has proven successful as – given the rather limited financial resources available – it provides the flexibility necessary to grow the network.

Organisational structure

The organisational structure of KulturNet Denmark is threefold and consists of the Ministry of Culture, as strategic body, the Steering Committee, as consulting body and the KulturNet Secretariat, as administrative body. The strategic decision making is done by the Ministry of Culture with the advise of a Steering Committee.

The KulturNet Secretariat is the operative branch and manages the gateway to Danish culture on a day to day basis, and also maintains contact with citizens and the member

institutions. It is responsible for disseminating information and contacts, catalysing innovative cultural information technology projects, arranging courses and conferences, editing some parts of the portal, initiating new cultural services on the Internet, and co-operating nationally and internationally with similar activities.

Although the Secretariat does not have a direct decision making power with regard to the overall strategy, it has the standing to also advice directly with the Ministry and by-pass the Steering Committee. Suggestions from the Secretariat might be directly taken up, or discussed further with the Steering Committee. The KulturNet Secretariat also consults the Ministry of Culture on other culture-related issues that indirectly relate to the network, or is appointed into special committees for its expertise. Thus, the Secretariat also functions as quasi-expert panel and resource centre for the Ministry in many different ways. Although there is not official status, it is nevertheless a very pragmatic way of using the knowledge and expertise available through the Secretariat.

The Steering Committee advises the Ministry of Culture on the future development and operation of KulturNet Denmark, and currently consists of nine experts not only from the cultural heritage field, but also from other cultural sectors.

ON THE RECORD

KulturNet Denmark facts

Founded in 1996.

Permanent staff: four full time, three part time employees.

Annual budget: 3 Mio.

KulturNet Server: hosted by Royal Library, National Library of Denmark.

KulturNet – a strong metaphor to push the basic idea

Undoubtedly, one of the strongest points of the initiative has been the creation of a powerful metaphor that – as almost self-explaining – is able to simultaneously convey the basic idea and that would allow the participating organisations as well as the visitors of the KulturNet portal to develop a sense of belonging to a network of common interest. The KulturNet-metaphor is so successful, that in the meantime it has become the signature for a range of similar initiatives especially in the Nordic countries. The KulturNet-metaphor was readily adopted by Sweden, Norway, the Netherlands, and Finland, and although the underlying concepts and models have been further developed and modified to fit the needs of specific cultural policies, the metaphor has become a sort of brand name for national initiatives that aim at bringing cultural heritage institutions and their holdings to public attention. This is also an advantage when it comes brand recognition and audience loyalty.

The metaphor also makes it easier to seek out the areas of similarities to enable co-operation, and even, to realise the vision of a European cultural server. Similar to the European school net, the already existing national initiatives in the Nordic countries could serve as the hub to further build a European cultural network and pan-national gateway to European cultural heritage anchored in the KulturNet metaphor. In this model, already existing cultural networks on the local, regional or national level could be extended and developed, in a bottom-up manner, into a pan-European initiative. The primary objective of a European KulturNet should be in communicating European culture, taking into consideration cultural diversity as well as similarities between the European countries.

Co-operation

While Denmark and Sweden have been co-operating already in the past, now the other Scandinavian countries like Norway, Finland, and Iceland have joined the network to

intensify work under the metaphor CultureNet Scandinavia. Meeting on a regular basis, the objective of this co-operation is to commonly plan and implement projects, as happened for example in 2000 with a project on Nordic net art. Other areas of co-operation considered for the future are marketing and web strategies, design and staffing, the use of standards for data exchange and the circulation of editorial content among the members of CultureNet Scandinavia.

From Net to Network

Advancing from a Net to a Network was not an easy task – especially as the project was initiated top-down and membership was not voluntary. As a top-down initiative placed onto cultural heritage institutions by the Ministry, the participating cultural heritage institutions did not have a comprehensible understanding of why they should participate, and the rights and obligations of the members where not transparent. In addition, the top-down implementation did not give the cultural institutions a sense that they were in control and able to contact on their own terms.

If national governments opt for the top down approach, they need to provide partici-pating members with a clear agenda of the aims and objectives in joining the network. In the case for KulturNet Denmark, the two most important benefits for members was space on the KulturNet server and support for cultural heritage institutions who wanted to set up their own institutional web site. In 1996, these were considered valued to most of the cultural heritage institutions.

Despite this ,,it took nearly six years before the notion of a network among the participating members became more than an empty phrase. "In the secretariat", says Pia Vigh, "we had to reinvent the whole idea of the network, and also needed to convince the members that a network was a very productive way of working. But this was a very slow process."

The idea of a network is a very good and strong idea, yet, as Pia Vigh notes: "One should be careful how to define networks. The strongest networks are those that are defining themselves and that understand themselves as networks." As such, networks are most successfully constructed around the idea of sharing: sharing technology, resources, skills, knowledge, ideas, and motivation.

An alternative to the top-down approach on how to facilitating networks between cultural sectors is to identify and support already existing networks or intensify networking between existing communities.

KulturNet Services

Services for member institutions

There are two main services KulturNet offers to its members: On the one hand, the initiative actively supports its members in creating content by funding selected digitisation projects. On the other hand, motivating its members to also communicate and disseminate those contents over the Internet. These kinds of services are like the two sides of a coin: One cannot build a gateway to Danish culture without content, and on the other hand, a single access point to Danish culture increases the chances that those digital cultural resources and services will be discovered and used by the broader public. This is especially important today, as user behaviour on the net has changed considerably, with users favouring one-stop access points and thematic portals to idle surfing.

KulturNet Denmark is a service base that offers the following services to the 74 publicly-

funded institutions in Denmark:
- allocating funds for digitisation and online dissemination projects,
- web hosting services,
- connection of all publicly-financed cultural institution through an extranet,
- knowledge-transfer in the form of 1-day conferences on specific issues relevant to cultural heritage institutions, 8 – 9 times a year; conference topics are, for example e-commerce, dissemination strategies, watermarking, design strategies, etc.,
- technical support: beside a technical help-desk, KulturNet Denmark offers technical support through a webmaster on location, in the cultural institutions.

Selection criteria for projects administered by KND

Projects need to address the two primary objectives of Danish cultural heritage policy:
- to initiate collaboration between different institutions, and
- to stimulate, through digitisation, the dissemination of the Danish national cultural heritage.

In addition, the following selection criteria should be applied:
- emphasise official collections,
- supplement digitised material with additional resources especially created for the Internet,
- produce results of a technical format that can be disseminated via the Internet,
- produce visible results in 6-9 months,
- target the general Danish citizen who is interested in culture,
- show collaboration across institutions and contribute to the realisation of establishing virtual collections,
- build on and increase the technical knowledge and dissemination experience from previous projects supported by KND,
- be a pilot project that provides knowledge and experience for the benefit of other institutions,
- be maintained beyond the project period, and should be expanded and further developed by the institution itself.

When many projects fulfil the application criteria, smaller cultural institutions are given preferential treatment.

The lack of IT skills within smaller institutions is also regarded as a severe problem the Danish cultural heritage sector faces today. "Whenever small institutions are looking for IT solutions", explains Pia Vigh, "they need to buy services from companies, which means, it is very expensive and instead of being an investment in your institution, you are investing into commercial companies. (...) If you do not hold sufficient IT skills within your own institution or organisation, than it is very difficult to decide what requirements are needed for your project when you draft an agreement with a company. And it is difficult to evaluate, when they deliver an IT solution, if they actually supply what you need."

Therefore, since winter 2000, one of the services offered by KulturNet Denmark is having the webmaster consult with small institutions on requirement definitions and contracts with commercial companies. Unfortunately, cultural institutions do not always take advantage of this service.

Although creating awareness among Danish citizens for cultural heritage is one of the major tasks of KulturNet, there is no designated marketing budget available to promote the Danish culture gateway. This stimulated the KulturNet Secretariat to come up with

alternative approaches to marketing. One way was by selecting projects whose scope and content would stir up media interest and generate free coverage in the print media.

As KulturNet Denmark is the primary funding body that is responsible for evaluating and selecting projects for funding, the Secretariat can allocate grants especially to projects and web events that are particularly innovative or thought provoking. Although there are only very limited funds available for digitisation projects, overall only DKK 3 Mio. (EUR 403.000) per year, some good results have been achieved that way. However, there is also the awareness that national initiatives of this scale require an adequate marketing budget to market the gateway in the traditional media.

Another approach is by exploring innovative ways of accessing KulturNet services through new technologies, and thereby being portrayed in the press as an innovator in this area. This was one of the main reason why the KulturNet Secretariat decided to also offer its cultural calendar via WAP, on mobile devices. Being the only cultural web portal accessible over mobile devises generated a whole wave of news coverage and helped to draw attention to the KulturNet brand.

Due to the limited funding, the purpose of those projects are more to motivate and inspire cultural heritage institutions rather than a serious attempt to digitise the Danish cultural heritage. Only nationally funded cultural heritage institutions are eligible to apply for grants to digitise their collections. In this respect, KulturNet Denmark functions as a primary initiator and catalyst of projects.

That is why the KulturNet does not create lots of original content itself other than the culture news and the cultural guide that currently comprises approximately 700 annotated links that are regularly updated.

The original idea, to also offer web space for cultural institutions who want to set up their own web site, has been outstripped by the current development that especially larger institutions run their own server. KulturNet Denmark now hosts a few web sites from smaller institutions, yet it hosts many specific project web sites with particular technological requirements.

In 2002, the Danish Cultural Ministry will decide on a national digitisation strategy for cultural heritage, with the prospect of making more funds available.

The Danish cultural sector

ON THE RECORD

About 1.8 percent of total public expenditure in Denmark is spent on culture and the arts. The national government, counties and municipalities are the three most important cultural funding bodies in Denmark. In 1999, the cultural budget amounted in total to more than DKK 11 billion. Government subsidies accounted for DKK 4.5 billion (including funds from the National Lottery and the Football Pools) or 40 % of the overall budget, municipalities spend DKK 6.3 billion or 56 %, while counties accounted for DKK 0.4 billion, or about 4 %.

Of the total government spending on cultural activities in 1999, support for archives, libraries and museums amounted to 26 % of the total cultural budget, and training in the arts, with 15 % of total expenditures being the single most important point of expenditure.

The Danish Ministry of Culture web site, <http://www.kum.dk>

Services for citizens

To Danish citizens, KulturNet Denmark currently offers, free of charge, the following, partly bilingual services:

The Culture Guide: The Culture Guide offers information on Danish culture and cultural institutions. Updated regularly, it features editorial reviews of selected Danish cultural web sites that are public institutions administered by the Danish Ministry of Culture.

Culture News: Culture News on a weekly basis offers a selection of news items, articles and interviews, as well as "e-says", i.e. expert contributions highlighting particular issues of Danish culture and information technologies.

Calendar of Activities and Events: In collaboration with the Danish company KultuNaut, the cultural calendar on the KulturNet gateway informs citizens about cultural events and the cultural activities taking place in the public cultural institutions of Denmark.

The culture calendar is also available via WAP over mobile phones. For the "mobile" cultural calendar, KulturNet Denmark works together with an intermediary, a Danish company, who provides event calendars over mobile phones.

KulturNet Future

The future of KulturNet Denmark looks optimistic. Conceptualised initially as a five year project, KulturNet Denmark is currently in the last year of the first project phase. The Danish Ministry, however, has already decided that the project will not only continue but that it will be considerably enlarged. Although it has not been determined to which extent: growing ambitions? increased financing? broadened scope? more staff?

At the moment, KulturNet Denmark is being evaluated by independent reviewers as a bases for future development. To Pia Vigh, this course leads across the Danish national boarder, and around the globe. Although particularly designed for Danish citizens, she is convinced that on the global Internet the cultural gateway also needs to respond to the requirements of a global audience. "Since we know that culture is one of the main interests of the international community when it comes to Denmark, it is crucial that we do disseminate Danish culture to an international audience." In this respect she suggests that a national digitisation strategy for cultural heritage resources should be supplemented by a strategy to facilitate contemporary art and networked art that already takes place at an international level.

With regard to the services KulturNet Denmark offers to Danish citizens, in the future, the functionality and services of the portal to Danish culture will be greatly extended as the public service obligation in Denmark extends to the Internet. Then, KulturNet Denmark as gateway to culture for Danish citizens will be defined as a public service, similar to public broadcasting. This implies, to also co-operate with the other major public service providers, the Danish public television and radio, to co-operate and supplement each other with respect to online services.

International co-operation is already a part of the KulturNet mission statement, although it is limited only to the Nordic partner. The new version of the mission statement should stress the need for co-operation not just within Europe but world-wide. The necessity to do so lies with the need to gain a better understanding of other cultures and nations: "When you are in the business of cultural heritage and national culture," says Pia Vigh, "you are also in the business of working with a national identity. In order not to be taken hostage in the wrong discussion of nationalism, I think it is very, very crucial that we are engaged with pan-national initiatives and international projects."

What is clear to the Secretariat, however, is that they will remain to be defined as a project, and not become an institutionalised entity. Despite the drawbacks associated with being defined as project:

– first, with regards to employment: KulturNet employees work on a contractual basis for a limited period of time,

– secondly, the intensity of work: to cite Pia Vigh: "one tends to give a 110% in a project, and when the project stops you give 110% to the next project, yet you never going into a kind of operational phase",

– and finally, the limited opportunity for any long term planning. However, the last point must not necessarily be a draw, at least not in the area of IT: "In the area of IT, three years is a very, very long time. It would be next to impossible to plan for longer than two to three years. For this reason, I think it would be very dangerous to make an initiative like KulturNet Denmark permanent."

Being defined as project, on the other hand, will enable the organisation to keep the kind of flexibility necessary to quickly repond to the fast changing IT-environment.

The "wish list" for the future of KulturNet Denmark is simple. On the one hand, to have the sort of staff and funding available that be in the position to take some risks, to be innovative and at the leading edge, without the constant pressure that each project needs to be successful.

KulturNet as part of Nokia

And on the other side, as KulturNet Denmark is not just a cultural initiative, but at the same time and to a very great extent, also an IT initiative, the inspiration for future development should also come from outside the cultural sector. Therefore, Pia Vigh suggests placing an organisation like KulturNet Denmark not within a major cultural institution but instead, within the telecommunication or IT-environment. As such, KulturNet Denmark would be able to benefit from the inspiration that can be found within such fast changing sectors. "We get all our ideas, inspiration and content in exchange with cultural institutions. However, we have no contact with the IT sector, and I think that the fact that we are an IT project should be taken literally. We need someone to be innovative when it comes to technology to teach us what technology can do, also in order to let the content manage the technology, and not the other way around, and to also improve our IT skills."

Placing KulturNet Denmark within, for example, Nokia could be a challenge for both sides: "This would be a challenge not only to KulturNet Denmark, but also a challenge to us as Secretariat, the way we work, the way we get our ideas, the way we are motivated, and perhaps, it could also be a challenge to Nokia."

To Pia Vigh, this is the basic requirement for true innovation also in the cultural heritage sector.

Lessons learned

A cultural heritage initiative like KulturNet Denmark needs to have a clear vision, yet should also have room to grow and to adapt to future developments. This vision needs to be broken down into definite strategic goals against which initiated programmes and project are assessed and evaluated.

In addition, if national governments decide to carry out a similar project with a top-down approach, the benefits need to be clearly visible to give cultural heritage institution an incentive to participate.

VI.6   Understanding new target groups: Education as a future driver of the cultural heritage sector

What is the purpose of creating, collecting and maintaining cultural heritage resources and how will they be used in the future? For the experts participating in the DigiCULT study it is clear, that any cultural heritage policy needs to formulate a vision about the purpose and future use of cultural resources that serves as referential framework for future decision making. Otherwise, national governments run the risk of spending ever more money on digitisation projects that may produce masses of digital material that remains unused. As Hans Petschar, Austrian National Library, states: "What does this mean at the level of national policy? It means that digitisation projects need to have a clear goal. Why should we digitise, if there is not a clear policy of what we want to do with the digitised images? Why then bother to digitise at all?" (DigiCULT ERT, Vienna, June 25-26, 2001)

Educational pull

Although there exist many different purposes for future use that may justify the investment, the experts participating in the DigiCULT Study stressed the importance of education as the most promising and therefore most significant area of future use. Because knowledge becomes obsolete more quickly in the Information Society it is now apparent that Europe's population should expect that learning will not end with the termination of school life but will more likely be a life-long experience. Cultural heritage information is high on the list of interests of individual for learners. Accordingly, when making decisions on priority areas for education, re-education and upgrading, national governments should not neglect the importance of cultural heritage information.

Therefore, education should become the focus of every digitisation policy and a central point in every cultural heritage policy. For example, when selecting material for digitisation and producing new cultural heritage resources, memory institutions should follow a multi-purpose approach focusing on education. This kind of "education pull" should always be a part of the strategy.

To Mark Jones, Director of the Victoria and Albert Museum, UK, comments that education is so important that it should also become part of the core business of every cultural heritage institutions: "ALM resources are vastly undervalued and underused as an educational resource. It's not all about money. ALMs should be doing this as part of their core business, it improves collection management as well as access." (DigiCULT Interview, August 9-10, 2001)

Although there are many individual projects and initiatives that try to build a bridge between culture and education, concrete national policies that address this issue are rare. Two initiatives that stand as examples in bringing culture and education closer together are "Culture Online" in the UK and "Education Online" in the Netherlands.

Culture Online: The digital bridge between culture and learning (UK)

In September 2000, the UK Department for Culture, Media and Sport (DCMS) announced the creation of a new, central "body" with the working name of Culture Online, with the aim to establish a network of cultural heritage resources and know-how that would deliver the riches of museums, libraries and archives to learners of all ages. Although this central body does not exist yet, the national policy "Culture Online" conveys

a clear vision of building a bridge between culture and learning, to the benefit of both sectors.

Using the Internet along with broadband services such as digital TV and mobile communication once they are available, Culture Online's sphere of activity is to widen access to the resources of the arts and cultural sector, for the purposes of learning and enjoyment both at school and throughout life. Conceptualised as a "step-change in access to and participation in arts and culture" (DCMS), the idea of Culture Online is to become a new kind of cultural institutions designed for the digital age that complements already existing services, such as Curriculum Online. As highly participatory service, Culture Online would enable individuals and communities to use digital technologies to pursue their own interests, create their own cultural resources and interact with others. The materials for this service would be drawn from museums, galleries, libraries, heritage sites, archives of written, broadcast and film materials, the performing arts and the new digital arts.

National Curriculum Online, UK

EXAMPLE

National Curriculum Online is a central access point that links every National Curriculum programme of study requirement for currently 12 subjects to high-quality, relevant teaching resources. In addition, the site offers teachers a vast repository of online resources that are directly related to the requirements of the national curriculum, as well as additional services, such as guidance teaching pupils with learning difficulties or extraordinarily talented pupils. The online resources are categorised by subject as well as by grade.

<http://www.nc.uk.net/home.html>

After a consultation phase with institutions from the cultural sectors and with educational and technology experts, the vision for Culture Online was published in March 2001. This vision paper focuses on the major objectives to be achieved but also raises still yet open questions on how implement this vision and how to operate such a service in practice. In doing so, the report provides a number of examples of hypothetical projects to illustrate the range of possibilities which Culture Online might support. (see Leadbeater, 2001)

Clearly, the goal is to connect and integrate already existing digital cultural heritage initiatives, such as the British Film Institute's 'virtual bfi', the British Museum's COMPASS system, or the Public Record Office's 'Learning Curve', into a central body, Culture Online. The initiative would connect and interlink the many, many actions and measures that are currently on their way under a unifying umbrella, i.e. education and learning. The role of Culture Online would be that of a broker between learning and culture on the one hand, but also between the different cultural sectors, to encourage the creation of digital contents and linking digital learning materials that are spread across many organisations. In its broker function, Culture Online would:

- – create partnerships between cultural institutions, teachers and educational users,
- – help to avoid overlap and duplication in materials provided for learning,
- – encourage the use of common standards and avoid the danger of fragmentation as more cultural institutions start putting their work online,
- – foster collaboration between institutions to span the institutional boundaries,
- – help institutions to learn from each other and help others s to identify best practice,
- – provide a forum in which both users and owners of copyrights could agree on how digitised material should be used and copyright protected (example: SCRAN – the Scottish online cultural service).

Culture Online would also function as a stepping stone enabling small institutions with few resources to contribute by encouraging partnership with other institutions to commonly create the rich and high-quality learning resources that Culture Online envisions offering.

Key success factors

However, as stated in the vision paper, the success of Culture Online depends on its ability to overcome some critical issues related to, in particular, three areas: content, technology and access.

With regards to content, the challenge would be to interlink the already existing resources that have been created in many projects throughout the UK. The issue is not to create better resources, but to create a network of digital resources to which many different institutions can contribute. Projects in this area would concentrate on:

- digital collections: Provide funding for digitising material of the national archives that are relevant to the educational community;
- sets of resources around exhibitions and learning themes: funding a new genre of hybrid online and offline exhibitions;
- national collaborative projects: Such projects could be focused on particular themes (for example the upcoming 50-year jubilee of Queen Elizabeth);
- participatory projects: Culture Online should offer ways for people to participate in contributing their own resources and own stories;
- masterclass channels: Creation of dedicated broadband channels to stream live audio and video;
- collaboration and creativity: Conduct collaborative projects, across different sectors, across different nations.

Secondly, the success of Culture Online would depend on its ability to make materials and services available in the most attractive format possible. This implies, to build a technological infrastructure and channels that will be able to deliver the kind of services that would attract learners. Projects in this area would aim at getting more organisations online, establish common standards and provide tailored tools to be used by the key audience. Content, however, should come before technology as it would be a mistake to wait for a technology platform to be built before content could be created. In addition, another goal would be to get all publicly funded cultural institutions up to a minimal level of digital competence within a given period (e.g. by providing easy-to-use templates for web sites, navigation tools, shared hosting of web materials, joint purchasing of equipment, bandwidth to lower costs, etc.).

Finally, the success of Culture Online would be measured by its ability to implement a strategy to make material accessible to a variety of users, especially those who were not aware that such resources were available or even in existence. There would be a need to develop an adequate strategy to make material accessible to a variety of users (should include marketing and technology issues). This could be achieved by:

- creating a CO portal or better: themed portals (themed around user interests and communities of expertise in cultural organisations - relevant content and interested user communities would be brought together),
- building teaching materials available on the web,
- syndicating digital resources to sites run by partner organisations such as broadcasters, tourist boards and travel agencies,
- providing specially designed search tools for kids.

In the meantime, a business plan for Culture Online as a new kind of cultural institution to build a bridge between learning and culture, has been created and submitted to the Treasury at the beginning of August, followed by a series of pilot projects to expand the experience for a possible foundation of Culture Online as an organisation in April 2002.

Education Online: Connection to the future (NL)

Over the last ten years, the Dutch cultural heritage policy concentrated on several different areas, with cultural heritage for educational purposes being one of the key areas. It aims at linking education and institutions in the field of cultural heritage by "developing new curricula and teaching methods" and by "publicising successful examples and promoting the expertise of teachers and staff at heritage institutions." A significant outcome of the area is Kennisnet, the Knowledge Net project. (The Ministry of Education, Culture and Science, 1998)

Knowledge Net

In recent years the fields of Education and Culture have been reunited under the roof of the same Ministry of Education, Culture and Science which offers additional policy potential with regard to the cultural sector. One outcome of the reunion is the Knowledge Net ("Kennisnet") project which represents one of the four main policy areas within the action plan "Education On line: Connection to the Future". The project aims at linking schools, colleges, libraries and museums under one portal in order to provide all schools "access via the Knowledge Net to high-quality services so that they can concentrate on use in education and be troubled as little as possible by technical management aspects." (The Ministry of Education, Culture and Science, 2000: p. 10; Kennisnet, <http://www.kennisnet.nl/>)

So far, some 400 schools, colleges, libraries and museums are linked together in Kennisnet.

Education On line

The "Education On line" action plan also deals with the role to be played by cultural institutions in the educational field. To make culture widely and easily accessible for educational purposes, the Ministry of Education, Culture and Science decided in July 2000 to make funds available to create a cultural component within the Knowledge Net. The cultural component will focus on the use of the arts and culture in education and will provide ready-to-use materials for teachers and pupils. Cultural institutions will also receive funding to help schools, teachers and pupils to create cultural knowledge networks. There are also plans to open a virtual library and to establish a competition which should facilitate the development of new cultural-educational projects. (cf. Chatrie, Wraight, 2000: p. 193)

Creating cultural heritage content for education

Although carried out at a different scope, both examples show that some national governments are already actively building a bridge between culture and education as the most promising market for cultural heritage resources, also in commercial terms. Especially in the UK, the national government currently discusses alternative funding models that would allow small companies, that previously produced TV footage on a commission bases for the public television stations, to create educational products. With the increase of TV channels, the rate of own programming within the public channels has dropped considerably, which has brought many small TV production companies into financial trouble. Now, the idea is to have these companies create educational material to be delivered over digital channels.

The DigiCULT navigator to cultural heritage for education

Experts consider education as one of the primary drivers for the future development of the cultural heritage sector. Because knowledge becomes obsolete more quickly in the Information Society, it is fact that learning does not end at the termination of school life but will be a life-long experience. Life long learning has already become a reality.

Beyond the obvious economic benefits of a well-educated population, education also plays a crucial role fostering integration and mutual understanding among citizens. A key factor in this understanding is a knowledge of and respect for the historical traditions and cultural expression of a European multicultural society. Digital cultural heritage may play a key role in educational programmes, as cultural heritage institutions increasingly become important providers for new pedagogical tools.

Cultural heritage information is high on the list of interests for individual learners. Accordingly, when making decisions on priority areas for education, re-education and upgrading, national governments should not neglect the importance of cultural heritage information. Policies on digitisation of this information will be crucial in providing the access that will be required in coming years.

This is not to say that national authorities have been negligent. The value and importance of education is well known and many European Member States are already debating the issue. Despite the lack of concrete policies, a body of experience exists from the projects linking educational and cultural domains. As a result, national governments are in a strong position to influence the market for educational material particularly in the area of cultural heritage.

10 National governments and regional authorities should see educational use of digital cultural heritage information as a key target of any national digitisation programme.

Digitisation plans and programmes should be clear about the intentions and objectives with regards to future use. Therefore, in drafting digitisation plans, national governments should ensure that digitised resources can be used for multiple purposes, yet with educational use being always on the list. In addition, national governments should encourage projects with educational value. Such projects should actively foster the co-operation between content providers and teachers as well as research institutions to create new educational content based on cultural heritage resources.

11 The European Commission should fund a current assessment of the market for educational use of digital cultural heritage information and best practice in the field of educational–cultural projects.

For commercial content providers, educational exploitation is one of the more interesting fields for cultural heritage resources. An assessment of the educational market for cultural heritage products should go beyond the current view of market size and viability. It should also include knowledge gained from the many projects that cross the educational-cultural domain.

VI.7 Between commercialisation and access for all: Creating a sustainable cultural heritage

In the last years, the cultural sector has gained a great deal of political attention due to its economic potential and importance for market development in the Information Society. Fact is that the cultural industries, and especially the creative sector are big business. In most countries, the cultural economy makes up "perhaps five percent or more of GDP (...) and by any standards, this is significant in economic terms". (Throsby, 2000: p. 38) As a result, developing strategies and frameworks for a prospering cultural sector economy has become a key political agenda point.

Although the digital age has also opened up new opportunities for the cultural heritage sector, the question remains, if they can really benefit from the growing importance of the content producing industries in the emerging knowledge society. Can cultural heritage institutions become active players in the digital cultural economy?

The expectations are high, even within national governments as the primary funders of memory institutions. Increasingly, cultural organisations and their activities culture which until now have been regarded as separate from commercial, profit-oriented considerations, are evaluated in economic terms, having business models in mind that would allow for a "monetarisation" of symbolic cultural goods in the Information Society. Yet, this view needs to be reconsidered, paying attention to the fact that, on the one hand, what national governments are paying for goes far beyond an economic value, and on the other hand, that commercial success stories in the cultural heritage sector so far have been rare.

Beyond the commercial value: What is the value of cultural heritage?

The commercial value of cultural goods is closely related to their origin in individual creativity, skills and talent, "which have a potential for wealth and job creation through the generation and exploitation of intellectual property". (DCMS Creative Industries Task Force, 1998) In the creative industry sector, a work of art or the copyrights for that work are traded in the market where it captures its economic value. Through market exchange the work will acquire a price, reflecting its economic value. (cf. Throsby, 1999)

Besides the economic value that is determined by market demand, the creative work also conveys an *idea* that can be exchanged. However, this idea cannot be copyrighted, and therefore, it cannot accumulate any value in the market. Nevertheless, in the process of exchange, the "consumers" of the idea determine their individual valuation. As the idea circulates, it creates value that can be thought of as the aggregation of individual valuations that comprise the total value of the idea within its sphere of circulation. This aggregation could be thought of as the *cultural* value of the work.

"The essence of these propositions is that there exists both a physical market for artworks and a parallel marketplace for the ideas that are a necessary attribute or product of those works. The physical market determines the work's *economic value*; the market for ideas determines its *cultural value*. The fact that the physical work is the vehicle for conveying the idea transforms the work from an ordinary economic good into a cultural good." (Throsby, 1999: p. 29)

What becomes clear is that the value of all cultural artefacts and products is multi-dimensional, meaning that the value is measured not just through one criterion, its economic value, but also through a range of other values that define a creative work. Thus,

as Throsby (1999) remarks, a cultural resources can also be described through cultural value characteristics that are not economic, including:

– aesthetic value: beauty, harmony,
– spiritual value: understanding, enlightenment, insight,
– social value: connection with others, sense of identity,
– historical value: connection with the past,
– symbolic value: a repository or conveyor of meaning.

It is especially these other cultural value characteristics that are communicated by cultural heritage resources. Reducing the value of cultural heritage to its economic value as it is currently the trend within national government, means to only consider one part of what might influence the individual's choices. Thus, the suggestion that individual judgements about the value of particular cultural objects are converted to a common, economic denominator, cannot be sustained. Indeed, as McGuigan remarks, such a reduction would be deeply flawed. "The notion that a cultural product is as valuable as its price in the market-place, determined by the choices of the 'sovereign consumer' and by the laws of supply and demand, is currently a prevalent one, albeit deeply flawed. Its fundamental flaw is the reduction of all value, which is so manifestly various and contestable, to a one-dimensional and economistic logic, the logic of 'the free market'." (McGuigan, 1996, p. 31, quoted in Throsby, 1999)

What governments need to understand is that the value of cultural heritage resources and the benefit that is gained in building and maintaining digital cultural heritage repositories goes beyond the economic value. In fact, it is these other cultural value characteristics and the "intellectual exploitation" that are the true value of cultural heritage. This does not mean to totally ignore market opportunities, but it implies to maintain a realistic view on the exploitability of cultural heritage resources and the return on investment.

As the primary funders of cultural heritage institutions, national governments should be very aware that what they are financing goes far beyond the economic value, but is a cornerstone of establishing a society's cultural identity. Consequently, a cultural vision should pay attention to first, the societal benefit and only secondly, to commercial exploitability.

The commercial potential of cultural heritage

With the digital media, and in particular the Internet, the expectation that cultural heritage organisations like archives, libraries, and museums, can somehow become players in commercial markets and "valorise" their holdings (with some favourite candidates as in particular images) have become a priority. Yet, for institutions that are driven by a mission that usually includes to make information available for education and academic research, it seems to be a paradox that, at the moment, when the marginal costs for reproduction and delivery of information are tending towards zero, they are asked to charge for it.

Although there are already many experienced voices that meanwhile report back from the commercial "front", that there is no or surely no short and easy way to be successful, the pressure on cultural heritage institutions to "go commercial" remains high.

The ability of cultural heritage institutions becoming players in the commercial arena will be discussed in detail in Chapter "Exploitation: Valorising cultural heritage resources". For the moment, commercial issues will only be covered in so much as it directly concerns national cultural heritage policy.

Need for additional funding

Going commercial and offering in a commercial way information services, surrogates of objects, or products causes additional costs that need to be covered. Yet, most cultural heritage institutions will not be able to finance commercial ventures out of their regular budget, especially not within the next years where budget most likely will remain stagnate or even decrease. Therefore, if it is a goal of cultural policy to enable cultural heritage institutions to commercially "valorise" the treasures they are taking care of, there is a need for considerable additional funding. In addition, as experience has shown so far, in order for projects to get up and running to the point where they become sustainable, more funds are needed over longer time periods which usually exceed "normal" project periods of 3-4 years.

Commercial success stories are rare

Some European governments over the past five years invested substantially in the cultural heritage sector, one of the most prominent examples being funding opportunities for cultural heritage projects through the U.K. Lottery and New Opportunities Funds. Yet, even with well-funded projects that aimed at "valorisation" of their resources, "big time" commerce has never been the objective. Even if some of those projects have successfully establish a commercial channel that provides them with additional income, it has become quite clear today, that financial profits will not be a major outcome.

Overall, examples of commercial success in the cultural heritage sector involving memory institutions directly are rare. Concluding from prominent success stories such as SCRAN, one notes, that even those services needed and still need extensive investment, only to achieve *some* return on investment. More realistically, what might be achieved is a coverage of the running costs, yet, only after enormous amounts of public money has been invested to establish the infrastructure, digitise a critical mass of cultural resources from many institutions, and market intensively the services and products. In addition, as in the case of SCRAN, it is also not the end user who directly pays for the service but again public institutions, in this case schools in the region, who are the "paymasters" of the service.

Considering all this, national governments should rethink the expectations they have concerning the commercial potential of cultural heritage institutions. Instead, they should keep in mind that what they are paying for goes far beyond the commercial value of cultural heritage resources.

The DigiCULT navigator to sustainable cultural heritage

Reducing the value of cultural heritage to its economic level, as is currently the trend within many national governments, means only considering *one* part of what constitutes the value of cultural heritage and what ultimately might influence the individual choices of citizens as primary users of cultural heritage resources. What needs to be understood by national governments is that the value of cultural heritage and the benefit that is gained in building and maintaining digital cultural heritage repositories goes beyond the economic value.

As primary financiers of cultural heritage institutions, national governments need to be aware that what they are funding is the intellectual value that constitutes a cornerstone in a society's national identity. Thus, the authorisation to invest large sums into the valorisation of cultural heritage must derive from an overall objective in the public interest – namely to unlock the value of cultural heritage for regional development, quality of life, education and life long learning, and to stimulate the cultural industries, i.e. tourism, publishing and broadcasting. This should be considered when the demand for a commercial exploitation of cultural heritage resources is put on memory institutions.

12 National and regional governments that also expect cultural institutions to exploit their collections commercially should provide substantial medium to long-term additional funding.

13 When funding major national cultural heritage initiatives and projects, national governments and regional authorities should not expect a direct economic return of investment. Instead, they should ensure that they can create synergies and leverage results in other publicly funded sectors (e.g online learning) as well as cultural industries (e.g cultural tourism) to maximise the impact of their investment.

14 National and regional authorities should develop value indicators to measure the impact of their investment in cultural heritage.

VI.8 Future use: Keeping digital resources accessible

A methodological approach to digitisation also includes developing methodologies on how to maintain digitised and born-digital resources accessible in the future. As ever shorter technological innovation cycles replace existing technologies at a breathtaking pace of 2-5 years, the urgency to address long-term preservation to avoid the inevitable loss of our cultural heritage becomes ever more pressing. Yet, current methods for long-term preservation of digital cultural objects are insufficient, and offer only a short term solution to a problem that grows daily. Immediate action by all stakeholders, including national governments is needed, to prevent substantial parts of our cultural heritage from being lost.

A more detailed account of the long-term preservation problem can be found in the Chapter 9, "Technologies for tomorrow's digital cultural heritage", which also includes a list of recommendations that challenge national governments:

– to formulate a strategy for digital preservation as part of a national information policy,

– to set up a network of certified organisations to archive and preserve digital cultural resources,

– and to expand the legal deposit to include electronic and born-digital material.

VI.9 Case Study: "Safeguard of Cultural Heritage" – An initiative of the National Research Council (CNR), Italy

The Italian project "Safeguard of Cultural Heritage" is today one of the largest national initiatives in the European cultural heritage sector. It started in 1997 and will be active for five years. Its overall budget is about 115 billion Italian lire (about 88 million Euro).

The project was prepared and organised by the National Research Council (CNR) of Italy: The National Research Council (CNR) is a public organisation that has a key role in the Italian research system. The primary function of the CNR and its scientific research institutes, distributed over Italy, is "to carry on, through its own organs, advanced basic and applied research, both to develop and maintain its own scientific competitiveness, and to be ready to effectively and timely take part in the strategic fields defined by the national planning system". (cf. <http://www.cnr.it> for a more detailed description of the mission and activities of the CNR)

The project philosophy

The project "Safeguard of Cultural Heritage" was designed starting from the fact that before no well organised, scientifically conceived and comprehensive cultural heritage project had been prepared and put in action under strict scientific and public authorities control. On the contrary, in Italy as well as throughout Europe the approach was rather random, ephemeral, and often consequent to natural catastropes or accidents and disasters provoked by men. (cf. Guarino, 1999)

The project is based on a broad definition of cultural heritage that includes every material evidence of civilisation. It brings together scientific research groups specialised in the protection, the restoration and the valorisation of cultural heritage. As Umberto Baldini (Director, Safeguard of Cultural Heritage, CNR) has stated: "It is imperative that this collaboration be based on mutual co-operation. Scientific experts, from restorers or art historians to archaeologists and architects must all work together towards a common goal, rather than individually as has happened so often in the past." And the resources were made available "to open a new scientific frontier." (Baldini, 1999)

In particular, the aim of the project is to transfer into the cultural heritage sector technologies developed in different areas or to develop new scientific tools suitable for specific cultural heritage domains. Yet, the project is not only research driven as the targets set must be approved by public authorities (on the national, region or city level) who take the responsibility for the use of project results or products.

Therefore, the philosophy is based on the following key points (cf. Guarino, 1999):
– No single research group will be financed.
– 40 targets were set, involving 5 – 8 research groups for each target.
– Any target must have a public authority (state, region, city) which takes the responsibility to employ the "products" of the target.

The CNR project is considered by Angelo Guarino (President, Cultural Heritage Committee, CNR) as a "preliminary draft" of a comprehensive European project that would favourably follow the "philosophy" of the Italian project. Such a project would take into account the cultural identities and contributions of all EU Member States, and receive national as well as EC funding if the set targets are of common European interest.

As an example of the recognition and impact the project already had in Europe, it should be noted that the Spanish Government's National Research and Development Plan for 2000-2003 takes into account the activities carried out in Italy in the field of cultural heritage and in particular the CNR-project "Safeguard of Cultural Heritage". (cf. Ferrari, 2000)

The importance of cultural heritage in the "global village"

"Many people believe we are living or at least ready to live in a sort of global village where computers, telecommunications, satellites will cut every distance, every difference, every identity. Unfortunately, this belief is just a good example of 'virtual reality'. In fact, in 'true reality', at the end of the second millennium, we are faced with many of the dramatic problems which were present at the beginning of this millennium: racism, poverty, ethnic conflicts, even religious wars.

So, if we really want to enter the third millennium as a true global village we need to change our way of thinking: we need to pay more attention to our common Cultural Heritage, because only by respecting the cultural identity of our populations it will be possible to save the common roots of our civilisation, entering a new age of peace and welfare."

Angelo Guarino, President, Cultural Heritage Committee, CNR, 1999

The five sub-projects

The CNR special project "Safeguard of Cultural Heritage" is divided into five broad sub-projects:

The *first subproject* deals with the *diagnostics* of cultural heritage patrimony. It is mainly devoted to archaeology and to geographical information systems (GIS) useful to safeguard ancient resources constantly in danger for environmental and human aggression. The sub-project fosters co-operation of specialists in archaeology, geophysics, cartography, photogrammetry and tele-surverying in order to discover archaeological sites and, more importantly, to develop methodologies to allow their protection.

The *second sub-project* deals with the *restoration* of cultural heritage. It covers the following topics:

– development of new scientific and technological methodologies for researches on
  the state of conservation of cultural heritage objects (from paintings to
  historical buildings)
– development of new materials and procedures to restore and save
  cultural heritage objects
– development of new technical and legal procedures to prevent the impoverishment
  of the cultural heritage in Italy.

The *third sub-project* aims at *saving our memory*. The aim of the research undertaken in this sub-project is to reduce the chemical, physical and biological decay of paper-like and non paper-like materials. More specifically, it deals with:

– studies on paper decay under the action of biological and physico-chemical agents,
– studies on new materials and procedures to restore damaged books and
  archive documents,
– studies on restoration of photographic plates, films and computer magnetic tapes.

The *fourth sub-project* deals with *biological diversity* and includes:

– studies on ancient and modern DNA, biological origin, genetic and pathological
  characteristics of human populations in Italy,
– preparation of archives and storing of genoma of ancient and modern populations,

– preparation of archives and storing germoplasms of vegetal and animal origin belonging to species which are disappearing.

The *fifth sub-project* focuses on *museums and cognate institutions,* covering issues as management, exhibition, and exploitation:

– Innovative methodologies for a better organisation and management of different typologies of museums,

– Restoration and exhibition of scientific and musical instruments,

– Exploitation of multimedia technologies,

– Interaction between museum exploitation and tourism.

More detailed description of the sub-projects are available on the Internet in five languages at: <http://www.culturalheritage.cnr.it>.

Operative entities and products

The project "Safeguard of Cultural Heritage" has involved a multitude of research institutes, public entities as well as private businesses, and generated a broad portfolio of products. The following paragraphs provide a general overview of the achieved and projected results based on available data for the period 1997–2001.

Distribution and funding of operative entities 1997–1999

According to project figures available for the period 1997–1999 the project involved 345 active entities that received financial support from the project budget:

Active entities – 1997-1999	Number of entities	Funding in billion Lire
University institutes	205	21.651
CNR institutes	83	9.877
Public entities	34	3.810
Private businesses	23	2.735

Source: Ferrari, 2000

Products of the project

In 2000, a total of about 1000 different "products" was expected to be the outcome of the project until 2001. These products include new technologies and equipment, methods and patents, databases and software, print and multimedia products. Technological products for example include a remote monitoring system that continuously observes the situation of monuments or a new method to eliminate graffiti from monuments.

Typology of products	Expected results
Data Bases	200
Equipment, technologies, methods and patents	300
Publishing and multimedia products	250
Specific software and web sites	250

Source: Ferrari, 2000

A crucial issue will be how to make known and exploit the knowledge and products accumulated in the project. Some workshops have been organised and articles published in Italian as well as international journals, but it seems clear that the best channel to market the products would be a dedicated portal (see below).

One of the products that merits to be noted in particular is the *Journal of Cultural Heritage*. This journal was created in order to provide scholars and students in the field of cultural heritage, which involves many and varied disciplines, with a high-profile periodical for publication and reference. The scientific office of the journal is based in Rome at the CNR project headquarter. The journal is published in English since 2000 in co-operation with the international scientific publishing house Elsevier. (for more information: cf. <http://www.elsevier.nl/inca/publications/store/6/2/0/7/3/8/>)

A database on enterprises and researchers in the Italian cultural heritage sector

In the framework of the project "Safeguard of Cultural Heritage", a database of companies and researchers who work wholly or partly in the field of cultural heritage was developed. The wide definition of cultural heritage used in identifying the companies includes: works of art, archaeological finds and sites, buildings of historical interest, linguistic, paper heritage, the biological and ethno-anthropological archive, books, landscapes, folk traditions etc.

The six principal categories of the database are: archaeology, diagnostics, restoration work, paper heritage, the biological ethno-anthropogical heritage, and museums. Around 500 key words are used to classify and make searchable the entries. The database is available in five languages (Italian, English, French, German and Spanish) and is programmed to take into account the territorial and administrative subdivisions of the European Union.

In 2000, the database contained 11,601 records, of which 9,959 were related to mostly small and medium sized companies and 2,002 to individual researchers. Until the end of the project the database is expected to include 20,000 records. (cf. Ferrari, Tardiola, 2000, provide a break down, analysis and visualisation of the available data)

The database includes scientific research institutes, public entities as well as companies active in the field of cultural heritage. The majority of the entries provide data on companies of which most are medium sized enterprises and "micro-enterprises" (employing 4-5 people and not being related to scientific research activities).

Grouped and analysed according to the main topics of the project "Safeguard of Cultural Heritage" (cf. Ferrari, 2000) one can say that:

- the majority of enterprises are involved in activities related to restoration work,
- of the enterprises involved in diagnosis most work on archaeological dig-related activities,
- only few are involved in the documentary heritage sector and principally work with paper-like materials,
- enterprises operating in the biological and ethno-anthropological archive sector are practically non-existent, and
- in the museum sector, the majority of enterprises work on the creation of services and systems.

Development of a cultural heritage portal

Based on the accumulated knowledge and results of the "Safeguard of Cultural Heritage", an Internet portal is planned that will target the various market segments of the cultural heritage sector. The portal will be used to market products developed in the course

of the project and offer additional services to institutions, administrations, companies, scholars and professionals in order to become a major reference point in the cultural heritage sector. Ideally, the portal will become a virtual network of excellence where products and technologies are sold through e-commerce applications. (cf. the feasibility study: Guarino, 2001)

The portal will be launched at the begin of 2002 as an Italian project. Driven by the CNR the project is supported by the following partners:

- Telecom Italia, that will provide the ICT infrastructure,
- Banca Nazionale del Lavoro, and the
- Sviluppo Italia, the national development agency for the Mezzogiorno and other less developed areas throughout the country. <http://www.sviluppoitalia.it>

The portal will be subdivided into the following areas respectively "channels":

- *Databases:* will offer access to databases on specific themes.
- *Technology:* will offer services related to the safeguarding of cultural heritage targeted at public bodies (e.g. regional and local councils) as well as opportunities for innovation in enterprises in the cultural heritage sector (B2B).
- *Publishing:* will promote print and multimedia products (e.g. manuals and textbooks, videos and CDs, CD-ROMs and DVDs)
- *Events:* will offer services connected to the organisation of congresses, meetings, workshops.
- *Training:* will promote awareness of the numerous training courses related to cultural heritage offered by universities, research bodies, regional and local councils.
- *New business:* will in particular showcase new business opportunities related to technologies, equipment and methods e.g. in the field of diagnostic or restoration work.
- *Institutions:* will provide information on scientific and technological activities of institutions in the cultural heritage field (e.g from the ministry to the level of local councils)
- *Scientific news:* will highlight international news on scientific activities and achievements.

Towards an European cultural heritage business platform

The CNR (Progretto Finalizzato Beni Culturali) already in 1999 has suggested to the Italian Ministry for University and Scientific Research (MURST) a European cultural heritage Internet platform to be considered as a EUREKA/Eurocare project. (cf. <http://http://www.culturalheritage.cnr.it>)

This initiative, the "European Agency for Cultural Heritage" (EACH), is still listed as a potential EUREKA/Eurocare project. (cf. E!2209 EUROCARE EACH on <www3.eureka.be>) The Italian partners of EACH are CNR - Progretto Finalizzato Beni Culturali, ES S.R.L. and Officine Solari S.A.S. The financial contribution from Italy would be 55 percent, with the other resources coming from Austria, Spain, Sweden, and Greece.

This platform would provide supportive online services for cultural heritage business processes, including for example an exhibition and market area as well as an information and development center for companies in the sector dealing for example with restoration and conservation.

In a recent EUREKA news (No. 54. August 2001), it is noted that "EUROCARE will shortly offer a mechanism to help such companies work together and innovate. A new sub-

project, EACH (European Agency for Cultural Heritage currently in preparation, will provide a web-based directory of firms across Europe involved in the cultural heritage field, providing a boost to collaboration."
(<www3.eureka.be/Home/eurekanews/54/54eng.pdf>)

Building networks, information about new technological solutions, and co-operation will be much needed in developing marketable technologies and methods. Cultural heritage technologies are to be considered an interesting market that will become much more competitive in the next years. Leading European institutions and companies with there accumulated knowledge and experience might still have a competitive edge in comparison with the USA or Japan. But, as Angelo Guarino (chairman of Eurocare) warns: "The US is beginning to wake up to cultural heritage. If European companies do not take up the challenge, in a few years we will see major European monuments being restored by American companies." (<http://www3.eureka.be/Home/eurekanews/54/heritage.html>)

Resources

Project web site: <http://www.culturalheritage.cnr.it>

Baldini, Umberto (1999): Foreword to the newsletter of the project Safeguard of Cultural Heritage. <http://www.culturalheritage.cnr.it/news/safeguard/default.htm>

EUREKA: Using EUREKA to secure our heritage. In EUREKA News 54, August 2001. <www3.eureka.be/home/eurekanews/54/heritage.html>

Ferrari, Angelo (2000): Il contributo del CNR alla salvaguardia del nostro patrimonio culturale. In: Ricerca & Futuro, Nr. 18 / 2000. <http://www.area.fi.cnr.it/r&f/n18/ferrari1.htm> (26-11-2001)

Ferrari, Angelo, Tardiola, Stefano (2000): L'anagrafe dei ricercatori e delle emprese che operano nel settore dei beni culturali. In: Ricerca & Futuro, Nr. 16 / 2000 <http://www.area.fi.cnr.it/r&f/n16/ferrari1.htm> (26-11-2001)

Fiore, Sandra: Al CNR un incontro italo-statunitense sulle tecnologie per i beni culturali (interview with Angelo Guarino). In: Ricerca & Futuro, Nr. 20 / 2001 <http://www.area.fi.cnr.it/r&f/n20/eventi2.htm> (26-11-2001)

Guarino, Angelo (1999): Introduction to the newsletter of the project Safeguard of Cultural Heritage. <http://www.culturalheritage.cnr.it/news/safeguard/default.htm>

Guarino, Angelo (2001): Portale beni culturali. Piano di fattibilità. Progetto finalizzato beni culturali. CNR, marzio 2001.

DigiCULT Interview with Angelo Guarino, October 12, 2001.

VII ORGANISATIONAL CHANGE
Enhancing the interoperability of cultural heritage organisations

"Blackbox" exhibition, Hongkong Festival of Visions, 2000

This chapter focuses on the interoperability of cultural heritage institutions in organisational terms. This interoperability determines if an institution can do what it is there for, its actual capacity to meet its mission, as well as its capacity to innovate and "re-invent" itself in order to come to terms with a changing environment.

VII.1   Adapting to the network logic

"Networks are the fundamental stuff of which organisations are and will be made."

Manuel Castells (1996: p.168)

An essential corner stone for the understanding of the changing environment and conditions for success of the cultural and memory institutions in the Information Society is the "network logic", a logic that is of course directly related to the necessity of being interoperable. The network logic constitutes and drives businesses and institutions that have re-organised themselves in order to profit from the opportunities provided by the ICT-based networks and new media in a highly competitive environment.

What is needed to make networking manageable?

"Visions and goodwill." Gertrud Nord, Parliament Archives, Swedish Parliament (Sweden)

"Culture and technology." Syrus Alidousti, Faculty, Irandoc (Iran)

"Interoperability, standards – especially for terminology, economic sustainability, technological expertise, leadership." Ray Lester, Head of Department, Natural History Museum (UK)

Selected answers from the DigiCULT Online Delphi.

As Manuel Castells illustrates, the rise of the "network enterprise" was a consequence of the process of disintegration of the dominant organisational model of the industrial society, of the vertical, bureaucratic, tree-like structure of businesses and institutions. This model proved to be inadequate to cope with the flexibility requirements of an ever more unpredictable business environment, with rapidly changing market opportunities, competitors, and consumer demands.

The network logic provided for more adaptability through strategic alliances, decentralised decision making, projects-orientation, subcontracting and outsourcing. The "network enterprise", the implementation of the network logic in the economy, was not the mechanical outcome of the information and communication technologies (ICTs). On the contrary, heavy re-organisation, doing away with the rigidities of the traditional corporate culture was necessary to be able to effectively implement the new technologies.

There is no reason to expect that this will not be the case with cultural and memory institutions that adapt to the network logic. The frequent assumption that the implementation of ICT can serve as a 'motor' for organisational change in a company or institution is more than questionable. In practice, such notions lead to short sighted and unsuccessful ICT projects. The main prerequisites for the successful use of new media, such as skilled employees (networkers, information or knowledge workers) and radical changes in the workflow are often neglected. Interoperability in organisational terms is not foremost dependent on technologies.

This insight clearly has emerged from the many experiences cultural heritage institutions have made in the last years: "It's no longer all about technology. I think that is how it used to be. When I say used to be, than I am talking about five, six, seven years ago. It's not that long ago, when it was all about technology, technology, and technology. But, really it is only one aspect of a broader picture. The questions are what do you want to do with it, what do you want to communicate?" (Angela Spinazze, CIMI; DigiCULT Interview, May 18, 2001)

VII.2   Towards a cultural e-business model

The following schema illustrates the development towards a cultural 'e-business' model. The use of information technology for data processing in one department (e.g. catalogue or collection management) should proceed, on the one hand to a complete integration of the workflow by means of ICT, and on the other hand to a user-centric, demand-driven operation of the institution.
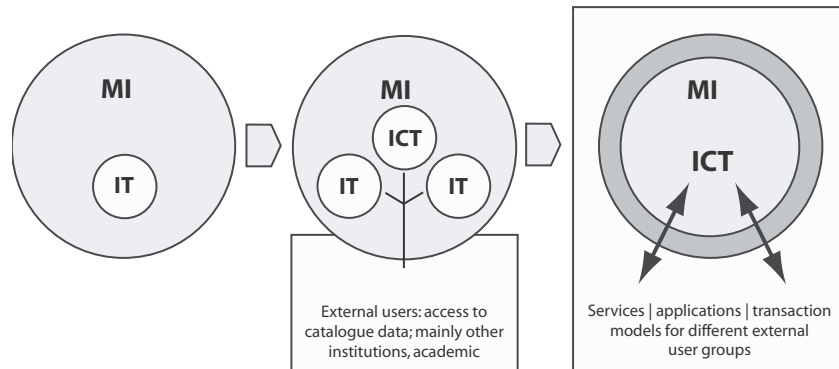
1960/1970/1980:
– Single department/ functions: e.g. catalogues, collection management,
– Data processing
– Users come to institution

ICT = Information & Communication Technology
MI = Memory Institution

Source: Salzburg Research, 2001

1981-1990:
– Single department/ functions: e.g. catalogues, collection management,
– Data processing
– Users of ICT in institutional administration/ communication

1991-2000: (+Inter-/Intranet)
– External users: Online access to catalogue data
– Online presentation

2001 -:
– Re-organisation of internal structures, work flow, external relationships
– User centric approach
– Demand driven services:
  - Commercial (private / business
  - Non-/semi-commercial

Today, many memory institutions lack a clear strategy with regard to their business processes. The piecemeal, one-dimensional approach is often due to the fact that the original impulse for "going online" came from a single department (or even an individual) with a particular interest. Other important factors are small budgets and project-to-project funding.

For memory institutions progressing from a one-dimensional use of ICT (e.g. "having a web site") to new ways of doing their core business is clearly not easy to manage. Furthermore, from the viewpoint of an institution as a whole the Internet will surely not be the essential catalyst. In some specific cases the Internet will help in fostering new working procedures and co-operation. But generally, steps towards a digitally integrated institution will, at least in a first phase, lead to a disturbance of internal politics, and tensions between traditional and new working practices and processes.

It cannot be assumed that new technologies foster structural change within cultural and memory institutions (archives, libraries and museums). Quite the opposite is true: In order to beneficially implement ICT they have to "reinvent" themselves. ICTs are systemic

technologies that affect all practices and procedures of an institution, if properly integrated. Therefore, ALM institutions that aim at optimising their internal and external workflow with ICT have to rethink their complete institutional fabric.

Results from the DigiCULT Online Delphi indicate that experts tend to expect a considerable impact of ICTs on the organisational structures of cultural institutions. They were asked to react to the following statement: "Adaptation to the new electronic environment will lead to a complete transformation of the organisational structures of cultural institutions (to achieve more flexibility)". Of 51 experts who responded, 32 said *yes*, 12 *no*, and 7 *not clear*. Yet, most were sceptical or quite unclear whether this would affect the traditional departmental structure of the institutions. The questionnaire included the statement: "In the next 10 years, cultural institutions will throw their traditional departmental structure over board to achieve full integration of their technological systems." The result for this statement was: *yes*: 14, *no*: 15, and *not clear*: 22.

VII.3 Defining interoperability in organisational terms

The interoperability of a cultural heritage organisation depends on its complete set-up, that includes on the one hand its mission and values, on the other hand its "intellectual capital". While it seems clear that cultural heritage organisations know what their missions and values are, the term "intellectual capital" needs clarification.

The term stems from various origins, in particular from:

– business related new concepts to make visible and expand the "real or hidden value" of companies, that usually is not present in balance sheets and management reports (e.g. Edvinsson, Malone, 1997),

– theoretical thinking about learning organisations (e.g. Senge, 1990; Pedler, Burgoyne, Boydel, 1996),

– concepts of knowledge management that focus to a more or less degree on the role of ICT (e.g. Davenport, Prusak, 1998).

Rather than dealing with these concepts in-depth, a generalised "intellectual capital" approach will be used, that is summarised in the graphic below. In the following paragraphs the different elements and their interconnection will be shortly described. It must be highlighted that the interoperability of an institution depends on its complete set-up and is put to the test in each interaction with its customers and partners. In these interactions "user capital" and "co-operation capital" can be built, maintained, or lost.

The graphic illustrates that, with regard to organisational interoperability, the collections of a cultural heritage institution are only of secondary importance, or rather: partners and users can only access and make use of them, if an effective intellectual capital is in place.
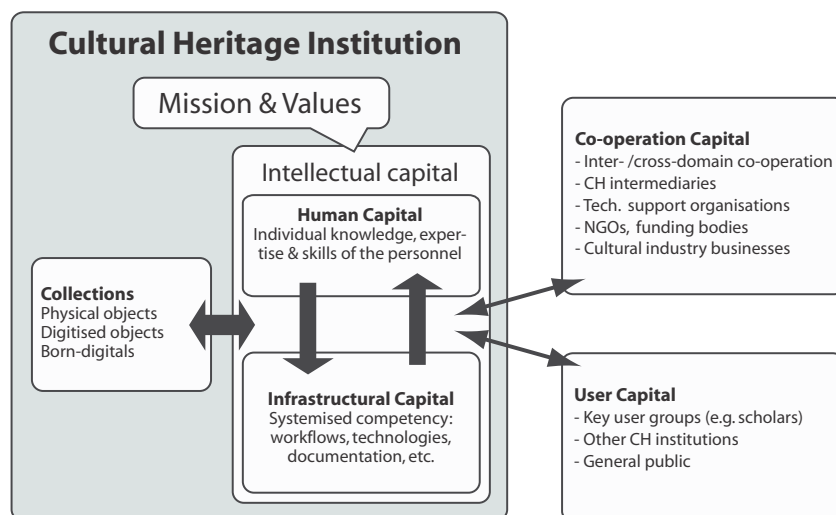
Source: Salzburg Research, 2001

Mission & values

The mission of a cultural heritage institution defines what the institution embodies, how it sees itself in terms of goals and values, and the core functions it has to fulfil. Generally, a memory institution incorporates and is driven by a service ideal, a special commitment to

serve the public at large or particular users of their services whose activities enhance knowledge and education. Maximisation of profit in financial terms usually is not part of the mission and core functions of a cultural institution, rather it would likely be "to provide free access". Therefore, the mission of a cultural heritage institution and the values it nourishes can essentially determine who might or might not be a natural partner for the institution (i.e. affect considerably what lines of co-operations it will develop).

In the DigiCULT Online Delphi, roundtables and interviews, experts from cultural heritage institutions were asked whether they see a change in the "core business" of their institution or of memory institutions generally due the "digital revolution".

The results derived from their answers point in the direction that:
   – the overall mission and core functions of archives, libraries and museums will not change completely,
   – there will be an expansion of core functions: also to collect, manage, make accessible, exhibit, and preserve "born–digital" and digitised objects,
   – there will be considerable changes in how the core functions will have to be fulfilled,
   – with regard to "born–digital" and digitised objects, users will expect new, value added services, products, and experiences.

Overall, with regard to memory institutions and their mission and values it should be highlighted that they rank very high under those organisations that have credibility and are trusted by citizens. These institutions are seen to be centres of trusted knowledge driven by a service ideal. They hold the key to coming to terms with the "information overflow": professional selection and management (often including elaboration and analysis) of information resources they regard to be of value for actual users and for future generations. As Thomas Baiget, Institut d'Estadistica Catalunya, Barcelona, has stated in the DigiCULT Online Delphi: "We are in an inflexion point. E-culture is advancing much more quickly than expected thanks to the oil spread effect. (...) But what is more important is that our institutional image as service provider to the community has improved a lot, far beyond we had expected – and beyond the ‚real reality' that we know from inside." (DigiCULT Delphi, June 6, 2001)

Collections

The collections a memory institution owns or holds are not part of their intellectual capital. They have their own life, or rather the institution brings them to life by providing the means to use cultural objects in different ways (e.g. an exhibition, an illustrated book or an on-/off-line multimedia product).

Today, memory institutions have to come to terms with the radical changes in the ways information is produced, distributed and used. The major institutions are working hard to adapt their infrastructural and human capital in order to be able to collect, make accessible, and preserve also "born–digitals", i.e. set-up and mange e-collections. In fact, as many experts in the field see it, the rise of the "born–digitals" is the main driver of organisational change in memory institutions. For some institutions most or key current objects they have to deal with become "born–digitals". These objects stem from different origins, may it be public administrations, scholarly publishing, or new networked media objects of artists.

Beside the question of how to come to terms with the "born–digitals", there is an even more daunting question of how cultural heritage institutions can unlock the value of their

traditional holdings into the Information Society. The following table gives an overview of the new digital challenges facing memory institutions, which will in part be covered within this study.

Type of institution	Traditional (meta-) core function	Core traditional objects/collections	New digital challenges
Archives	Provide evidence and historical facts	Records Non-current, historical stocks of cultural artefacts (from old manuscripts to documentary films, sounds, pictures etc.)	Public administration becomes digital (e-government): need for life cycle management of (current) digital records Production and distribution chains of related publishers and distri-butors become digital (e.g. broadcasters): – in direct working relationship: need for life cycle management of digital objects – as providers of historical material: need to fit into production chains
Libraries	Make accessible packaged information resources	New, contemporary and old information sources, e.g. books, journals, newspapers etc. Special collections	99% of printed material is digital before, and access to this material would be very useful Products published also/only digital (e.g. scholarly e-journals) Implementation of new tools and environments in the "digital library" concept
Museums	Relate people to objects by exhibitions and other activities	Historical, contempo-rary and new cultural objects	New digital works of art and other forms of human creativity and expression Provide new in-house or on-line experiences with networked media

Challenges for all cultural heritage institutions:
– How to unlock the value of traditional holdings into the Information Society on a broad scale (i.e. from digitisation to the whole management of digitised collections)
– Sustainability of "hybrid" services (i.e. traditional & digital services in parallel)
– Access information for cross-sectoral search & retrieval and use of cultural heritage objects
– Preservation of / long-term access to born-digitals and digitised objects

Intellectual capital

The intellectual capital of an institution (or business) can be split into two different yet highly related components: its *infrastructural capital* and its *human capital*. Both are abstractions of processes and assets that are very common for cultural heritage institutions: for example, a library catalogue or a collection management system (infrastructural capital), the knowledge, experience, skills of the staff (human capital). The efficiency of the intellectual capital of an institution depends on the interplay of the infrastructural capital and the human capital: Infrastructural capital without knowledgeable and skilled personnel is (almost) worthless, staff without infrastructure cannot effectively, if at all, deliver what the users demand.

The infrastructural capital of a cultural institution enables its management and staff to act in certain ways and thereby fulfil its mission and core functions. The infrastructural capital is the *systemised competency of the organisation*. It includes the structure of workflows, databases, intranet/extranet, collection management systems, and all the systems at hand to offer services, to exhibit, to produce cultural products etc.

These examples should not lead to the conclusion that infrastructural capital is "just technology", and particularly information and communication technologies (also most activities might be related to or supported by technical solutions). It also includes the results of intellectual work the institution possesses and builds on (e.g. copyrights), or employee programs which build on existing skills, or the introduction of new skills into the institution.

The infrastructural capital empowers the human capital of an institution, and it stays in the institution when the staff goes home. Therefore, it has to been seen and analysed separately from the knowledge, experience, and skills the members have *individually* and use in the work they do.

In their long history the memory institutions have developed infrastructural capital that enables the handling of physical objects (records, manuscripts, books, film rolls, tapes, pictures, etc.). However, in today's environment they also have to deal with "born-digitals" or digitised objects. Which involves new solutions, such as the implementation of new workflows and procedures, along with new tools to collect, make accessible, exhibit, contextualise, and preserve these objects.

Whereas the major technological challenges concerning the infrastructural capital are described in Chapter 9, "Technologies for tomorrow's digital cultural heritage", this section focuses on the development of the human capital.

Co-operation capital and user capital

The interoperability of an institution, i.e. whether it fulfils its mission, is put to the test in the concrete interactions with customers (users, visitors, clients) and partners (within or across ALM sectors, public administrations, businesses). In these interactions "user capital" and "co-operation capital" can be built, maintained, or lost. An essential factor here are the mission and the values of the institution, that might or might not fit with the "culture" e.g. of commercial enterprises or certain groups of users.

Co-operation capital

The co-operation capital includes for example: Institutional credit, loyalty of partners, trust and openness, and the longevity of the partnership. The co-operation capital can include signed contracts and agreements, or more or less explicit rules concerning for example shared infrastructures, standards, and other resources. But contracts, agreements

and rules only hold or "work out" as long as the supporters or partners fit together; otherwise the co-operation will fail, bringing with it a negligible value, or even being counterproductive, for instance increasing the workload etc., without increasing the competitive advantage.

Key role of new intermediary cultural heritage organisations

With regard to the co-operation capital of cultural heritage institutions, this study in particular highlights the role of intermediary organisations. Such organisations play a key role in providing support, services and networked environments for the institutions. This might include e.g. supporting digitisation projects, offering a portal to digital collections of many different institutions, or building an integrated and protected environment for scholarly or educational uses of digital objects and documentation derived from cultural institutions. Such organisations are extremely valuable in bringing cultural heritage to certain interest groups (e.g. scholars, learners, tourists) and the public at large. Basic indicators for the success of cultural heritage in the Information Society will be, the number of such organisations in existence and the intensity of use. Therefore, beside the traditional memory institutions, these organisations will also be a main focus of the DigiCULT-study.

User capital

In comparison to the co-operation capital the user capital is much more volatile. User demands put a heavy pressure on the institutions, yet, user permanence and loyalty cannot be taken for granted. As Sigrun Eckelmann, German Resarch Council, Bonn, summarises this fact: "Where the pressure comes from for change in the future, I think first comes from the user. The users, at least the scientists, search for information based on their specific needs, using the most convenient, reliable and complete source, maybe even deciding on the basis of cost. They are not concerned with the place of origin of the source, whether it is in Germany, Europe or in the States. (…) There is a growing competition between libraries, archives, museums, and I think those institutions who are not aware of this situation of competition, which is a new situation, will lose out. Because, the providers of funds look to who is using the institution they are funding. If it's not being adequately used, but the neighbours institutions are used, then they will probably lose their funding, to their neighbours." (DigiCULT ERT, Berlin, July 5, 2001)

Furthermore, institutions must meet the growing and expanding expectations of users. The DigiCULT Online Delphi points to a considerable gap between these expectations and what most institutions will be able to provide online.

What users expect

- Immediate access to everything,
- provision of integrated services,
- applications to be user friendly, multilingual, providing full cultural information about the stored objects,
- core information written simply and accessibly, without using jargons or making –
- assumptions about prior knowledge,
- quality and pertinence of the content,
- "processes" rather than static artefacts,
- increased interactivity,
- fully documented collections presented in engaging ways,

- richer imaginative experiences,
- ability to create personal collections and to surface resources in own working or learning environments,
- acceptance as an equal partner; have a "voice" that is heard,
- opportunity to criticise and debate issues, resources and services provided by cultural institutions.

Accumulated from the DigiCULT online Delphi.

Learning how best to serve their customers will be in particular a demanding process for institutions that cater to many different user groups or the public in general. Using a birds-eye view of the market data might provide some insight, but institutions will be well advised:

- to look closer into web trends (e.g. booming features like simple to use weblogs) and what users do when they act as content providers themselves,
- to not count too much on what users say they would like to have (once a services is provided they might have changed their mind), but on how they use services in effect,
- to involve users from the start in assessing new services,
- and to use all means on- and off-line to get feedback from users.

Along with the suggestions above, a major recommendation for institutions that do not serve broad user groups or the general public would be to focus on the key demands of the key customers of the institution, provide at least the standard service level in their field, and follow new developments in the field closely.

User needs are "simple"

The checklist of things users expect from the various institutions as archives, libraries, and museums might not be the same with respect to all entries. But the summary provided by Charles Oppenheim, Professor of Information Science, Loughborough University, UK, of what users generally expect, should be kept in mind:

"Users' needs are simple. They want electronic information, delivered to the desktop wherever they are, even if it is on the move. They want user-friendly search software, and a single portal to do all their searches from. They want to put in a single ID and password to access anything and everything. They want current awareness that gives them exactly what they want and no false drops. They want a choice of titles, abstracts or full text, according to need. They want to be able to hyperlink from one item to another by clicking once on a reference button. They don't care who supplies the information to them, or from where, and they want seamless links between internal information and external information. They want to be able to annotate or amend the materials they get, and they want the right to forward it to as many people as they so wish. They are happy enough for the library to set all of this up for them, but they don't want to have to go through the library or into the library to get access. And, of course, they want all of this at no cost to themselves or to their employers. In other words, users are becoming more and more demanding, and less and less willing to accept statements along the lines that this isn't practicable, or isn't legal. Librarians historically have sided themselves with users and against producers. However, it they fail to deliver what users are now demanding, they will be seen by the users as getting in the way of information access. Furthermore, publishers are indeed keen that libraries shift their allegiance, and that libraries sere themselves more as the allies of publishers than their enemies." (Oppenheim, 2000)

VII.4 Main organisational challenges: Archives, Libraries, Museums

In this section an overview of major challenges for memory institutions, archives, libraries, and museums will be provided. Drawing on opinions gathered in the Digi-CULT Study, experts expect the memory institutions to adapt their intellectual capital (infrastructural and human capital) to the challenges indicated in the following formulations:

– Archives: From "storing objects" to the management of the life cycle of digital / digitised products
– Libraries: From "reading room" to digital information service centre
– Museums: From collections to narrative connections and new experiences

In the following sections, these challenges are briefly described to provide an overview of major shifts within the sector. For each type of institution,

– first, representative answers from an expert will be reproduced to the following questions: "Has your core business changed / expanded, and if yes, how has your core business changed?" and "What changes in your core business do you foresee within the next five years?"
– second, major developments and challenges ahead will be briefly presented,
– third, additional information provided in separate boxes to highlight certain aspects of the developments or challenges.

Archives: From "storing objects" to the life cycle management of digital/digitised objects

Has your core business changed/expanded, and if yes, how has it changed?
"The core business of the archive today is primarily to join the production of documents within the organisation. To implement guidelines concerning preservation of information at the earliest possible moment, sometimes even before it's created."
What changes in your core business do you foresee within the next five years?
"As all information today is created in digital environment the knowledge of IT and management has to be up-to-date among archivists. The dialog with the organisation will concern policy-making and planning rather than paper quality etc."

Gertrud Nord, Parliament Archives, Swedish Parliament, DigiCULT Delphi, May 21, 2001

Archives involved in the digital production chain

Some archives have come very far in adapting to the "digital revolution" in their working environment, i.e. they actually collect, manage, make accessible, and preserve "born-digitals" and digitised objects on a broad scale. Particularly, these are institutions for which it is mandatory to do so, e.g. supporting archives of public administrations, and other archives that have to support institutions that rapidly turn to create products in digital form (e.g. archives of broadcasters). These archives have a highly active working relationship with the organisations they serve, and therefore are involved strategically in the management of the life cycle of digital products (i.e. the question of long-term access/preservation is posed from the start).

Archives that are today involved in the digital production chain exemplify that "the archive" in the digital environment becomes the hub for most activities within an

institution and in the co-operation with others. Because archiving is directly related to and supports the processes of creating new products, re-use of material, research and editorial work and much more. This view of the archive became particularly clear in the case of one of the DigiCULT project partner, the House of World Cultures (see: On the radar).

EXAMPLE

"The archive is the event" – House of World Cultures, Berlin

The House of World Cultures (HWC) is not a classical archive - even maybe being its complete counterpart. Its mission is to promote and support a dialogue between Western and non-western cultures. Since it was established in 1989 it has organised more than 6.000 exhibitions, concerts, readings, lectures and film screenings with artists in particular from Africa, Asia and Latin America.

Yet, the HWC realised that in order to fulfil its mission in the digital environment it needs to develop an archive that supports (1) organising new events and (2) creating virtual events and presentations from the accumulated old and new material. This demands a complete reorganisation of work: When a new event is prepared all information (texts on artists, press/PR material, images, sounds, etc.) first needs to go into the archive and from there the event will be organised, as well as a rich documentation of the event (images, recordings, discussion results etc.) then brought into the networked archive.

Starting points for this reorganisation are two projects: culturebase.net and blue space:
- culturebase.net builds on the rich information base of the HWC on performing artists from all over the world (as well as will include information from international partners),
- blue space is the archive turned into an event, a walk-through interactive encyclopaedia.

Sources: <http://www.hkw.de> and <http://www.oneart.org/projects/bluespace.htm>

Archives outside the digital production chain

Traditional archives that today mainly hold and deal with non-current cultural objects (i.e. not "born-digitals") are in a somehow different situation than institutions that are directly involved in the digital production chain. A question only very few of them will have to answer today is whether they should become "hybrid" at all, i.e. beside holding for example historical films or images also start to collect, manage, make accessible, and preserve "born-digitals". Because these "born-digitals" (and the related copyrights) mainly reside in the digital storage of broadcasters, music companies, image agencies, and the like, who will of course not delete their stocks.

The question with regard to the collections of traditional archives, as well as special collections in libraries and museums, is how these treasures can be unlocked for the opportunities of the information and knowledge society. To do this in a sustainable fashion might by a task smaller or medium sized ALMs due to limited budgets, technological capacity as well as lack of personnel with the necessary knowledge and skills cannot accomplish. Results of the DigiCULT-study suggest that an appropriate strategy would be to set up specialised organisations that support ALMs in developing and managing digital collections (e.g. digitisation, collection management, licensing, etc.). This suggestion will be followed up in the following chapter on new types of cultural heritage institutions.

Libraries: From "reading room" to digital information service centre

Has your core business changed/expanded, and if yes, how has it changed?
*"The library's core business changed/expanded through new (Web) technologies and standards, and
as a consequence through the terrific development regarding digital publications."*
What changes in your core business do you foresee within the next five years?
*"The library will more and more develop from a library offering services to users in reading rooms
and offering bibliographic services to customers mainly in the library sector to a so-called 'Hybrid
Library' which does no longer collect legal deposit material only and give access to that material,
beside the library will offer access to publications, information resources and services world-wide and in
this way act as a 'global portal' not only to the memory of the nation but to the memory of
mankind."*

Renate Gömpel, Die Deutsche Bibliothek, DigiCULT Delphi, July 27, 2001

The library community has traditionally been involved in providing information on and physical access to printed information resources like books, journals, newspapers, and special collections of other (mostly) printed material. Today, libraries have to face what has been termed the "informational turn" in the cycles of production, assessment, distribution, usages, and archiving of newly published – but increasingly not printed – information resources.

Depending on which type of library one looks at there are different pictures of the library of the future. For most general libraries it is the "hybrid library" concept, the traditional library with additional digital media to hand out (e.g. CD-ROMs and DVDs) or accessible through networked computers (i.e. "the global networked information" at the fingertips of their patrons).

University and other research libraries see themselves becoming in part "digital libraries", i.e. libraries that provide their users also with access to e-journals and other e-material from various publishers. In doing so a key challenge is coming to terms with licensing agreements, i.e. their costs, administration requirements, and other implications as for example the question of long-term accessibility and preservation of the information resources.

Licensing and the issue of long-term archiving and preservation

Licenses should include commitments with regards to long-term archiving and preservation. IFLA's Executive and Professional Board has approved a set of Licensing Principles, which should prevail in the contractual relationship, and written contracts between libraries and information providers. Aspects that are touched upon by these principles include: the law, access, usage and users, and pricing. The text of the principles has been prepared by IFLA's Committee on Copyright and other Legal Matters (CLM), and has been approved by IFLA's Executive Board in March 2001.

In the introduction, paragraph 2.4., the document states:

*"Libraries generally provide patron access to such information via access to remote publisher or vendor
sites, rather than library-controlled sites. Yet, the tasks and costs of libraries and information providers with
regard to long-term archiving and preservation of electronic resources are disturbingly unclear. While a
license cannot resolve this complicated set of electronic archiving issues, it will, generally, recognise them and
express a set of commitments or expectations on the part of the contracting parties." (…)*

Under the heading "Licenses and Perpetual Access" the following principles are recommended:

*P22. A license should include provision for affordable, perpetual access to the licensed information by
some appropriate and workable means.*

P23. A license should address provisions for long-term access and archiving of the electronic information resource(s) under consideration and should identify responsibilities for these. (IFLA, 2000)

The full text of the IFLA Licensing Principles is available on IFLANET at: <http://www.ifla.org/V/ebpb/copy.htm>

The challenge of becoming "hybrid": Finding the right balance between traditional and new services

The term "hybrid library", coined in the mid 1990s, was a clear sign of the recognition that memory institutions in the digital environment have to bridge two different worlds, the physical and the digital, and to become something different than they were 20 or 200 years ago.

Taken in its full meaning, the term does not mean that libraries just have to add some new digital services (e.g. online reservation or e-magazines) to the set of services they traditionally offer to their clients. The challenge is clearly not one of addition but qualitative, namely to find the right combination and interrelations of the physical and digital spheres. Librarian Heikki Poriola writes: "Are there really still people who see the 'library' in terms of the previous century's tasks? Developing libraries is about much more than preserving literature in book form. It is about being centres of information; whatever the information and whatever its format." (The Finnish Library Journal, 2000)

As Chris Rusbridge, former Director of the UK Electronic Libraries Programme, puts it: "The name hybrid library is intended to reflect the transitional state of the library, which today can neither be fully print nor fully digital. As we have seen, in so many cases the results of adding technology piece-meal are unsatisfactory. The hybrid library tries to use the technologies available to bring things together into a library reflecting the best of both worlds." (Rusbridge, 1998)

Beside their traditional holdings and offerings, (major) libraries will have to collect, organise, preserve and give access to new media (electronic documents and artefacts, 'born-digital' and digital surrogates) and/or direct user to such resources. Yet, for the next decades, the analogue holdings will remain the core assets of libraries (and other memory institutions) and their legacy to many generations. Thus, they will continue to use their tried-and-true methods of making materials accessible to the relevant user groups. Yet, alongside and interrelated with the physical space, there will develop a 'cyber-place', online services, and virtual communities of interest and practice. Given limited financial resources, memory institutions will have to find the right balance between these information and knowledge spheres.

EXAMPLE

Think big - also in terms of physical storage

Misconceiving the relation between print and online can lead to unpleasant results as for example the ones the new San Francisco Public Library had to face. The library cost $140 million and opened to the public in 1996. It has been, beside other things, heavily criticised for not having planned enough space to accommodate new printed material. One reason for this was that the facility became the home of 400 electronic work stations (with the infrastructure having a capacity for 700 more). In an evaluation study, one of the objectives for a reorganisation of the library was formulated as discovering "means to increase space for future collection growth".

San Francisco Public Library: Post Occupancy Evaluation. <http://206.14.7.53/documents/poe_executive_summary.html>
Krohnengold, Jay (1996): Pacific Bell Sponsors Opening of San Francisco's New Main Library.
<http://www.kn.pacbell.com/news/1996/sflib2.htm>

Building and providing access to digital libraries

Starting from some natural science pre-prints made downloadable from a server, building digital libraries has become an occupation for "e-librarians" in many organisations. According to a working definition of the Digital Library Federation (DLF) from 1998, digital libraries should in fact be seen as organisations "that provide the resources, including the specialised staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities". (Waters, 1998)

In the last years, digital library collections have been a field of much development and achievement as well as uncertainty and concern for the library world. For example, Daniel Greenstein, Director, Digital Library Federation, summarising findings from a DLF-survey in 2000 to identify the major challenges confronting research libraries, writes: "With astonishing unanimity of opinion and clarity of voice, respondents pointed to digital collection development as their single greatest challenge." Yet, the whole issue "seemed to exist under a cloud of profound and unsettling uncertainty" (Greenstein, 2001), with regard to matters ranging from necessary library staff qualification to long-term access and preservation of e-material.

Coming to terms with e-material really demands looking into the radical changes in the publication and communication processes in the scholarly world and beyond. There is already the "scholarly publishing crisis" due to an imperfect marketplace, and a sense among the academic community "that the entire system of scholarly communication is in danger of collapsing unless there is concerted action by and within the community to promote less expensive channels for publication, dissemination, and archiving of scholarly research". (Webster, 2000) Suggestions for solutions to this crisis point decisively to electronic means of publication and in particular to the creation of online peer review mechanisms.

Although, the publishing crisis might have an cathartic effect on publishers, libraries, and authors, there are also other challenges ahead. Commercial publishers and professional societies today produce publications not only in print form but also electronically. They aggregate and organise their e-material, including the vast stock of their older digital material, and set up or commission subscription-based services like searchable e-repositories that replace traditional library functions (e.g. Questia.com or Ingenta.com). This challenge will be further addressed in Chapter 8, "Exploitation".

Finally, the impact of the "informational turn" referred to above will, particularly from the view-point of the scientific communities, be much broader than becoming hybrid and develop new digital information channels and services. The question is, whether the "digital libraries" of the future will also provide the necessary tools and environments (including bandwidth) for:

- intelligent searching, filtering, visualisation, and various usages of information resources (e.g. annotation, comparison),
- new forms of collaborative online work, bundling of information resources, peer review, and citation of information resources,
- virtual reality demonstrations, simulations, and other new forms of information objects.

A major question (mostly for scholars) therefore is, how far the concept of the "digital library" will expand into a digital information service centre, i.e. also include and come to terms with the emerging new toolboxes of knowledge workers and the new forms and relationships of their products.

Successful hybrid library implementation

The following is a short list of the recommendations that stemmed from the UK eLib-project HyLiFe (The Hybrid Library of the Future) that formally ended at the end of 2000. Distinctive features of HyLiFe, which have added to the value of the recommendations given, included: its diverse consortium, its non technological approach and its emphasis throughout on evaluation.

1. Secure the support of senior institutional managers and heads of departments (especially the Head of Library and Information Services).
2. Work collaboratively. Bringing different perspectives and experience together with a common purpose reaps dividends.
3. Establish strong links with academic staff and get them involved. Students follow the recommendations of their tutors.
4. Consider scalability from the beginning not at the end. This will save much time and effort.
5. Secure effective technical support from the start by making detailed agreements as to who, what, when, where and how often.
6. Concentrate on resolving authentication and copyright issues.
7. Devise policies on the provision of services such as loans, photocopying, document delivery etc.
8. Promotion should be vigorous and ongoing. Face to face promotion is the most effective. Tell people what is in it for them.
9. Focus on content rather than design, ensuring that what is delivered is useful, not just attractive.
10. Plan training and support for users and ensure that they have the confidence to use information technology.

For the complete text see: Wynne, Peter; Edwards, Catherine; Jackson, Maureen (2001): Hylife: Ten steps to Success. In: Ariadne Issue 27, March 23, 2001. <http://www.ariadne.ac.uk /issue27/hylife/>

Museums: From collections to narrative connections and new experiences

"Asked about our core business, it is really easy to answer, it is defined by ICOM-statutes, and we are dealing with collecting, preserving, researching, documentation, and last but not east, presentation of cultural heritage. In this way we are affected by IT-technologies in many, many ways.

I want to add some aspects from the more practical point of view. I want to stress the interior workflows where we are confronted by what I call 'the finger on the tender spot', that is the use of new media and IT-technologies often makes very clear how vague traditional terminology and vocabularies are, and often we are confronted with very inconsistent systematics that have been produced over the last 150 years. So the use of computerised documentation systems means often to revise the whole historical documentation.

The other point is growing velocity, that is what McLuhan has called new media, a massage not a message, a massage, it is very physical, it affects us very physically in the interior workflow of the museums. The use of e-mail systems, databases and so on makes work very, very quick and that is where most of our colleagues have problems. The next point on the interior side is new products and new problems, for example, long-term archiving, or hybrid archives.

On the exterior side, that is the outreach of our museums, I want to stress that our audiences
expect us to produce new, mostly interactive and personalised access to out collections. That is really
a challenge and, of course, we have to find the new position of our museums, to talk about 15
different museums, we have to find a new position in the information society. We are confronted
with the virtual museum and there is the problem between the museum as a network and the
museum as a building."

Andreas Bienert, Prussian Cultural Heritage Foundation, State Museums of Berlin,
DigiCULT ERT, Berlin, July 5, 2001

As the above expert statement makes pretty clear, museums today are facing many challenges concerning "back office" operations as well as their interaction with (online) visitors and users. Some of the challenges addressed, like documentation of objects (metadata) and long-term preservation of digital objects are dealt with in this study under the section technology (although not looking into questions like standard databases or collection management systems).

Here mainly the "exterior" side of museum, galleries and cognate institutions will be dealt with. Many of these institutions are aware of the fact that if new technologies are used just to display collections the new opportunities provided by ICTs will be missed. They realise that their core business has more to do with connections rather than collections, connecting people in-house as well as online to cultural artefacts by showing relationships between them, providing contexts, interpretations, explanations, and "telling stories".

Therefore, institutions that traditionally have a strong focus on providing exhibitions should, as a participant of the DigiCULT Online Delphi articulated, conceive themselves as "programs", programs that realise narrative connections with cultural heritage objects which add to new experiences:

"The artefacts represent a post-industrial / post-modernist culture but most of the cultural institutions that house them are defined by an industrial architecture. A new interpretation of the word 'museum' or 'gallery' would allow integration of the concept by 'redefining the context'. The cultural institution could be redefined as a 'program' that aims to create an appreciation for the artefacts where-ever they exist." (Phillip Charlier, Loundoun House Museum; DigiCULT Online Delphi, June 9, 2001)

The focus in this part of the study will be primarily on how co-operation on various levels can support museums, galleries and cognate institutions in shifting from an orientation on collections to new "connections", from "raw data and objects" to creating rich environments and providing knowledge and new experiences through creative use of networked multimedia.

The DigiCULT navigator to becoming a hybrid institution

By becoming hybrid institutions, cultural organisations struggle to find the balance between the analogue and digital worlds. Institutions that become hybrid (national libraries, research libraries, TV archives, etc.) are forced to bridge two different worlds: the physical and the digital. In their long history, memory institutions have developed infrastructure capital that is directed toward the handling of physical objects (written records, manuscripts, books, film rolls, tapes, pictures, etc.). Today these same institutions also have to deal with the intangible objects, the born digitals. This will require new overall solutions, the implementation of new procedures and workflows, and new tools to collect, make accessible, exhibit, contextualise and preserve these objects.

Memory institutions should be able to work with the tangible and the intangible, providing both their traditional services (e.g. books and other printed material) and new online services. However, with limited financial resources, memory institutions will need to find the right balance between the information and knowledge spheres.

15   **Taking care of traditional as well as new digital resources, hybrid memory institutions need to be prepared to face additional challenges related to: human capital and the availability of skilled staff, cost of ownership for technologies, managing the life cycle of digital resources, as well as the cost to co-operate in a networked environment.**

VII.5   Challenge: Developing the human capital

"As a curator in a small institution I feel the lack of employee expertise in technological areas is one of the most pressing problems for adoption of new technologies. Definitions of work practices are focused on exhibition and research development placing technological expertise low on the list of qualifications for employment. In a small institution where no staff are hired specifically to perform these functions the responsibility falls on individuals to develop policy and programs often with scant knowledge of development in other cultural institutions. Individual achievements are all wrought in the face of either instructing and training other staff members while at the same time needing to keep abreast of technological developments and carrying out the duties for they are employed.
An institution needs to have an understanding of how technology will impact on the different core business areas, and ensure staff training and employment guidelines are adapted to fit these needs. Technological standards are often notoriously slow in their development: metadata standards outside the Dublin core, and thus small institutions need to have a resource which they can approach which will outline the best direction when adopting these standards."

Geoff Barker, University of Sydney, Macleay Museum,
DigiCULT Online Delphi, May 22, 2001

Today, memory institutions are forced to adjust to the digital environment and implement new technological solutions at a speed rate that puts enormous pressure on the personnel to acquire new knowledge and skills. But, becoming part of the information society is not just about implementing technologies, there are also many changes with regard for example to organisational and financial issues. Therefore, human resources development will be a major challenge and key task for cultural and memory institutions.

Adapting all human resources to meet the challenge

For cultural and memory institutions to be successful in the information age will call for vision, leadership and high management standards. It must be recognised that the personnel at all levels will be decisive for success (or failure) in the digital economy. Therefore, adapting the competencies of all human resources in cultural institutions, not only with regard to IT experts, is necessary.

Part of this is that the institutions more then ever need people, management and personnel, that care, are committed, are able to move things, "infect" others within the institution as well as external partners with new concepts or solutions: "It depends on the people. If you are interested, personally, you can move it, and if you're only depending on your institution, your institution will not do anything. It comes from the people first of all. I think the personal resources, what we can give in from ourselves, this is important. For example: if you are able to interest the ones who are giving the money, if you really are able to infect them with your ideas, you will perhaps get something in reward." (Elke Freifrau von Boeselager, German Foreign Office, Political Archives and Historical Service; DigiCULT ERT Berlin, July 5, 2001)

The interplay of infrastructual and human capital is decisive

There is a not uncommon viewpoint, that "the real value" of memory institutions is in the librarian, archivist, and curator and not in the collections. For example: "Is it not possible that the value of libraries is not in the collections, but in the librarians? In a

turbulent technological environment, perhaps a change of scenery is required. Redirecting the focus of librarians' attention and resources from the development of ‚digital libraries‘ will be vital to the future of the profession. The time has come to invest in people and not in technology. Central to the vision of the new digital library is a digital librarian / know-ledge worker who cares about people." (Kuny, Cleveland, 1998)

Although this is somehow very true, it is a view of intellectual capital that ignores or underestimates the role of the infrastructures of the institution, and might even lead to opposing people and technology. In fact, the efficiency of the intellectual capital of an institution depends on the interplay of the infrastructural capital and the human capital.

IT-personnel as a key resource

With regard to IT personnel cultural heritage institutions experience that they are running into severe problems. On the one hand there is a growing expectation that they should become an essential part of the digital environment, and even spearheading new developments, on the other hand, particularly in smaller institutions, technological expertise is lacking.

In the DigiCULT Online Delphi, experts were quite sure with regard to the statement "Cultural institutions will employ IT personnel in order to develop and maintain technological advanced services". Of 51 experts who responded 44 said *yes*, only 2 *no* and 5 *not clear*. Yet, employees who can develop, build and run digital networks are strongly sought after. According to a study by International Data Corporation <http://www.idc.com>, "The Internet Economy – An Employment Paradox?" in 2002 there will be a shortage of about 600.000 IT network experts in Europe. For example, the estimation for open positions in IT that cannot be filled amounts to 188.000 for Germany, and 29.000 for Austria. As the number of qualified IT personnel is limited, the cultural sector will have to compete for employees with other industry sectors.

Skills check list for running an information gateway

Providing new services demands bringing together skills from various professions. Within the DESIRE project, Development of a European Service for Information on Research and Education (1998-2000), a skills checklist for running an information gateway has been developed. According to this list, an information gateway would ideally draw on the following bundle of skills:
- technical staff: technical implementation, technical support, web server administration
- content: subject specialist, information cataloguing
- general roles: project management, finances, publicity and promotions

Source: <http://www.desire.org/handbook/1-3.html>

It must be noted that also in traditional, IT-related areas of memory institutions a consi-derable update of knowledge and skills is necessary. Such areas are for example: In cataloguing some specialist knowledge and expertise will be required by the staff responsible to create metadata; with regard to the preservation of digitised and born-digital sources it might even be necessary to create a new profession, that of a digital preservation specialist. (cf. Mannerheim, 2000)

As in many other areas, the integration of new knowledge into the professional edu-cation is rather slow in comparison to the speed of technological change. There is a huge

demand for specialised technology-related courses in the cultural heritage field. (See for example the courses offered by the Humanities Advanced Technology and Information Institute at the University of Glasgow; in particular the "MPhil in Digital Management and Preservation" <http://www.hatii.arts.gla.ac.uk/Courses/DigitalMPhil/>)

Connect and incorporate to a higher degree the knowledge and expertise of the human into the infrastructural capital of the institution

It has to be highlighted that an institution cannot own, but only lend, the knowledge, experience, and skills its members possess. When an expert believes he is better off in another business, he takes his competencies with him. Only if some knowledge or particular way of doing things finds its way for example into the standard workflow does that knowledge or skill become part of the infrastructural capital of the institution. Therefore, one of the most important things for institutions is to find new ways of how knowledge, expertise and skills can be incorporated into the infrastructures itself, for example by developing recommended systems that can, on a general level, give advice and point to relevant material like an expert would.

Develop the right mix of competencies to be interoperable in the new digital environment

The term human capital includes different individual properties and competencies of members of the board, the management, and the staff as for example: leadership, commitment, professional knowledge, experience, and specific skills. Memory institutions must think about and address the question of the relative importance of the different segments of the human capital they need in order to be interoperable in the digital environment. In doing this, they must be oriented towards future challenges and relate their existing knowledge base to upcoming new ideas, concepts, new services to be offered, new products to be developed.

For a "hybrid" institution there will be no or very view skills that are "ageing" in the sense that in the foreseeable future they will no longer be needed. The rule of thumb to be successful with regard to the human capital will be: on the one hand to keep and further improve the key traditional competencies that are valuable in the physical as well as digital sphere, and on the other hand to develop, incorporate and share new competencies that are necessary in the digital environment. Therefore, the key to success is the right mix of competencies.

Provide higher-value services

The key role of the memory institutions in the future cultural economy will be to provide digital access information (object descriptions, metadata) and digital cultural objects. Yet, it should be clear, that the most important intellectual capacity of a memory institution lies in the contextualisation, interpretation and explanatory narratives it can bring to networked cultural heritage resources.

One of the main things experts in memory institutions expect from the new technologies is that they allow users to find online all basic information related to material they are interested in (in a "hybrid" institution e.g. where certain records reside, if they are available, when and where they can be used, etc.), and, in a digital library or archive, even get to the material itself. The experts expect that the technology will take away from them the effort to provide (basic) information and materials, and, consequently, they can focus on higher value work and support clients in-house or online with their expertise:

"When I look back on the last ten years, we got a lot of letters from researchers just asking these questions: How do I get access and which way? What letters do I have to give? When we use the Internet for all these technical things, and maybe then take the next step and use the Internet to describe our collections and give information about the contents of our archives, we are able to be a little bit freer to answer the researchers questions coming really to the collections themselves, to special questions. We are specialists and it is just more rewarding for your job." (Elke Freifrau von Boeselager, German Foreign Office, Political Archives and Historical Service; DigiCULT ERT, Berlin, July 5, 2001)

There is some evidence that this hope might come true, due to the fact that scholars and students "do their homework" and then approach the personnel in the memory institutions (in-house or on-line) with questions that are intellectually more demanding. But there is also an increasing demand for faster, ideally immediate delivery of information:

"The information services have completely changed. When we did not have access to the Internet then people, of course, came with basic questions, 'Do you have that and that book?', and so on. Now the basic questions are solved, people are doing their research work at home, 24 hours a day and they come to us with complex questions. What we are not trained to do is to react as quickly as we should to a library that's open 24 hours a day, in terms of staff and organisational aspects." (Hans Petschar, Austrian National Library; DigiCULT ERT, Berlin, July 5, 2001)

In-house staff use is unlikely to decline in hybrid institutions

There is also evidence that for hybrid libraries or archives in-house staff use is unlikely to decline in the digital arena. In a hybrid environment managers will have to enable the institution not only to provide online services, but also to come to terms with more physical handling of material. Because, users "mine" online catalogues extensively and then show up in the library or archive with longer lists of material then before. Furthermore, for digitised as well as "born digital" resources on the Internet, the need for some higher-value online information and support tasks can be expected.

The DigiCULT navigator to human capital as key resource

Today, memory institutions are forced to adjust to the digital environment and implement new technological solutions at a speed that puts enormous pressure on personnel to acquire new knowledge and skills. Therefore, human resources development is a key task in cultural institutions. This not only applies to IT competencies; highly qualified personnel are necessary at all levels.

In the Information Society the most important intellectual capacity of a memory institution lies in the contextualisation, interpretation and explanatory narratives it can bring to networked cultural heritage resources. Whereas there is substance in the view that "the real value" of memory institutions is in the librarian, archivist or curator, in fact, the efficiency of the intellectual capital of an institution depends on the interplay of the staff (human capital) and technology (infrastructure capital).

16 **Cultural institutions should put human resources development high on their priorities list.**

For hybrid institutions this means coming to terms with the following challenges:
- be prepared for more physical handling of material as well as more competencies needed to meet the intellectual demands of users,
- keep and further improve the key traditional competencies that are valuable in the

physical as well as digital spheres,

– monitor, develop, incorporate and share new competencies that are necessary in order to be interoperable and expose the existing human capital to upcoming new ideas, concepts, new services to be offered and new products to be developed.

17 **Cultural heritage institutions should in particular further develop the knowledge, expertise and skills of their staff in relation to tangible and intangible cultural resources, i.e. providing object descriptions, contextualisation, explanations and interpretations.**

With regard to IT personnel, cultural heritage institutions are running into severe problems. Particularly in smaller institutions there is a manifest lack of technological expertise. New areas of expertise must be covered e.g. in the development of digitisation projects as well as the preservation of digitised and born–digital sources. Furthermore, there is a need to update knowledge and skills in traditional areas related to the digital environment, e.g. metadata creation in cataloguing.

18 **Cultural heritage institutions should develop information management know-how, intensively share IT-expertise, and actively involve their staff in hands-on training programs.**

19 **Cultural heritage associations and educational institutions should set measures to speed up the transfer and integration of knowledge into professional training and develop special courses for key areas such as digital management and preservation.**

20 **With regard to basic qualifications of their staff, cultural heritage associations should promote the adoption of the European Computer Driving License.**

VII.6   Challenge: Developing co-operation capital

Co-operation capital is a key area to the success of cultural heritage institutions in the networked environment. The many strategic partnerships and alliances developed in the Internet business world in the last decade testify to the fact. While companies focus on their core business and assets, they also form partnerships and co-operate with others to succeed in new markets. Today, cultural and memory institutions will have to adapt to this concept. It is not a completely alien concept to these institutions, in particular for libraries co-operation has traditionally been central to many of their operations (e.g. OPACs, inter-library loan systems). Yet, in the new environment they and other institutions face the challenge to define the "digital commons", in for example building and offering shared digital libraries or archives.

As Abby Smith, Director of Programs, CLIR, writes with regard to the library sector: "Building digital libraries also puts libraries in a new relationship with one another in the as-yet ill-defined digital commons. One thing this digital commons does not reward is competition among libraries. The digital commons rewards co-operation in building collections, in sharing resources, and in developing standards for interoperability." (Smith, 2000)

In discussing issues of co-operation, experts pointed to many opportunities co-operation can bring to their institutions and the cultural heritage field in general. This chapter will:
- describe shortly some general advantages of co-operation,
- focus on the importance of co-operation in building rich environments for digital cultural heritage,
- and address the issue of cross-domain co-operation in the cultural heritage sector.

General advantages of co-operation

It is clear that co-operation has costs associated with it and that a cost-benefit analysis, if anyway possible, might not in each case result in an overall gain. Yet, there are many advantages that might or might not be directly linked to financial issues.

Strength in negotiations with commercial players

A major opportunity of co-operation lies in the strength it gives to institutions in dealing with commercial players from the cultural industries. "Co-operate, co-operate and co-operate" is the conclusion and recommendation Charles Oppenheim, Professor of Information Science, Loughborough University, UK, draws from a description of the strong position library consortia can gain in negotiations with information industry players. Strategies and tools of library consortia include for example, ability to bulk buy large amounts of electronic information for a fixed fee (e.g. the National Electronic Site Licensing Initiative service) or agreed statements of policy outlining principles by which each library will abide by, e.g. with regard to appropriate subscriptions prices for electronic journals. (cf. Oppenheim, 2000)

Legitimise existence and public funding

Co-operation is also seen to be a major factor in legitimising the existence and public funding of cultural heritage institutions. In particular smaller institutions with special subjects seem to experience a pressure to legitimise their existence and the work they do. As Jan Baeke, Netherlands Filmmuseum, Amsterdam, describes the situation of an institution

that has only a small source of people interested in cinematography from a historical point of view:

"Legitimising your institution, I think that is a problem museums are faced with more than libraries or archives perhaps, because I can imagine that a lot of people come to libraries because they need the information. At the museum you are always faced with people who have a lot of different choices to make. (...) And I think for the Filmmuseum it is very important to find partners who enable you to legitimise your existence, and to get the people you want to reach more attracted to your museum." (DigiCULT ERT, Berlin, July 5, 2001)

Reaching critical mass and new perspectives on different collections

Co-operation is a basis to reach a critical mass of networked content and, as a participant in the DigiCULT study described it, "combining things that we could not have combined before". The huge investments in new technologies seems only legitimate, if the co-operative use of these technologies brings about new value that has a broad impact on cultural experience and inclusion, knowledge and education:

"I want to stress that co-operation legitimises in a way the use of IC technologies. There will be network services or no services, that is my opinion, and if we do not achieve a very new quality of information by use of IC technologies then we cannot legitimise expensive and very time-consuming efforts in this field. So we need a new quality of results, new views on our history, new views on our collections, and this means co-operation between different institutions, combining things that we could not combine before. It is absolutely necessary to achieve this kind of co-operation." (Andreas Bienert, Prussian Heritage Foundation, State Museums of Berlin; ERT, Berlin, July 5, 2001).

Partnerships with mediators as bridges to major sponsors

Due to the tradition of memory institutions, their specific mission and values, the "fit" necessary between them and possible sponsors from the business world has not always been apparent, in certain projects. Here mediators (e.g. media companies) that understand the different perspectives and cultures can be helpful in building a bridge. Bettina Schoch, Pandora New Media, Berlin, describes the benefits of such partnerships:

"Our partners in the cultural sector often have not enough money for the projects they are heading for. We are always trying to help by making relations and contacts to business partners. We know big industry partners and we know from cultural projects how their house policy is. And we are always trying to really find together with institutions and industry partners a concept in which both sides can benefit from. Of course this is sometimes not that easy because, well, what you might hear is 'Today, you are the twentieth person who calls us for a digitisation project ...'" (DigiCULT ERT, Berlin, July 5 2001)

Co-operating to unlock the value of cultural heritage resources

Today, cultural heritage institutions realise that the networked media offer them new opportunities to unlock the value of their information, objects, and knowledge to their users and the public at large. In previous chapters the organisational changes have been addressed that today take place within the institutions. These changes are oriented towards "re-inventing" the institutions in terms of workflows and procedures. They are focused on the internal chemistry, the "back-office" operations. Yet, these changes in how things are done are of course for the most part directly related to ICT-based services the institutions provide to their users. Furthermore, unlocking the value of cultural heritage resources is

essentially a co-operative enterprise, based on partnerships and collaboration on all four layers distinguished by the DigiCULT four-layer model.

**Unlocking the value: core functions
of cultural heritage organisations**

Core functions | Analogue | Digital | + VALUE

New types of cultural heritage organisations
- Contribution, exhibition, manipulation
- **Provide user personalisation & community**

Some Museums
- Recommendation, explanation, narration
- **Provide expert knowledge & creativity**
- **Transaction / interaction environments**
- **Context**

- Paintings, sculpture, records, books, ...
- **Provide objects**

Libraries Archives Museums
- **Provide access**
- **Digitised objects / born-digital resources**
- Finding aids, catalogues, registers
- **Databases**

**Provide long-term access
(preservation of digital objects)**

Source: Salzburg Research, 2001

"Raw content" is not good enough

The DigiCULT four-layer model distinguishes different ways in how cultural heritage institutions can create value. On the first two layers there are databases that contain descriptions of their holdings (layer 1) and digital surrogates of objects as well as objects that have been born-digital (layer 2). Providing networked access to information about holdings has long been a domain of library co-operations (e.g. library OPACs), and today also the other cultural heritage institutions are heading towards making their registries or collection catalogues accessible online. Furthermore, many institutions already provide access to digital surrogates of objects.

These online resources are of course of high value for scholarly and professional uses. Yet, based on the experiences made in recent years, experts doubt whether making huge volumes of object descriptions and digital images accessible provides value to broader, lay audiences. Especially in museums that traditionally cater to these audiences with exhibitions and educational programmes there is a growing awareness that providing merely "raw content" is not an adequate way of fulfilling their mission. Even if they provide their raw content to various projects that aim to display it and somehow add value, curators may doubt whether this is something that shows that they do their job well. As Oliver Watson, Head of Digital Projects, Victoria and Albert Museum, London, describes the situation:

"I am interested in the issue of where added value lies. It is certainly our experience that as a large institution full of content – not much of it digitised, but we are working on that, what we see are lots of institutions and partnerships elsewhere coming to us for our raw

content. What the question for us is, how does providing raw content, for however worthy projects outside, help us to deliver, as it were, our mission and show our paymasters that we are still worth the £30 million a year that it costs – is the raw data, the raw object, images, is providing those digitally alone going to satisfy?" (DigiCULT ERT, Edinburgh, July 24, 2001)

From this statement at least two major questions come up: What is today seen as more than "raw data or content" and how can institutions enrich and add value to it, in order of creating something that is more valuable for potential users (including broader groups of users: e.g. in the educational sector)?

How to add value and create new contexts online?

Asked what new online approaches are there to add value to and create contexts for cultural heritage collections, participants in the DigiCULT Online Delphi suggested various concepts and tools. Generally, as Jean-Marc Blais (Director, Programmes Development, CHIN) has noted, in the virtual environment "the challenges are the same as the ones facing museums when creating physical exhibitions: How to be relevant to our audiences, how to cater to their needs, how to attract and keep new audiences." (DigiCULT Delphi, June 11, 2001) Yet, as the following suggestions show, for "virtual curators" there are or will be many new approaches available to attract and involve online visitors:

- Heritage collections closely linked together in a variety of navigational ways,
- semantically rich, adaptive information contexts for the understanding and consumption of artefacts (digital or otherwise),
- have the ability to view collections from multiple points of view,
- multiple perspectives and multidisciplinary approaches,
- online virtual reality museums, live conferences, multimedia products,
- video clips online telling the story of the art or artefacts in the gallery,
- artificial intelligence and automated response systems to communicate with personalities of the past (allowing current ideology to challenge that of the past),
- having people add their own stories and meanings to existing collections.

Creating rich environments

One clear route to offer more than "raw data" is what experts call enriched environments or rich interlinking of diverse materials. Such environments for scholars might have an emphasis on abstracts, indexes, bibliographic information, reviews, commentaries as well as the full text of primary and secondary literature, and for communities e.g. in the schools and lifelong learning field surely would need a higher degree of graphics, images, sound files and even moving images.

A basic requirement to achieve this are generally cross-sector interoperability and in particular metadata. As Dennis Nicholson, Directorate of Information Strategy, Strathclyde University, states, "the creation of enriched environments (…) we certainly tend to see very much as a metadata issue. The better the metadata, the more descriptive and controlled and structured the metadata, the better chance you have of creating user-adaptive environments, by which I mean different landscapes for different things for users for different kinds of purposes." (DigiCULT ERT, Edinburgh, July 24, 2001)

Metadata that would allow for an interlinking of the sources into for example e-learning environments would need to include elaborated descriptions and interpretations of objects that can be integrated in higher level contextualising structures, e.g. historical concepts and narratives. The creation of contextualisations that support processes of learning,

understanding, interpretation might be done within single institutions (e.g. a museum exhibition team), yet experts see the building of such intellectual spaces clearly as the collaborative product of diverse communities.

Erik Jul, Executive Director, OCLC, highlighted the importance of collaboration and lists some of the communities needed to participate in creating digital contexts for cultural heritage resources: "Co-operative and collaborative efforts are essential to identify and harness the resources of communities of interest that include scholars, knowledge management professionals, subject matter experts, students, faculty and teachers, and lay users. Each of these parties at interest can participate in on-going effort to create context for digital cultural and memory resources." (DigiCULT Delphi, July 16, 2001)

It is clear that such communities do not easily emerge outside of targeted initiatives, programs and projects, because creating contexts is a complex enterprise, which demands to have vision, commitment, leadership, and appropriate resources. Yet, new technologies can be supportive in connecting communities of interests as well as the results would be completely new types of virtual collections and exhibitions.

As Jul describes this promise inherent in creating rich environments: "Moreover, technology enables the formation of communities of interest and supports synchronous and asynchronous exchange of information among community participants, subject-matter experts, knowledge managers, and resource users of all sorts. This rich environment both demands and enables the creation of interactive, real-time, multi-dimensional, and dynamic virtual collections. Traditional exhibitions, created and staged for a time, limited in geographic reach, and often intended for undifferentiated mass audiences, will be augmented and, in some cases, replaced by ongoing, dynamic exhibitions or customised, on-the-fly exhibit." (DigiCULT Delphi, July 16, 2001)

This description points to the feasibility of a new way of generating virtual cultural exhibitions, events, or products that resemble the industrial "from file to factory" approach. In embryonic form such an approach from digital collections to virtual products was for example realised in the automatically generated "virtual resource packs" provided by SCRAN (see case study in this chapter).

Providing expert knowledge & multimedia creativity

The DigiCULT four-layer model highlights the importance of bringing together expert knowledge and new creative ways of catering to broader audiences (layer 3). This actually means forming project groups that include subject matter experts and scholars as well as specialists in interactive multimedia design and production. There is no doubt that cultural heritage experts and scholars know how to for example preserve, exhibit, and contextualise objects in broader cultural and historic contexts. But, generally, if the focus is on the competency to develop and implement interactive multimedia, such competencies today are neither present in the institutions nor in the scholarly communities, who are traditionally mainly focused on the written word.

There are different strategies with which cultural heritage organisations can make sure that their collections and related knowledge are used in creative ways, leading to new attractive and involving online as well as in-house digital environments. These strategies include:
   – Developing media creativity within institutions;
   – Buying in creativity from media companies;
   – Making use of "media culture" centres;
   – Linking up with new cultural heritage organisations and infrastructures (networks, platforms).

Not included in the list is the option to become a new art media centre like the ZKM, Germany (see the case study in this report) or Ars Electronica Center, Austria. Because such institutions have been set up from the start with heavy investment in technology and workforce, to be the experimental vanguards at the junction of high-tech, media research, and cultural creativity. The probability that established museums will develop into such centres, i.e. have media research and production units side by side with the traditional museal activities is very low. As Jeffrey Shaw, Head of the Institute for Visual Media, ZKM, summarises his experiences: "You do not just do it on the side. It involves an enormous investment, it involves enormous know-how, you have to employ a whole bunch of new people and you introduce almost new philosophy or a new sort of culture to an institution when you bring these components in. You cannot just do it on the side. You have to do it completely, or you do not do it at all." (DigiCULT Interview, June 29, 2001)

Developing media creativity within institutions

The strategy to develop media creativity in-house seems only applicable for major institutions (e.g. national museum) or co-operations of cultural heritage institutions. An example for this approach is the multimedia department of the Réunion des Musées Nationaux (RMN, France). The RMN unites 33 national museums of France and has in the year 2000 welcomed over 9 million paying visitors. The multimedia department was set up in 1993 and has since developed products available widely, in attractive form, scientific and artistic material related to the museums' collections and the exhibitions organised by the RMN (CD-ROM, DVD, but also cultural heritage games for game consoles). What's more, since 1997 it has developed the institutions web site into an attractive site with many features (<http://www.rmn.fr>).

Buying in creativity from media companies

The purchasing of creative solutions can be performed at various levels, from the support, set-up and maintenance of an attractive web site to a complete solution for a digital environment that offers interactive options in-house as well as online use. An illustrative example for this is the Rafael Roth Learning Center in the newly established Jewish Museum Berlin (<http://www.jmberlin.de>). Starting in 1999, this centre was conceived and implemented by the company Pandora Neue Medien, involving up to 50 people (including 10-15 persons from the museum, designers, programmers, editors) The learning centre contextualises digitised artefacts of Jewish history and culture in narratives and offers in-depth information. It is "interlinked" with the permanent exhibition of the museum in that artefacts that are present there are key elements in the virtual stories of the centre. The learning centre is not a place where objects are presented, but a place for interaction and communication. The next step planned will be to offer the visitor a ticket with a code through which objects and contexts he or she is particularly interested in will be captured, assembled, summarised, and stored centrally. Later on the visitor can access this personalised record online.

The interviews with representatives of Pandora Neue Medien and the Jewish Museum (DigiCULT Interviews, July, 6 and 12, 2001) exposed essential elements of such a project. Experts involved in the project observed that such a learning centre could only be the product of a team involving many specialists. Its development and implementation is to an essential part a communication and learning process in which all persons that are more or less closely related to the project must be involved (in the course of this project the staff of the newly built museum increased form 9 to 120 persons). In practice this means for

example to come to a common wording and realising a suitable workflow that fits IT-specialists, subject matter experts and other institutional personnel. In particular, traditional hierarchies need to give way to an interdisciplinary teamwork. Finally, such a project needs to be developed to a point of stability after which it can be left to a group of four to five people who can maintain the environment and add new informational elements.

Making use of "media culture" centres

In the later 1990s, supported considerably by the Council of Europe, there was an extended discussion about the role of "new media culture/s" and their roles in the Information Society as safeguards of democracy and social cohesion, enablers of participation and new forms of learning, and drivers of innovation in multimedia (for a snapshop of this discussion see Boyd et al., 1999). Points that were and still are clear in the discussion about these cultures are that: (1) they provide a pool of new artist-initiated ways of thinking and working within the digital environment, (2) are active on the interchange of art and technology, (3) are strongly involved with youth cultures, marginal cultures, local as well as global grassroots activities. The "new media culture/s" are to a considerable degree driven by loosely connected individuals and groups, yet, over the last years there has been an emergence of foremost media culture centres. Making use of such centres is an option for cultural heritage institutions that value having access to competent and unconventional support as well as a link to a lively and innovative culture.

Example: The Public Netbase (<http://www.t0.or.at>) based in the Museumsquartier of Vienna has been in operation since 1994 and has developed from a small, active cultural project into one of Europe's most respected media culture institutions. It promotes the artistic use of digital media and as a non-profit Internet service provider supports a number of artists, cultural activities, and cultural institutions with its technical expertise. Cultural heritage institutions that draw on technical and creative resources from the Public Netbase are for example: Sigmund Freud Museum (<http://freud.t0.or.at>), MAK–Austrian Museum of Applied Arts (<http://www.mak.at>), Wiener Secession (<http://www.secession.at>).

Merging of arts, culture and commerce

ON THE RADAR

A new trend in the relationship of arts, design, architecture and commerce is the transfer of methods developed by artists into the realm of business. Such methods of performance are for example ambient sound, light design, video projections. They are used for a certain "staging" and "mood management" that attracts culturally interested and well to do customers, residents and cultural tourists.

The new relationship might also result in a partnership of joint projects in a new generation of "cultural workers" and managers of shopping malls or trading centres. These are cultural event managers, multimedia producers, audio-visual designers and performing artists that are attracted by traditionally unusual or even inappropriate places to exhibit cultural works and find a broader public than in the established art circles. Through the added cultural value such places could become the "talk of the town" and a "must see" (e.g. the Bluewater Center in London, that attracts shoppers as well as tourists with an interest in design and culture). Others lead to a "tribalisation" of visitors with identical or corresponding values, motivations, and life styles. Furthermore, as there is a growth in the wide spread use of creative work amongst the new generation of "cultural workers" to other channels as for example advertisement, on- and off-line multimedia, video clips and the like, the audience also adapts to the new forms of presentation.

Fostering the unexpected

Looking into the current development of museums and galleries and forecasting into a not to distant future, one might expect the following: That most museums and galleries will adjust to the challenge of new media in the sense that they will have at least a web site with standard information. Many more than today will have some additional content and functionalities online as well as offering CD-ROMs related to their collections and exhibitions. Additionally, in many more exhibitions one will find computer displays, with overviews of what the exhibition presents, audio-visual sequences and in-depth background information (that can also be accessed online). In contemporary art museums, due to more reliable and stable technologies, new media art forms (e.g. video art) will become more common.

To achieve this would be already something. Yet, with regard to what opportunities ICTs provide and what cultural industries are and will be offering, one might expect more or even something completely different from cultural heritage institutions. Drawing on viewpoints of experts that participated in the DigiCULT-study the best strategy for an institution would be not to invest in predictable formula, because there is no distinctive power in them. They would need to develop projects with themes, content, and interactivity, which the public consider unique and compelling. Pia Vigh, Director, CultureNet Denmark, highlighted that cultural institutions would need to offer things that are challenging, involving as well as entertaining, "and a way of doing that is to perhaps be a little more bold at developing ‚stunts' on the Internet and engaging in risky business, and I am not talking about risk when it comes to financial projects, it does not have to be very expensive projects, but risky projects when it comes to content." (DigiCULT ERT, Edinburgh, July 24, 2001)

One approach how the unexpected could be achieved was described by Jeffrey Shaw, Head of the Institute for Visual Media, ZKM: An audio-visual archive or museum "could go to any of these companies who do museum design and they will give you a predictable formula or even a better formula". Yet, another strategy would be to set up an artists in residence programme for two or three artists a year "and then each of these artists can get in and experiment with these collections, each one is going to do something different, and each one has got its own agenda; and then suddenly this archive will come alive and there will be a continuum of new angles to it. It will always be reborn through the eyes of whatever the artists is doing. And I think, here is a strategy, which can do something with this collection not one time, not one bit decision, but it is dynamic, it is changing. What museums should be doing in terms of new media should be something very experimental and very fluid and very open." (DigiCULT Interview, June 29, 2001)

Involving communities

As represented in the DigiCULT four layer model above, involving communities (other than scholarly users and cultural heritage experts) can be done in very different forms two of which will be addressed in this study:

- Providing an online environment and communication tools which allow for participation and contribution in communities of interest, not traditionally affiliated to museums or other institutions that exhibit cultural resources;
- Building protected user environments for communities of learners that produce their own exhibitions or other results of working with cultural resources (e.g. school classes).

Both approaches are very demanding for cultural heritage institutions, the first in terms of opening up to "non-expert" contextualisations, narratives, explanations of resources, the second with regard to the technological investments necessary to build the infrastructure and interactive tools for learners. The focus here will be on the first approach, while building protected environments for e-learning will be dealt with in the case study on SCRAN (it is also addressed in Chapter 8, "Exploitation".

The relationships citizens have to their cultural heritage resources in terms of history, identity, and community are essential. Yet, the selection and valuation of these resources has traditionally been done by members of disciplines and professions, who have acquired a mandate and legitimisation to define, evaluate and interpret cultural heritage resources. Today, there are many groups or communities of interest that demand to bring their record to the cultural history and memory of society. Participants of the DigiCULT Online Delphi highlight this trend, for example:

"I can see more and more interested working groups of people (in local neighbourhoods, associations, etc.) trying to understand their history and their heritage. Many times the research that they carry out remains unknown or grey (only published in short diffusion journals)." (Thomas Baiget, Institut d'Estadistica Catalunya; June 6, 2001)

"We have to increase our definition of heritage in order to include: religious heritage (currently vanishing in Canada), languages as heritage, natural landscapes, architecture. We also have to open ourselves to organisations that preserve part of our heritage that have not been part of public initiatives such as private businesses, private collectors or religious communities." (Jean-Marc Blais, CHIN; July 16, 2001)

Furthermore, the presence of many different ethnic and religious groups (multiculturalism) as well as "sub-cultures" within a society pose the question how their cultural and artistic expressions can be included in appropriate ways by cultural heritage institutions. The basis for this would be the development of new concepts of documentation, contribution, and interaction that allow for such groups and communities to participate in the cultural heritage field. One example for this is the new project "Moving here" of the UK Public Records Office together with libraries and museums to create online sources related to immigration. (<http://www.pro.gov.uk/about/plans/corporate.htm>)

The virtual eco-museums of the future

ON THE RADAR

Surprisingly, the eco-museum concept, developed in the cultural heritage field decades ago, is still awaiting its renaissance in the cyber-space. By making full use of ICTs, this could be exactly the place for it to gain new importance, meaning and vitality. The concept declares a community to be a museum and builds on narrations and objects that come from its members. Hugues de Varine, the main proponent of the idea, for example writes: "There is no need to move these objects into the museum as soon as one locates them. The community itself is the store and for this reason every household and every business has continuous links with the museum." (Varine, 1993) With ICTs in place, digital images of objects people value and stories they have to tell can quite easily be brought together in a virtual eco-museum as well as one can link up to it online. Add to this Kenneth Hudson's formula that Europe is "a giant network of potential eco-museums" the concept has much future potential. (Hudson, 1996)

Cross-domain institutional co-operation

An important issue in EU initiatives and academic discussions is the need for enhanced co-operation of archives, libraries, museums, and other cultural heritage institutions. There is a general vision and expectation that the age of the domain-fixed institutions will come to an end and that cultural institutions will co-operate with each other across domains with regard for example to standards, digitisation, new services. This vision is in particular present in what users increasingly expect to be able to find on the Internet. From the user's point-of-view the traditional separation between archives, libraries and museums simply is a barrier for efficient access to resources. Because users are not interested in institutions and their different logic of how resources are catalogued, registered, etc., but in themes of research and study that often encompass institutional borders.

Cross-domain co-operation in not easily achieved

While co-operation of institutions in the same field is most common, cross-domain co-operation is not easily achieved. In fact, most institutions do not seem to be concerned with cross-domain co-operation. A recent study on cross domain collaboration between libraries, museums and archives (ALMs) in Europe, has brought clear results that co-operation with institutions outside their own field of work is not a task that ranges high on the priority lists.

The study, which had a European-wide perspective, found: "Currently, the ALM co-operative efforts reveal to be finally not sufficient enough for the entirety of the European countries (only 46 'projects' in progress, actually associating the three ALM institutions, were able to be identified)." Causes for the neglect of co-operative efforts stem "mainly from the breaking up of the entities and the widely diverse status of the different institutions. The priorities retained put in the forefront those projects between institutions in the same field and choices have to be made given the delays in the modernisation of the structures themselves." The problems faced in coming to terms with one's own business seem to contradict co-operation: "A vague conviction, even an objection to the existence of an ALM collaboration, was expressed occasionally by certain professionals..." (European Commission, 2000: p. 4+6)

Supporting factors

Although there might generally be a strong blockage to cross-domain co-operation, there is much exclusion to this observation. Very active in building such co-operations are for example the Northern countries, which have set up networks and projects that can be seen as examples of good practice for other countries trying to establish cross-domain collaboration.

Sweden: Cultural Heritage of the Industrial Era in Sweden

An interesting example for cross-domain co-operation with regard to theme and set up is the initiative "Cultural Heritage of the Industrial Era in Sweden" (<http://www.sou.gov.se/kulturarv/>). The initiative illustrates that cross-domain co-operation can be stimulated if a thematic focus is set in which many institutions can buy into. The initiative is funded and supervised by the Committee on the Cultural Heritage of the Industrial Era in Sweden with financial resources of SEK 24.5 million for 1999-2001.

Norway: Netting local history

Started in August 1999, the Netting Local History project aims at a closer collaboration between archives, libraries and museums by focusing on local history and making accessible

EXAMPLES

valuable material that is traditionally spread among several institutions. The public's interest in this area was another reason for selecting local history. The project was initiated by the Directorate for Public Libraries and covers seven local projects. (cf. Hindal, Moseid, 2001)

While archives, libraries and museums have their own organisational characteristics, one might expect that the technological development and the requirements to guarantee effective cross-sectoral information access and delivery will compel them to co-operate. Another, maybe stronger factor, seems to be scarcity of resources. Results from the DigiCULT Online Delphi indicate that experts see this as an important driving force for working together more intensively. 51 experts responded to the statement "Scarcity of resources will be a driving force for more collaboration between cultural institutions", of whom 38 said *yes*, 4 *no*, and 9 *not clear*.

This factor is made even more critical, when the funding for new projects is tied to the involvement of institutions across sectors. Birgit Henriksen, Head of the Digitisation and Web Department, Royal Library, Copenhagen, mentioned that this is one line of the Danish policy in the cultural sector: "Funding is a way of stressing these things in Denmark. The three ministries, the Ministry of Culture, the Ministry of Research, the Ministry of Education have pooled some of their money and the institutions can seek funding for their projects, but they cannot go it alone, they have to co-operate with some of the others. (...) If you want to take part in the projects you have to be able to co-operate and make cross-sector projects. This is the way things work in Denmark, and for the moment I think it is the only way that you can pressure the institutions to do it, because they are cut down on their budgets so they cannot finance their projects from their own budget, they have to go for external money." (DigiCULT ERT, Berlin, July 5, 2001)

The DigiCULT navigator to co-operation capital

Developing co-operation capital is one main key to success for cultural heritage institutions in the networked environment. Co-operation provides many general advantages for institutions as for example gaining strength in negotiations with other cultural sector players or reaching new users groups. The DigiCULT-study in particular highlights the importance of co-operation in creating value added services and rich environments for broader user groups as well as fostering more cross-domain co-operation of cultural heritage institutions.

Co-operation in creating value added services and rich environments for broader user groups

Co-operation is central to unlocking online the value of cultural heritage resources for broader user groups. For these user groups not masses of "raw data" (digitised objects and basic documentation) are needed but enriched, interactive environments and packaged material (e.g. course material that fit into the curriculum).

At the basic level this demands the creation of metadata that includes elaborated descriptions of objects that can be integrated in contextualising structures, e.g. historical concepts and narration. For the creation of such data and structures targeted initiatives, programs and projects are required to form collaborations between the relevant expert communities.

In building attractive and involving online as well as in-house digital environments project groups are needed that include subject matter experts and scholars as well as specialists in interactive multimedia design and production. Ways to build such groups are in

particular: developing media creativity within institutions, buying in creativity from media companies, making use of media culture centres, as well as working together with cultural network organisations. Which option will be used by an institution will depend on the project objectives and the available resources.

Furthermore, cultural heritage institutions within multicultural societies need to find appropriate ways of involving and allowing for the participation of different communities that demand and merit to be present in the cultural record and memory.

21   **Cultural heritage institutions should not only provide "raw data" (digitised objects and basic description), but co-operate in building enriched, interactive environments. If their target audience is the educational sector, they should also provide packaged material (e.g. course material).**

22   **Cultural heritage institutions who regularly exhibit digital objects should develop in-house competency or co-operate with innovative companies or organisations specialised in interactive multimedia design and production. With regard to the presentational forms they should explore new approaches in the usage of advanced technologies for building attractive virtual environments for cultural heritage applications.**

23   **Cultural heritage institutions should seek to find appropriate ways of how to involve different cultural and ethnic communities in society.**

Cross-domain institutional co-operation

The traditional separation between archives, libraries and museums is a major barrier to efficient access to resources and knowledge. An important issue in the cultural heritage sector therefore is cross-domain co-operation that allows for bringing together resources and knowledge from the different institutions. Yet, such co-operations are not easily achieved as the institutions struggle to come to terms with many other major tasks. Promising examples of cross-domain co-operation e.g. in the Northern countries are based on themes different memory institutions can easily buy into as for example local history. A major further incentive is if funding for projects is bound to cross-domain co-operation of institutions.

24   **In order to foster cross-domain co-operation, national governments, regional authorities, and cultural councils should bind funding of cultural heritage projects to participation of cross-domain partners.**

25   **Cultural heritage institutions should participate in national or regional cross-domain projects in order to contextualise and present their rich resources together.**

VII.7 The key role of new cultural heritage organisations in the digital environment

"Cultural organisations are learning that their presence and authority in the real world is not automatically translated into the virtual world." (QUEST, 2000: p. 26)

Unlocking the value of the cultural heritage sector into the Information Society will demand huge efforts and investments in building new organisations that support existing institutions in coming to terms with different issues that determine success or failure in the digital environment.

To link up with new cultural heritage organisations and infrastructures, i.e. cultural networks and portals is an option for all institutions in the sector. Particularly for smaller institutions this can reduce the barriers to entry and provide a wide range of opportunities: from being present in events calendars or news tickers up to participating with their collections in major digitisation initiatives (depending on the aims and models of the support organisation).

In the discussions on the digital economy the concept of disintermediation (i.e. the elimination of anything that stands between producers and users of products and services) figures prominently, yet, to bring cultural heritage into this economy will demand exactly building intermediaries that were missing in the old economy.

New cultural heritage organisations are extremely valuable in bringing cultural heritage to certain interest groups (e.g. scholars, learners, tourists) and the public at large. Basic indicators for the success of cultural heritage in the Information Society will be how many of such organisations exist and how heavily they are used. Therefore, beside the traditional memory institutions, these organisations are a main focus of the DigiCULT-study.

This chapter addresses the major roles new cultural heritage organisations play in:
– developing and making accessible digital collections,
– building protected virtual environments for users of cultural heritage resources,
– supporting smaller institutions to become visible and part of the digital world

Illustrative examples for this are provided with a short case study on AMICO, an overview of different types of cultural networks, and an extended case study on SCRAN.

Developing and making accessible digital collections

The question with regard to the collections of cultural heritage institutions is how these treasures can be unlocked into the information and knowledge society. To do this in a sustainable fashion might cost considerably more than smaller or medium sized institutions can afford; and there is the question of whether or not the public purse can afford to finance a digital trial and error approach and unsustainable ventures in the cultural heritage sector.

If it is an objective of cultural policy to make cultural resources of many institutions available, supportive infrastructures will be needed, i.e. digitisation centres providing consultancy and project management, digitisation equipment and skilled staff, digital collection management, support in creating products or offering online services and long-term preservation (including migration or emulation).

The model for this approach could be a complete splitting of functions: The supportive

infrastructure organisation manages the digital resources of many institutions, while the institutions (together with scholarly communities) provide for their "outsourced" digital collections primarily what is their key domain and the highest value they can bring into the Information Society: the knowledge and expertise related to the digitised objects, descriptions (e.g. metadata), contextualisation, explanations, interpretations, and stories, that really involve potential users. This seems to be the appropriate variant for smaller institutions, because it is unlikely that a knowledge transfer model would work for them, because they lack the necessary resources (skilled IT staff and equipment) to manage digitised resources, implement and further develop necessary additional features (e.g. for e-learning), and in particular to secure long-term preservation of the resources. A blue-print for this model is SCRAN (see case study in this chapter).

Where can the institutions grow?

In the digital environment, institutions need to re-evaluate their mission, not to give it away (and run out of business). Following the trend in the business world, cultural institutions should think about outsourcing certain tasks that are not central to their core business, i.e. activities that are only supportive in fulfilling their core functions. Sorting out institutional activities that are only supportive and looking for efficient and cost-effective external solutions is an important strategic element. And as such it has not only its advantages, but also its risks.

The risk lies in outsourcing supportive functions that have the potential to further develop the intellectual capital and build new assets of the institution. Outsourcing therefore should not involve things that would be major areas where the institution can "grow", i.e. areas for the development of new, future-oriented competencies. Developing and constantly updating a technological infrastructure is not a core function of a museum or archive; but providing knowledge and expertise related to the content of digitised resources (e.g. providing rich documentation) clearly is one.

Due to many factors including limited budgets, technological instability, shortage of ICT personnel, outsourcing technical functions clearly seems to be an option, if not a must, for cultural institutions. The optimal scenario would be the sharing of a technical support organisation with other institutions within or across the sector. In this scenario, the supportive organisation is managed by a trusted consortium and is based on agreed upon technologies, applications, standards & procedures, and financing mechanisms.

Beside technical support functions, the organisation could also focus on goals and activities the individual institutions cannot accomplish themselves because they lack the necessary expertise (e.g. negotiation of services of third parties, rights clearance, management of licenses, certification). Which competencies should be kept or nourished within the individual institutions, should be observed and decided upon on the basis of best practice and lessons learned in the cultural heritage sector.

Building supportive infrastructures

The OpenHeritage project

OpenHeritage is an IST-research project (2001-2002) funded under the Fifth Framework Programme aiming to create an IT infrastructure and services to improve access to information resources and collections held by regional museums and galleries. For a detailed description, see Scali et al., 2001. <http://www.spacespa.it/openheritage/>

The RegNet project – Cultural heritage in regional networks

BROWSER

Launched in 2001, REGNET will set up a functional network of cultural service centres through Europe which will provide IT-services dedicated to cultural heritage organisations. A technical and legal framework, the REGNET system, for such a service infrastructure will be developed. This will offer services like data entry, search and retrieval, and e-Business. <http://www.regnet.org>

The DigiCULT navigator to supportive infrastructures for digitisation

Many cultural heritage institutions are not capable of setting up and managing sustainable digital collections without outside assistance. This issue is particularly relevant with respect to the collections of traditional archives, as well as the special collections in libraries and museums.

While it may be the objective to unlock these treasures and make them more readily available in the information and knowledge society, to do this in a sustainable fashion might cost considerably more than smaller or medium sized institutions can afford.

There is also the question of whether or not the public purse can afford to finance a trial and error approach that may result in unsustainable ventures in the cultural heritage sector.

Therefore, there is a clear need for specialised and well funded organisations that support ALMs in setting up and managing digital collections (e.g. digitisation, collection management, online registration of users, licensing and transactions). The model that drives innovation will not so much be knowledge transfer but a splitting of functions. The memory institutions and scholarly communities will provide the real value they can bring into the Information Society: that is knowledge and expertise related to digitised objects, i.e. descriptions (e.g. metadata), contextualisation, explanations and interpretations, and stories that truly involve potential users.

26 **Instead of funding individual digitisation projects of cultural heritage institutions, national governments, regional authorities and other funding bodies should invest in comprehensive digitisation programmes.**

27 **National governments, regional authorities and other funding bodies should invest in specialised organisations that particularly support small and medium sized cultural heritage institutions in setting up and managing digital collections (e.g. digitisation, collection management, online registration of users, licensing, and transactions).**

28 **Cultural heritage institutions should not individually attempt to address all the problems involved in digitising and managing digitised cultural heritage, or expect that they can solve them on the basis of a knowledge transfer model.** Cultural heritage institutions should split tasks with specialised organisations and focus on providing the real value they can bring into the Information Society: knowledge and expertise related to the digitised objects.

29 **Cultural heritage institution should use a multi-tiered partnership and licensing model that involves creators and owners of digital surrogates of cultural heritage resources as well as distributors and licensees that address special user groups.**

Case study: AMICO – Developing a multi-tiered partnership model for digitised cultural heritage resources

The Art Museum Image Consortium, AMICO <http://www.amico.org>, founded in 1997, is an independent non-profit corporation that enhances the collaboration of museums and other institutions with a collection of art or information about works of art. AMICO has over 30 members from the United States, Canada, and the United Kingdom. Their participation is very concrete in that they make annual contributions of digitised works of art (high resolution images plus rich documentation) to the AMICO Library. This library is a joint digital repository set up for licensed scholarly and educational use by universities and colleges, libraries, and schools. Members pay dues based on their annual operating budget (in 2001: annual budget up to $5 million – membership fee $2,500; operating budget $5m – membership fee: $3,500; operating budget $10m+ - membership fee $5,000).

Full Members of AMICO agree to contribute as many digitised works per year as they are able to provide, until they have completely documented their collections (suggested submission is 500 works per year, with AMICO helping members lacking technical capacity to ramp to that requirement over time). One of the strengths of the AMICO Library is that it does not duplicate the teaching canon of a university slide library but augments it with tens of thousands of art objects that do not appear in current printed textbooks or monographs. The 2001-2002 edition will include approximately 75,000 different works of art. It is accessible primarily to institutional subscribers, with the current potential user base being over 2 million users, including faculty, students, teachers, staff, and researchers.

The AMICO partnership model is multi-tiered, which is, as Jennifer Trant, Executive Director, AMICO, has stated in the DigiCULT Online Delphi, "essential to achieve economies of scale and efficiencies, and to develop required depth of knowledge". It prevents market failure, which cultural institutions might have to face if they are "operating outside ones sphere of expertise without knowledge, research and advice." (July, 17, 2001)

The licensing model (see chart) describes five different roles for partners: The creator, the compiler, the distributor, the licensee and the user. The creator (e.g. a museum) has a membership agreement with AMICO and contributes/licenses digital images + metadata to the AMICO library. AMICO administers the licenses and acts as a compiler or wholesale licensee. The organisation has contracts with distributors or value-added resellers. These include e.g. the Research Libraries Group (RLG), the Ohio Library and Information Network (OhioLINK), Scottish Cultural Resources Access Network (SCRAN). A distributor has relationships with licensee "retailers" (e.g. a university or library) under subscription terms, and educational or scholarly users will finally use the AMICO license.

Beside the membership dues, the subscription fees collected generate AMICO's major income. According to David Bearman, President, Archives & Museum Informatics, AMICO is "reasonably successful without any government funding at all and operating in a market economy", and he added "the cost to run AMICO for five years is less than the cost of any first year EU project". (DigiCULT Interview, July 8, 2001)

Recently AMICO developed and made available a variety of model art history assignments designed to introduce students and their teachers to usages of the images and metadata in the AMICO library. Created by Peter Walsh, former director of publications for the Harvard University Art Museums, the model assignments took account of what is offered in studio art and art history courses offered by current AMICO Library subscribers.

Roles	Creator	Compiler Warehouse Wholesale Licensee	Distributor Value-added Reseller	Licensee Retailer	User Consumer
Examples	Museum	AMICO	RLG OCLC AMN CHIN	University Museum Public Library State Agency	Faculty Staff Visitor Student

Relationships	Museum AMICO	AMICO Distributor	Distributor Licensee	AMICO Licensee	Licensee User
Document Types	Membership Agreement	Contract	Subscriptions terms	AMICO License	Intellectual Property Guidelines

Source: AMICO Licensing Model, 2001

Summary

AMICO shows that through strategic institutional collaboration, a joint digital repository of high quality digitised resources can be built. Providing a new asset for the participants and valuable resource for scholarly and educational users.

A key element of this example of best practice is the multi-tiered partnership and licensing model that involves creators and owners of digital surrogates of cultural heritage resources as well as distributors and licensees that cater to target user groups.

As with other examples where resources are aggregated and catered to educational user groups, a need for suggesting particular usages was perceived and addressed by AMICO (e.g. model assignments for studio art and art history courses are provided).

Developing protected environments

Many major institutions regard intellectual property laws as an obstacle for access to cultural heritage resources. However, under certain well defined prerequisites, a workable solution has been found to allow for access to high value resources. Such a solution demands:

   – to make a clear distinction between commercial versus scholarly and educational uses,
   – to come to an agreement with resource holders that respects their rights and allows them to provide their resources for non-commercial uses,
   – usually such an agreement will grant perpetual, non-exclusive rights to aggregate materials and distribute them electronically for scholarly and educational uses,
   – these uses have to be located within protected environments and allowed only under well-defined licences.

This approach of a "walled garden" or protected environment is advocated by SCRAN (see case study), but also for example by the Mellon Foundation that supports exemplary

digitisation initiatives in the scholarly and cultural heritage fields (e.g. JSTOR or the recently announced ArtSTOR project).

ArtSTOR

The project ArtSTOR was established in April 2001 and is funded by the Andrew W. Mellon Foundation. It plans to become an independent not-for-profit organisation (public charity) that will develop, collect, manage, and distribute digital images and related scholarly materials for the study of art, architecture, and other fields in the humanities. One of ArtSTOR's first major projects will be the construction of an image gallery that will facilitate the teaching of art history courses. Furthermore, it will build a number of scholarly collections, including material of projects sponsored by Mellon (e.g. the Dunhuang cave art archive).

Source: <http://www.mellon.org/artstor%20announcement.html>

Donald J. Waters, Program Officer, Mellon Foundation, in an interview described the rationale of the protected environment: "We need to separate, make a distinction between commercial users of property and educational cultural users. And so we also have to set up in ArtSTOR and in all of our granting agreements, that the foundation will have a right to aggregate material and distribute it for educational purposes, and that we will create a protected environment in the Internet so that we can assure the owners of property that it is only being used for educational purposes."

The Mellon Foundation is not advocating free use for everybody, but aims in fostering and supporting scholarly and educational uses of high quality resources. As Water explicates: "This whole notion of a protective environment is one that has to be aimed at particular sets of users for certain purposes, and that environment may not be available for free although it may appear to be free to the end user. (...) The second thing is that part of our policy is aimed at ensuring very high quality images and digital products. One of the things that we keep seeing is that if you are aiming for free you typically end up with lower quality, because people are not willing to give the high quality image out for free." (DigiCULT Interview, June 5, 2001)

The DigiCULT navigator to developing protected online environments

Cultural heritage institutions perceive many risks in the digital environment. They fear losing control over digitised resources once they are "out there" on the Internet as well as harming their reputation if, for example, images of objects are used in inappropriate ways and contexts. These fears keep institutions unwilling to make their resources available online. Trusted competency and service centres can convince institutions to bring their digitised resources into protected environments for licensed uses by scholarly and educational communities.

This demands:
- to make a clear distinction between commercial versus scholarly and educational uses,
- to come to an agreement with resource holders that respects their rights and allows them to provide their resources for non-commercial uses,
- usually such an agreement will grant perpetual, non-exclusive rights to aggregate materials and distribute them electronically for scholarly and educational uses,
- these uses are bound to the protected environment and allowed only under well-defined licences.

Protected environments are, of course, demanding in terms of technological set-up.

The protected environment concept is spearheaded by renowned organisations such as the Scottish Cultural Resources Access Network (SCRAN) or the Mellon Foundation that has funded similar digitisation projects (e.g JSTOR and ArtSTOR).

30   **National and regional governments should support the creation of protected environments that enable scholarly and educational user communities to access high-value cultural heritage resources. This implies, to exempt educational use from the current European Union copyright directive.**

31   **Cultural heritage institutions should participate in building protected environments and allow for licensed uses of their digitised resources by scholarly and educational communities.**

Flagships and nutshells: Becoming visible in the digital world

Size matters also in the digital environment or rather for becoming a valuable and recognised part of it. As Oliver Watson, Head of Digital Projects, Victoria and Albert Museum, London, has stated it: "It is very important to remember that we are dealing with institutions that are enormously different in their size, in the subject matters that they cover, in their mission and why they're set up and what they are intending to do, in what you might call their horizons, whether they are local, national, international, where their funding comes from and where they sit in public perception. And all these make an enormous difference in what they see as success in any part of their ventures including the digital world." (DigiCULT ERT, Edinburgh, July 24, 2001)

A major concern for the cultural heritage sector is the future position and role of the smaller institutions in the digital environment. They make up the large majority of institutions (estimated to be up to 95 percent) and are of major importance for cultural identity and life in particular on the regional and local level. Today, they observe that they may lose their presence in cultural life if they do not become part of the virtual space that increasingly influences the patterns and forms of cultural information and consumption.

Yet, there is ample evidence that for smaller institutions taking advantage of the new opportunities provided by digital networks and new media is not easily achievable. For example: Setting up a web site with basic information might be relatively easily done by a small local museum, but it most likely will not become a powerful communication channel and attraction point in the virtual cultural landscape. A much stronger position could be gained by being part of a regional cultural network that is professionally set up, showcased institutions and their unique resources, and provides information services for schools and/or tourist agencies in the region. Yet, such networks do not emerge and develop without considerable investment in dedicated organisations or units in major institutions with skilled personnel and equipment.

As Paolo Galluzzi, Director, Institute and Museum of Science, Italy, explained in a recent interview of the situation and possible solution for smaller institutions: "Small institutions are facing and will face serious problems with the use of ICT in cultural heritage. They have no budget, no specific knowledge for an efficient and exploitable use of ICT technologies in their day-to-day life. We are living through a situation where small is becoming synonymous with ugly and uninteresting. For this reason, national policies should adapt and react to this threat. One possibility might be that the state could decide to finance only selected initiatives, while promoting co-operation between smaller and bigger institutions,

which could set up a service centre supplying services with the targeted funding. This would allow public funding to sustain specific non-commercial areas." (DigiCULT Interview, September 2, 2001)

Results from the DigiCULT Online Delphi indicate that many experts in the cultural heritage field confirm the need for supportive infrastructures. The participants were asked to react to the following statement: "Most cultural institutions will only be able to adapt to the electronic environment with the help of a supportive infrastructure (set up by trusted third parties)". Of 51 experts who responded, 36 said *yes*, 4 *no*, and 11 *not clear*.

A supportive infrastructure can of course be many things including: A cultural network showcasing institutions, a digitisation centre, an e-commerce platform, etc. Here an overview of access points to cultural heritage is provided that range from low to highly integrated networks.

Access Points to Cultural Heritage

Examples

High Level Comlexity Cultural Networks

Are centrally co-ordinated "networks" of digitised cultural artefacts, collated from a number of participating organisations, all directly accessible. Provide "deep linkage" and e-learning facilities.

Scottish Cultural Resources
Network (SCRAN)
www.scran.ac.at

Medium Level Complexity Cultural Networks

Offer a significant amount of cultural content that is not fully integrated in the portal, i.e. at a certain level users need to leave it and access the website of the content owner.

Picture Australia
www.pictureaustralia.org

Low-Medium Level Complexity Cultural Networks

Offer a central access point to a selection of institutional websites as well as own content and features: news, articles, bulletin board, discussion groups etc. Do not offer cultural heritage resources (e.g. digital images) but refer to it.

KulturNet Denmark
http://www.kulturnet.dk
24Hour Museum, UK
www.24hourmuseum.org.uk
L'Internet Culturel, France
www.portail.culture.fr

Low Level Complexity Cultural Networks

Serve as central access points to a selection of institutional website, i.e. provide a search engine or link lists and serve as jump-page. Offer no or only very limited own content.

Austrianmuseums.net
www.austrianmuseums.net
CultureNet Canada
www.culturenet.ca

Level of complexity — high / low

Source: Salzburg Research, 2001

The above overview of cultural networks includes very different types of organisational forms. For example the CultureNet Denmark is driven by a small and highly active secretariat (see the case study in the part on policies & initiatives), while SCRAN is a registered charity that owns an IT company limited by guarantee. All bring value to the cultural heritage community although to a different degree that depends on the complexity of features and services they provide.

The DigiCULT navigator to intermediary organisations

Intermediary organisations play an essential role in bringing the value of cultural heritage to larger interest groups (e.g. scholars, learners, tourists) and the public at large. Traditional memory institutions that seek to bring their hidden treasures into the emerging digital cultural economy will not be effective enough to reach larger segments of certain user communities (e.g. the educational sector or cultural heritage markets related to tourism). This is due to a lack of marketing and technological capacities of individual memory institutions (that also have no tradition of this type of work) and to the necessary critical mass to generate markets and rich services that are needed to attract and involve users.

Therefore, intermediary organisations that build user platforms and environments are of critical importance to the cultural sector. They provide access to information resources of many institutions (within and/or across sectors) as well as function as portals to (protected) virtual environments that include digital collections.

Teaming up with intermediary organisations may considerably reduce the barriers to entry for smaller institutions and provide a wide range of opportunities: from being present in events calendars or news tickers up to participating with their collections in major digitisation initiatives (depending on the aims and models of the existing intermediary organisation in a country or region).

32 Cultural heritage institutions should actively participate in the consortia that establish intermediary organisations and services.

In bringing cultural heritage resources to larger interest groups institutions and intermediaries in the cultural heritage field can build on online services that already have been established in the educational and tourist sector. To address for example the educational community, they can interlink with the existing European and national educational servers, as well as projects which aim to enhance the use of new media by teachers.

33 Cultural heritage institutions and intermediaries should interlink with established educational and tourist sector services.

Unlocking the value of the cultural heritage sector into the Information Society will demand huge efforts and investments in building new organisations and services that support existing institutions in coming to terms with different issues that determine success or failure in the digital environment.

In the discussions on the digital economy the concept of disintermediation (i.e the elimination of intermediary organisations that stand between producers and users of products and services) figures prominently, yet, to bring cultural heritage into this economy will demand exactly building intermediaries that were missing in the old economy.

34 National governments, regional authorities and funding organisations should actively support the establishment of intermediary organisations and services in the cultural heritage sector and their co-operation with services in other sectors as education and tourism.

VII.8 Case study: SCRAN - Eliminating risk for cultural heritage institutions

In the framework of the DigiCULT-study, SCRAN (Scottish Cultural Resources Access Network) serves as an example of the new type of institutions needed in the digital environment to fully unlock the value of cultural heritage resources.

SCRAN is a brand and in a class of its own: Its name is a Scottish word meaning provisions – food. But SCRAN is not just Scottish "food for thought", it aims at being a benchmark in providing online educational resources, tools and services. And it really has become a reference point for new cultural heritage institutions that are set up with similar targets. SCRAN has received many awards:

– A Silver Muse Award from the American Association of Museums (AAM) "in recognition of the Highest Standards of Excellence in the use of Media and Technology for a Collections Database or Research Resource" (<http://www.mediaandtechnology.org/muse/>);

– The Jason Farradane of the Institute of Informations Scientists – "an outstanding piece of work in the information field";

– The Guardian Newspaper – one of the "six of the best" museum web sites in the world.

On the SCRAN web site there is a definition: *"The official definition of SCRAN is that it is a searchable online resource base of over one million text and multimedia records. Translated to layman's terms, SCRAN is rather like an enormous online interactive library with an extensive and diverse collection of records relating to culture, history and science."*

This is mainly a definition of its web site and the resources it makes available to licensed users. There is much more to SCRAN than just a web site, in the work it has done in convincing so many cultural heritage institutions to understand more about the risks they see in the digital environment, and helping them unlock the value of their resources through an established business model, the secure presentation of their material to a world-wide audience and the development of educational material from their resources integrated with others.

How SCRAN came into life

SCRAN was started in November 1996 on the basis of a partnership of three major Scottish institutions: the National Museums of Scotland, the Royal Commission on the Ancient and Historical Monuments of Scotland and the Scottish Museums Council, with the National Museums taking the lead role.

What SCRAN aimed to become initially was "Scottish Culture's Digital Heart", a networked multimedia resource base for the study and celebration of human history and material culture in Scotland. A "one stop shop" where people can come, to access authoritative cultural content. This was not seen as part of the core business of the founding organisations, so the venture was taken separately, driven by a separate company set up specifically with these goals. There are two parts to SCRAN; SCRAN is a company limited by guarantee and a registered charity. SCRAN IT is the trading company, wholly owned by SCRAN.

The initial funding to digitise and make accessible Scotland's material culture and human history came from the Millennium Commission who distribute funds from the UK

National Lottery. Its resources until August 2001 were some 15 million pounds sterling, half of it from the UK Millennium Commission and half from contributors to SCRAN's resource base (matched funds). The process of applying for funds to the Millennium Commission began in early 1995.

SCRAN's target, set in 1996, in crude quantitative terms were one million digital records of artefacts, buildings and sites of interest (reached in July 2001), with 120,000 of the most important having associated online multimedia resources i.e. video, sound clips, animations, graphics, plans, virtual reality objects and in particular, colour photographic images.

Grants were made available by SCRAN to cultural organisations, allowing them to digitise objects in their collections, in some cases funds were made available to create "multimedia essays" in the form of targeted educational CD-ROMs or web sites. A large part of the work carried out was to extract data from the various contributors catalogues and massage it into a suitable format, as well as to supplement it with caption material specifically written to a set of educational guidelines, worded to be understandable by the intelligent lay reader.

Running the business: SCRAN IT Limited

SCRAN is a company, limited by guarantee and a registered charity. SCRAN IT Limited is the wholly owned trading subsidiary of SCRAN which enters into licence agreements with subscribing bodies. SCRAN IT Limited employs all the staff and is liable for all over-heads. SCRAN IT Limited derives further income from third party sales of CD-ROMs and other services.

During the first three years of operation, SCRAN focused on building up the web based resources of digitised assets by attracting contributors and managing data capture projects. Due to the increasing government focus on Internet delivery of material for the National Curriculum, SCRAN then diverted funds from some planned CD-ROMs to develop and offer extensive educational resource packs and narrative trails.

SCRAN is now available at a wide range of institutions, including schools, institutions of further & higher learning, libraries, museums, community centres and tourist information points. Thumbnail images and textual information are available to all, while licensed users are provided with enhanced text, tools, full size high resolution images, video clips, audio clips, and virtual reality objects.

An independent user survey carried out in 2000 revealed a very high degree of user satisfaction, with 90% satisfied with ease of use, 80% confirming their satisfaction with products and services and 78% agreeing that the service provided a very valuable resource.

SCRAN offers services such as data hosting and project management to cultural institutions, and recently an e-shop has been opened, offering a range of high quality CD-ROMs and Resource Packs (which contain information sheets and ideas for classroom activities). If end-user purchase of items shows real potential, new products will be selectively created.

It is planned to dedicate more effort on increasing user groups' awareness of add-on products and services. Direct marketing and promotional campaigns will be aimed at raising more income from the licensing of multimedia resources and the sales of related products.

SCRAN's picture library contains about 125,000 digital colour and black and white images, and it is planned to target more intensively the commercial image market. Today, SCRAN has no end-to-end licensing process for organisations wishing to use images for commercial purposes. They must sign a Commercial Licence Agreement, for which an annual licence fee of £150 (+VAT) is charged. The licence allows clients to search for

images online and download interesting images at screen resolution for drafting work. A rates table can be downloaded, but licensing is done off-line.

What SCRAN is all about – reducing risks

First and foremost SCRAN is, all about, education: learning, exploring, telling stories, historic contexts, interpretation. To cultural institutions SCRAN is also about, reducing risk to a level that they are comfortable with their material being used in bringing an interactive multimedia library with one million objects from different owners into life.

SCRAN is an excellent example of the new type of cultural heritage institutions needed in the digital environment. It reduces uncertainty and risk, or rather all the risks cultural heritage institutions see if they think of digitising and bringing their treasures online. SCRAN has one of its partners after the other convinced that "taking risks" pays off, not in commercial terms, but in terms of unlocking the value of cultural heritage to the educational and other sectors.

Graham Turnbull, Publishing Manager, SCRAN, described his observation that many cultural memory institutions seem to have "an imperfect understanding of actually what their mission is at the moment", and while they are confronted with a completely new media environment, "cannot easily take risks and do not understand 'risk'. (...) What they have to understand though, in that search for what they should be doing, is that they have to take some risks. Now, not all of them are money-related. A lot of them are ideas-related. There's a danger that SCRAN has faced and we spent an enormous amount of marketing time at the start of SCRAN convincing the memory institutions in Scotland that they should take the risk." (DigiCULT ERT, Edinburgh, July 24, 2001)

Top on the list of risks cultural heritage institutions envisage is losing control over digitises objects (images) or valuable information once they are "out there" on the Internet:

"We have learned in SCRAN, that one of the inhibitions that these institutions have, is that they are scared that if they give this information out that they lose it, it is somehow devalued and so on (...), but there are safe and secure ways of putting digital information into the public domain (...), it is not such a big risk, it is not such a big risk as they think it would be and it can be run safely and securely". (Sandy Buchanan, SCRAN; DigiCULT ERT, Edinburgh, July 24, 2001)

Another risk that institutions envisage is losing their reputation if for example digital images of objects they hold are used in inappropriate ways, manipulated or set in contexts they would not like to see them. Yet. experts that participated in the DigiCULT round table on exploitation suggested that the risk of losing control of content and in particular its authenticity on the Internet should be put into perspective.

How to protect authenticity online?
"It is about risk, surely. As soon as it grows into any proportion where it looks as though it might have an actual risk, you take action. If it is lost in the noise of the web you don't worry. (…) Surely the important thing is that the museum guards its authenticity within its own context, within its own boundaries, within its own site and when things move off then there is no guarantee. I mean, we as a museum do not say to somebody who wants to buy an image to publish in a book, 'Oh let's read your book first to see if we agree with it.' We do not do it. (…) If somebody has taken your things and uses it somewhere else in a way you do not approve of, that's life. That is not your problem, it's not our problem. Our problem is making sure that we guard our own, where it is branded V&A, where it is in our own context that we maintain the standards."
Oliver Watson, Victoria and Albert Museum, London, DigiCULT ERT, Edinburgh, July 24, 2001

Still another risk is commercial usages of cultural heritage resources that run counter their character of being public goods. As Bruce Royan, CEO, SCRAN stated, cultural heritage institutions "feel that they have a duty to protect the resources and the rights which they are funded to curate, and that part of that duty is to protect that material against exploitation by commercial companies without any return to the public purse." (DigiCULT ERT, Edinburgh, July 24, 2001)

And, last but not least, there is the risk that smaller institutions anyway find it difficult to participate in the information society and therefore their collections and activities might be completely invisible online.

SCRAN, with its competency and resources, manages successfully to take away from cultural heritage institutions most of the risks they perceive in the online world as well as reduces considerably the barrier to entry for the smaller ones. What the institutions see are the benefits of partnering with SCRAN that supports the digitisation of resources and brings online interesting parts of their collections within a licensed user environment that caters to the educational institutions of Scotland and potentially world-wide.

How to bring in smaller institutions?

"One of the things that we had to change quite drastically from original models was that we expected quite a lot of the project management to be done by these smaller organisations, and that just did not work. So we have actually had to really increase our project management capacity within SCRAN to cope with that. But partnerships do not have to be equal, and certainly in the SCRAN case we do not have very many equal partnerships, there are all sorts of different levels and different scales of partnership."

Sandy Buchanan, SCRAN, DigiCULT ERT, Berlin, July 5, 2001

Building a "walled garden": SCRAN's educational licensing model

About 350 institutions so far have contributed digitised resources to SCRAN's multimedia online interactive library, including museums, galleries, libraries, archives, institutions responsible for built cultural heritage as well as organisations fostering contemporary and performing arts.

SCRAN's approach to make sure to contributors of digitised resources that their rights are protected is not based on copyright law but a well-developed licensing scheme. As Bruce Royan, CEO, SCRAN described its basic idea in the DigiCULT round table on exploitation:

"The SCRAN approach has been to say, that we cannot rely on copyright. We need to rely on licensing. So we never make available into the public domain an image which is of marketable quality. We only ever provide that to institutions which are licensed to use our services, who have signed a license saying, we will do this, this, this but we will not do that'. And if we need to prosecute we would do this on the basis of their breach of license contract rather than the breach of copyright law. (...) We emphasise the idea of a walled garden within which high quality resources can be exchanged and used and re-used but which is restricted only to those who have a license." (DigiCULT ERT, Edinburgh, July 24, 2001)

Within the licensing model, contributing institutions grant SCRAN the perpetual, non-exclusive, world-wide right to make the digital resources useable on the basis of strict licensing agreements. SCRAN has different licensing terms and conditions for individuals, schools, institutions of further and higher education, museums, libraries, as well as commercial use. Here only the most common educational scheme can be shortly described.

Educational institutions that subscribe to SCRAN's service have to sign a licensing agreement through which they gain the non-exclusive, non-transferable institutional right to non-profit, non-proliferation use of the digital resources at its point(s) of education.

According to the short summary of terms of the license agreement form for educational institutions this means:

"Summary of terms:
- material may be used for no profit, no proliferation use in education,
- you may not place SCRAN material on a system such as an external web page, disk or other media which is available publicly, i.e. to other than those licensed,
- you can put SCRAN materials in a system such as intranet web page, disc or other media if only licensed users can access it,
- you may not transmit SCRAN materials electronically to unlicensed users, i.e. through e-mail or any other system."

The educational institutions, e.g. a school, has to subscribe to the licensing agreement whether it pays for the licence or not (mostly the local school authority pays). It receives an annual site licence providing full access to SCRAN's online resources, copyright-cleared for educational use. SCRAN applies a scheme of reasonable low license fees, aiming at a balance between maximum usage and good price. In October 2001, the licence fee for a primary or middle school (full multi-user license) was maximum £60 per year (+VAT), and for a secondary school fee £120 per year (+VAT). Furthermore, SCRAN offers to teachers in licensed schools a username and password to access the resources from their own machines at home for only £5.00 p/a (+VAT), or £20 (+VAT) for life.

How to set a reasonable price?
"We for the schools market we actually did what the market would bear best. We actually profiled the service throughout a tour round Scotland, spoke to 600 folk and asked them what they thought a fair price would be. We did offer them some suggestions of what we thought a fair price would be. That is how we arrived at the price. I think that is something that is very often missed out."

Graham Turnbull, SCRAN,DigiCULT ERT, Edinburgh, July 24, 2001

SCRAN of course runs an authentication and authorisation system and records every download. This information helps very much to understand which resources are popular (or not), and SCRAN's contributors are secured in that it is well known where the digital surrogates of their objects are going. SCRAN also has an audit trail of the images, because it uses a method of 'watermarking' data. The watermark enables SCRAN, if necessary, to pursue an image and to ascertain if it has been used against the terms of the license.

SCRAN's virtual environment

Visitors and potential users first

The SCRAN web site does not represent the traditional logic of an institution that would first of all present itself and then, second or later on the list, what customers, clients or users might expect from it. On SCRAN.AC.UK its first of all about the visitor and potential user, how he or she might want or rather be enabled to use this interactive library.

Surfing through the SCRAN web site is a fascinating experience. The web site gives the user a comprehensive view of all the available features. An "instant search" box is available

on each page providing the opportunity to mine SCRAN's resources and change the navigation path at any time. Searching or browsing is facilitated by Pathfinders, i.e. brief, illustrated introductions to People, Places, Things, Events and Ideas. The Pathfinders might well act as "teasers" to subscribe to the full range of unique resources on SCRAN.

Reading the text on how to get a licence as an individual, that includes some hints of what is on offer, one really would like to right away pay the £25.00 per year and dig into the site: "from the mediaeval art of Nigeria, to the Post-Impressionist oils of Gauguin and the monumental sculpture of Paolozzi. Architecture is well served with stunning virtual reality panoramas giving 360° views of important buildings such as Mackintosh House, (...) video material enables you to fly over Mount Everest circa 1933, or join an archaeological dig at a Viking burial site. You might even master the steps to the Dashing White Sergeant."

But, the SCRAN web site is not primarily for home users, its main focus and subscribers are educational institutions.

What's in the interactive library for teachers and learners

Since 1998, SCRAN has won about 80% of the Scottish schools and other learning institutions as licensees to its interactive library:

Percentage of SCRAN school licenses, 1998-2001

Year	% Primary Schools	% Secondary Schools
November 1998	11 %	9 %
November 1999	50 %	53 %
November 2000	67 %	65 %
Mid 2001	78 %	74 %
End 2001	100 %	100 %

*The Scottish Executive Education Department has recently announced that they will be funding the 'buy out' of the SCRAN Licence for all schools in Scotland. This will be formally launched in November 2001.

Universities and colleges in the UK are already fully covered, thanks to an agreement with the Joint Information Systems Committee (JISC).

In 1998, after having developed a considerable volume of digitised cultural heritage resources and made it searchable online, SCRAN spent much effort presenting its service to regional educational authorities throughout Scotland. It became clear that to really find its way into the classroom additional features would be necessary, a challenge SCRAN immediately accepted. (cf. Buchanan, 1999)

In 1999 it launched the "Curriculum Navigator", that represents the National Curriculum as a tree structure, allows teachers to find where their class is within it, and then suggests a "virtual resource pack", pre-selected by education professionals, of materials useful in the teaching of that topic. Today, over 500 Resource Packs related to specific areas of the Scottish curriculum, and over 400 for the National Curriculum in England are offered.

What SCRAN, and many others that serve schools, has learned is that it is a hard job to provide tools that many teachers would use to conceive and create digital teaching material themselves. Teachers might say that they would like to have a tool at hand to select and assemble material themselves, but only few – may be 3 percent - really make use of such a tool, the others sticking to the pre-packaged materials offered (according to Jürgen A. Schmidt, Ernst Klett Verlag – Educational Concepts, DigiCULT-Interview, Sept 14, 2001).

But SCRAN is confident that by and by, and in particular with a new multimedia savvy

teacher generation, this will change. Already in 1999 it offered teachers and students a set of practical tools: Clipper, a presenter tool that allowed users to select items from the SCRAN resource base and quite easily create a structured presentation either on or off-line. Other presenter tools were Promenade, using a panorama metaphor to organise material, and Chronicle, to show sequences of events or information within a chronological framework. (cf. Buchanan, 1999)

Recently, SCRAN launched a new service, Virtual Exhibitions, which allows users to create their own exhibition on the web with the extensive range of images and other material available on SCRAN. "It has been designed so that anyone can use it and achieve professional results, without having to get to grips with the nuts and bolts of web design", said Robin Tatler, Director of Media and Communications, VFactO, who worked with SCRAN to develop this inspirational new software.

New funds, new partnerships

The idea to digitise and make accessible Scotland's material culture and human history has become reality, through an investment of £7.5million pounds sterling from the UK Millennium Commission (UK National Lottery funds) and much effort and resources invested from all participating institutions.

Most of the funding went into digitising and bringing online the rich stock of cultural heritage resources SCRAN now offers to subscribers to the virtual environment it has developed. With the revenues from the licenses and additional products and services SCRAN can cover its running costs, yet for further development, digitisation and educational projects additional funding is required, and in the pipeline.

A new financial injection will come from a recent New Opportunities Funds, NOF <http://www.nof-digitise.org>, grant of 4 million pounds to Resources for Learning in Scotland (RLS). RLS is a project developed by a consortium of institutions including the National Library of Scotland as lead partner, the National Archives of Scotland, SCRAN, and over 100 smaller Scottish archives and libraries.

RLS will create digital content for the study and celebration of social, cultural and industrial heritage in Scotland, complementary to and integrated with the SCRAN resource base. The main target group of RLS are life-long learners and the intention is to develop a virtual portal and environment for them. Currently the web site gives information on the project and allows searching and browsing of resources from RLS and SCRAN (<http://www.rls.org.uk>).

In May 2001, SCRAN entered into a broad collaborative agreement with the Art Museum Image Consortium (AMICO) that is active in the United States and Canada (see the separate short case study on AMICO's partnership and licensing model). The two organisations will share expertise, specifications and tools, and in particular explore the opportunity to extend the user base for their subscription-based resources. This material will go live on the SCRAN resource base on November 30 2001.

(Source: SCRAN and AMICO to Collaborate: <http://www.amico.org/docs/press/pr.010516.AMICOSCRAN.html>)

Sources used for this case study:
DigiCULT expert round table in Edinburgh, July 24, 2001, statements of Bruce Royan, Graham Turnbull and Sandy Buchanan, respectively Chief Executive, Publishing Manager and Resources Manager of SCRAN, Edinburgh, July 26, 2001. A follow-up interview with these experts was done on July 26, 2001.

Buchanan, Sandy (1999): Unlocking the Treasure Chest Using SCRAN Tools.
<http://www.archimuse.com/mw99/papers/buchanan/buchanan.html>
SCRAN web site: <http://www.scran.ac.uk>
SCRAN Business plan, August 2001.
   A valuable summary of technical details, in particular related to the creation of the digital
   images, is provided by the Technical Advisory Service for Images (TASI)
   <http://www.tasi.ac.uk/resources/scran.html>

Summary

This case study highlights that for cultural heritage institutions various risks perceived by them in the digital environment are blocking their willingness to unlock the value of their rich resources to potential users in particular in the educational sector.

The list of perceived risks includes losing control over digitised resources once they are "out there" on the Internet as well as losing reputation if, for example, images of objects are used in not appropriate ways and contexts.

Trusted competency and service centres as SCRAN can reduce the reservations of cultural heritage institutions by developing a protected environment for licensed use of resources by educational communities.

Furthermore, they can reduce the barriers to entry of smaller institutions by providing support in digitisation and overall project management.

It is also important to note that providing resources to the educational sector (in particular schools) cannot mean only to offer "raw data". Therefore, major new organisations like SCRAN that massively accumulate resources of many institutions need also to make sure that they provide packaged information to their users (e.g. course material that fit into the curriculum).

VIII EXPLOITATION
Valorising cultural heritage resources

Yu Hui-Hung, Cloud Gate Dance Theatre of Taiwan, 1997

This part of the DigiCULT-study will:
- Describe how cultural heritage institutions see and adapt to the pressure to "go commercial",
- provide an overview on online business models,
- describe the institution to business market for surrogates of cultural heritage objects (e.g. digital images) with focus on factors that support or constrain market entry and development (including a SWOT analysis of the „fitness" of cultural heritage institutions to be players on the relevant markets),
- look into new library services that are not related to special collections,
- provides a case study on genealogy or family history, which is booming on the Internet and is a field were archival databases can be turned into „goldmines",
- and finally, will summarise the findings and provide a set of recommendations for policy and institutional decision makers provided.

VIII.1 Introduction: Adapting to the pressure to „go commercial"

"I think there can be two meanings to exploitation. First of all, typically commercial. And secondly, for most memory institutions, something which could be more sensible, maybe you could call it intelligent exploitation (…). So not purely in commercial terms, but looking for, let's say, a return of investment kind of approach."

Friso Visser, Price Waterhouse Coopers, DigiCULT ERT, Edinburgh, July 24, 2001

This part of the DigiCULT-study focuses on the exploitation of cultural heritage information, products and services. Although often not a primary target of day-to-day work as well as new projects of cultural heritage institutions, exploitation is a major line of unlocking the value of cultural heritage in the Information Society. To talk about exploitation is first of all an indication, that what is provided will not be free of charge, no "free ride" as the Internet surfer lingo would call it, but offerings one has to pay for (e.g. single payment or subscriptions). Yet, examples of exploitation in this study will cover activi-ties that might be profitable and help to cover some of the overall costs of an institution, or that might not be profitable, in that they for example only cover the running costs.

High commercial expectations through digital media

Generally, thinking about and actively exploring new opportunities to exploit their information, objects, and knowledge is not very common to European cultural heritage institutions. Commercial activities are something they were rarely involved with as they traditionally dealt with cultural artefacts that are seen as public goods and are inclined to be services for the public that are mostly provided free of charge. There are of course some exceptions to this, distinct areas and practices where "being commercial" seems legitimate, as for example museum gift shops or licensing images to publishers.

The rise in digital media, and in particular the Internet, has brought with it the high expectation to optimise, add value to, or even re-invent an organisation's mission-related activities. However, for cultural heritage organisations this adds to the pressure to become commercial players and "valorise" their holdings (with some favourite candidates as in particular images).

Yet, for institutions driven by a mission that usually includes to make information available for education and academic research, it might seem to be a paradox that at the moment when for them the marginal costs of reproduction and delivery of information are tending towards zero they are asked to charge for it: "A lot of our publishing, which was the old stuff we used to do, was done on a kind of cost recovery basis, recovery of marginal costs only. I mean some of the vast expensive catalogues we produce are not covering the costs of actually generating this, because that is all hidden. And I am uneasy, because that is what the Government is giving our funding for: why, if there is virtually no marginal cost in having developed material in publishing it, should we be thinking of charging. (...) This is one of the things about the digital world, it is not integrated enough into the general understanding of what the institution does." (Oliver Watson, Victoria and Albert Museum; DigiCULT ERT, Edinburgh, July 24, 2001)

Some experts see the "economic shift" as a threat to the mission of memory institutions. They recognise that the organisation's mission is being blurred and might even be redefined on the basis of unproven economic expectations.

"When we are looking forward to what will happen in the next 5 years, or what should be reflected on, my opinion, my message would be: I am missing, on a national level as well as on an European level, a discussion on the mission and the philosophy, of what libraries should be, or are, or what their job should be in the next years.

I think that in building up the information society in Europe, in the public discussion libraries, and also museums and also archives, do not appear in an appropriate way. If I compare this with the United States, where, for example, the Director of the New York Public Library told me in an interview, it is clear for him that libraries are an integral part of the American understanding of democracy and building up democracy.

I have the feeling that the discussion in Europe is stressed too much on what I would call the economic shift in thinking about information and, especially, when we are talking about cultural heritage issues. I would like to add something here concerning the financial point of view and also the costs: that this is a very risky way, because it is not at all true that you can make a lot of money out of it, and I think we should discuss this mission and philosophy issue." (Hans Petschar, Austrian National Library, DigiCULT ERT, Berlin, July 5, 2001)

The "valorisation" expectation, that has been evident since the 1990s particularly from the political side, seems to be somehow tempered by the many experienced voices that report back from the commercial "front", there is no or surely no short and easy way to be successful. And, of course, the "dot.com wipe-out", i.e. the inglorious end of so many commercial online ventures, some of which explored to "valorise" cultural heritage, adds another strong signal to this. As the New York Times' art@large columnist Matthew Mirapaul, wrote in April 2001, "the e-commerce landscape changed from a sunny Monet to a desolate Hopper". (Mirapaul, 2001)

Many representatives of cultural heritage institutions might welcome this, but with reduced budgets there is a considerable and increasing pressure to somehow "go commercial". This pressure is there not only verbally, but also shows up for example in project application forms, in that the project will be funded on the understanding that there is an "exit strategy", i.e. that it leads to something that after a given time can stand on its own feet.

Covering the total cost of ownership of cultural heritage

Many experts that participated in the DigiCULT-study confirmed the observation of a pressure to "go commercial". Some representatives of memory institutions considered doing this, of course not in order to become an economic enterprise, but to generate revenues to finance their cost-intensive operations, which are not only ICT-related, but also very traditional ones (e.g climatisation of stock rooms).

Memory institutions hold collections, for which there is a huge total cost of ownership. Today, they realise, more than ever, that they also have intellectual capital (e.g. copyrights), and due to financial pressures should or would need to demand (more) money for certain services they provide. This re-orientation can be illustrated in a statement by a participant from the DigiCULT expert roundtable on organisational and financial issues, Reimer Witt, from the State Archive Schleswig-Holstein, Schleswig (Germany):

"In former times and also nowadays, the use of archival documents was without charge, but I think nowadays we have to think more economically and, therefore, we have to try to find methods of refinancing our work. That means, we have to think of our services for people that need written expertise, reproduction, research and so on, that is one way. The problem of archives is not only (...) the question or the issue of copyright. It is only a

method, or a way, to refinance for the modern and the younger documents, but what about our maps and our records and documents of the early time and of the medieval time? You have to think of your right to ownership and then you can look for refinancing your work and all the services you did to your holding just to bring it over the time."

Asked whether there is a feasible model for the refinancing of archival material, the expert said:

"No, you see, it is just a new idea, because in former times we did it free of charge, but now we have global budgeting, we have the duty of refinancing our work and, therefore, we have to think what we can do to get money. And that means selling books, selling finding aids and selling reproduction of seals or of photos, copies of films or videos. That is the common way, but (...) our documents are unique, we are sometimes monopolist and therefore we have to use these rights, because storing these holdings is very expensive." (DigiCULT ERT, Berlin, July 5, 2001)

Therefore, also cultural heritage institutions do not see to be active commercially as part of their mission or "core business", there is one clear reason they should – and actually do – think of exploiting their holdings: To generate revenues in order to cover at least a part of the total cost of ownership in holding their collections and all the related activities (e.g. exhibitions, catalogues, educational products).

Impact of the pressure

Results of DigiCULT Online Delphi indicated, that the pressure to "go commercial" seems to have some impact. Although the results are by no way statistically representative, they give some indication that experts today really expect a kind of "cultural change" in cultural institutions, that traditionally were not seen to be market-oriented, or even able or willing to think commercially.

Of the 62 experts who participated in the second round of the Online Delphi, 51 answered the questionnaire on exploitation and services. This questionnaire included 12 statements with the options: yes, no, or not clear.

With regard to the results it should be added that in the participant category "Cultural Industries" there were only two experts. Most participants classified themselves in the categories that are related to the ALM sector (32 experts), university institutes and research centres (16), governmental organisations as well as professional associations, councils, commissions etc. (11).[5]

The following results show that the larger proportion of experts expected to see a move of cultural institutions in the direction of being more commercially oriented.

Statement	Yes	No	Not Clear
Cultural institutions will increasingly charge for digital services they traditionally have provided for free	**25**	14	12
Cultural institutions will develop new services/products and market them commercially	**44**	1	6
Cultural institutions will find new profitable ways to make use of their intellectual capital (professional knowledge and skills)	**40**	6	5
Archives with audio-visual content (e.g. photography, music, video) will be able to develop commercially successful business cases	**29**	5	17

5) For a more detailed description of the experts participating in the DigiCULT Online Delphi, see Chapter X, Methodology.

Yet, the following results show, that in large part the experts were sceptical or unclear with regard to sustainability.

Statement	Yes	No	Not Clear
Cultural institutions will be able to generate enough new revenue streams to reach sustainability (also public funding will decrease continuously)	3	**31**	17
The electronic services of cultural institutions developed today on the basis of funded projects will be sustainable in the future	9	14	**28**

In the context of the assumed move of cultural institutions towards being more "commercial" it might also be important to mention that the results for the statement "Free access to cultural content will decrease while commercial services will flourish" were: *Yes*: 13, *No*: 20, and *Not Clear*: 18.

What cultural heritage experts see to be relevant areas of exploitation

In the DigiCULT-study the topic exploitation was raised in the two rounds of the Online Delphi, in an Expert Round Table, as well as a sub-theme in (some) interviews with cultural heritage experts. This paragraph gives an overview of what experts in the field expect to be relevant or promising sources of revenue generation for cultural heritage organisations. With regard to this list it must be highlighted that experts, when asked generally, were quite willing to suggest services or products that might be relevant, which does not mean any guarantee that a successful exploitation in commercial terms is or would be feasible.

For an (anecdotal) example: In the Expert Round Table on exploitation, held in Edinburgh, July 24, 2001, Bruce Royan, CEO, SCRAN, who moderated the round table, drew the attention of the participants to a snippet of news he picked up that day: Egg, deemed to be one of the most successful Internet banks in Europe had just posted losses of £63 million for the first 6 months of 2001. The participants were not too impressed and affected by this.

Sorting out what is appropriate for commercial exploitation

In their statements, some participants of the Online Delphi (round 1) drew a line between commercial services versus uses that should be free of charge. Services in the latter group were characterised for example as "for individual and education purpose" or needed to be "free at the point of use for education". Such services include: catalogues, bibliographical information, standard research on collections. One participant even stated: "all non-reprographic content should be freely distributed to provide maximum intellectual access". (David Stockdale, Dundee City Council Arts & Heritage; DigiCULT Delphi, June 21, 2001) But, if a service as for example search for material is conducted for companies or demands more than "standard effort", experts clearly consider charging to be eligible.

Jennifer Trant, AMICO, with regard do exploiting cultural heritage content made clear: "This is not black and white; the same content can be both free and charged, depending on the services offered with it, the use that is made of it and market to which it is offered." And, she added: "Any service with a revenue-generating potential must offer more than just 'content'." (DigiCULT Delphi, July 17, 2001)

Another major point that was highlighted in the Expert Round Table on exploitation is that if cultural heritage institutions offer services to the educational sector, it most often will

not be the individual user (teacher, student) that pays the subscription fee, but the educational institution or a public entity responsible e.g. for a school district. The material or virtual learning environment offered on a cultural heritage platform will therefore be free at the point of use. This model is used by leading new cultural heritage organisations as for example SCRAN and AMICO that are described in Chapter 7, "Organisational Change".

Below an accumulated list of services and products is provided, which experts mentioned to possibly have some market potential, respectively could be relevant things people would be willing to pay for. This list presents many lines of activities that are today practised in (some) cultural heritage institutions and could be reinforced, or would need to be explored to see whether reasonable revenue could be generated.

The activities mentioned are grouped in the classical distinction between Business to Business (B2B) and Business to Consumer (B2C). This distinction will also be used in later paragraphs where selected lines of activities will be dealt with in more detail. B2B in the context of cultural heritage of course means institution to business or other institution (e.g. in the educational sector).

Revenue options for cultural heritage institutions

The following list includes off- and online markets, of which experts have suggested being of relevance with regard to exploiting cultural heritage. It is not meant to be exhaustive, but can give a first overview of services and products to be considered. The sequence of things mentioned represents no ranking in terms of real market potential. Also, the list represents a relative clear distinction between B2B and B2C markets, many things can be either/or: e.g. a video-conference with a museum expert might be interesting to do for auctioneers or for a school class doing history projects.

What companies, other institutions, or individual customers would pay for (not ranked):

Business to Business:
- Licensing images (seen as a niche market),
- copyright fees on other reproductions (e.g. maps, posters, etc.),
- educational material (e.g. courseware),
- virtual education, e-learning (e.g. services for virtual high schools or universities),
- merchandising (e.g. special museum shop products),
- renting premises (e.g. museum spaces) for conferences or meetings, use of monumental areas in film shooting etc.
- services / products for companies in the touristic sector,
- (interactive) cultural television programs, e.g. for a tourist or education channel.

Business to Consumer:
- Internet shops for tangible cultural heritage goods,
- cultural CD-ROMs,
- exhibitions, guided tours, personal guides, seminars,
- genealogists,
- alumni market,
- complex/time consuming research on collections,
- alert services,
- video-conferences with museum experts.

The most promising markets in general terms are seen to be (not ranked):
- content industries (in particular publishing houses),
- education and life-long learning,
- tourism.

Accumulated from expert statements at the DigiCULT ERT, Edinburgh, July 24, 2001

Risk as a key theme

In the Expert Round Table on exploitation, risk was a key theme with regard to the agreed fact, that cultural heritage institutions "cannot easily take risks and do not understand risk". A great advantage of the commercial over the non-commercial players therefore is "that they can take risks and they have taken some substantial risks. There will be continued examination of models and trials (...) until they reach a situation when they find something that makes money." Institutions seem to really avoid as much as possible anything that is risky or might fail. What they need to learn these days is "that they have to take some risks. Not all of them are money-related. A lot of them are ideas-related." (Graham Turnbull, SCRAN; ERT Edinburgh, July 24, 2001)

This theme is a focus point of the case study on SCRAN in the chapter on new cultural heritage organisations, of which one function is to reduce various risks for institutions in the digital world.

Things to keep in mind

In the roundtable discussion some points were highlighted that should be kept in mind when thinking about commercial services of cultural heritage institutions. These include that:

- all commercial activities need to be checked whether they are appropriate with regard to the mission of an institution and whether there really is a favourable balance between the (expected) revenues and the costs of setting up and running a business line,
- the institutions themselves may not be best placed to actually judge what people would pay for, because in many ways their decisions will be based more on internal considerations (including e.g. mission, ethos, possible loss of reputation) rather than what new markets might be there,
- what is required by clients, and what they might pay for, often is not for a lot of material, but "the exact thing", that is specific bits of information, images or other materials,
- what people might be more willing to pay for are manipulative facilities, the ability to interact and actively do something with certain resources, be they scholarly uses, e-learning or entertainment.

Manipulative facilities might have high market potential

"If you do look into marketing opportunities and opportunities to exploit content, the possibility of charging the user for services is very closely linked to specialisation. The more specialised, the more personalised the content, the better the opportunity to actually charge, and perhaps one very successful way of doing it is giving the user the opportunity to actually manipulate or interact with the content in correspondence with their own personal needs.

A way of addressing this whole area for most cultural institutions would be to establish, implement and run special projects, special web services that are in a way parallel to the core service that the institution will provide anyway. Most of the core business of cultural institutions is what we could call public service, something that should be free of charge, and then you have a parallel structure of developing specialised projects or features that would actually form an object for exploitation."

Pia Vigh, KulturNet Denmark, DigiCULT ERT, Edinburgh, July 24, 2001

VIII.2   Online business models

Starting an online business just after the "dot.com wipe out"?

"What's the business model?" This is a question very few venture capitalists are likely these days to ask aspiring newcomers to the online market place. Yet, cultural heritage institutions that today are seeking a place in this market, clearly must ask where is their "niche" market and which models could work for them to gain some revenues through online services or e-commerce solutions.

Generally, the business model outlines how and from where an organisation generates its revenues by specifying where it is positioned in the value chain or "value web". The Internet has led many people with entrepreneurial minds to figure out all sorts of online business models that range from very clear cut to extremely fanciful approaches. After some years of experience, observers in the development of online business models are prepared to tell quite a realistic story of e-commerce. Even before the "dot.com wipe-out", Jeffrey F. Rayport (Head of The Marketspace Center, Monitor Company, Cambridge) wrote:

"What awaits us is the perhaps deflating realisation that, Internet company valuations aside, e-commerce is just, when all is said and done, another kind of business. As with businesses that have come before it, there are countless ‚right' answers, endless combinations of business models and infinite permutations of key themes and approaches. There will be no magic bullet. (...) So the truth is that there are no simple answers. Every e-commerce business is either viable or not viable. They hardly qualify for the paint-by-number prescriptions that business people seem to expect." (Rayport, 1999)

After the "dot.com wipe-out", there seems to be, as Tim Jackson (columnist and venture capital advisor to the Carlyle Group) has observed, a re-focusing on "tried-and-true business models", i.e. ventures that did come off the ground, prove to work, and are more or less stable. Overall, of course, the e-commerce hype has gone and the investment climate has become more risk-averse. (cf. Jackson, 2001)

It might seem to be a kind of paradox for cultural heritage institutions to start thinking of investments in online commercial ventures after so many dot.coms have crashed. But, in many ways these crashes have cleared some ground and show what does and what does not work, and what the tried-and-true models might be also for these institutions.

Models in the box

Drawing on the opportunities offered by information and communication technologies (ICTs), companies and organisations have developed a broad range of online business models. To take into account all the different basic models and sub-forms one actually needs to develop and apply a taxonomy. For example, according to the taxonomy developed by Michael Rappa there are nine generic models including: Brokerage, advertising, infomediary, merchant, manufacturer, affiliate, community, subscription, and utility. For these generic models, Rappa distinguishes a total of 26 subforms. (cf. Rappa, 2000)

Rappa also provides concrete examples, and it might not be insignificant that the only example he gives that is somewhat related to cultural institutions is in the generic model group "community", subform "Voluntary Contributor Model", and the example being: National Public Radio. The Voluntary Contributor Model is "predicated on the creation of a community of users who support the site through voluntary donations. Not-for-profit organizations may also seek funding from charitable foundations and corporate sponsors that support the organizations' missions."

If one expands the notion of a business model into the sphere of people and groups that support an organisation's goal and activities with voluntary contributions or membership fees, then some cultural heritage institutions might be giants as for example the National Trust, UK (<http://www.nationaltrust.org.uk>).

And what also should be thought of are "adoption" programs: In order to be able to preserve cultural heritage objects, institutions can invite patrons online to help financially to preserve a book, map, manuscript, poster, or other piece of history. This can take the form of an exchange of a donation for a symbolic honouring of the demonstrated respect and support for cultural heritage. Adoption programs might also include "e-adoption", i.e. support for digitising objects in order to reduce their physical handling and/or make it available for an educational product.

The Adopt-a-Book, Etc. program of the Library of Virginia Foundation

Donors giving $100 or more will have their name(s) and the name(s) of those to be honoured recorded on an insert placed in the conserved book or kept with the selected piece. The contribution will be listed in the Library's catalogue record. Donors giving $1,000 or more may choose the type of book or other item they wish to adopt.
In autumn 2001, items waiting for "adoption" included e.g. the First World War poster "Oh Boy, That's the Girl!"; volumes of "Camera Work" edited and published by Alfred Stieglitz containing photographs from the first decade of the 20th century, or "A Complete System of Husbandry and Gardening; or, The Gentleman's Companion, in the Business and Pleasures of a Country Life" (1716).

<http://www.lva.lib.va.us/about/foundation/adopt/index.htm>

Pointing to these "models" first does not mean that for some of the subforms Rappa distinguishes examples from the cultural heritage sector could not be found (e.g. e-retailers or subscription services) or, more often, imagined. Yet, for the following overview a more down to earth approach has been chosen that will provide:
- *A basic set of business models* including models that focus on selling:
  - user attention & information,
  - products (physical & digital products) & tickets for events,
  - pay-per-view,
  - subscriptions.
- *a short description and examples are given, followed by a short or more extended assessment.*
- furthermore, *a sample of illustrative examples* is provided for readers who want to have more detailed information.

The models described are for the most part models actually used or explored by cultural heritage institutions. Some others were included in order to clearly indicate models that have become obsolete or are in the meantime known to be not applicable or only under very specific conditions.

Licensing as an online business model (mainly institution-to-business) will be analysed in a separate chapter. In addition, commercial library services will be looked into in more detail.

Capturing and selling user attention & information

Connect-time revenue split

Short description

In the early days of the Internet/WWW, when users paid by the minute or hour, providers of content, information or consultancy who helped online service providers in keeping users online could get a share of the generated connect-time revenues.

The model worked particularly well for content providers, whose information could captivate many users for quite a time (e.g. CNN Newsroom, MTV with information on pop music and videos). Yet, the model was killed by Internet service providers who offered from the start flat-rate monthly pricing.

Example

America On Line (AOL), which is, now as AOL Time Warner, still alive and prospering.

Assessment

The model is outdated, but it had a considerable impact on the thinking about online business models, that was – retrospectively seen – very negative. The idea it generated was that one could easily "monetise" web site visitors. The assumption was that online businesses must first capture large audiences of users and will then be able to "monetise" them. How these curious visitors, information seekers or shoppers (looking for something free or really cheap) could be later on persuaded to be loyal customers, pay subscription fees or pay-per-view often was far from being clear.

Payments for contact rates with banners (and other Internet advertisements)

Short description

Web sites with high volume of traffic (e.g. search engines) or huge audiences for reasons of content, community or commerce, can "sell eye-balls" to advertisers' banners (a model borrowed from TV broadcasters). This approach also brought with it a new science that analyses Internet contact rates, click-throughs, the meaning of hits, page impressions, etc.

Examples

Yahoo!, Gamesville, Geocities, Amazon.com

Assessment

In the framework of a major sponsorship a cultural heritage institution certainly would make a suitable notification with a logo or banner added (with the sponsor profiting symbolically from the brand of the institution). Banner-ads and other Internet advertisements as a source of (small) revenues might generally be an option for large and attractive institutions (e.g. major museums), cultural heritage portals and networks, provided they suit to or at least do not interfere with the institutions' mission and activities.

Yet, today, due to very low click-through rates, sales volumes and prices for banners are down. The unanimous opinion in the advertising sector is that in commercial terms they only work to some degree for the very big aggregators of attention and traffic knots. "Banner advertising strategies have fallen hopelessly short for all but a few destination Web

sites. Highly coveted, targeted ad-insertion technologies have generated a tremendous amount of hype, but few actual results. Subscriptions and pay-per-view models, at this point, really only work for porn and sports sites." (Top, 2001)

Market observer Tim Jackson writes, that the "collective mistake" of the ad-based businesses was to "fatally overestimate the size of the online advertising market and the amount of money that merchants would be willing to pay to acquire each new customer. Once VCs [venture capitalists] stopped giving nearly free money to online merchants, demanding only that they build up as many customers as possible, the sales volume and prices of advertising slumped." (Jackson, 2001; see also his description of some "weird and wacky forms" of ad-based businesses).

ON THE RECORD

Click-through rates*
USA: 0,19;
UK: 0,27;
France: 0,28;
Spain: 0,32;
Germany: 0,42;
Sweden: 0,49.

*) Percent of web page visitors clicking on an banner ad, June 2001, Source: Connectis, Issue 15, 10/2001, pp. 6-7.

Indirect exploitation of customer relationships

Short description

Companies that provide customers opportunities to save costs (e.g. offering products or services for free, at or below cost) can ask for detailed user information, and re-use it for their own lines of business, sell the information or elaborated user profiles to other companies (and, if there are really a lot of customers, also sell the aggregated "eye-balls" to advertisers).

Examples

Buy.com; Idealab!'s Free PC Inc. (an offer that really hit the news pages).

Assessment

This model is far from being acceptable for cultural heritage institutions.

Lessons learned: in/out-themes of the dot.com survivor club

OUT (what will not work)	IN (what might work)
Underestimating the effort to change human behaviour	Be clear that the service fits into how users are used to doing things
Monetising audiences	Why one will become a (loyal) customer and pay subscription fees should be very clear
Selling information bits	Provide a full information package
Banners and other online advertisements as a key revenue source	Use advertisement partnerships strategically for yourself (e.g. an affiliate program)

Developing and selling products: e-retailing

Short description

E-retailing is selling physical products via online channels. The purchasing, and often payment, takes place online and delivery of the good via postal services. An option for cultural heritage institutions is to combine e-retailing with a membership scheme, e.g. with special items and prices only for members.

Examples

museumshop.com, The National Geographic Store, <http://www.museesdefrance.com> (Réunion des Musées Nationaux)

Assessment

E-retailing in commercial terms seems to be only an option for institutions that are potent enough to establish a brand (e.g. large and well-known museums). For example: The Metropolitan Museum in New York, with 5,5 Million visitors in 2000, sells its items with the slogan "A gift from the MET is a gift to the MET." <http://www.metmuseum.org/store/>

To establish a brand will necessarily include to develop and produce – together with specialist companies – items that are based on their collections or related to their activities (e.g. gift shop articles, cultural CD-ROMs). Yet, in order to develop for example cultural CD-ROMs most institutions will need creative and commercial partnerships. Developing multimedia products is still a risky and largely a costly business. Returns from most off-line multimedia products have shown to be very limited, profit often being not more than 1–3%, with many products not reaching the break-even point. After the experiences of the last ten years in the multimedia market, the willingness of cultural industry players to put money into such projects will be limited. (Council for Cultural Co-operation, 1999: p. 11)

Ideally, a museum e-shop would offer only unique products based on objects held in the museum collections. For the big e-stores that draw all of their products from merchandisers (e.g. post cards, posters, calendars), competition is very high, meaning that the range of products offered, responsiveness (e.g. telephone support), gift wrapping, shipping etc. need to be top-end.

Generally, what the really big names under the e-retailers, e.g. Amazon.com, have learned is "that building a retail brand costs a fortune"; and that you need the scale of millions of loyal customers, "to make up for the damage that shipping costs wreak on your margins". (Jackson, 2001) There are, of course, many small institutions involved in e-retailing in the cultural heritage field. On Yahoo! Store in October 2001 with the search term "museum" one could find 672 stores! Yet, for most of these institutions e-retailing can only be seen as an add and the revenues to be expected are far from impressive (e.g. break-even). The situation might even be worse, because engaging in e-retailing can lead to a channel rivalry.

In a study on the 36 non-departmental public bodies (NDPBs) sponsored by the UK Department for Culture, Media and Sports the authors write: "E-commerce can expand revenue streams, tap into new markets through sales to non-traditional customers, and reduce costs of transactions and fulfilment. However, trading plays only a very small part of the core business for many NDPBs, suggesting that for these organisations the potential for e-commerce is low. Furthermore, unless new markets can be tapped, online sales may simply be displacing those through traditional channels, creating a channel rivalry with the potential to increase rather than reduce costs." (QUEST, 2000, 40)

Products based on special collections - National Library of New Zealand

Memory institutions that develop products based on special collections can quite easily offer them online. A prerequisite for this commercial channel to be successful is to actively establish a brand and market the products or rather the appreciation for unique historical or even contemporary cultural heritage. Being renowned for special exhibitions and carefully selected and contextualised objects will surely add much to the brand.

An illustrative example is the National Library of New Zealand that provides online ordering and payment (credit card) of publications and reproductions. The catalogue includes books and serials, cards, exhibition catalogues and related publications, posters, and music on CD. The impressive list includes for example: Greeting cards based on works of Frances Hodgkins (1869-1947), drawings from the French 1769-1846 New Zealand Exhibition, or modern artwork by New Zealand children's book illustrators. Music on CD: The Treasures in Sound – He Puiaki Puoru collection features some of New Zealand's most rare and treasured voices from the past, taken largely from the famous Alexander Turnbull heritage collection.

<http://www.natlib.govt.nz/en/about/pub/catalogue.html>

A big "do it yourself" museum shop – Museum of Fine Arts, Boston

This gift shop is based on Yahoo! Store. Since its launch in 1999 the online gift shop team referred to it as the "throw-away solution", because it wants to have a more advanced solution (e.g. to integrate the inventory). Yet it also has learned that the affilation with "Yahoo! Shopping" and its other tousands mechants (8000 in 1999) "seems to bring in quite a bit of traffic and sales." (Getchell, LaKind, 2000) The Museum projected revenues for 2000 of $2,4 million from online retail and membership sales; in the second half of 1999 it generated ca. $1 million [gross] (cf. QUEST, 2000, 41)

Sources: <http://www.mfa.org/shop/> and <http://www.archimuse.com/mw2000/papers/getchell/getchell.html> that gives a very illustrative description of the development of this online museum shop.

For adventurous minds – The National Geographic Store

The National Geographic Society is the world's largest nonprofit scientific and educational organisation, with the overall mission "the increase and diffusion of geographic knowledge", a mission that includes education, exploration, environmental efforts, scientific research and conservation. Today, in order to fulfil its mission, the society is also a striving commercial enterprise. Beside its traditional flagship magazine, National Geographic, it offers special interest publications like Adventure or Traveller, owns the TV channel Explorer, and – there is a high performance e-commerce web site with many features and offerings. Recently it has gone into a partnership with NOVICA, that sells artfully fabricated craft products from all over the world.

<http://shop.nationalgeographic.com>

An exquisite megastore – Museumshop.com

MuseumShop.com is a large online retail platform for mostly unique gifts of its partner museum, in October 2001 more than 75 museums that showcase more than 3,000 products. It has a high-standard e-commerce solution, including for example: a "gift finder" tool (matching gift to gender, age, occasion, price range) or for registered users the shipping status. Partner institutions from Europe include for example the Musée d'Orsay, Prado Museum and Victoria & Albert Museum.

<http://www.museumshop.com>

e-ticketing

Short description

Today, e-ticketing means selling tickets or reservations online for visits to real world events, e.g. a festival or an exhibition, while the days of selling e-tickets for virtual exhibitions or events are not yet here.

Examples

Solution & service providers: tickets.com, ticketweb.com

Assessment

E-ticketing is already used by large and first-rate cultural institutions, museums, theatres, opera houses, concert halls, that can afford such an additional service. The service is usually provided by external intermediaries. The large e-ticketing solution and service providers have in their customer stock many museums, with the more famous being for example Guggenheim or Louvre. The QUEST "e-Value"–report states: "In the UK one of the most pressing concerns for individual arts organisations is online ticket, amid fears that multi-national ticketing will control the market, reducing individual arts organisations' ability to manage and control their own products." (QUEST, 2000, p. 13)

E-ticketing solution & service provider – Ticketweb.com

The company was established in 1995, has a strong US-base as well as a large presence in the UK and in South Africa. The more than 500 top-tier clients, include from the museums sector for example the Louvre Museum, the Guggenheim Museum, the New York Museum of Modern Art.

<http://www.ticketweb.com>

Digital commerce (digital products)

Short description

In digital commerce, what is sold or licensed is a distinct digital/digitised product, and the commercial transaction ideally takes place completely online, including purchasing, payment and delivery of services.

Examples

Accessible.com (digitised historical periodicals), Audible.com (sounds), Handlo.com (choral music scores); image banks are dealt with separately.

Assessment

Digital commerce is clearly an option for cultural heritage institutions, but having with the Internet a distribution channel at hand with which products can be displayed and delivered very efficiently will not be enough. Usually much marketing is needed to come to a broad enough customer base (if there is one).

In targeting consumers with e-products (and related services), many dot.com's found that it is very difficult to turn a brilliant idea into an online business model that really works. For those that failed, a shared common feature was that "they did not realize how much time it would take for consumers to accept a radically new way of doing business". (Jackson, 2001)

Accepting and developing a radically new way of doing business is also something

cultural heritage institutions might have to learn in the networked environment. If they engage in selling products (physical as well as digital) or subscription-based services, one method they would need to explore and use intensively is up- and cross selling (or, to use a more familiar term: referring between content and related products or services they or institutional partners can offer). As a participant in the DigiCULT Expert Round Table on exploitation stated:

"What we need to do is what most IT resellers do and amazon.com does, things like that which say that when you are looking for one particular thing you may also be interested in x or y. Most of our cultural sites do not do that very successfully or at all and I think that's something that we really properly have to look in. Because, that is what people are becoming used to on the Internet. And I think that is what they will want to look at in our institutions as well. Plus from just a purely commercial view it gives you lots of opportunities therefore to buy up, sell bits and pieces. Rather than have a separate shop, why should not you be offering the item at the point you are looking at the record of it?" (DigiCULT ERT, Edinburgh, July 24, 2001)

With regard to cultural heritage institutions, the list of e-products of which experts think companies, other institutions, or individual customers would pay for includes educational material (e.g. courseware for teachers or students) and digital surrogates of cultural heritage objects (images).

As one would not expect many cultural heritage institutions to engage on a regular basis in the production of elaborated educational material, digitised cultural resources are today clearly expected to be the most promising (niche) market. In a later chapter the "fitness" of cultural heritage institutions to enter into this market will be analysed in more detail.

Medieval musical scores – handlo.com

Handlo Music, located in the historic city of Bath, England, offers digitised medieval musical scores to amateur choirs. It has been active for four years, and has a selection of 2,800 scores online, with a further 1,250 scores available on request. The scores can be downloaded as pdf-files; prices are from $ 2,5-12.

<http://www.handlo.com/>

Selling "all the marvellous details of real life" in historical periodicals - Accessible Archives, Inc.

Accessible Archives (Malvern, PA, USA) was founded in 1990 and makes historical information, previously furnished only on microfilm, available online and on CD-ROMs. The focus lies on early American periodicals that reflect a broad and rich view of the times: "Eyewitness accounts of historical events, vivid descriptions of daily life, editorial observations, commerce as seen through advertisements, the cavalcade of births and deaths... all the marvellous detail of real life that a newspaper contains".
The databases provided allow for full-text research, transcribed individual entries are complete with full bibliographic citations and are organised chronologically. They include for example: The Pennsylvania Gazette 1728-1800 ("The New York Times of the 18 Century"); The Civil War: A Newspaper Perspective, November 1860 – April 1865 (including major articles from: The Charleston Mercury, The New York Herald, Richmond Enquirer); African American Newspapers: The 19th Century.
The commercial service targets K-12 Schools, colleges & universities, public libraries and historical societies, as well as historically interested individuals.

<http://www.accessible.com>

Pay-per-view model – interactive TV

Short description

Pay-per-view interactive TV means that users pay for special TV transmissions they select and can control via their back channel (bi-directional satellite or terrestrial broadband networks). Today, usually the product will be first downloaded on a local storage and then executed from there.

Example

Cultural heritage games, already developed e.g. by the Réunion des musées nationaux (France) on traditional carriers, might be an interesting future market.

Assessment

Interactive TV as a business opportunity for cultural heritage institutions was mentioned by only one expert who participated in the DigiCULT study, Dominique Delouis (President, Cultural Heritage On Line, Paris). Coming from France, this seems a natural future opportunity, as Canal+ in 2000 had a total of 5,3 million (of which 3,3 are located outside France) digital subscribers. The Vivendi Universal Group reports that 90% of the Canal+ digital subscribers use interactive services, with the weather site being the most often visited in France (9 million hits), Canalsatellite Games had 2.2 million active gamers. (<http://finance.vivendi.com/communication/drcanalplus.HTM#02>)

The market potential for cultural heritage interactive TV programs cannot be easily assessed (for a general market impression see Stone, 2000). Yet, it can be expected to be a limited one and open only for major cultural heritage institutions that have strong partners in the production of (interactive) educational programs, historical documentaries or elaborated virtual museum tours.

Cultural heritage games

EXAMPLE

In 1993, The Réunion des Musées Nationaux (RMN) set up a multimedia department and formed various partnerships to produce CD-ROMs, later extended to DVD-ROMs and game consoles. With Canal+ Multimédia and Cryo Interactive, the RMN has invented a new type of multimedia program: cultural heritage games that involve users in exploring a historical period, a civilisation, its art and traditions. Each new game published by RMN and its partners is previewed on its own exclusive site, presenting the plot, the characters and the setting.

The first title, "Versailles, Complot à la Cour du Roi Soleil" was brought on the market in 1996. Newer products were developed together with Canal+ Multimédia, France Télécom Multimédia and Indexplus (e.g. Louvre, l'Ultime malédiction, 2000).

These games are not marketed for pay-per-view interactive TV, but the potential is there.

<http://www.rmn.fr/gb/04editions/04multimedia/03.html>

Selling subscriptions

Information services (selling just "information")

Short description

Providing information services commercially really means selling just information on the basis of subscriptions or, less frequently, on a one-off payment scheme. Information is of course a very broad category, including e.g. more or less condensed data, information graphics, texts, etc. Here only two examples are given to illustrate how information derived from or related to cultural heritage resources can be sold.

Examples:

Artprice.com: offers auction data services (subscription) as well as artist-by-artist auction indices (single payment) for professionals, but also targets the broader market of "art lovers".

Ancestry.com: subscriptions for a search & retrieval service of information bits in digitised public records.

Assessment

Selling information services in a world of information abundance is a very tough business. Many business options one might have first thought of, like "valorising" newspaper archives, proved to be unsuccessful in commercial terms, at least not for second-rate players (a first-rate and successful player is for example Wall Street Journal's WSJ.com).

Commercially feasible services require skilfully elaborated, "premium" or "value-added" information, along with sufficient demand from professionals or others with a personal line of interest. Other decisive factors might be: having an information monopoly, status as a trusted source, high specialisation. Yet, also if a provider really has a stock of first class information, one lesson learned in the last years is that selling subscriptions in full information packages is more likely to be feasible than an information bits approach: "people who are willing to pay high subscription fees for services like Lexis-Nexis simply proved unwilling to shell out the same amount when they were paying item by item". (Jackson, 2001) A telling example for this effect is the Encyclopaedia Britannica online venture.

In the cultural heritage sector, many information services are of course offered by memory institutions, in particular by libraries, but due to their mission, status and role as basically free public information "hubs" a commercialisation seems to be not appropriate (except for e.g. document supply or custom research services). Yet, while memory institutions stick to their mission and develop valuable online solutions for special material needed in scholarly research and education (e.g. digitisation of journals' backfiles, material for course readings) commercial players are heading towards controlling the subscription based use of published works (see chapter VIII.4).

EXAMPLE

artprice.com – "The world leader in art market information"

Artprice.com owns and runs one of the world's biggest art price quotation data banks, spanning paintings, prints, drawings, miniatures, sculptures, posters, photographs, tapestries (4 million results dating back to 1700). Artprice.com was the first "Dot Corp ®" listed on the French Stock Exchange and is majority owned by the Server Group. It is based on highly-effective, integrated processes of gathering, processing and enrichment of data on practically all art transactions, sourced from over 2,900 auction houses in more than 40 countries.

<http://www.artprice.com>

A separate, explorative case study in this chapter focuses on genealogy, an area that is particularly interesting for archival and public records institutions, booming with private users, and technologically demanding (including e.g. mass-digitisation & indexing).

Virtual environments (e-learning)

Short description

A virtual environment offers an interactive space that includes material with which users, individually or as a group, can do and produce something that is valuable for purposes as for example educational progress. Access to and usage of such a "members only" virtual space is usually based on a subscription.

Examples

louvre.edu, fathom.com

Assessment

To justify monthly or annual payments an organisation needs to offer an extensive volume of high quality material with rich documentation as well as tools, clues and examples for usage. The cost of content generation for online use is high, particularly that associated with the development of well-supported, interactive educational material. To build and keep attractive a subscription-based virtual environment is very demanding and today a reasonable "commercial" line of activity only for major single institutions, consortia or new types of cultural heritage organisations that are heavily funded (e.g. the Louvre, SCRAN).

EXAMPLE

[Louvre.edu]

[lourvre.edu] is an educational virtual environment service realised by the Musée du Louvre and Pagesjaunes Édition, in partnership with the Ministère de l'Éducation nationale. The environment builds on the collections (digitised objects) and digital library resources of the Louvre, and also is helpful in preparing a visit to the (physical) exhibition spaces of the Louvre.

Users of this subscription-based environment are provided with a personal "virtual office" (also for group use, e.g. a professor and a group of students). Work with the digital objects is supported by indexes, maps, and search options (e.g. on artists, genre, themes). The virtual office has a set of functionalities with which digital objects (images and legends, texts and audio commentaries) can be selected, combined and re-grouped (with the help of an "mosaïqueur"), stored together, or downloaded for external usages as for example a presentation in the classroom or on an educational web site.

A sample of examples of "applications pédagogiques" that have been realised by teachers and students are accessible via the Educanet.

<http://www.louvre.edu>, <http://www.educnet.education.fr/louvre/louvre1.htm> and
<http://www.educnet.education.fr/louvre/usages.htm>

Short case study: Fathom Knowledge Network Inc.

Fathom Knowledge Network Inc., launched in November 2000, is one of the most interesting ventures in cultural distance learning targeting customers with offers for cultural lifelong learning and professional development. Most interesting, because it puts to the test whether high-quality cultural, professional and scholarly online education or "an interactive

knowledge marketplace" can be established and become a profitable business.

According to a Fathom.com press release (April 3, 2000) it aims at becoming the category leader on a marketplace that is seen to be growing rapidly: "Significant growth in online education is expected over the next few years. According to IDC, the size of the U.S. market for distance learning is already $2 billion and is projected to be $6 billion in 2002 and $9 billion by 2003, a growing component of the $750 billion higher education market in the U.S. alone. Enrolment in online programs is expected to increase at an annual rate of 30-35 percent."

The Fathom venture was brought into life by the spearheading Columbia University in alliance with a mix of institutional partners that come from different cultural and academic corners (i.e. libraries, museums, and scholarly institutions). Fathom's list of founding partners and members is impressive: Founding partners, beside Columbia University, are: The London School of Economics and Political Science, Cambridge University Press, The British Library, National Museum of Natural History (Smithsonian), and The New York Public Library. Members include the University of Chicago, the University of Michigan, the American Film Institute, RAND, Woods Hole Oceanographic Institution, the Victoria and Albert Museum, the Science Museum and the Natural History Museum.

Drawing on the intellectual resources of its partners, Fathom.com aims to cover a wide range of subjects such as business, law, economics, social sciences, medicine, computer science and technology, physics, the arts, journalism, and more. While Fathom is the knowledge market place and e-learning access platform, tuition fees, accreditation, and admission policies are set at the discretion of the content offering institutions. One clear target group and possibly the greatest potential for growth are alumni of member academic institutions. In mid 2001, Fathom offered 800 seminars and, for a fee, links to online courses that have been selected from the member institutions' curricula. Beside the online courses and other subscription based services, much free content is provided to attract users (e.g. interviews, articles, exhibits).

The Fathom consortium represents a vast intellectual capital to build on. Though it is not easy to "migrate" it onto the Internet and provide e-learning solutions people are willing to pay for. In particular, developing attractive and high-value e-learning content together with faculty members and curators of the partner and member institutions, as well as offering the right packages, is clearly not an easy business.

For example: Fathom first thought it feasible to market courses that might last weeks or months, however the emphasis needed to be switched to shorter courses and self-contained seminars. It is reported that "some people interested in distance education experience 'sticker shock' upon discovering that an eight-week course costs more than $ 500. To respond to this concern, Fathom is developing shorter, less expensive courses (e.g., a one-week course for $ 100) that can help build its customer base." (Smith, 2001)

For starting the venture Columbia invested $18 million, and at the beginning of 2000 it was reported to have put another $10 million into the project to keep it afloat. In an interview Ann Kirschner, president of Fathom.com, admitted that it will be "a long hard road", but "rumours of our death are exaggerated"; and she added: "This is not for the faint of heart – only those with institutional and strategic commitment are going to make it." (Kirschner in MacLeod, 2001) Expectation is that it will be at least two years before Fathom.com is able to prove itself as a success.

Source: <http://www.fathom.com>

VIII.3 Institution to Business markets for cultural heritage collections

In this chapter, a condensed overview will be provided on Institution to Business (I2B) markets for key cultural heritage resources, which are seen to be mostly images, and to a much lesser extent film and video footage.

It should be noted, that with regard to images there is a widespread assumption that licensing to consumers is commercially feasible. Any company or institution that has set up a digital image bank will of course offer its products also to individual private customers. Yet, to really create a relevant stream of revenue from private customers, a greater marketing effort is needed, that might not pay off.

For example: In May 2001, Getty Images had to close Art.com, a consumer e-commerce operation, which it had acquired in May 1999 to expand its business beyond the professional market by offering prints and framing to consumers online. The relation of expanding costs to revenues generated (approx. 4% of Getty's total revenue) was no longer acceptable, and the company re-focused completely on the B2B market. Getty Images, founded in 1995, has a 25% share in the stock image market. Its prime customers are from the print media and advertising industry. Today, about 40% of its sales are delivered over the Internet. (Gates, 2001)

The following overview draws on the report *Like light through a prism. Analyzing Commercial Markets for Cultural Heritage Content*, that was commissioned by the Canadian Heritage Information Network. (CHIN, 1999) The report describes and analyses established as well as potential commercial markets for the intellectual property of cultural heritage institutions. It examines five different market segments: broadcasting, publishing, multimedia, corporate, and advertising. In particular, it focuses on the service standards required to meet market demands, i.e. the prerequisites of becoming recognised and effective business partners.

Due to the broad range and in-depth analysis of the report, we will only provide a condensed summary with two main elements:

- a table with key results of the report on factors that support or constrain market entry and development (this table is a reduced and simplified version of a chart given in the CHIN report),
- a SWOT analysis concerning the fitness of cultural heritage institutions for the I2B market (the CHIN report does not offer a SWOT, although its results can be easily adapted).

Factors that support or constrain market entry and development

The CHIN-report covers markets that are content-driven: publishing, broadcast, multimedia, as well as non-content-driven: advertising and corporate publishing. In the first group the core business of the companies is to regularly conceive and create products themselves, while in the second the enterprises only have a need for certain material on occasion, e.g. for a marketing campaign or annual corporate report.

Key findings

Across all market segments, photos/images generally hold the greatest interest and potential (including some cultural news items and images); film and video recordings are also relevant, albeit to a much lesser extent and mainly for broadcasters (e.g. for

documentary and other types of film, TV history series and cultural shows).

The most important competitors are seen to be other cultural institutions and stock agencies or brokers (e.g. Corbis, ImageBank, Comstock); substitutes available in the public domain are also to be taken into account.

With the publishing and broadcast industries being the most content-driven, the CHIN-study consequently found that they are also the most likely to have a need for cultural heritage intellectual property, while the small multimedia companies (i.e. CD-ROM and web site developers and producers) showed little interest.

Factors that support or constrain market entry and development

	Broadcasting	Publishing	Multimedia	Corporate	Advertising
Need for cultural heritage material	medium–high	medium–high	low	low	low
Importance of authenticity / CH significance	relevant	relevant	not relevant	less relevant	not relevant
Importance of CH expert knowledge for licensee Cost	relevant	relevant	not relevant	not relevant	not relevant
sensitiveness	medium–high	medium–high	high	low	medium
Expected turnaround time from request to delivery	One week or less	One to two weeks	One week or less	quick turn-around time (often 24 h or less)	quick turn-around time (often 24 h or less)

Source: cf. CHIN, 1999: p. 25

Where the intrinsic, authentic nature of cultural heritage sources is not generally perceived as valuable, there is a considerable barrier for market entry and development. The industries that value authenticity the most are broadcasters and publishers, as well as those who value expert knowledge related to the relevant material.

If one adds to this, that the expected turnaround time for material to be delivered to broadcasters and publishers is (relatively) moderate, it all boils down to the result that these are the key target industries for cultural heritage resources.

One barrier might be that these industries are more cost sensitive than the advertising and corporate sector, but as interviewees in the study frequently mentioned: "When you need the real thing, you need it" (signalling a possible trade-off between willingness to spend and authenticity of material).

I2B-markets: How fit are cultural heritage institutions?

A SWOT analysis can be helpful in assessing the "fitness" and perspectives of cultural heritage institutions in the I2B-market. In providing a SWOT analysis, one needs to take

into consideration the strengths and weaknesses, along with the opportunities and threats institutions face when they market objects, products and services to businesses. On the basis of the CHIN-report *Like light through a prism* (1999) one can, by summarising the highlighted aspects throughout the report develop such a SWOT analysis. Yet, what the CHIN-report does not cover, are where the new opportunities for cultural heritage institutions lie. These have been added, with particular attention placed on the techno-logical options and organisational developments in the cultural heritage (CH) sector.

Strengths	Weaknesses
– For CH resources there are often no acceptable substitutes – Historic authenticity of CH resources is essential for certain productions (e.g. for a documentary) – Certain customers (in particular publishers and broadcasters) value CH expertise in finding and contexualising relevant resources	– Competency in licensing material is low (actual focus is on other operations) – Management processes often are not streamlined – Considerable investment of time and resources is needed to reach industry standard – There are often parts of collections for which commercial rights are not cleared (making rights-clearances time-consuming)
Opportunities	Threats
– Work together with CH networks and platforms that are set up – Participate in funded projects for educational usages of CH material that include creation of digital databases – Use of online marketing tools (e.g. electronic catalogues) – Presenting and highlighting online possible usages of relevant parts of collections for cultural industries	– Lack of external awareness of existing material and possible usages – Limited number of relevant organisations /projects for which CH material is important (and cannot be substituted with other offers) – Relevant organisations/projects often have to license material from within limited budgets – High market service delivery expectations, in particular fast turn-around – Need to compete with licence price structure and service delivery minimums (in particular fast turn-around) of industry players – Need to consent to the use of CH material in highly commercial ways (restrictions would be barriers to business

The SWOT overview shows in particular severe weaknesses and a long list of threats cultural heritage institutions have to face. In order to compete with industry players, the institutions need to undertake decisive logistical and procedural changes. Requirements and targets of these changes according to the CHIN-report are:

> – to develop standard electronic on-/off-line catalogues of materials (sample images, sound bytes, video clips etc.),

– to establish a process that enables end-to-end clearance (preferably a centralised one for many cultural heritage institutions), with limited negotiation of individual contracts,
– to achieve quick turnaround time from initial request to delivery of rights-cleared material (with a standard in the industry that averages from overnight to two days),
– for rights-restricted material: standardised and well-understood rate structures for various uses need to be developed.

After having listed prerequisites for being a competitive licensor of rights-protected property, the authors of the CHIN-report mention: "Industry representatives suggest that the cost to develop competitive licensing systems and processes, as well as to develop and maintain collection catalogues could be prohibitive to entering the market. They recommend an alliance or partnership with an existing agency or broker as an alternative to building an in-house system." (CHIN, 1999: p. 15)

While it is certainly true that the barriers to entry into the market for cultural heritage institutions are high, the partnership option with a renowned and effective agency (e.g. the Bridgeman Art Library: <http://www.bridgeman.co.uk>) seems to be realistic only for institutions with high valued art or unique special collections. How to generate revenues through the licensing of less well-known resources online, and how to then spit these between agencies and institutions, is an unexplored question: Dominique Delouis, President, Cultural Heritage On Line, Paris estimates that while the usual rate in the traditional market is 10 percent of the licence fee for the agency, on the online market place it could well be up to 50 percent, "because, of course, the marketing is quite difficult." (DigiCULT ERT, Edinburgh, July 24, 2001)

Finding the niche and developing a strategy

A question not addressed in the CHIN-report is, whether most cultural heritage institutions really have to compete with the big players as for example Corbis.com that can deliver an image within minutes of a licensing request. There are other routes to unlock the value of cultural heritage, including commercial opportunities. Reading the CHIN-report it becomes clear that:
– there are established traditional relationships or at least contact points with the publishing and broadcasting industry,
– uniqueness and historic authenticity of cultural heritage resources are the key elements in the demand and usage,
– the knowledge and expertise of cultural heritage experts in selecting and contextualising resources provides value added.

Therefore, rather then competing with large image stock agencies and brokers, building on these strength and using new technologies to develop their own "niche market" seems to be the adequate strategy for most cultural heritage institutions.

One key element in such a strategy is to establish or further develop a cultural heritage brand based on authenticity, knowledge-based interpretation and contextualisation. This would be anyway, as experts in the DigiCULT Expert Round Table on exploitation highlighted, a value generating activity and what cultural heritage organisations are essentially about.

A second key element would be to actively develop cultural and historical themes together with cultural industries and the media. Publishers, broadcasters and other stake-

holders can buy into such shared and heavily marketed themes, enabling cultural heritage institutions then to selectively "mine" and digitise the respective parts of their collections.

Such a "shared themes approach" would be very helpful in the digitisation and valori-sation of cultural heritage resources: First of all it must be highlighted that commercial players on the image market themselves do not digitise and cannot exploit successfully all material they have. As Hans Petschar, Austrian National Library, has observed "most of the commercial picture archives and photo agencies have 90 % of their collections in non-digitised form; 5 - 10 % of their holdings make the money and the other stuff they just do not touch". (DigiCULT ERT, Berlin, July 5, 2001) Therefore, cultural heritage institutions that decide to play according to the same rules, i.e. only looking towards parts of their collections that might somehow be commercially relevant, would have to completely change their mission and the focus of their work. For example: Potential customers "do not just walk through the door", the personnel of the institution would really have to completely re-focus its work on marketing and selling the material to the most relevant customers.

Furthermore, cultural heritage collections do not lend themselves easily to commercial exploitation. For example, out of a historic image archive only a tiny fraction of the holdings (perhaps 5 percent) might be of any commercial relevance if available in digital form online. And this fraction cannot be easily determined. There is a thinking, that first a "critical mass" of digital cultural heritage collections should be produced from which customers could find what they are looking for. This approach seems to influence many cultural heritage institutions towards mass-digitisation of their holdings, yet, these investments are unlikely to pay off.

Heritage Images - Bringing special collections online together

Heritage Images is a new online picture library, distilled from the collections of the founding partners: British Library, Guildhall Art Gallery, Science Museum, National Museum of Photography Film & Television, National Monuments Record of English Heritage, National Railway Museum and the Corporation of London Libraries (most recently photographs from the Royal Photographic Society have been added). Cultural heritage sources brought into this venture are special collections of photographs, pictures, manuscripts, artworks and engravings. Heritage Images targets the publishing and other media industries and aims at bringing to them an unusual set of material for illustrations.

<http://www.heritage-images.com/>

Images from Britain

"Images from Britain" might serve as an example of an online image bank venture that so far has not been able to take off. It was planned as a commercial venture of the Public Records Office (UK) together with the marketing partner Cardington plc (London, <http://www.cardington.co.uk>), and the online store (that is online) was developed by the web company The Brain Station.

The "Images from Britain" web site was launched in April 2000, and displays the intention to target primarily newspapers and magazines searching for good historical illustrations. Yet, the web site presents only 100 images, grouped under the following categories: America, crime, empire, famous people, festivals, historic milestones, monarchy, places, science & industry, social history, sport, transport, warfare. According to Paul Johnson, Image Library Manager, (e-mail, Sept 10, 2001) it is now "a test site" as "further funding has not been forthcoming, and the site is 'dormant' until decisions are made on how to progress".

<http://www.imagesfrombritain.com>

Commercial partnerships and the risk of "pauperisation"

An argument could be, that the "valorisation" of cultural heritage resources should be mainly done by private enterprises in partnership with the institutions that hold the cultural heritage collections. Yet, in order for such a strategy to be feasible, it would imply, generally, to accept that only a small, high-valued segment of cultural heritage is selected on pure market considerations (e.g. digital image banks of first-rate art collections).

Furthermore, if a joint venture is not about some objects but on collection level, experts estimate that there is little prospect for the institution to cover its costs from the share of licensing fees it would get. As Erland Kolding Nielsen, Director, Royal Library, Copenhagen, describes it: "If you should go into a commercial venture with the purpose of exploiting the collections with commercial firms then the library must have its start costs, its technical costs and an overhead because otherwise there is no incentive and no gain for the library to do that. (...) We have often been asked whether we could not do that and earn parts of our operational costs, but unless you get an overhead of at least 100 % you will not be able to achieve what the politicians or the system expects ... It is not valid just to recover the marginal costs. The costs you had on this part you have to earn at least 100% and more. That is also how the private sector reckons or tries to get their investment back." (DigiCULT Interview, June 28, 2001)

Added to this must be that such ventures, besides most probably not leading to a significant revenue and cost recovery, would mean a re-prioritisation of personnel and other resources that are taken away from mission-related user services.

Valorisation of cultural heritage resources based on selecting only the commercially most relevant fractions of collections as well as commercial partnerships based on the requirement that institutions cover all costs of bringing their resources into the market are highly questionable. Referring to a commercially driven selection of what are valuable resources to digitise, Bruno Mannoni, Head of the Computing Department in the French Ministry of Culture, Paris, has stated, "there is a major risk of impoverishment in doing so. If we deal with cultural heritage as a market driven product, what will be the interest of a private entity in digitising little-known, unpopular or difficult to comprehend works of art?" Therefore, a risk of "pauperisation" exists and a need for state intervention or counterbalancing in the cultural field is necessary. On the global level there is the well-known example of France having raised the "cultural exception" issue during General Agreement on Trade and Tariffs discussions, as well as it has quota on TV transmission and radio programs. (Mannoni, 1996)

It will be a major political task to set measures that counterbalance pure market-driven exploitation, that ignores all that cannot easily be brought into commercial markets, which in the information society of course increasingly means online markets. Yet, it needs to be added, that there might of course be cases where it is very reasonable to foster public-private venture, e.g. if an enterprise takes the risk to cost-intensively digitise and make accessible archival material and can expect to be able to recover the costs on a moderate costing scheme (an example for this is the 1901 Census Project of the UK Public Records Office <http://www.census.pro.gov.uk>).

VIII.4 Exploitation of library services

Libraries have a mission and essential role to act as information "hubs" that serve key functions for the scholarly and educational sector as well as for the general public. With regard to exploitation, (some) libraries can draw on special collections (e.g. licensing to publishers), addressed in a previous chapter. As highlighted there, a workable business model in exploiting special collections is not easily found, an observation that is confirmed by an expert from a leading American public library with remarkable special collections:

"When I first came to the library we spent 3 years working with a global publishing company to see if there was a way in which we could benefit from the exploitation of libraries' collections and everybody wanted to see this happening but no one could come up with a business plan that was going to be successful. – So I think it is naive basically to believe that great commercial value resigns in the use of library collections. No one has been able to make money out of library collections so far. You know the British Library had an RFP a couple of years ago, they tried to privatise their digital library. It was not a success, our efforts were not a success and I do not know if any library will have a success in meaningful dollar claims." (Paul LeClerc, New York Public Library; DigiCULT Interview, June 8, 2001)

Besides licensing digital surrogates from special collections, libraries might offer information services that are value-added and therefore subject to subscriptions or fees. The latter approach does not fit well with the "provide everything (almost) for free ethos" of libraries. But, if a value-added subscription or fee based service clearly is in the interest of scholars and students, and is generally affordable for all users, "exploitation" activities seem legitimate.

It is not the intention of this chapter to provide an exhaustive overview of online services that were or are currently being developed in the library community, because for most of them "commerce" is not a project target. The main focus of this chapter will be to point to the rise of conflict areas and competition between libraries and commercial aggregators of content. Some of them are noted generally in the chapter on organisational changes, while here issues will be addressed which are directly related to exploitation ventures, albeit not of the libraries, but the commercial companies. The competition is a general one, namely for the future face of "the library", and whether the established libraries will in the long term be the places to go to for relevant e-material.

Custom research services: Generating revenues from library expertise and skills

Libraries usually have a strong service ideal and are inclined to offer their services free of charge. Yet, if they offer services that clearly demand more than "standard efforts" charging is eligible. One such area of activities is custom research services for patrons. These services draw on the human capital of library personnel, their expertise and skills in using databases and other library resources to create customised information packages. Such services can include much more than the traditional information searches, which libraries have provided for. If the necessary competencies are strategically built up in-house, this can for example include information on companies, markets or industry trends, as well as patents or trademarks. An illustrative example for an elaborated custom research service is "IntelliSearch", a service offered by the Toronto Public Library.

"IntelliSearch": Toronto Public Library

The IntelliSearch service offers to find journal and newspaper articles, compile company information or market and industry profiles, conduct subject or trademark searches, monitor new information on topics or subjects of interest to the customer, create bibliographies, and even help to locate lost friends, relatives and missing heirs.

The fee research service can be contact by phone and e-mail, or the research request can be done through an order form (of course, confidentiality is guaranteed). The researchers will try to locate and deliver the information in 24 to 48 hours (or sooner). For a small surcharge, rush requests can usually be completed the same day if received before 2 p.m. Deliver is done by fax, courier, mail or email, or the material can be picked up at the library.

<http://www.mtrl.toronto.on.ca/Resources/intellisearch.htm>

Solutions for online delivery and usage of material

There are examples where library services clearly can add to covering some of the overall costs of an institution, in particular document supply, provided since a long time and now additionally offered electronically. An example of this is mentioned in the QUEST e-Value-study: "The British Library currently generates 20% of annual funds through its document supply business. Although a key revenue driver before the advent of the Internet, the last five years has seen business grow by 22% from £ 21m to £ 25m. Although only 7% of the requests are currently delivered electronically (this figure is due mainly to electronic rights issues), more than 88% of the orders are received online." (QUEST, 2000: p. 41)

New approaches to deliver scholarly and educational material in digital form, have been extensively explored in the last few years. The examples range from providing access to huge volumes of journals' backfiles (e.g. JSTORE) to Internet editions of scholarly journals that experiment with added features (e.g. Stanford University Libraries' HighWire Press: <http://highwire.stanford.edu>). The results in terms of sustainability (or profit) are as diverse as the missions and models that drive the projects.

An illustrative example is JSTOR (<http://www.jstor.org>): JSTOR, started in 1995, currently includes the entire runs of 147 journals, and serves over 1,000 institutional subscribers in more than 40 countries. While the initial capital costs of digitising the journals in JSTOR's database were supported by grants from major foundations, the current running costs of updating the database and providing access to it are supported by fees paid by participating institutions. "JSTOR defines economic self-sustainability as the point at which, if it stopped adding journals to its database, it could reliably maintain its archive with the resources on hand and the annual contributions made by participating institutions." (Smith, 2001)

A major "test bed" for online library services has been the UK Electronic Libraries Programme, known as eLib: <http://www.ukoln.ac.uk/services/elib/> (See the evaluation documents, in particular the Summative Evaluation of Phase 3 of the eLib initiative: Final Report, conducted by ESYS limited, May 8, 2001). eLib was a huge enterprise, spanning 5 years, involving 70+ projects and hundreds of people, and costing in excess of £20 million. Of these projects, in commercial terms, only a few have been successful, from being more or less sustainable to having mutated into a spin off that became a publicly quoted company, the latter being the spin–off of the BIDS JournalsOnline service: ingenta.

Ingenta

Ingenta.com, founded in May 1998, is a publicly quoted company with around 240 staff world wide and offices in Oxford and Bath, UK, and Boston and Providence, USA. In September 1998 it acquired BIDS, the Bath Information Data Services (BIDS), from the University of Bath. BIDS then served over 70% of the UK higher education institutions, delivering over 10.000 documents per month. Ingenta expanded aggressively growing the number of publisher customers and the repository of available journals. It now is a global gateway and one of the largest web sites for the search and delivery of research articles. Ingenta provides free access to the article summaries from over 25,000 publications, and, for subscribers, to the full-text of over 5,200 titles from 170 publishers. It reports having had in March 2001 over 3 million user sessions per month (March 2000: 750.000), and in February 2001 delivered 400,000 articles per month (March 2000: 200,000).

[For detailed company and market information see the reports from industry and financial analysts available from the Ingenta web site].

<http://www.ingenta.com>

As Chris Rusbridge, former Director of the e-Lib Programme, states: "The document delivery project InfoBike may have failed in its original terms, but it mutated: first into the BIDS JournalsOnline service, which then provided the core of the spin-off company ingenta, now a £100 million publicly quoted company! In this sense it was an extremely successful project, and one of which we can be justly proud, even if some parts of JISC (Joint Information Systems Committee) are a little unsure of claiming such commercial success as an appropriate yardstick (unlike the NSF, which is proud to count successful spin-off companies as a performance indicator)." (Rusbridge, 2001)

Concluding from the experiences of the e-Lib programme, one can say that exploitation in the library world – if it is a target - is far from being easily achievable. The key issues and targets are clearly on the side of conceiving and making possible, with information technologies, solutions for online delivery and usages of material most needed in the scholarly and educational sector.

An example for this is HERON (Higher Education Resources ON-demand) that defines itself as a "one-stop service" for the UK Higher Education community for copyright clearance, digitisation, and delivery of digital book extracts and journal articles (<http://www.heron.ac.uk>). In particular, it focuses on the re-use of current copyright material in digital form, for course readings in higher education. In this case, again citing Rusbridge, "after much hard work and many drafts of business models, a business strategy may have been identified. The important thing here is to devise sustainable ways that copyright material can be used with clear, known and reasonable costs, and at short notice."

Overall, the e-Lib programme provides ample prove of "the difficulty of taking even widely supported ideas through research into service" as well as pointing out, "that the real problems are organisational, political and financial rather than technical". (Rusbridge, 2001)

Lessons learned: Successful projects need more than three years

An important question in all digital cultural heritage projects that aim at becoming successful (at least self-sustained) in economic terms is: What is the time scale needed? There is a clear message here from the UK Electronic Libraries Programme that included 70+ projects. Each project could only expect to be funded up to 3 years. Services that were intended to exist longer than that had to without further financial injection from JISC, the Joint Information Systems Committee.

Rusbridge comments on this: "Why 3 years? Not because that is the time needed to make a cultural change or to establish an infant service so that the community will pay for it. We now know that (ignoring the huge investments of 'dotcoms', many of which could eat the entire eLib programme budget for breakfast) it is nearly impossible to take an idea through prototype into real implementation to sustainability in just 3 years!" (Rusbridge, 2001)

Therefore, as a rule of thumb, and surely not only for projects that aim at establishing a sustainable e-service in the library sector: Funding for more then three years is needed!

Competition with commercial aggregators of digital content

A surprising result of the DigiCULT Online Delphi (round 2) is that most experts expect, that libraries will be challenged by commercial aggregators of digital content and providers of special features (e.g. for scholars and students). In fact, of the 51 experts that answered the questionnaire on exploitation and services 32 expect this to happen, while 8 said *no* and 11 chose *not clear*.

For examples of such challenges ahead and business models that are used or explored in providing new digital libraries one must, beside the example Ingenta, look towards America. Two examples are given here: Ebrary and Questia.

Ebrary Inc.: <http://www.ebrary.com>

Ebrary Inc., based in San Francisco, has conceived a service offered to libraries and consumers that lets people browse through a large collection of books and other media online. Charging is not based on access, but based on print-out of pages (15 to 25 cents/page) or cut and paste of paragraphs. Material cannot be copied indiscriminately, and the publishers participating in the venture can set limits in how much users can obtain from a publication. Big publishers, including Random House, Bertlesmann, Pearson PLC and McGraw-Hill, support the venture. The revenue-split between Ebrary and the publishers is said to be 40:60 percent. (cf. Buckman, 2001)

Questia Media Inc.: <http://www.questia.com>

Questia, based in Houston, offers an online study service, targeting primarily college students. The service includes searching through by word, phrase or concept an enormous database of mostly scholarly books & journals, as well as providing additional features such as automatic footnoting to selected texts and creation of a bibliography. Students pay a flat $19.95 monthly fee for unlimited access to the database, and can print parts of books, or cut and paste segments. In the year 2000, the database was said to contain 50,000 books (with 250.000 expected by 2003).

According to a Redherring report, Questia's raised $130 million from various capital funds, and has gained subsidiary rights from 200 academic presses, including Oxford, Harvard, Yale, Cambridge and the University of Chicago, as well as Pearson Education, the world's largest educational publisher. (<http://www.redherring.com>) Troy Williams (Founder, President & CEO, Director) of Questia "figures he can recover his costs in two and a half years if only 5% of the 12.3 million U.S. undergraduates subscribe for six to eight months." (Cook, 2001)

In the DigiCULT Expert Round Table on exploitation (Edinburgh, July 24, 2001), Bruce Royan, CEO, SCRAN referred to Questia as one example of a service that is "being placed specifically on a who is likely to pay and what it is they might want, rather than what might be worthy to digitise and what might be worthy to build up". (For the latter he pointed

to the JSTORE initiative that is building a huge digital storehouse of journals' back-files: <http://www.jstor.org>). Furthermore, the example highlights "what may become more and more clearer, that what end users may be ready to pay for is not exactly what the [institutional] providers feel is worthy of provision."

Moreover, and more pressing, the two examples should make clear, that a serious competition is out there for libraries, in particular in the scholarly and educational sector. Questia, which is the more impressive example, presents itself to students as "The Online Library for all your study, research and paper writing needs".

Of course, today, the new online companies have only a small portion of all that a big academic library can offer, especially older material that is only available in printed form. That will become apparent to more and more students as they try to use the Web for research, particularly on historical subjects. Others who think that they can find for example articles of magazines of the pre-digital area online will have to be reminded, that for most material there is a definite watershed and they cannot get everything on a computer.

Some librarians might shrug off competitive concerns, even though it's clear that many students are doing more research at home and online these days. They often realise that the overall in-house circulation is going up because with online catalogs students are also now finding it easier to locate many relevant material in the actual library. Yet, if students, teachers, and academics could have (almost) all they needed on their desktop or laptop (including the features already offered by Questia) the choice between going to the library or doing the work from the PC seems pretty clear.

It has to be noted that commercial publishers today are:

  – heavily investing in building up their digital collections,
  – concentrating content through acquisitions and mergers,
  – providing it to commercial aggregators and subscription based services (e.g. Questia),
  – trying to control the complete information chain, including software for delivery of content, reference databases, and on-demand services.

Therefore, a conclusion might well be, that in the not to distant future, scholarly and educational libraries will only play a relevant role in the digital world, once they have built up their own digital collections from all available resources (e.g. by managing collections for various parties in the publishing cycle as well as digitising parts of their collections). According to Núria Gallart, FESABID, Spain, the perspective would be "that management and ownership of digital collections, distributed all over the world, is the only way for libraries to survive and to have a chance to fulfil their mission in the digital environment". (Gallart, 2000)

Competition for free access

An interesting factor in the drive to exploit cultural and scholarly is that there is also a kind of competition to deliver content for free, with major institutions acting as e-commerce "spoilers". The motives for providing high-value content for free can be very different, including a strict "for free" policy, or to attract potential customers for other offers. Yet, the basis is that the institution already has covered its costs through donations, funding, or business revenues.

An example is the New York Public Library (NYPL) that has a global presence online, with up to 25 million hits a month on the library's web site with readers coming from 179 different countries, and no intention to charge users with a library card for anything it

provides (e.g. access to many licensed databases). Recently the NYPL received a gift of $ 7 million for its Visual Treasures project (2000-2004; 600.000 digital images) under the condition that it will be made available for free world –wide.

The conclusion of its director, Paul LeClerc, is: "We might be a spoiler. (...) We are going to give it all away for free. Why should a national library that is funded by the state (…) why should they charge, when a private library can give it away for free. Why should people pay when they can get it for free from the New York Public Library. Or the Library of Congress, which is a major, major player in free information in electronic form also." (DigiCULT Interview, June 8, 2001)

Another U.S. example from the scholarly world is the Massachusetts Institute of Technology (MIT) that will put its course materials on the Internet for free. The web site OpenCourseWare does not provide free e-learning, but is a online library where visitors can browse through and examine lectures, syllabuses, reading lists, and assignments for courses ranging from architecture to physics. While many universities try hard to get into the e-learning business, the MIT "will head in the opposite direction by making nearly all of the elite university's course materials freely available on the Internet. In the next two years, MIT plans to post the content of 500 courses on the Web – and roughly 2,000 courses by the end of the decade." The OpenCourseWare, also it will not provide packaged material for online courses, is said to cost MIT about $100 million to start. Its user groups are imagined to be Third World academics or intellectually aspiring high schools kids. For other universities OpenCourseWare squanders the chance to profit from the booming distance-learning market", while supporting M.I.T's brand and position in being seen as a high-class scholarly and educational institution. (cf. Hartigan, 2001)

VIII.5 Case study: Turning archival databases into goldmines – the genealogy case [6]

This case study focuses on:

– Public records and other archival material: One would think that historical public records, and archival material in general, do not lend themselves easily to exploitation. Generally this might be so, but there is at least one highly interesting area where they can be a "gold mine": genealogy or family history. Looking into how main players do get and try to protect a "claim" in this area can provide hints also for activities in other cultural heritage fields.

– The importance of community: The basic business model and related strategies in the online genealogy market show that volume of digitised content is essential (at least in this market), but user community is also a very important key to be successful.

– Private users: Genealogy is a field booming with private users, what one cannot easily say about other usages of cultural heritage sources. These private users might be or become very interested in history and cultural heritage, but they are primarily interested in their "individual case", their family roots and tree. Being to a considerable part an "over-50s market", genealogy also highlights the importance of this age-group for the cultural heritage sector.

– High-end technologies: Providing online access to information in digital surrogates of archival material is technologically demanding, including mass-digitisation and mass-indexing as well as a high integration and performance of all systems.

Finding the mine, and protecting the claim

In the information society, a digitised archive is a gold mine. It has at least a chance to become one. But how? By looking into a major field of archive exploitation, this case study shows how this is feasible. The case study focuses on exploitation models and strategies in the field of genealogy or, as it is also referred to, family history. While looking into how the most popular and financially most potent American family-history.coms develop their business, this case study is also about whether such methods could be applied by cultural institutions, taking into account their mission-intrinsic "e-commerce constraints".

This case study focuses on the two major U.S. players, Ancestry.com and Genealogy.com, as well as "institutional" ventures of cultural heritage institutions in the UK, Origins.net and the 1901 Census Project of the Public Records Office (PRO) scheduled to go online on the first working day of January 2002.

Genealogy: A booming online market

Genealogy is becoming increasingly popular. There is a growing number of for-free genealogy information providers and commercial enterprises, and clear signals also come from market observers: Genealogy is obviously an important area of interest and is becoming a significant e-commerce market. For example: According to Nielsen/NetRatings (<http://www.nielsen-netratings.com>), online genealogy sites are considered to be very

popular online destinations, with key genealogy sites numbering among the top 50 sites in page views. The usage of the sites' various services is enormous. For example: Genealogy.com, launched in November 1999, as early as January 2000 it had announced that its GenForum message board had surpassed a total of three million messages posted. (Sources: <http://www.genealogy.com/press-051600.html> and <.../press-012700.html>) A market study conducted by Maritz Marketing Research Inc. (<http://www.maritzresearch.com>), a survey that also included a poll to look into the popularity of genealogy, found that "120 million adult Americans have an interest in genealogy (33% more than five years earlier). Genealogy continues to gain in popularity — in fact, it's the number two hobby in the United States. Books and software programs abound — and the Internet has made digging up family roots even more accessible." Beyond that, the market study highlighted that about 35 million people have used the Internet more or less extensive for family history research. These were, of course, results that really hit the news on the genealogy web sites.

(Sources: <http://www.genealogy.com/press-051600 and /press-071701>)

Added to this should be, that genealogy is a *demand-driven* market. Genealogists explore the Internet for new sources, and these are not only databases that might contain some information on ancestors. They want to create a family history, unfold it, tell and illustrate it in an imaginative way (e.g. a richly illustrated family history album). Therefore many other historical sources (manuscripts, local periodicals, images, maps, etc.) are relevant. As a Scottish participant in the DigiCULT-study stated: "When we [SCRAN] started out our web site, the majority of clients we received were genealogical or family history clients." (DigiCULT ERT, Edinburgh, July 24, 2001) There are about 60 million people world wide who can claim Scottish ancestry.

Genealogy Top Sites & Lists

BROWSER

<http://worldwide-top100.net/gen/>
<http://www.genealogy.org/genseite/>
<http://www.cyndislist.com>
Articles & Press information
ContentBiz (2001): Resource Review: Selling Subscriptions to Internet Content, May 24, 2001. <http://www.contentbiz.com/sample.cfm?contentID=1690>
Recent Maritz Poll Shows Explosion in Popularity of Genealogy.
<http://www.genealogy.com/press-051600.html>
Genealogy.com Reaches Major Milestones as Popularity of Online Family History Research Grows. <http://www.genealogy.com/press-012700.html>
Genealogy.com Plants the Seeds for Your Family Tree. <http://www.genealogy.com/press—071701.html>

American companies clearly are in the lead, and expanding

Providing genealogy related information and making a business out of it is clearly a domain of American companies. As a matter of fact, we could not find any genealogy service provider in Europe, that could compare in someway to the leading American family history web sites (e.g. with regard to appeal, range of services and products, marketing).

This might be first of all due to the huge investments needed to develop such a business, starting from digitising archival records up to developing a highly integrated system, not only in terms of technology, but also with regard to partnerships, development of additional products, marketing channels, etc. A second important factor is of course the potential

market size and its composition – with America being the classical immigration country.

What has to be highlighted is that genealogy is not only a market led and dominated by enterprises based in America, they also expand, i.e. integrate into their stock of information European databases. With about seventy percent of North-Americans who can trace their family history back to the United Kingdom or Ireland, this is first of all about archival data from there.

The expansion of large US family history providers towards Europe is not insignificant. As David Thomas from the Public Record Office, UK, puts it: "There are two very large American companies, Genealogy.com and Ancestry.com. They have both enormous amounts of money, $35 million in the case of Ancestry.com and probably a similar amount for Genealogy.com. They dominate the US market, and you know, they are fast and efficient and prevent other people from getting into the market by getting there first, and they are interested in moving into Europe." (DigiCULT ERT, Edinburgh, July 24, 2001)

Ancestry.com actually offers subscribers to search in a new UK/Ireland Collection, which includes over 50 million names, for $24.95/quarterly, $69.95/year. It seems, European genealogy service providers will have to invest heavily if they want to prevent the large US companies from conquering the European virtual origins space.

Family historians: What do they want, and who are they?

Family historians want much more than data

Finding information on their ancestors in online databases is an important line of interest for family historians. They look for key data as for example birth, marriage, residence, immigration, etc. Having new sources and research methods at hand, gathering additional information, to come a more complete picture, is clearly one of the things they want. Because without information no genealogical family tree can be built and no long family history told.

But, from searching through the major web sites, one can definitely conclude that true family historians want much more than just a family tree, built with one of the many software packages that are on the market. They also want to share their findings and tips with other searchers, make their own web sites, and develop a rich and well structured representation of the family history, including pictures of ancestors, images, official documents, etc., as well as bring in historic, geographic, social and cultural contexts. Finally, driving this demanding hobby, they want to create a historical identity for themselves and their family, within a broader community.

Family historians: Who are they – typically?

One thing is sure: Family historians and genealogists are not kids and teens. According to a Media Metrix/Jupiter Communications survey, based on a sample of more than 55,000 Internet users in U.S. homes and businesses, it can be assumed that the typical genealogist is most likely a person above 55, and female.

The survey found that females account for 50.4 percent of U.S. Internet users in May 2000 (1999: 45,5 percent), with some other interesting results as for example: Girls aged between 12 to 17 increased their presence 126% from 1999 to 2000, and women older than 55 showed an increase of 110%. (Weise, 2000) It also illustrates that different Web sites appeal to women, as they get older. "Among those aged between 24 to 34, when many women are starting families, the most popular Web sites are Babygear.com, Pampers.com and Ibaby.com. (…) Among the 55 and up set, genealogy is all the rage", as Washington Post

journalists commented. (Klein, Johnson, 2000) They also pointed to Robert Armstrong, chief executive of Genealogy.com, who "...has helped the cause. He has marketed his site aggressively, contracting with others to mention his site on television and sponsoring other related sites. He even sometimes shows up at senior citizen centres (...) 'They want to understand where they came from, their roots' he says. 'Particularly among women, they want to pass it down, to their kids'."

The typical family historian seems to be most likely: American, 55+, female, and has a enough leisure time for this hobby. Of course, not only women aged 55+ are family historians, their large presence in this field may be due to an American cultural pattern. But there is a lesson to learn here with regard to people in their "third age" on the net. If there is something on the Internet that is appealing to them, they will learn to use it, and use it heavily.

According to a NetValue-Survey the percentage and number of home-based Internet users aged 50 and over in December 2000 (NetValue-Survey) were:

Country	%	Number of users
US	24,4	20.583.000
UK	19,3	2.235.000
Germany	17,2	2.168.000
France	15,7	1.077.000
Spain	7,5	216.000

Source: Ryll, Collier, 2001

The numbers are very encouraging, and it should be highlighted that Internet users aged 50 and over are a highly interesting group for cultural heritage institutions. Summarising some important aspects of "silver surfers", one can say: that they are most likely "cultured and curious", feel up to 15 years younger than the previous generation did, and have some time and money available (e.g. people in the 50-59 age group make up the richest generation of all time). (cf. Ryll, Collier, 2001)

As people in their "third age" in particular search for things that bear meaning and represent enduring value, cultural heritage web sites with interesting themes and relevant content might well be places they will visit regularly.

Sources: Articles & press information

Klein, Alec; Johnson, Carrie (2000): Number of women on the Internet surpasses men. In: Washington Post, August 9, 2000. <http://www.genealogy.com/news-081000.html>

Ryll, Christine; Collier, Phillippe (2001): Wrinkles and all. In: Connectis, September 2001. <http://specials.ft.com/connectis/FT393C3SRRC.html>

Weise, Elizabeth (2000): In a Web first, women are in the majority. In: USA today, August 9, 2000. <http://www.genealogy.com/news-080900.html>

Content: Turning records into gold

For genealogy and family history, the basis is information drawn from public archive material. To provide this data online is a demanding and cost-intensive business.

Basic and special archival sources for genealogists are for example: census records, social security death indexes, parish records, county birth and marriages directories, genealogical and biographical indexes, international passenger records, immigration notations, war databases, etc.

These resources, records and surrogates such as microfilms, reside originally in analogue form in various public records and other archival memory institutions that provide information (almost) for free. For free, but usually not digitised or searchable online. Searching for ancestors still requires travelling to their places of origin, and searching institutions and responsible record keepers, who might find and provide valuable bits of information.

Today, digitised archival data goes a long way in changing this. They save a lot of time and money for family history pursuers and professional genealogist by enabling them to get the same information on their home PC. However, not for free.

Online searchable databases with digitised public archive information can be a real "gold mine". But how does a company like Ancestry.com get the "claim"? It really means to make the gold oneself, by scanning the information, i.e. primarily microfilms, index the names and other information, put it in fully searchable databases, and make it accessible online for subscribers (or on a pay-per-usage basis).

Just to give one example: From the U.S. National Archives Record Administration (NARA) anyone can buy all the microfilms from the Federal Population Censuses (1790 to 1920). (<http://www.nara.gov/publications/microfilm/census/>) But not everybody has the capacity to make an online "claim" out of it – as Ancestry.com does. Ancestry.com states: "While not all Images Online projects require an extra subscription amount from our customers (i.e. Civil War Pension Index), the extensive scope and nature of the U.S. Federal Census collection required that an extra subscription fee be attached to this content to compensate for Ancestry.com expenses in content acquisition, image scanning, quality control, indexing, web hosting, etc."

Ancestry.com launched this project in the fall of 2000. Consisting of more than 10 million unique images, once completed, the database will contain over 450 million names. But, of course, the data is processed and posted portion after portion, forming an expanding "gold mine", and a continuous attraction. The census data are the most important, but only one corner stone in what Ancestry.com calls an "aggressive data acquisition program".

Details of how census returns are "digitised" are given in the description of the 1901 Census Project of the Public Records Office (UK) in co-operation with QinetiQ (formerly DERA – the Defence Evaluation & Research Agency). (see: http://www.census.pro.gov.uk) The process has three main steps:

- scanning the microfilms of the census returns and creating a database with a digital image of each page of the returns,
- transcribing the information from the returns and creating a database with an index which can be searched by name, place, address, and other information (and link to the images of the returns),
- making the index of the transcribed information and the images accessible online.

The intensive part is of course the transcription of the information, in this case 32 million names which are listed on about 1.5 million pages. The transcription will be carried out by the Enterprise Supply Services (ESS), an agency of the Prison Service, which is a subcontractor of QinetiQ.

According to the Public Records Office, these businesses "are run and managed to fully professional commercial standards and they are fully ISO9000 quality approved. (...) We are well aware that the transcription is the key element of the 1901 Project and we have put in place a series of quality measures and checks to ensure a very high standard to the finished product."

These measures include:

"Only fully trained operators who have demonstrated consistent accuracy will be used. No transcript can be 100% accurate but ESS will aim to get as close to that as possible. All entries will be double keyed – i.e. literally typed in twice, by different operators, and one operator will not know who the other operator is; software will be used to check any inconsistencies between the two versions and trained personnel will seek to resolve the inconsistencies. The transcript will then be checked by ESS. The work by ESS will be checked again by QinetiQ using a team led by a professional quality engineer. It will then be checked by the PRO's own Quality Assessment team led by expert staff."

As the example above illustrates, turning records into goldmines is laborious, and one always has to protect the "claim". The Public Records Office notes: "We recognise that there is currently some expressed demand for microfiche and in 2002 we will review the sale of microfiche beyond record offices and libraries."

Building a commercial genealogy network

The network business model

Being successful in selling subscriptions for online information services implies more than just offering digitised information. Content is one necessary element of the business, yet there need to be other important ingredients for an economically prospering enterprise. In many cases the community aspect is an important one. In genealogy, this aspect is of major importance, in that the genealogy organisation provides for the users a kind of "virtual family". Nevertheless, the fundamental asset is the digital content, i.e. huge online data bases of public information, where those interested in family history can find what they need to (re-)construct their family history – factual evidence, info bits, traces.

It is a key principle of commercial genealogy service providers to build their business models on the triangle of content, community, and e-commerce, understanding all three as important ingredients of the business, rather than the first two as simple means to drive users directly to the commercial offers (e.g subscriptions, software, books, etc.).

There is flexibility in the model for different entities to participate and be part of the business: Content builders, community networks and platforms, and e-commerce web sites. Yet, companies that target the genealogy market are heading to dominate all three main ingredients of the model, and are adapting them perfectly to the demands of private family historians.
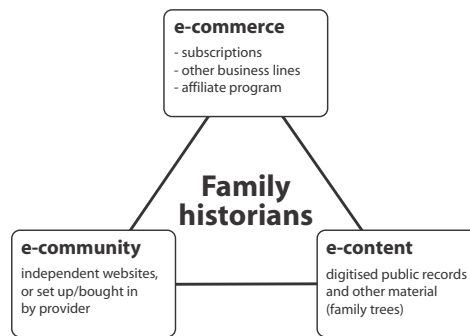
The major American commercial genealogy network was established be MyFamily.com Inc. The network includes Ancestry.com, MyFamily.com and RootsWeb.com. Anecstry.com represents the commercial arm, while the latter two web sites are oriented towards genealogy community and free services.

MyFamily.com Inc.

The mother company, MyFamily.com Inc. has its origins in the publishing sector, producing family history books and magazines. With the advent of the WWW it expanded strategically into the online world, becoming, as it sees itself, "the leading network for connecting families and generations on the Web", a network that is "consistently ranked among the top 15 Internet properties world-wide in both page views and stickiness".

The (online) revenue drivers to further develop this network come from subscription services, e-shops, and advertising agreements. What is particularly striking, is the enormous competency portfolio of MyFamily.com's management team brought in from previous positions at leading technology and Internet companies.

Investors in the privately held company include: America Online., Amerindo Investment Advisors, CMGI@Ventures, Compaq Computer Corporation, Eastman Kodak Company, Europ@web (formerly Group Arnault), Intel Capital and Wasatch Venture Fund, Pivotal Asset Management LLC, Tango of Boulder.

In March 2000 the company announced the completion of a $30 million third round of financing, for a total of over $75.5 million in private equity funding.

MyFamiliy.com, Inc. is expansive and acquired:

– June 2000: RootsWeb.com (focus: genealogy community),
– November 2000: ThirdAge Media, Inc. (focus: people in the "third age"),
    December 2000: ah-ha.com, Inc. (focus: advertising in the family environment).

BROWSER

MyFamily.com, Inc.
Main web sites
<http://www.ancestry.com>
<http://www.MyFamilyInc.com>
<http://www.MyFamily.com>
<http://www.RootsWeb.com>

Ancestry.com

Ancestry.com was the first web site launched by MyFamily.com, Inc. in 1996, and focuses primarily on subscribers to its online data services. For the U.S. it offers "over one billion names" from a multitude of databases, and has committed itself to add 10.000 names each working day, which is of course a marketing trick to keep users coming again and again.

Subscriptions

Ancestry.com sold the first subscription in 1997, in July 2000 it reached 200.000, and in July 2001 over 400.000 subscriptions, making it the third largest paid subscription site on the Internet behind the Wall Street Journal's WSJ.com and ConsumerReports.org. (Contentbiz, 2001)

In October 2001, Ancestry.com offered the following subscription plans, with the most popular subscription plans said to be: Super, Basic annual and Basic quarterly.

Subscription category	Access to 705 million U.S. names	U.S. Census (332 million names)	UK/Ireland collection	Annual*	Quarterly
Super	✓	✓	✓	$129.85	$74.85
U.S.	✓	✓		$99.90	$49.90
Basic	✓			$69.95	$24.95
U.S. Census		✓		$69.95	$24.95
UK &/Ireland collection			✓	$69.95	$24.95

*)The annual subscription includes a 30 day money back guarantee and for the first three categories the free Ancestry Magazine CD-ROM.

Other business lines

Shops@Ancestry.com: Ancestry.com has of course an online store offering many products: consumer electronics such as computers and scanners, genealogy software, books and archival supplies, family gifts, personalised products, etc. *Magazines:* Most important are the bi-monthly Ancestry Magazine and the tech-related quarterly Genealogical Computing. *Advertising opportunities offered include:* Traditional ad units & banners, boxes, interactive ads; sponsorships & feature articles, contests; targeted newsletters, etc.

Free information

Ancestry.com also offers a lot of free information that attracts visitors, i.e. potential subscribers and shoppers: *The New Ancestry World Tree:* Ancestry.com and Rootsweb.com have combined their public family tree databases (Ancestry World Tree and WoldConnect) built from user-submitted family trees. It is the largest family tree offering available online, including more than 150 million names. The new implementation also includes "post-em" notes, which allow users to make comments on the information they find. *Free e-mail newsletters:* Ancestry.com distributes a daily and a weekly e-mail newsletter (over 5 million subscribers) containing the latest family history tips, news and trends. *How-to resources:* Ancestry.com offers some readings, information and tips for beginners and more advanced genealogists (but directs them of course to products and services on offer).

As noted above, beside Ancestry.com there are the two community web sites that are linked with this commercial arm of the MyFamily.com, Inc. family history network:

MyFamily.com (<http://www.myfamily.com>) is a community platform for families, provides free web space and supports the building of private web sites. Families can post news, create family albums, hold live voice and text chats and maintain a calendar of events in a secure, password-protected environment.

RootsWeb.com (<http://www.rootsweb.com>) is a free online community for family historians. The site contains interactive guides and research tools for tracing family histories. RootsWeb also "boasts" approximately 22,000 mailing lists and 175,000 message boards.

Providers of subscription site management technologies

BROWSER

<http://www.emeta.com>

<http://www.membergate.com>

<http://www.webonthefly.com>

Affiliate programs: The search box out on as many sites as possible

Observing the practices of a leading online information provider that really accumulates subscribers, one thing seems clear: Ancestry.com obviously knows how to get visitors to its web sites, turn them into users and subscribers, and keep them. There is no miracle behind this, it is a set of well combined methods, of which one online method merits a closer look. It is not only used by Ancestry.com, because it suits online information providers very well. Rather than being "aggressive", it is highly intelligent.

An affiliate program establishes partnerships whereby other web sites can generate revenue by offering access to content of the program provider, which is in genealogy of course a searchable database. The advantage is that the user does not leave the affiliate's web site, because the search box is placed there. (For examples of such boxes from different genealogy content providers see: <http://worldwide-top100.net/gen/index.html>)

The principle is excellently described by Origins.net, which also has an affiliate program: "We have developed unique interactive search boxes that allow your users to search our databases without ever leaving your site. Only when your users have found something of interest will they be directed to Origins.net. This means that you don't lose your own users until they are ready to spend money at Origins – which makes you money!" (<http://www.origins.net/affiliate.html>) Origins.net offers 10 to 15% commission of everything users pay for its services, and promises a check each month a partner earns $25 or more.

In comparison Ancestry.com is and describes itself as a giant. It promotes its affiliate program, saying that "We pay more than $100,000 per month in commissions; we have hundreds of successful affiliates – including six who earn more than $5,000 per month and dozens more who earn more than $1,000 per quarter." (<http://www.ancestry.com/home/partner/affiliate.asp>) It also offers to partners assistance in creating genealogy pages, get more visitors and of course successfully promote Ancestry on the site (which can bring both partners revenues); the best web site with an Ancestry search box is said to have a 17% click rate. Ancestry.com affiliate partners can earn up to $40 for every one who becomes a subscriber.

Affiliate Program Solution Providers

Web sites with an affiliate program usually contract a third-party affiliate program manager who provides statistics of referrals and commissions, and supports payments administering. Examples of providers:

<http://www.befree.com> (chosen by Ancestry.com)

<http://www.commissionjunction.com> (chosen by Origins.net)

<http://www.linkshare.com>

<http://www.affiliatepro.com>

Genealogy.com LLC

Genealogy.com is the second most important American commercial genealogy service provider. It is built on the general business model in the field, i.e. content, community, and e-commerce. Genealogy.com is a pioneer as well as a "late-comer" in the field. It is a pioneer, because its foundation and key asset lies in software that helps genealogists build their family tree.

The key software of Genealogy.com, the Family Tree Maker, was developed by Banner Blue Software as a DOS product in the 80s. Its origin lies in a software that was meant to primarily serve corporations in making organigrammes and charts, but the software has found other applications, Banner Blue's founder, Kenneth L. Hess, did not think of:

"Although Genealogy.com's current development efforts focus on genealogy software and Internet products, former President Kenneth L. Hess actually founded the company (then called Banner Blue Software) with a different product line: Org Plus. Hess bootstrapped the company in 1984 to develop Org Plus, a product that automates the tedious task of creating and editing corporate organisation charts. The Banner Blue team found that many customers were using Org Plus to create their family trees, so after further research, Family Tree Maker was born as a DOS product in 1989, and it was an immediate best-seller." (<http://www.genealogy.com/company.html>)

A short history of Genealogy.com

The genealogy of Genealogy.com is itself an interesting story: In late 1994, Banner Blue acquired Automated Archives, Inc., to get into the genealogy CD-ROMs market, a line of business, that is still pursued by Genealogy.com. In May 1995, Banner Blue was acquired by Broderbund Software, Inc., that was purchased in August 1998 by The Learning Company, Inc., which was purchased in May 1999 by Mattel, Inc.

Genealogy.com, LLC, formerly the Broderbund genealogy unit of Mattel, was launched in the fall of 1999 as a new company by a joint-partnership including The Learning Company, A&E Television Networks, Hearst New Media and Technology and other companies. It received $37.5 million in initial funding. Located in Fremont, California, it then had 90 employees.

In February 2001, Genealogy.com LLC was acquired completely by A&E Television Networks, which is a joint venture of The Hearst Corporation, ABC, Inc. and NBC. The focus of A&E Television Network is clearly on broadcasting and related business lines including television programming, home videos/DVDs, music CDs, magazine publishing, as well as web sites.

With regard to the genealogy market, a clear asset of A&E Television Networks are its historical TV channels: The History Channel, The Biography Channel, History International, yet, with regard to e-commerce the interlinkage and cross-selling is rather weak.

Genealogy.com, the "grandchild" of Banner Blue, still develops and markets genealogy software applications, but the focus of software development has shifted to software that can make use of the main sources for today's genealogy information gathering: online databases.

It was said, that Genealogy.com is also a "late-comer". The company was launched in the fall of 1999, three years after Ancestry.com, and with less capital. It has many strengths but there seems to be one main weakness: In comparison to Ancestry.com, it is somewhat lagging behind with regard to online information resources, i.e. access to key digitised archival material it can offer to subscribers. An overall comparison of the data resources of Ancestry.com and Genealogy.com would not easily be made, but with regard to U.S. census data, it only offers the 1900 census (and seems to have no plans to further digitise census data).

Genealogy.com's "flagship" is clearly the Family Tree Maker, which is bundled with online services. In October 2001, the following Family Tree Maker 9.0 packages were offered:

FTM 9.0 Premier	$99.99	Includes 3 month subscriptions to Genealogy Library, International&Passenger Records, World Family Tree, and 1900 Census
FTM 9.0 Deluxe	$69.99	Includes 3 month subscriptions to Genealogy Library and World Family Tree
FTM 9.0 Plus	$49.99	Includes 3 month subscription to Genealogy Library
FTM Programm Only	$29.99	

Shear volume of data vs. intelligent software?

In the competition between the two major U.S. players (and players from Europe) shear data volume, software, and "community" are among the most important factors: Ancestry.com is clearly stronger in data volume and obviously also in "genealogy community". Genealogy.com's key asset is the software Family Tree Maker, which might be a strong "lock in", i.e. users that have it might stick to the services and other products offered by the company

Without going into details, a short description can highlight one feature: The Online Family Finder Report. Owners of a Family Tree Maker package can use it to search the data in their entire family tree against searchable genealogy data on the Internet, as well as Genealogy.com's hundreds of data CDs. It is quite an intelligent search machine, which can search multiple names and dates simultaneously. After the search is completed, the software then produces an organised report with the findings prioritised by likelihood that the names found are actually family members connected to the family tree being searched. In January 2000, Genealogy.com reported that its Online Family Finder Report had conducted a total of 6.7 million individual online searches in a single day. (<http://www.genealogy.com/press–012700.html>)

An European example: Origins.net

Founded in 1997, Origins.net provides exclusive (online) access to the official, genealogical information sources for Scotland held by the General Register Office for Scotland as well as to important parts of the holdings of the Society of Genealogists. Via online databases of index data, finding aids and abstracts, researchers may identify information of interest on a pay-per-view/usage basis, and then order copies of the source material.

Network structure & main content

Origins.net brings together two separate web sites, Scots Origins and English Origins, that provide fully searchable indexes of public records and other archival material.

Scots Origins provides its service on behalf of the General Register Office for Scotland (GROS), and provides searchable indexes to the registers of births and marriages from 1553-1899, deaths from 1855-1925, and census records for 1881 and 1891.

English Origins provides indexes and abstracts from the Society of Genealogists (indexes to Marriages, Wills, Witness depositions & Apprentice records); data sets currently online contain over one million names covering 1568 to 1850.

Both services offer their content exclusively, i.e. not available anywhere else on the Internet.

Objectives & "business model"

Origins.net's objective is clearly not primarily making profit, but to make material more easily accessible, recover costs, and support archival issues. Furthermore, by regularly adding material from other important sources of genealogical information, Origins.net aims at enhancing its position in genealogy and family history research as "the most important resource on the Web for research relating to the British Isles".

Costing model & content delivery

Access costs are £6 for each web site, payable online by credit/debit card. On English Origins this allows for up to 150 records to be retrieved over 48 hours. On the Scottish site, the user gets 30 "page credits" valid for 24 hours starting from the time of payment. Each page consists of a maximum 15 search results. Further credits can be bought on the same basis.

Beside using the indexes, on both sites users can order copies of materials for £10: On Scots Origins these are "extracts", being an official copy of all the information in an entry in the original registers held by GROS. Orders are processed by GROS and the paper documents sent by post.

In comparison, for the 1901 Census of the Public Records Office no charge for searching the index is planned. If the search result is positive, i.e. the name of an individual has been found, the user has two options:

"(1) View a digital image of the census return. The image will be the whole page from the enumerator's book in which the individual's entry appears. This will cost 75p. Once you have bought the image you can save it to your own system and/or print out a copy. (…)

(2) View the details for an individual transcribed from the census returns. This will cost 50p. If you wish to view the details for all the others in the same household you can do this for an extra 50p." (Source: <http://www.census.pro.gov.uk/factsheet/factsheet4.htm>)

Marketing & Community

Origins.net has an affiliate program to attract users, offering affiliates 10 to 15% of everything users who come from their web sites spend at Origins, which includes databases access fees as well as charges to order print copies of records.

On these "official" web sites the community factor is rather weak. Both, Scots Origins and English Origins give information that visitors can become members of a "discussion group", i.e an e-mail list, with the "Scots Origins discussion group" on Yahoo being the livelier.

Main web sites

Origins.net: <http://www.origins.net>

Scots Origins: <http://www.origins.net/GRO/>

English Origins: <http://www.englishorigins.com/>

General Register Office for Scotland: <http://www.gro-scotland.gov.uk/grosweb/grosweb.nsf>

The Society of Genealogists: <http://www. sog.org.uk>

Further interesting sites

Scottish Archives Network (SCAN): <http://www.scan.org.uk/familyhistory/>

SCAN offers on its web site good e-learning material on how to-do family history and in particular on palaeography, and links to the Scots Origins web site.

VIII.6 The DigiCULT navigator to online business models

Today, many cultural heritage institutions are seeking a place in the online market and are looking for "niches" and business models that might work for them to gain some revenues through online services or e-commerce solutions. The overview provided in the previous chapters shows that there are many and varied business models cultural institutions can use. But, as Jennifer Trant, AMICO, USA, has noted in the DigiCULT Online Delphi (round 1): "No one model will work for all institutions – that's like saying there is one e-commerce model. There will be many inter-related models in place in cultural institutions depending on the aspect of their service that is being delivered."

Although, there is not one definite answer, a general orientation with regard to online business models for cultural heritage institutions can be given, as well as a set of recommendations for policy and institutional decision makers.

Online user attention and information

Selling user attention (e.g. banners on a web site) has low commercial potential. Offering online advertisement opportunities might be a business line for major cultural heritage institutions, networks or portals. But, generally, advertisement for cultural heritage institutions seems suitable mostly in the framework of major sponsorships for a project rather than the whole web site.

Selling user information is clearly not an appropriate line of business for cultural heritage institutions. What the institutions themselves need to do is gather more detailed information on their users to be able to adapt and further develop their services according to changing user demands.

35 Cultural heritage institutions should use the attention they receive from visitors for marketing their own products and services.

36 Cultural heritage institutions should gather and exchange user information in order to adapt and further develop the services they provide to users.

37 For smaller, less known institutions cultural heritage networks and platforms should act as aggregators of attention and provide them with user information and feedback.

Developing and selling products: e-retailing

Selling physical products via online channels is an option and actually a practice of many cultural heritage institutions (in particular museum giftshops). For small institutions it might be a plus, for major institutions or specialised actors it can represent a considerable line of business.

Generally, institutions that want to develop an e-retailing business need to be aware of the potential channel rivalry between their in-house and online shop. Additional costs for the online business line might not pay off.

Prerequisites for success are to establish a brand and in particular to develop unique products that are (ideally) related to in-house collections. Furthermore, in order to bring their products to the attention of many potential consumers cultural heritage institutions

need to intensively co-operate with intermediaries in the sector (including e.g. tourism agencies).

38 **Cultural heritage institutions should explore the opportunity to develop unique physical products related to in-house collections as well as to market and sell them online.**

39 **In order to avoid market failures, cultural heritage institutions should reduce risks and seek partnerships with established user focused agencies, institutions or companies (e.g. tourism agencies).**

40 **Smaller institutions should intensively co-operate with cultural heritage intermediaries, networks and portals that aggregate visitors to market their products.**

Digital product development

Developing and marketing digital cultural products (e.g. cultural CD-ROMs) is still a risky and costly business. Returns from most off-line multimedia products have shown to be very limited, profit often being not more than 1–3%, with many products not reaching the break-even point.

Experts recommend that the development of online cultural heritage multimedia be made the priority, and that an off-line product be offered only in the case of an online success and a proven demand for such a product.

After the experiences of the last ten years in the multimedia market the willingness of cultural industry players to put money into cultural multimedia projects will be limited. Yet, in order to develop attractive products and bring them to a broad market creative and commercial partnerships might be very helpful.

41 **National and regional governments should support cultural heritage institutions in developing digital on- and off-line products that bring the richness of their collections to a broader public. If partnerships between institutions and creative or commercial companies are needed for market success, appropriate measures should be put in place to stimulate such partnerships, e.g. public–private co-financing or sponsorship models.**

42 **In order to generate digital cultural products, including material from lesser known institutions and collections, national and regional governments should support setting up creative and commercial centres that might favourably be implemented within organisations that manage cultural heritage networks and platforms.**

Digital commerce (licensing)

Digital commerce, i.e. selling or licensing digital/digitised objects online, is today explored by many cultural heritage institutions. Licensing digital surrogates of objects from (special) collections is seen as the most promising market, yet, it must be highlighted that this is primarily a Business to Business market.

According to a market study conducted for the Canadian Heritage Information Network (CHIN), across the most relevant market segments (i.e. publishers, broadcasters, multimedia companies, advertisers and corporations) relevant cultural heritage resources are mostly images, and to a much lesser degree other material such as film and video footage. Being the most content-driven cultural industries, publishers and broadcasters are the most likely to have a need for intellectual property of cultural heritage institutions, while the small multimedia companies (i.e. CD-ROM and web site developers and producers) are much less relevant.

Barriers to market entry are high and cultural heritage institutions need to find and intensively develop their niche in competition with stock agencies or brokers that set the state-of-the-art in online licensing (and surely dominate the advertising and corporate market for licensed images).

The list of key elements that cultural heritage institutions need to effectively exploit resources online are:

- standard electronic on/off-line catalogues,
- standardised and well understood rate structures for various uses,
- end-to-end clearance (preferably a centralised one for many cultural heritage institutions), as well as
- quick turnaround time.

An option for cultural heritage institutions may be to seek partnerships with existing agencies or brokers (rather than build in-house systems), yet such an option seems to be realistic only for institutions with high valued art or unique special collections.

Overall, it must be highlighted that it is only where the intrinsic, authentic nature of cultural heritage sources is perceived as valuable (and the expert knowledge related to relevant material is an essential plus) that a considerable market potential exists.

43   **Cultural heritage institutions should build on their strengths, authenticity, knowledge-based interpretation and contextualisation, and use new technologies to develop their own niche markets for licensed resources.**

44   **Cultural heritage institutions should develop the necessary elements they need for licensing resources effectively (e.g. standard electronic on/off-line catalogues, standardised rate structures for various uses, end-to-end clearance, and a turn-around time that is appropriate for the main customers).**

Strategic development of shared themes of common interest

Cultural heritage collections do not lend themselves easily to commercial exploitation. For example, out of a historic image archive only a small fraction of the holdings (perhaps 5 to 10 percent) might be of any commercial relevance if available in digital form online. In addition, future customer segments are not readily evident. 'They do not just walk through the door'. The personnel of the institution would have to completely re-focus its work on marketing and selling the material to the most relevant customers. Experts believe that first, a 'critical mass' of digital cultural heritage collections should be produced to enable customers to find what they are looking for. This approach seems to influence many cultural heritage institutions towards mass-digitisation of their holdings, yet these investments are unlikely to pay off.

A more reasonable approach to market digital surrogates of cultural heritage resources would be to develop shared themes of common interest in which players throughout the cultural sector (including e.g. publishers and broadcasters) could buy into. Such themes would

– stimulate the public interest in particular cultural heritage topics and resources,

– create new market potential for institutional and commercial players in the cultural sector, and

– provide a basis for a purposeful digitisation of certain special collections.

45 **Cultural heritage institutions should, together with cultural councils, cultural industry and media partners, strategically develop and heavily market cultural and historical themes in order to create a basis for the purposeful digitisation of certain special collections.**

Subscription based information services and virtual environments

Libraries

Information services are a major domain for libraries, with traditional commercial (non-subscription-based) services being document supply and custom research. With regard to new online services one can say that commercial success or even sustainability in the world of scholarly and educational libraries is far from being easily achievable (if it is a declared target of projects). These libraries stick to their mission as ideally free information hubs and develop valuable online solutions for special material needed in scholarly research and education (e.g. digitisation of journals, material for course readings).

Yet, in the digital environment competition is growing for the future face of 'the library' and the question will be whether the established libraries will in the long term be the places to go for relevant e-material. Mainly because the major commercial players increasingly control the complete online information chain and, in particular, the subscription-based services.

Without a complete change in the model of scholarly publishing, libraries will have to direct users to these commercial services for online access to most current published material.

46 **In order to play a relevant role on the market for online access to e-material, institutions should build up their own digital collections from all resources they can get, e.g. by managing collections for various parties in the publishing cycle as well as digitising parts of their collections.**

47 **The European Commission should commission an in-depth market analysis of international and European players on the market for subscription-based access to published works as well as conditions that might lead to market dominance and control.**

Archives

With regard to historical public records and other archive material an explorative DigiCULT case study looked into the online genealogy and family history market. This booming market is today dominated by major commercial players that are US based (Ancestry.com, Genealogy.com). Furthermore, it needs to be highlighted that these players are expanding, i.e. integrating the information of European databases into their stock.

48 **With many European archives now starting projects to get into the online genealogy and family history market, in-depth analysis and regular monitoring is required, taking into account international as well as national developments.**
   - The European Commission should commission a study on the European/global market for genealogy.
   - In order not to let extra-European players completely take over the genealogy & family history market, appropriate sector and institutional policy measures should be set.
   - Public records and related archival institutions should themselves closely observe and proactively explore their opportunities on the genealogy market. They should define and develop their own position and strategy (depending e.g. on their holdings) as well as favourable strategic partnerships.
   - Institutions in the field should also look into lessons that can be learned from the genealogy & family history market. A key factor for commercial success in this market is building and/or supporting communities of users.

Museums

Subscription-based virtual environments, in particular for e-learning, are today being explored by major museums as well as new cultural heritage organisations (e.g. louvre.edu, SCRAN, AMICO). In Europe, these projects are not commercially driven, but developed within projects that are publicly funded. The aim of these projects is to build protected environments that provide high-value cultural heritage resources for educational use. Commercial ventures related to the cultural heritage sector are rare (e.g. Fathom.com) and of questionable success.

49 **National and regional governments should support the establishment of virtual protected environments as the most relevant future platforms for cultural e-learning.**

IX TECHNOLOGY
for tomorrow's digital cultural heritage

Paola Arosio and Diego Meozzi, Cnoc Ceann à Gharaidh (Callanish II)

Being digital for European cultural institutions is not an option but a reality. Despite the fact that only a small amount of the digital data produced daily is of long-term value and thus subject to the attention of archives, libraries and museums, the vast quantity of digital information creates a major challenge for memory institutions. Today, cultural institutions are confronted with a virtually endless amount of digital cultural information of all types and formats, including, digital images, audio and video recordings, electronic text, interactive and multimedia applications, as well as geographic information.

Many archives, libraries and museums (ALM) have turned into hybrid institutions that take care of both, analogue and digital cultural collections. Besides dealing with traditional analogue materials like books, sculptures, paintings and official records, they collect, manage, store and provide access to a variety of digital cultural artefacts, including digitised legacy resources, digital data about cultural resources, and born-digital cultural resources. Managing these new types of cultural heritage artefacts and the underlying technologies has become a challenging task for memory institutions, especially with regard to two dimensions:

- – Access: How to enable users to benefit from the rich cultural holdings of ALMs.
- – Persistence: How to ensure that our digital cultural heritage will be accessible for future generations.

ON THE RECORD

Digital cultural artefacts

Digital cultural artefacts include:
- – Digital information on cultural resources: e.g. online catalogues, bibliographies, and listings of cultural works and artefacts.
- – Digitised resources (all types of media and formats): Digitised resources refer to material successfully transferred into the digital world: Besides the item in its traditional form, there now exists a digital surrogate of the cultural source in a format suitable to be used in another medium (e.g. for display on a computer monitor).
- – 'Born-digital' cultural resources (e.g. electronic publishing items, virtual art works, exhibitions, tours): Born-digital cultural resources have been created with hard-ware and software. With regards to usage one can distinguish between a) artefacts that can only be used with digital equipment or in a specific digital environment (e.g. a virtual installation), b) artefacts or resources that can be transformed into other media forms for easy use, for example to be printed (e.g. print-on-demand).

IX.1   Making culture accessible

Cultural heritage experts widely agree that providing access to the rich European cultural heritage resources has become the primary focus for European memory institutions. They also agree that cultural collections and holdings kept in archives, libraries and museums all over Europe are at their best when used. As a result, what we have seen within the last five years within the community of European heritage institutions is a paradigmatic shift from building collections to providing access.

This paradigmatic shift was partly driven by the emergence of the Internet. The Internet has greatly expanded one particular function of memory institutions in a dimension and quality yet unknown: providing access. Through the networked, distributed nature of the World Wide Web (WWW) and ICT-based end user devices such as mobile phones or PDAs, archives, libraries and museums have now the potential to reach – and be accessible by – completely new audiences world-wide. Networks enable users of cultural information to search and retrieve innumerable resources, without the limitation of geographical, institutional or sectoral borders.

In this networked environment, access to digital resources promises:
– increased and enriched use through the ability to search widely across networks,
– new contexts by manipulating, comparing and studying distributed resources,
– new scholarly use through the provision of enhanced services enabling widespread dissemination of local or unique collections,
– digital cultural resources generated in collaboration with others over networks,
– clusters of related cultural or scientific works that encourage different perspectives,
– annotated cultural resources with relevant factual information, commentaries, and explanations,
– interaction with cultural resources, i.e. by viewing objects from different angles, zooming in and zooming out, choosing video sequences, etc.,
– knowledge about collections and holdings,
– a variety of cultural communities, and
– "virtual collections" through the flexible integration and synthesis of a variety of formats, or of related material, scattered among many locations.

Yet, to meet these promises and to fulfil user needs, cultural heritage institutions find themselves confronted with the challenge to create "shared network spaces" (Cathro, 2001) through which they deliver databases, collection guides, exhibitions and digital surrogates of their collections.

Unlocking the value of cultural heritage: From masses of raw data to structured content

The concept of a shared network space goes far beyond simply putting online an institutions digital catalogue. It resembles more a "hybrid information environment" [7] that offers users "an appropriate range of heterogeneous information services in a consistent and integrated way via a single interface. It may include local and/or remote distributed ser-vices, both print and electronic. The environment will provide some or all of the following functions: discovery, location, request, delivery and use, regardless of the domain in which objects are held. Domains may include libraries, archives, museums, government, ...". (Russell, Gardner, Miller, 1999)

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[7] The phrase "hybrid information environment" was coined by UKOLN, UK.

Clearly, in such an environment, providing access to databases can only be the first step towards the higher goal of unlocking the true value of our rich cultural heritage resources. As Marc Jones, Director and Chief Executive of the Victoria and Albert Museum, London, UK, said: "The ability to search across different databases is not enough. (...) The model that suggests that all we need is access to the information, images, etc. is profoundly deficient. For that access to make sense there has to be an active process of understanding the needs of different types of users and meeting those needs (...) from the very start. The ability to search the National Gallery, the Louvre and the National Gallery of Art at the same time will not provide the kind of crafted information and selected pathways that will re-assure users that their is someone out there that understands what they want and has thought about how to provide it. What I mean is the difference between masses of raw data and carefully structured data allowing different kinds of users to find their way around it." (DigiCULT Interview, August 9-10, 2001)

What becomes clear is that providing access can actually only provide the first step in a four layer model for bringing cultural heritage resources and the knowledge resting within cultural heritage institutions to the attention of a broader public.
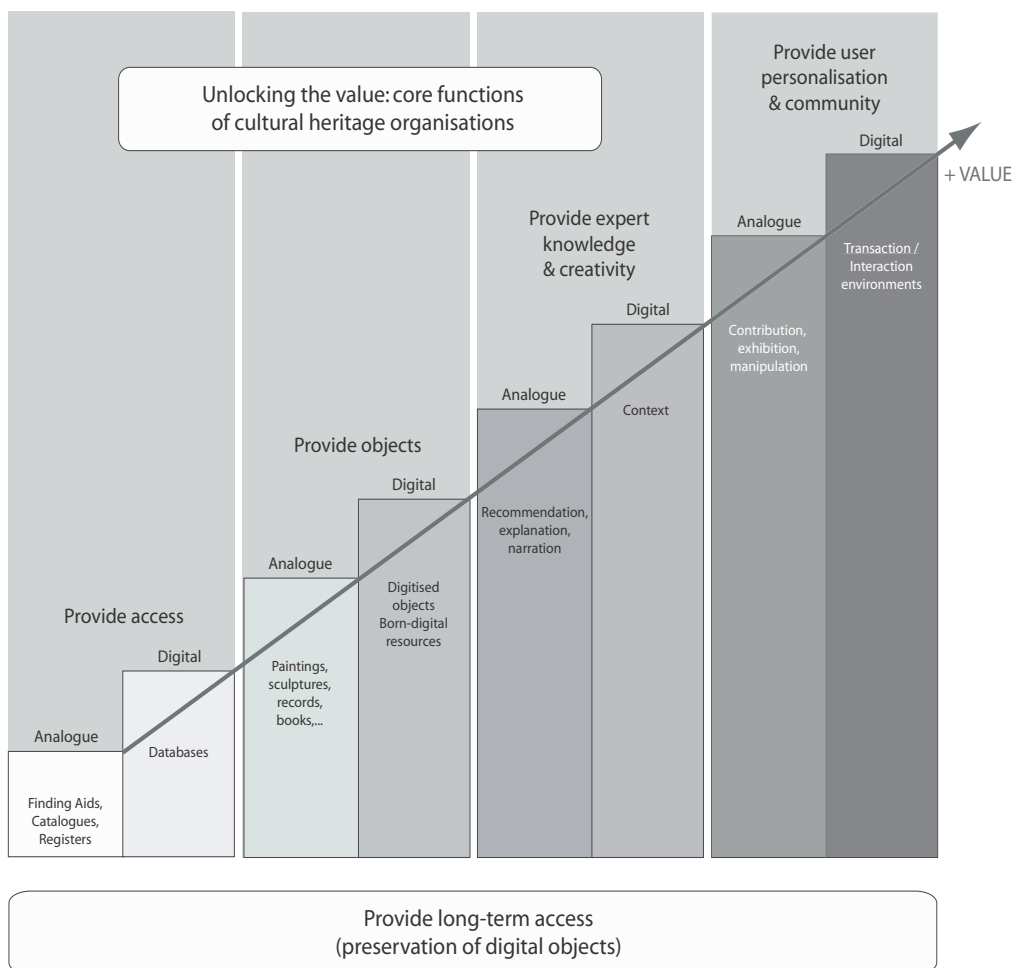
Source: Salzburg Research, 2001

At the first layer, ALM institutions provide access to databases that contain descriptions of their holdings, such as digital catalogues, online finding aids, digital registers or other non-catalogue collection descriptions. Providing this sort of access information is the first requirement for any further functionality of a hybrid information environment. Yet, it is not enough to satisfy user needs.

At the second layer of unlocking the value of cultural heritage resources, memory institutions enable users to get an impression of the object itself. Given changing patterns and modes of cultural consumption in the Information Society that centre around communicating over computer and wireless networks, we assume that only those cultural heritage resources that will remain valuable in the future will be those readily available in digital form. This means to not only provide descriptions about cultural objects, but also providing digital surrogates of the object itself. Thus, if they are not already in digital form, such as born-digital cultural information, cultural heritage artefacts will need to be digitised – a time and resource consuming process.

At the third layer, to further increase the value of digital cultural resources, stakeholders in the cultural heritage sector will be required to build contextualised presentations for new target groups based on the expert knowledge that resides within memory institutions. Building context means to increasingly integrate expert knowledge and creativity into services offered in the hybrid environment, to establish meaningful relations between object clusters. This process leads to information environments that explain and narrate, offer recommendations, and create meaningful relationships with user.

Another step forward in unlocking the value of cultural heritage resources expands the concept of creating narratives and contexts to users of digital cultural heritage resources. At the fourth level, the hybrid information environment offers the necessary tools and technologies that enable users to actively participate in the creation of context, to manipulate and interact with cultural heritage resources. By putting future users into the position of building their own environments and/or to actively contribute and participate in this process of establishing knowledge communities, they will develop a sense of ownership as they are involved in creating new cultural heritage.

In such a networked, hybrid information environment the ultimate goal is to leverage the value of Europe's rich cultural heritage resources by encouraging a shift from information to knowledge. As Jennifer Trant, AMICO, USA, noted: "As well as integrating data, however, we have realised that we need to integrate people, institutions and systems." (DigiCULT Interview, August 8, 2001)

IX.2 Providing integrated access to digital cultural heritage resources

From a technological point of view, providing seamless, integrated access to services and cultural heritage resources is primarily a question of convergence and interoperability. At the basic level, convergence and interoperability means providing users with the capacity to treat multiple digital collections in various cultural institutions as one.

For cultural heritage institutions, one of the primary obstacles to providing integrated seamless access over computer networks relates to the fact, that over the Internet, protected databases or online catalogues cannot be directly searched. Search engines like Google or All-the-Web can only provide full-text searches in web documents that are marked up with HTML. They are not capable of conducting searches in library catalogues, digital finding aids, registries or other non-catalogue material in digital form.

In addition, a major hindrance for searching across categories and sectors is the fact that archives, libraries and museums have developed – sometimes over centuries – different practices to describe their cultural artefacts. Today, their documentation and object descriptions are not compatible across the sector. To make these resources searchable and deliver quality results, cultural heritage institutions will need to find a solution to these problems.

The goal: quality in search results

Although there are still issues that need to be addressed, such as network technology that is not yet robust and capable enough to support high quality time based delivery, many technological problems related to offering seamless access are solved. The issues that remain to be solved are organisational and managerial, and are related to issues such as the use of common metadata standards across the sectors, which can only be addressed through intensifying collaboration between sectors.

As Greg Newton-Ingham, Head of the National Advisory Service for moving Pictures and Sound at BUFVC, UK, made clear: "Whether to provide seamless access, is not a key issue technically. We can do this, but it is the quality of the results that are returned that is the key issue." Newton-Ingham links the quality problem to the various ways how memory institutions describe their collections: "We have no clear way of describing what a collection is, never mind what is inside the collection. The notion of a collection is very specific, thus we need ways to translate the internal perspective of what a collection is into a framework which users can then access in a way *they* see the world." (DigiCULT ERT, Stockholm, June 14, 2001)

This difficulty with describing collections will become even more severe as novel, born-digital information objects appear as a result of new technologies. Existing means and experiences will be inadequate to describe these new and future cultural heritage objects. As Rene van Horik, Netherlands Institute for Scientific Information Services, explains: "The problem with born-digital objects is first and foremost an intellectual problem. What is it? Is it a 'photo' or a 'text', or something we know from the 'analogue' world." (DigiCULT Delphi, July 17, 2001)

Yet, reaching the commitment and achieving agreement between all stakeholders in order to make cross-sectoral access work, is not an easy undertaking. "One of the fundamental barriers we have come across is a cultural one. (...) We have to get passed it first, before we can provide seamless access of any value." (Sandy Buchanan, SCRAN;

DigiCULT ERT, Stockholm, June 14, 2001)

As a consequence, to reach *agreement on metadata standards* in a *collaborative process* is an important first step to providing integrated, seamless access across sectoral borders.

A key to integrated access: standards

The biggest obstacle to providing seamless access at the institutional level, across sectors, is a lack of commonly shared metadata standards. For users to be able to search the different databases in archives, libraries and museums directly, all cultural institutions would need to describe their cultural objects homogeneously, using the same kind of metadata standards. The fact is, however, that cultural heritage institutions not only use a multitude of different standards, but in many cases they do not use any standards at all but still work with their own "native" data.

Compliance with standards for object description is the first step to achieve integrated, cross-sector search. This implies:

- reaching agreement across the cultural sector, on a minimum set of standards to facilitate cross-sector search,
- and enabling and empowering cultural heritage institutions, and in particular small organisations, to monitor and keep track of recent standards developments in order to make informed decisions.

Standards – what they are and why they are needed

Standards are agreed-upon guidelines that help cultural heritage institutions to document their collections according to a commonly shared model. Following certain rules on how to structure information, standards help to create systems where "data can be reliably read, sorted, indexed, retrieved, and communicated between systems" (Bower, Roberts, 1995) The benefits for cultural heritage institutions using standards are compelling:

- protection of the long-term value of data by permitting data to be formatted and stored to easier export them to other systems,
- sharing of information,
- re-purposing of information,
- improve of data retrieval,
- and, make it easier to determine the requirements for training capable and effective staff.

Standards exist at various levels and with different binding nature, as shown in the following three-dimensional matrix originally developed by David Bearman and further elaborated by the Working Group on Standards for Archival Description (WGSAD).

The explanation of the matrix closely follows the description in the handbook published by the Society of American Archivists (1994).

The three dimensions of the matrix refer to:

- the relative strength of the standard, i.e. its rigidity with regard to standard application,
- the primary developer of the standard, i.e. referring to the fact that many standards used in the cultural heritage sector have been developed outside the field,
- and, the level of description to which the standard applies, which ideally, should progress downwards from the most general to the most specific operational level.

Standard matrix
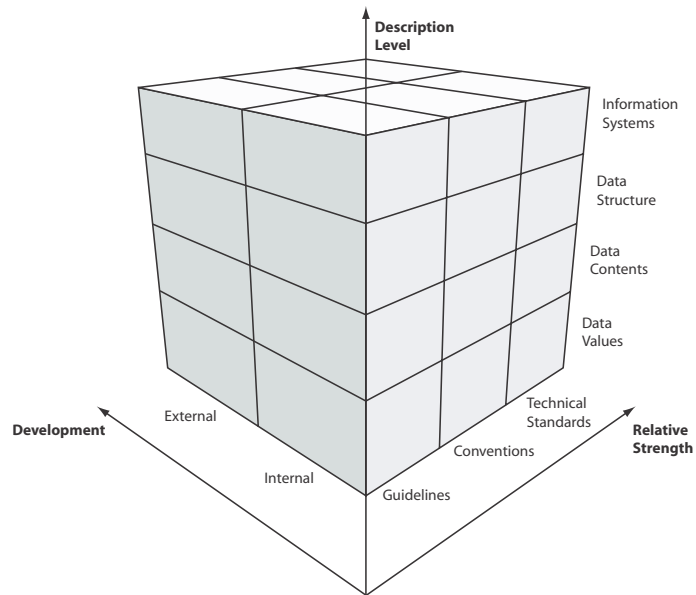
Source: Society of American Archivists, 1994

Strength of standard

Technical standards are the most rigid in the hierarchy of standards, and will yield, if followed correctly, the same results (example: ANSI X3.4 which specifies the ASCII-characters).

Conventions, rules or *professional standards* are more flexible and may allow more variation in local practice. Therefore, the results may slightly differ depending on the local practices (For example: MARC for machine-readable cataloguing or the Museum Documentation Association Data Standard).

Guidelines are based on particular practices an/or service criteria that can be used for benchmarking. They describe the basic elements of a system/procedure that, in practice, has proven successful (for example: description guidelines inventories or commonly accepted systems development methodologies).

Primary development

External standards are developed outside the cultural heritage sector, yet they are either widely used or accepted within the profession or, they have been developed by groups with similar interests. ALM professionals may need to adopt a standard because it has become the de-facto standard within a particular field, for example some geographic place-name code sets. On the contrary, *internal standards* are developed specifically by and for cultural heritage representative bodies. Today, the ALM sector shows an increasing willingness to embrace external standards, such as XML and SGML.

Level of description

At the broadest level, *information system standards* attempt to specify all the functional components of the information system as a whole. Systems in different locations that are

based on the same standard have similar functionality and therefore, are able to communicate and exchange data more readily. In libraries, for example, there are separate systems for cataloguing, collection management, administration or finance. Information system standards ensure, that these systems can exchange data.

Data structure standards define the elements of information contained in the components of an information system, for example the fields used to record information and their relationships. They include input formats, output formats (catalogues, registers, lists, etc.), and record types. The benefit of uniform data structure standards lies in facilitating data exchange without the need of developing specific software to read data, yet the standard must be flexible enough to leave room to accommodate the different institutional methods and practices.

Data content standards define the elements for entering information within each element defined in the data structure standard. They regulate cataloguing rules and syntax conventions, for example, punctuation, capitalisation, quantities and date formats, required vs. optional inclusions. Data content standards address the issue of data integrity.

Data value standards provide lists or tables of terms, names, alphanumeric codes, or other specific entities that may be entered in a particular data elements. Such indexes of terms and agreed-upon vocabularies can be accumulated in thesauri or code lists.

In addition, to enable working in a shared environment, two more groups of standards are needed in automated information systems: procedural standards and information interchange standards.

Procedural standards define the documentation procedures needed to manage operations effectively, including procedures for logging on/off electronic systems, or policies regulating an institution's acquisition and loan procedures.

Information exchange standards, on the other hand, define the technical framework for exchanging information within an institution, but also for data exchange with external organisations. Examples in this category include SGML (Standardised General Markup Language), EDI (Electronic Data Interchange), ISO 2709 (originally developed to support the exchange of bibliographic information) and XML.

Reaching agreement on sector standards

"It's a major technology thing, that technology demands collaboration."

Jennifer Trant, AMICO, USA; DigiCULT Interview, August 8, 2001

Standards are products of consensus and the result of an often time- and resource consuming group effort to review and test developed standards before they are adopted by a larger community. Hence, the question of achieving seamless access through developing commonly shared (metadata) standards is not so much a technological as a managerial and organisational issue.

Reaching agreement on standards turns out to be a time- and resource consuming process where high expectations are often disappointed. Not only does there exist a tendency within the cultural heritage sector to "re-invent the wheel" as similar standards are developed in the individual domains – the countless number of standards in the cultural heritage sector speaks for itself – but one can also sense some resistance within the community to give up what has already been achieved. As Magdalena Gram, Division Head at the Swedish Royal Library, stated: "As professionals, we always have to create structures, and

I do not want to ignore these structures when we present our collections on the web." (DigiCULT ERT, Stockholm, June 14, 2001)

This situation clearly points to the need for actively facilitating co-operation and collaboration between the individual domains with the objective of reaching agreement on an authoritative set of standards that can be used in all the different cultural heritage sectors. As Warwick Cathro, Assistant Director-General, Information Technology, National Library of Australia, points out, this process should "bring together all interested parties across a range of sectors", not just the cultural heritage sector. (DigiCULT ERT, Stockholm, June 24, 2001) This includes all stakeholders that have a potential interest in cultural heritage information, including, publishers, governments, the educational community, the tourism sector, the IT data management community as well as all suppliers of cultural heritage information, including broadcasters.

Given such a large group of diverse interests, it becomes obvious, that *the smallest common denominator* should be the goal to avoid frustration rather than reaching agreement on *all issues*. "What is important is cross-domain co-operation to decide within the sector on a minimum set of standards in order to allow cross-sectoral searches." (Johan Mannerheim, The Royal Library, National Library of Sweden; DigiCULT ERT, Amsterdam, September 25-26, 2001)

One of the biggest obstacles is the institutional structures that hamper cross-sectoral collaboration on various levels:

– Fragmented state responsibilities - on the regional and national level, archives, libraries and museums often fall within the responsibility of different ministries, which causes an obstacle to common planning and information exchange.

– Missing organisational interfaces - internationally, the special interest organisations of the various domains are very well organised, yet the organisational structures do not foresee an interface for regular information exchange on common areas of interest with the other domains.

– Fragmented standardisation groups - similarly, the official standardisation bodies are organised along industry lines, yet common cross-sectoral themes such as information management issues are dealt with in a range of different standard committees that have little contact with each other.

Before successful cross-sectoral collaborative work on standards can take place, these primary barriers need to be removed.

The future of the catalogue?

While many experts during the course of the study stressed the necessity to co-operate more closely across sectors to reach agreement on metadata standards to describe digital collections, Paul Miller, Interoperability focus UKOLN, UK, seriously questioned, if the data structures that have developed over decades (and sometimes centuries) are adequate to meet the demands of the Information Society: "The different catalogues from different times have different social and cultural context. (...) Why describe the copies we have in our collections? Let the original be described once, point to that, and add any extra information you need. This leads on to quality and trust and authority." (DigiCULT ERT, Stockholm, June 24, 2001)

In the future, users on the web will be measuring the wealth of offerings especially by those criteria. The real value-added European cultural heritage institutions are in a good position to deliver in the future are quality, trust and authority.

Empowering institutions to make informed decisions on standards

Despite the awareness that commonly agreed upon standards and standard compliance are the first and most important steps in realising seamless, integrated access, there is no internationally accepted set of standards for describing or identifying cultural property today.

The dilemma with standards, especially when it comes to choosing the appropriate ones is, that there are so many of them. The Society of American Archivists identified more than 550 standards that affect archival work, during the research leading to the publication of standard handbook for archival description. This may be a strength, as it opens up many options for particular problems. "The marvellous thing about standards is that there are so many to choose from. Of course too many choices means no choice at all, but simply chaos." (Society of American Archivists, 1994)

The multitude of standards that are used in the cultural heritage sector today, is partly due to the fact that archives, libraries and museums collection description and cataloguing practices have not developed coherently with the result, that they now rely on many different set of standards. So, how can memory institutions make informed decisions on standards without running the risk of jumping on the wrong bandwagon?

Strategies for keeping track of changing standards

Although the risk of jumping on the wrong technological bandwagon is still imminent, it seems to be something cultural institutions have learned to live and deal with. In addition, awareness about standards within the community has increased. Nevertheless, given the constant evolution of standards, the standards jungle undoubtedly will remain an impene-trable thicket also in the future.

Thus, the questions remains:
- how can heritage institutions make informed standard decisions and,
- what mechanisms should be in place to avoid that they are jumping on the wrong technological bandwagon?

The experts participating in the DigiCULT online Delphi survey suggested various strategies on how to keep track of the current development in the standard arena. They advice cultural heritage institutions to check the following questions before adopting a standard:
- Is the standard used? Before adopting any standard, cultural institutions should look out for workable and working solutions not only in the cultural field but also within the industry sector. The widespread use of standards within the commercial sector may be a good hint that particular standards can be used safely and are widely supported.
- Who uses the standard? Peer discussion and use of standards by trusted and know-ledgeable organisations play an important role. Hence, it is not only a question of how many other organisation are using a standard, but who is using it. Among the trusted organisations to look at are national institutions (national libraries or archives) or international standard consortia such as MDA or the CIMI Consortium.
- Is the standard compatible? With adopting proprietary software standards, there is always a certain risk involved. Hence, cultural institutions are well advised to only choose software products that support the most important open standards. In addition, cultural institutions themselves should encourage software producers

to adopt open standards and integrate them into their products.
- Are you able to take a proactive approach? With regard to standards specific to the cultural heritage sector, such as thesauri and metadata, the best strategy is an active approach, which means to actually get involved in standards development.
As Edmund Lee, Data Standards Supervisor at the National Monuments Records Office, described it in the 1ˢᵗ round of the DigiCULT online Delphi: "Heritage sector standards should develop in the context of co-operative ventures between organisation that will ensure 'sign up' as part of the development process."

As a consequence, memory institutions need to formulate a comprehensive strategy as basis for a methodological framework that drives the implementation of technology and standards in the organisation. This includes an active preservation policy that informs the selection process for digitisation and the management of digital information through its life cycle. Both should be based on open standards to ensure that cultural heritage resources remain accessible also in the future.

Nevertheless, to keep track of current and future standard development, cultural heritage institutions would need mechanisms that helps them make informed decisions. As the experts participating in the DigiCULT online Delphi suggest, there are several options that would help ALM-institutions to avoid getting trapped in the standards jungle:

At the European level: establish an efficient pan-European expert organisation similar to the European Information Technology Observatory that serves as standards authority for the European cultural heritage sector. The role of this authority would be to:
- monitor and track current standard developments that are of importance to the cultural heritage sector,
- participate in standards trials,
- produce technical recommendations and guidelines,
- collaborate with the technical working groups of international NGOs and special interest groups such as IFLA, ICOM or ICA, and thus function as a European umbrella organisation that is concerned with cross-sectoral issues.

On the national level: establish standards authorities outside the cultural institutions, to:
- monitor, test and provide latest information on development of standards,
- participate in international standard test best on behalf of other archives, libraries and museums, and communicate the results down to less enabled institutions,
- localise standards information from international resources for local and regional ALMs,
- give clear advice and guidance to organisations,
- provide training of standards and their use.

Although by no means representative, the experts participating in the DigiCULT online Delphi consider regional R&D centres to be the most viable approach to test standards, and most effectively communicate the results also to cultural heritage institutions.

Information on technology performance, integration
standards and other issues will be provided by ... (n=52)
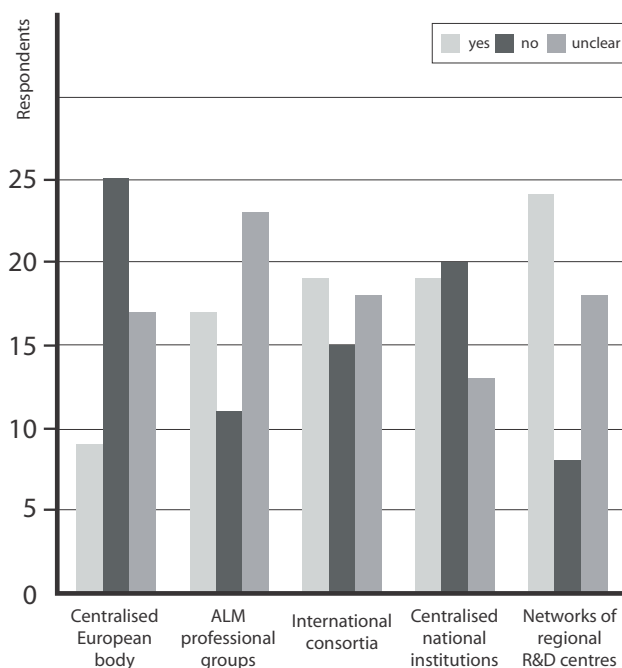
Source: Salzburg Research, 2001

Having such national or regional standard authorities in place is seen as one chance for small institutions to stay on top of the technical development. However, as the DigiCULT experts also stressed, an external standards authority still requires cultural institutions to employ knowledgeable and well-trained staff that are able to evaluate and implement the advice given on standards. Only trained staff can guarantee that standards will be implemented on a day-to-day basis. What cultural institutions need is an "adequate supply of people who know both the practices and problems of cultural institutions and also the state of modern information technology research". (Michael Lesk, National Science Foundation, USA; DigiCULT Delphi, July 16, 2001)

Providing access across sectors: the technical issues

From a technical point of view, providing seamless, integrated access is primarily a question of making diverse technological systems interoperable. This requires "detailed consideration as to how previously private – and often proprietarily monolithic – systems can be opened up." (Miller, 2000) As a rule of thumb, the more diverse the systems, the more complex the issue of data exchange. With regards to seamless access, we can talk about an interdependent, yet conflicting system with three parameters: the degree of interoperability, the quality of search results and the comprehensiveness of the provided metadata:

The interdependent system of providing seamless access

high
Interoperability

Metadata complexity: high
Search quality: high
Interoperabilty: low

Metadata complexity

high

Search quality

high

high
Interoperability

Metadata complexity: lo
Search quality: low
Interoperabilty: high

Metadata complexity

high

Search quality
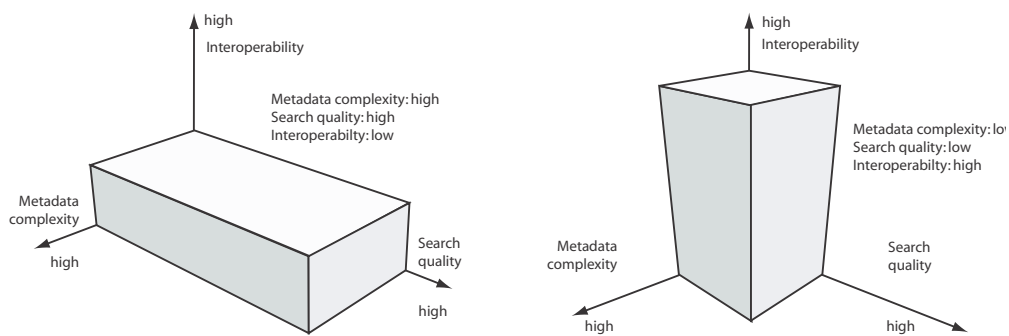
high

Source: Salzburg Research, 2001

The higher the metadata complexity, the better the search results, but the lower the degree of interoperability. What becomes obvious through this matrix is that providing seamless access across institutional and sector boundaries always demands a compromise. Future work in this area should be striving to reach an optimum between these three parameters: High search quality based on comprehensive metadata, at greatest level of interoperability:

The interdependent system of providing seamless access

high

Interoperability

Optimal situation:
Metadata complexity: high
Search quality: high
Interoperabilty: high

Metadata complexity

high

Search quality
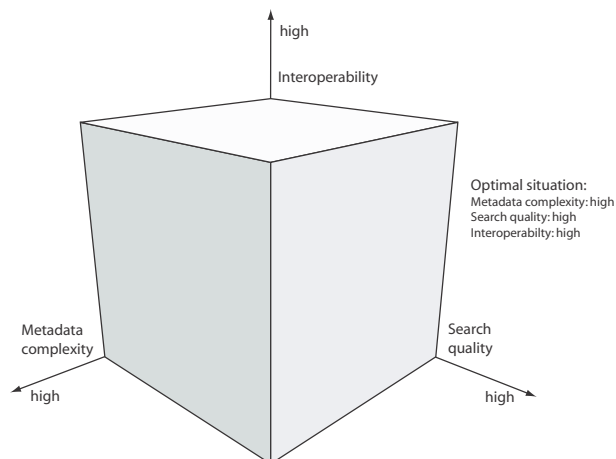
high

Source: Salzburg Research, 2001

According to Warwick Cathro, Assistant Director General for IT at the National Library of Australia, there are currently three different avenues to achieve high quality search results:
- first, providing access through specialised resource discovery services that work across sector domains,
- secondly, searching and retrieving data at the collection level, and
- thirdly, by granting access to collection management systems. (cf. Cathro, 2001)

The third approach offers users the possibility to directly go to an institution's web site and search their online catalogue through an own interface, for example an OPAC (Online Public Access Catalog). Although this model allows to achieve the best results when only one institution is searched, it causes considerable problems when it comes to federated searches of collection management systems across the ALM boundaries due to the significantly different metadata standards used.

The second approach, searching and retrieving data at the collection level, builds on EADs (Encoded Archival Description) or other standardised collection description formats to search across sectors. Yet, at present, the search engines are not adequate enough to really deliver good search results.

The most commonly used approach to seamless access to digital cultural artefacts across domains today, is to establish specialised resource discovery services across sector boundaries.

Discovering information across sector boundaries: building metadata repositories

Specialised resource discovery services lower the interoperability barriers by establishing centralised metadata repositories, where metadata is stored in a unified format for direct search. The model adopts an interoperability solution known as metadata harvesting. Depending on the approach, providing metadata in a unified format lies either within the responsibility of the contributing institution or can be delegated to the resource discovery service. In the better case, heterogeneous metadata is exported and mapped against a uniform metadata standard. Search brokers or harvesters, i.e. client-based services that interface with external servers through standard search protocols, are then used to launch searches at distributed metadata repositories. If users search for resources through the portal of the resource discovery service, they actually search the central metadata repository at the level of the discovery service, yet do not search at the institutional level. One example for a resource discovery service working with metadata harvesting is the Picture Australia image service.

Picture Australia

Picture Australia is a web service offering access to nearly 500,000 images about Australia. It is a central resource discovery services that serves as a portal to the holdings of currently seven Australian cultural heritage institutions, including the National Library and the Australian War Memorial, and in the future will be further expanded to include more libraries, museums, archives and galleries. Users can search a metadata repository held at the National Library in Canberra which links to pictorial images that are maintained on the web sites of participating cultural agencies around Australia. The service has a "hybrid" architecture with a centralised search index and distributed images.
As material at the various institutions has already been digitised, Picture Australia needed a method to collect the records, bring them into a common record format, index them and make them available for web searching. The services uses harvesters or search brokers to automatically collect the metadata from the participating institutions at a monthly basis and

store them in the central metadata repository. The collected information is then translated into a uniform metadata format (the elements are based on the Dublin Core Metadata Standard and the format is XML), and automatically indexed to be searchable.

<http://www.pictureaustralia.org>

The second, in some respects different approach is still at a quite experimental stage. Instead of building a central repository for unified metadata, this second approach lets users directly search at the institutional level. However, to do so, the metadata at the institutional level needs to be structured as XML documents, which have a corresponding XML-schema for validation. The searched metadata is then aggregated, packaged and presented, using standard DTDs (Document Type Definition). In contrast to the first model, this second approach gets closer to the object level. One example for this approach is COVAX, an IST-project funded by the EC under the 5th Framework Programme.

COVAX - Contemporary Culture Virtual Archives in XML

COVAX has developed a metasearch engine that distributes searching within and across sectors. One is able to query at the institutional level against XML repositories based on standard DTDs or query all collections or combinations of collections (Archive, library, Museum and Electronic Text collections).

Any DTD can be used within a collection type and multiple DTDs are possible within each collection.

Standardised repositories enhance *interoperability* because they are also searchable by other non-COVAX systems. Furthermore, future harvesting tools are simplified because of the use of the standard DTDs and because agents can access the XML data servers via the HTTP protocol.

Queries from the user interfaces are mapped to Dublin Core (Bib1 Use Attributes –Dublin core subset) and packaged using Z39-50 XER for the metasearch engine. Using mappings of Dublin Core to the target elements of each DTD, the metasearch engine is able to build an XML query for each XML database.

ALM's convert source data from European library catalogues, archives, museums, and text centre collections to XML documents based on standard XML DTDs (presently EAD, MARC DTD from the Library of Congress, Amico-2in1, and TEI.2). When *conversion* is not possible, exploitation of COVAX could include harvesting to build alternative or supplemental Dublin Core metadata XML repositories; centralised or distributed.

Access to XML Repositories
- HTTP protocol enabled access to XML repositories,
- Middleware software standards for internal communications include Z39.50, (and XER),
- Multilingual user interfaces and document labels.

Metasearch Engine
- Open to any DTD and collection type,
- Open to new or additional XML query languages,
- User search requests are converted to Z39.50–XER format using the Bib–1 Use attributes for Dublin Core,
- Metasearch engine maps Dublin Core to the related elements within each XML DTD and composes a query for the specific XML repository containing,

XML Data Servers
- – Database indices are created for each DTD based on the defined COVAX Access points,
- – Access via HTTP protocol,
- – XML servers include Software AG's Tamino data server and IXASOFT TEXTML server.

Multilingual User Interfaces

Multilingual user interfaces and document labels (six languages) are available for all DTDs. XSLT is used to transform XML results into HMTL presentations that include:
- – Complete documents based on the native XML document (EAD, MARC, AMICO or TEI metadata). The documents are distinctive based on their collection types,
- – Short Dublin Core results,
- – Full Dublin Core results,
- – Native XML documents are also available for download.

For display, Dublin Core is dynamically generated from the native XML document. Within the project exploitation plans, a central Dublin Core metadata XML repository will be included in order to gather metadata about resources that cannot or will not be completely converted to a particular XML DTD.

<http://www.covax.org>

The following graphs represent the difference between the two approaches described above:

Central metadata repository

Distributed resource discovery service
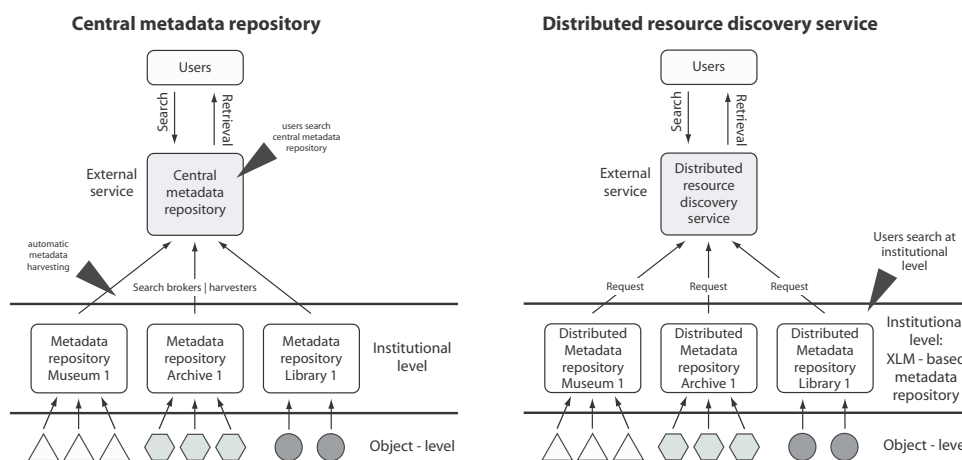
Source: Salzburg Research, 2001

As a basic requirement, both models use a uniform metadata format, the Dublin Core Metadata Standard. The Dublin Core Standard was initially brought forward to bridge the differences between the many distinct description practices in use in archives, libraries and museums by reducing the number of elements to describe a cultural object to a total of 15. In addition, the Dublin Core metadata standard provides a set of qualifiers – Fully Qualified Dublin Core – to give institutions the opportunity to further describe the cultural object. Today, it is increasingly used to facilitate resources discovery across sector boundaries.

The Dublin Core Metadata Initiative

The Dublin Core Metadata Initiative is an open forum engaged in the development of interoperable online metadata standards that support a broad range of purposes and business models. The initiative developed the Dublin Core Metadata Element Set in 1995/96, with the goal of supporting simple resource discovery for digital collections in different domains. In 2000, the basic element set has been extended with the Dublin Core Qualifiers for use within local applications or specific domains. Despite the criticism that Dublin Core is a rather crude standard for describing cultural heritage objects, it has been officially adopted in the meantime by various country governments, including Denmark, UK and Australia. Besides, the CIMI Consortium has extensively tested the Dublin Core Metadata Standard within the museum domain and published the results.

<http://dublincore.org/>
Further reference: CIMI Guide to Best Practice: Dublin Core <http://www.cimi.org/public_docs/meta_bestprac_v1_1_210400.pdf>

At present, the first model of previously harvesting data to be stored in a central repository that can then be searched is the more viable approach and has already attracted many followers. On the other hand, the second model that proposes to search at the institutional level currently faces many difficulties as the technological infrastructure is not yet robust and fast enough to handle user queries.

Both models, however, still face problems with regard to the quality of search results. The current Dublin Core Metadata Standard, is a good compromise to enable cross sector resource discovery today, yet it has some shortcomings that should be addressed in further developments. One such shortcoming, for example, is the loss of context. As Debbie Campell, Project Manager of Picture Australia, puts it: "A collection of images may have a collective title such as 'Images of Paul Revere'. But the image title may be reduced to 'On a Horse'. So the loss of context becomes a discovery issue." (Campell in Tennant, 2001) In addition, there are also problems with differing vocabularies that are used within the several cultural heritage sectors, which can create a major impediment to accessibility across sectors.

To minimise information loss in the future, a medium range strategy would be to further develop Dublin Core into a metadata standard that is still compatible with current Dublin Core, but that offers more granularity. Although a "Dublin Core II"-standard would not allow to conduct machine inferences, it would address some of the current shortcomings.

A long-term strategy towards cross-sectoral standards for resource discovery, however, should try and explore new grounds in the form of knowledge-based modelling with high expressivity. Knowledge-based modelling would deliver high granularity of metadata and therefore better search quality, without loosing interoperability.

Authority control

The introduction of automated information retrieval and the demand to exchange data not only between institutions within one sector but also between sectors and across national borders brought a dramatic increase in the demand for vocabulary control. Today, the problem of providing seamless access to digital cultural information resources is not so much the technology but, terminology, i.e. the fact that people describe the same things differently. Authority files help to standardise object descriptions across sectors, and would support persistent identification of objects in networked environments.

Authority control "presents a host of issues, all of which become more pronounced as individual resources (...) are made available through 'gateways' and 'portals' (...). These discrete resources use different terms to describe similar concepts ('author', 'creator' and 'composer'), or even use identical terms to mean very different things, introducing confusion and error in their use." (Miller, 2000) The solution to this problem is the attempt to describe digital cultural resources in common and agreed-upon terms to enable successful searches in remote databases, i.e. authority control.

"It is safe to say that no other type of descriptive standard is currently receiving more attention nor undergoing greater change than are the various controlled vocabularies embedded in thesauri and other kinds of authority lists." (Society of American Archivists, 1994)

This demand for authority files, i.e. internationally agreed-upon files on geographic places, names, corporate bodies, etc., thesauri and most importantly, multilingual authority controls has not yet decreased, as experts participating in the DigiCULT study confirmed.

The development of authority controls is a highly specialised area that demands, first and foremost, a consensus building process between the institutions in a particular field. It involves work within specific groups by clustering like-minded institutions that might share certain vocabularies and domain ontologies. Peer discussion and peer reviews are important steps in this process to also develop a sense of common ownership and increase acceptance of emerging standards within the community.

The controlled vocabularies in use today target the highly specialised and knowledgeable academic community, with the effect, that – if offered online – indexes are rarely used. As Sandy Buchanan, Resource Manager at SCRAN, UK, knows from experience: "80% of our users use text searches, and only 20% make use of structured searches such as indexes. What we need are tools that are comfortable for people. It is not about adapting the users to the Internet, but the other way around." (DigiCULT ERT, Amsterdam, September 25-26, 2001)

As the audience base is broadening with offering cultural heritage resources online, archives, libraries and museums are under pressure to also offer terms and vocabularies these new audiences would expect to see. For example, if the users were teachers, cultural institutions would need to offer curriculum-related search vocabularies. To Sarah Flynn, Access to Archives-Project, Public Records Office, UK, the key is knowing ones audience: "We have to learn more about the users, because professionals care about things users do not use. Therefore, we need technologies that would allow users to bring in their interests and work on them." (DigiCULT ERT, Amsterdam, September 25-26, 2001)

This demands a highly user-centred, bottom-up approach to the task of building special vocabularies. As Michael Lesk, Division Director, National Science Foundation, USA, took it: "Agreement will come by people 'voting with their feet' [or computer mice?] rather than by elaborate committee meetings." (DigiCULT Delphi, July 16, 2001)

Today, cross-sectoral work on authority controls is still in its infancy and extremely difficult as organisations – even within one sector – have different interests. Yet, any future work in this area needs to take users into account.

Creating user-centred authority files: The LEAF-project

Starting in March 2001, *LEAF – Linking and Exploring Authority Files*, is a three-year project, co-funded by the European Commission Information Society Technologies Programme to develop a model architecture for a distributed search system that harvests existing name authority information. The goal is to automatically establish a user needs-based common name authority file in a specific sector highly relevant to the cultural heritage of Europe.

The project results will be implemented by extending an existing, fully functional, international online Search and Retrieval service network of OPACs that provides information about modern manuscripts and letters and the MALVINE project. This search and retrieval service will also be extended into a global multilingual and multimedia information service about persons and corporate bodies based on user needs. The model architecture is intended to be applicable to other kinds of cultural/scientific objects and data, ensuring through the use of authority file information that the representation of the objects in question is one of high quality.

The LEAF demonstrator will thus provide a valuable example of how dynamic user interaction with the cultural/scientific content can considerably enhance the user experience. (cf. LEAF Homepage)

<http://www.cordis.lu/ist/home.html> and <http://roadrunner.crxnet.com/leaf/leaf_june_2001/index.html>

Standardised vocabulary or intelligent guides?

In the expert community, however, the issue of terminology standardisation and the creation of controlled vocabulary is not uncontroversial. As Mark Jones, Director and Chief Executive Officer of the Victoria and Albert Museum, London, UK, remarks: "I think, that [building controlled vocabulary] has proven to be an excellent way of wasting an enormous amount of money and effort without achieving the advertised result." (DigiCULT Interview, August 9 - 10, 2001) Although Jones sees the benefit in some areas, for example geographical place names, he also believes that those in favour of controlled vocabulary underestimate the complex way of how language is used by different communities today, as well as over time. "People underestimate the flexibility, malleability, the changeability of English [and any other language] as a tool of communication and that is why they keep running into problems." And he adds: "I do not think these problems are solvable".

Instead of controlled vocabulary, Mark Jones suggests a different approach to increase the quality of search results, i.e. intelligent guiding. Intelligent guides would support users in their search, for example through reference to a list of synonyms (for example, sofa instead of settee) or by referring to the search results of other users (recommender systems) or by providing access to the knowledge of the institutional experts. Instead of investing money for building controlled vocabulary, users should be empowered by intelligent types of "helps" that put them into the position to find what they need themselves.

In the future, both approaches will be indispensable. Even if 80% of the current audience do not use specialised indexes to search, the other 20% are the experts and scholars that rely on controlled vocabulary. To them, they provide real value added. On the other side, promoting intelligent guides – they maybe rely on the specialised vocabulary, yet they are hidden and invisible to the user – to also provide ordinary users with higher quality results will be equally necessary.

Multilinguality

The problem of controlled vocabulary multiplies when one considers that cultural heritage resources should also be searchable across language boundaries. To do so, we need multilingual thesauri, but also localised special vocabularies.

The experts participating in the round table and online Delphi agree that multilinguality is still one of the major unsolved problems. Providing multilingual access is a necessary requirement to leverage the full potential of digital cultural resources, and considered as a primary future R&D area.

As it will not be possible to create one single authoritative vocabulary, what is needed are new kinds of multilingual search engines for cultural heritage resources. These search engines should be able to work with diverse vocabularies and metadata standards, including multilingual thesauri.

The DigiCULT navigator to providing seamless access

With the advent of networked communication, the provision of access to cultural heritage resources has become the main activity of cultural heritage institutions to an unknown degree. It has initiated a paradigm shift from building collections to providing seamless access to digital cultural heritage resources. This requires the convergence and interoperability of diverse systems.

From a technological point of view, to enable seamless access across sectors means finding a compromise between a high level of interoperability, the granularity of provided metadata, and the quality of search results. The higher the granularity of metadata the better the search results, but at the cost of interoperability. What has been achieved so far is the ability to search across sectors, yet at the expense of search quality.

The primary barriers to seamless access today are related to the following issues:
- cross-sector incompatibility of metadata standards to describe cultural heritage objects,
- lack of de facto standards for the cultural heritage sector,
- lack of awareness for new standard developments due to missing mechanisms for cultural heritage institutions to obtain accurate, valid and trustworthy information on standards,
- lack of controlled vocabulary for cross-sector, international search,
- lack of support for multilinguality,
- international, national, regional/local, institutional and sector barriers that hamper effective collaboration between standard developing consortia and bodies.

To achieve seamless access to cultural heritage resources as the basis for other future services the following issues need to be actively approached:
- reach an agreement on metadata standards in a collaborative process involving all stakeholders across the boundaries of archives, libraries, museums,
- foster and encourage the use of open and/or de-facto standards in the community,
- provide mechanisms and tools to enable cultural heritage institutions to make informed decisions on standards development,
- further develop the technical requirements for user-focused and target-group sensitive authority and multilingual thesauri to enable access across institutional, sector and national boundaries.

50 **The European Commission, special interest non-governmental organisations, international standards consortia and ALMs together will need to continue to co-operate to establish sector standards.**

Experts envision different stakeholders for standards synchronisation. These are a central European Union standards authority, non-governmental organisations, national/regional bodies and international consortia. Therefore, a first step is to establish consensus on an international cultural heritage standards authority and its tasks. To do this, all relevant stakeholders need to be involved to develop a viable model on how to best reach agreement on sector standards and dissemination of results.

51 **The European Commission, national governments and regional authorities as primary funding bodies should actively promote the use of announced or open standards by making standards compliance a requirement for future funding for proposers of cultural heritage projects.**

As primary funding bodies, the European Commission as well as national governments are in the position of making standards compliance and other quality measures part of the agreement with proposers. Therefore, they need to issue clear guidelines for the submission of different types of electronic documents. This ensures future accessibility in the long term.

52 **National governments and regional authorities should set up co-ordination and dissemination infrastructures that help cultural heritage institutions to make informed decisions on future technological developments.**

Besides a national help desk, experts participating in the DigiCULT study especially favoured the foundation of regional cultural Research & Development (R&D) centres to actively support smaller memory institutions in the regions through a range of services. As members of all important standards consortia, these regional cultural R&D centres would:

- participate in standards test beds, evaluate and translate the results and guidelines and make them widely available to regional cultural heritage institutions,
- provide training on standards and their use,
- raise awareness about newly developing standards,
- monitor and test new technologies for the cultural sector and issue recommendations and guidelines on the implementation of new technologies in cultural institutions,
- hold courses and workshops for staff in cultural heritage institutions such as digitisation, project management, life cycle management of digital resources, etc.
- support small archives, libraries and museums in technological questions either on site and/or via a help desk.

53 **With the help of European Commission framework programmes, projects that focus on building target-group specific intelligent guides to cultural heritage resources should be solicited.**

These intelligent guides should include:

- "Intelligent" querying interfaces that offer: multilingual support, near natural language interaction, context-sensitive (i.e. role-specific, profession-specific) querying and presentation of content,
- Adaptive/learning systems that support the ability to process Frequently Asked Questions (FAQ) and associate them with experts' answers in a knowledge base,
- Intelligent guides exhibit collaborative behaviour, thus being able to contact "neighbouring" agents in order to make further relevant information accessible to the user.

IX.3   Beyond the information level: Providing access to digital objects

In the past decade, ambitious digitisation projects were initiated under the assumption that everything could be digitised. In many cases, digitisation was ad hoc, without prior planning or a clear notion why analogue cultural resources should be transferred into the digital realm. As one expert expressed very frankly in the online Delphi: Digitisation projects were initiated with "absurd priorities based around sexy proposals for funders". (DigiCULT Delphi, June 21, 2001) As many of these projects were under-funded yet over-ambitious, many of the results lacked quality and sustainability.

Today, the idea of what can be achieved by digitising analogue cultural artefacts and where digitisation has its drawbacks has become much clearer. Although digitisation is also undertaken for preservation purposes, for example in public record archives, experts agree that digitisation has its greatest value in providing access to cultural resources. As Cary Karp, Director of Internet Strategy and Technology at the Swedish Museum of Natural History, stated: "By definition, digitisation means the loss of information. (...) Digitisation is not for preservation but more for protecting the original from wear and use, and giving access through the secondary format with a good enough quality." (DigiCULT ERT, Stockholm, June 14, 2001)

Besides recognising that access is the real strength, what has also become clearer over the last years is that there are some pitfalls which cultural heritage institutions need to watch out for.

Pitfalls of digitisation

Colin Webb, Director of Preservation Services, National Library of Australia, has summarised the limitations and pitfalls of digitisation (Webb, 2000):

... from an access perspective:

- missing awareness that what is delivered digitally, is only a surrogate of the source material,
- the copying process imposes changes on the ways the material is perceived,
- missing legibility: too small, too blurry, too costly if done well,
- the way the material is delivered influences its quality (which, on the one hand has to do with compression, yet on the other hand also with the unwillingness to release high quality images over the web out of fear of copyright infringements,
- digital images are just image and their "content" is not searchable,
- besides digitisation, there are other large investments often overlooked, such as organising and describing material,
- issues related to ownership, rights of access, and cultural sensitivities.

All those issues may interfere with access, even though access is what digitisation can provide best.

... from a preservation perspective:

Although digitisation is mainly done for access, there are also a few good reasons to digitise for preservation:

– digital copies allow to put precious and fragile material away, and limit the usage considerably. Ultimately, this increases the life-time of rare material,

– digital copies are replacements for unstable materials,

– digital surrogates may serve as back-ups in case of loss of the originals.

Digitisation for preservation

In some cases, there is no choice other than to digitise, as Sven Allerstrand, Director-General of the National Archive of Recorded Sound and Moving Images, Sweden, made clear: "For the audio-visual world, digitisation is not an option to improve access. It is a must to secure the survival of the content." As he points out, digitising these audio-visual recordings for rescue is a cost- and resource intensive venture: "There are rough estimates about the audio-visual holdings in Europe. There are 10 million hours of film, 20 million hours of video, and 20 million hours of audio. This is only broadcast material. (...) The costs to transfer [this material] from analogue to digital is EUR 2000 per film per hour, and EUR 200 per video per hour. It is a matter of billions to preserve the audio-visual broadcast heritage. Therefore, we have to make a choice of which material is important for the future."

Sven Allerstrand, DigiCULT ERT, Stockholm, June 14, 2001

However, as Webb argues, these promises can only be fulfilled if:

– the quality of the digital surrogates also satisfies the user: Diverting use away from the original demands to have the highest quality possibly available for the digital surrogate,

– the level of risk to the originals during the digitisation process can be controlled: Avoiding damage to the original requires planning and vigilance,

– being able to provide and maintain access to the digital copy: This is considered the most difficult issue and therefore will be dealt with separately in this report.

For Webb, all these issues are problematic and need an active approach.

... from a management perspective:

Digitisation projects require utmost attention from the management side as:

– digitisation projects are complex: The bigger they are, the higher the complexity and the higher the demand on management,

– almost anything is achievable – at a certain cost: These costs are not necessarily monetary but may be human resources,

– the cost is always more than expected.

In many cases, cultural heritage organisations underestimate the project management skills necessary for a complex digitisation project. Managers need to understand and communicate the objectives, employ dedicated staff, try to involve external expertise, develop clear specifications, regularly control the quality, and select the best service providers for doing the job.

However, the most pressing challenge today comes form the sheer quantity of material that waits to be digitised.

The most pressing digitisation challenges: Volume and scalability

"It is necessary to understand that the nature of things change as the scale grows."

Mark Jones, Victoria and Albert Museum, UK, DigiCULT Interview, August 9-10, 2001

One of the most pressing issues related to digitisation is the volume of European cultural heritage material. Although the cost related to digitising those treasures have, from a pragmatic point of view, solved some of the problems, the amount of material is still too large to pursue a universal approach to digitisation.

At present, the sheer volume of information causes serious scalability problems. As Edmund Lee, Data Standards Supervisor at the National Monuments Records Center, UK, brought it to the point: "We have the technology to scan an aerial photo, rectify it and place it on a GIS, but how do you do that with seven million aerial photos?" (DigiCULT ERT, Stockholm, June 14, 2001)

"The main issue is to reduce the reliance on human labour and intervention exclusively. It is essential to build automated tools that can augment human processes and procedures. Workflow management systems that incorporate automated tools and human labour can address scale issues." (Sayeed Choudhury, John Hopkins University, USA; DigiCULT Delphi, June 1, 2001)

Automated processes and routines would be a solution to improve the performance problem with large record sets and also problems with version management. This includes the possibility to include metadata right at the point of digitisation. Most current software tools do not support this function, with the effect that digitised images cannot be searched fully.

Metadata integration at the point of digitisation

The Royal Library, National Library of Sweden regularly digitises images at high resolution on demand. As the current software in use does not support the immediate integration of metadata at the point of digitisation, there would be a need to somehow transfer the images to a librarian who is able to enter metadata which is a time and resource consuming undertaking. As there is no possibility to discover a particular digitised image at a later point due to missing metadata, the National Library made it a policy to throw out the digitised images instead of archiving them. For the library, digitising the image is a second time when requested is more economical than trying to locate the image in the maze of other digitised material.

Another requirement for managing the increasingly large amounts of data is the availability of cheap mass storage as well as access to a broadband infrastructure to transport large amounts of data.

Selecting material for digitisation

"'Why' is the most important question when you digitise."

Börje Justrell, National Archives of Sweden, DigiCULT ERT, Stockholm, June 14, 2001

The overwhelming amount of cultural information to be digitised requires selection in one or the other way. As digitisation is an extremely time and cost-intensive process that involves many risks and problems, memory institutions need to have a clear understanding of why and for which purpose analogue cultural materials are digitised. Nevertheless, Malcolm Ferris, Director of the Center for Research in Art and Communication at the University of Hertfordshire, UK, notes the lack of a clear contextual awareness, the "how, where, when and why these newly digitised collections will be used, and how they can relate to enhance the existing collection." (DigiCULT Delphi, July 6, 2001)

What we still see today is a more or less ad-hoc and accidental approach to digitisation that lacks clear planning and understanding of future use.

What is to be digitised should be part of a master plan that is anchored in a national policy that clearly sets priorities to avoid duplication of work. Based on this general framework, cultural heritage institutions should then formulate an organisational policy that clearly addresses questions of why and to which end analogue materials are digitised, and at which quality. As the final selection should be based on the qualitative assessment of the material to be digitised, no common selection procedures or agreed-upon guidelines on criteria of selection can be offered. Instead, memory institutions should develop and formulate their own methodology for digitisation.

Developing methodologies to select material for digitisation

Seamus Ross, HATII, University of Glasgow, UK, noted the lack of methodology in archives, libraries and museums and strongly recommends to take a methodological approach to digitisation. (DigiCULT ERT, Vienna, June 25-26, 2001) One such methodology is Ross' Source-Oriented, User-Driven, Asset-Aware Model (SOUDAAM) that focuses on three important aspects to be considered when deciding on what and how to digitise:

- First, institutions need to understand their sources: Is this material already available at other locations? What standards are required? What are the preservation risks involved?
- Secondly: Cultural institutions need to understand user demands and expectations: What do users want, and what kind of quality of digital resources do they need? How and in which contexts do users exploit this material?
- And finally, memory institutions need to think on how they intend to manage their assets in the future: Should those digital resources be preserved, and why? How can institutions encourage future use? How do institutions exploit digitised resources for sustainability?

User-centred approach to digitisation: Who will be the end user?

"Lots of information is only of interest to experts", as Jennifer Trant, AMICO, USA, noted. "A database can offer 297 different types of lizards, and 75 types of Delft lace. Yet, to the uninformed they all look alike." (DigiCULT Interview, August 8, 2001)

The results of this methodological approach to digitisation are two documents: The Intellectual Asset Survey (IAS) focuses on understanding the value of the holdings and

collections of a memory institution. Secondly, the Digital Representation Implementation Plan (DRIP) provides a step-by-step plan for implementing digitisation, doing one bit at a time. Behind this methodology stands the notion of sustainability, i.e. how to get the best out of a digital collection in the future.

Analyse first – digitise later: The Picture Archive of the Austrian National Library (ANL)

The hype of „going digital" usually ends in view of mile-long archive shelves of large collections. The Picture Archive is Austria's largest picture documentation centre and the centre for orderings of digital images of all holdings and collections of the Austrian National Library (ANL). The biggest challenge for restructuring the archive and introducing digital services was managing mass data: about 2 million image objects and a card catalogue comprising about 1.2 million meta data.

"Analyse first" was the motto of the first stage of the "Digital Image Archive" project which began in 1999. Employees of the collection and the project team gathered in weekly editorial meetings and closely analysed and documented system and structure of the archive and especially of the collection's card catalogue. Based on this analysis, the ANL developed a software which enables semi-automatic indexing of library catalogues in international card format. During 6 months, 5 project members produced 1.2 million meta data which formed the basis for the establishment of an Internet platform. Since July 2001 the entire holdings of the archive are accessible via the Internet.

Via an online ordering system, users can search the library's image catalogue, save their search results and order image objects of all collections of the National Library which are digitised on demand. Since November 2001 the library offers a digitisation service which enables the production of high-resolution archival scans under ideal preservation conditions.

That means that the basis has been laid for a systematic digitisation of objects in the Picture Archive of the Austrian National Library. Four archives dealing with contemporary history will participate in a comprehensive co-operation project, which will start in January 2002, using the Picture Archive's infrastructure and aiming at the establishment of a nation-wide platform.

The example of the Picture Archive of the ANL shows that it is possible even for large historical archives to get a functioning digital basis provided that systematic archive analyses and exact project planning take place.

<http://www.bildarchiv.at>

Quality of digitisation

Another issue that should be addressed by a digitisation policy is the quality of the end result. Today, the most commonly used approaches to digitisation distinguish between quality produced for access and quality for preservation:

- access-oriented selection aims at immediate supply and delivery and results in thumbnails and low resolution images; and secondly,
- collection-oriented selection aims at preserving and conserving and results in high-resolution images in print quality that are archived.

Although quite common, these approaches are primarily based on a lack of trust that can be sensed throughout the cultural heritage community, who are not willing to publish high-resolution images on the web out of fear of copyright infringements.

However, experts in the DigiCULT study agreed that cultural institutions should strive for the highest quality possible, to keep options open for future use of material. The US-based Mellon Foundation, a cultural heritage funding body takes a very clear position on this: the best quality is just good enough to guarantee the usefulness for future scholarship. As Don Waters, Programme Officer at the Mellon Foundation, USA, states: "There are certainly certain purposes for having thumb nails or small views that can help it finding, but for scholarly purposes the highest quality image needs to be made available. What we want to see this need in any system that we fund rather than low-resolution access copies. The motivation for people to provide lower quality images tend to be connected to these issues of economic and intellectual property. If you provide a protected environment, you protect the intellectual property, and if you have a mechanism for distributing that protected environment to the right users then you eliminate both of those rationales for keeping low quality images." (DigiCULT Interview, June 5, 2001)

Thus, the choice of quality always needs to be accompanied by other measures to secure that the content owner's rights are maintained. Cultural heritage institutions need to provide for these additional measures too, through the negotiation of user agreements and, if necessary, the technologies such as watermarking to control unauthorised use.

The DigiCULT navigator to digitisation

Today the volume of material to be digitised is the most pressing digitisation issue, and related to it, the need to select. With growing scale, the nature of cultural object digitisation changes considerably and poses problems to cultural institutions that are not yet solved, such as mass digitisation, integration of metadata at the point of digitisation, the internal transfer and storage of huge amounts of data and, of course, the exploding costs related to all these tasks. Volume and scale of future digitisation highlight the need for automated processes and integration of cultural object digitisation into the overall workflow within cultural heritage institutions.

This requires the establishment of comprehensive selection policies that are driven by a clear understanding of the *why* and *for whom* material should be digitised. Organisational policies for digitisation should be directed by a national digitisation programme to set priorities and avoid the duplication of work.

54 **National governments and regional authorities should formulate clear digitisation programmes that can guide cultural heritage institutions to formulate organisational digitisation policies. (see also the chapter: National Policies and Initiatives).**

55 **Anchored in national digitisation programmes, cultural heritage institutions should formulate organisational digitisation policies that transparently state the selection criteria based on:**
- **user demands,**
- **the quality of the source material (fragile material, etc.),**
- **future management of digitised material, and**
- **conservation and preservation issues.**

56 **Funding bodies of digitisation projects, i.e. national governments, regional authorities as well as non-governmental funding bodies should give a funding preference to projects that prove a good understanding why and for whom material is digitised.**

However, there is a risk that the barrier for small ALMs is too high to participate in digitisation projects because they often lack the expertise and the resources to fulfil these funding requirements. There is a need for a knowledge-based online support tool that could help small institutions to get a first assessment of their collections and ensuing digitisation requirements. A second step could be to get institutions in touch with experts, so as to improve their chances of gaining access to sources of funding through appropriate programmes.

57 **The European Commission should sponsor pilot Research & Development projects and solicit studies in the following areas:**

– Best practice cases in mass storage: A study should be solicited to aggregate information on existing case studies for large scale storage in the cultural sector but also in other sectors (for example, NASA and CERN) that deal with massive amounts of data. What can be learned from experiences in these areas about means and costs to handle large-scale projects?

– Automated mass digitisation: Fund pilot projects that investigate the possibilities of automated mass digitisation of different kinds of materials, resulting in guidelines that show the limitations but also the potential for future development for certain media types.

– Metadata capturing at the point of digitisation and integration of digitisation with collection management. In co-operation with software vendors, (distributed) systems should be developed that allow to capture and integrate metadata into existing collections during the phase of digitising material.

IX.4   Long-term preservation of (born-) digital resources

Long-term preservation means "addressing what is not only a moving target, but one which is rapidly growing both quantitatively and in complexity, and along paths that are not wholly predictable."

Kenneth Thibodeau, 2001

Not brittle papyrus and crumbling mortar is the most severe threat to our cultural heritage today, but, as Mary Feeney expressed it, "the death of the digit." (Feeney, 1999) This "death of the digit" is related primarily to two factors that put at jeopardy current efforts in archiving and preserving our digital cultural heritage:

– First, technology develops ever more rapidly, reducing the time before a particular technology becomes obsolete.
– And secondly, unlike their analogue counterparts, digital resources are much more "unstable" with the effect that the integrity and authenticity of digital cultural resources is corrupted.

Both these factors, the instability of technology and content, drive archiving and long-term preservation. The first factor addresses the *technological challenge* to keep cultural heritage resources accessible in the future, while the second refers to the issue of assuring the integrity and authenticity of the digital objects preserved, which is an *intellectual challenge*.

Technological obsolescence

"It is a technology with the minus that it self-combusts."

Greg Newton-Ingham, British Universities Film & Video Council, DigiCULT ERT, Stockholm, June 14, 2001

The technical problems with archiving and preserving (born) digital resources derive from the very nature of the digital cultural artefact itself. Digital cultural artefacts are "systemic", which means that certain prerequisites are needed to be able to use them. The "system" consists of the language in which the digital object has been encoded, the software necessary to create and read as well as the hardware equipment used to view the digital resource. As a consequence, not only the encoded information needs to be preserved, but also the technical equipment, i.e. the hard- and software to decode and display the digital information.

Technical discontinuity and obsolescence is a major problem particularly for institutions whose core business is the archiving and long-term preservation of digital cultural resources. According to prognosis, 80% of the technology used today will be obsolete in ten years. It will be replaced by novel procedures and new ways of working. "Fixing digital discontinuity sounds like exactly the kind of problem that fast moving computer technology should be able to solve. But fast-moving computer technology is the problem: By constantly accelerating its own capabilities – making faster, making cheaper, sharper tools that make ever faster, cheaper, sharper tools – the technology is just as constantly self-obsolescing. The great creator is the great eraser." (Brand, 1998)

Given that cycles of technological innovation are getting shorter and shorter, replacing

old systems at a breathtaking pace of 2 – 5 years, the threat of technological obsolescence becomes ever more pressing.

Technological obsolescence

As technical obsolescence accelerates, the "inventories" of obsolete computer technologies in museums increases rapidly:
– The Obsolete Computer Museum <http://www.obsoletecomputermuseum.org>
– The Virtual Museum of Computing <http://vmoc.museophile.com>

Therefore, changes in technology are regarded the greater risk as information will be rendered inaccessible within a much shorter time period. There is less risk concerning the technological obsolescence of the storage medium, such as magnetic and optical disks. "Indeed, technological obsolescence represents a far greater threat to information in digital form than the inherent physical fragility of many digital media." (Mallinson, 1986)

General preservation strategies

To come to terms with the risks related to technological obsolescence and media fragility, memory institutions will have to adopt various strategies and methods to keep digital resources accessible in the future and increase their chance of survival. This include:
– Good practice in storing and handling: digital material should be stored in a dust free environment away from magnetic fields at a stable temperature and relative humidity; in addition, security issues need to be observed (e.g. that digital media should be stored in a separate area, with restricted access).
– A strategy for retrieval and access: expected retrieval requirements will determine whether digital information is stored online, near-line, or off-line (e.g. little used off-line material may be stored on magnetic tape, including compression).
– Keeping data about stored sources and tracking the life cycle: keeping vital data about information management (e.g. preservation, copyrights, use rates).

Cultural heritage in the closet

Archives, libraries and museums are rapidly accumulating storage-intensive digital data without the management infrastructure to store and protect the data. "Most likely", as Jane Sledge, Information Resource Manager of the National Museum of the American Indian, USA, noted, "significant collections of thousands of CD-ROMs will end up in the closet. Only rarely, can museums afford to pay for Storage Area Network solutions to store their digital collections."

Jane Sledge, DigiCULT Delphi, June 27, 2001

Short- to medium term preservation methods

– Refreshing, i.e. periodically copying the data onto a newer carrier of the same type
– Transfer: copying data onto a more stable carrier (e.g. transferring data from a floppy disk to a writeable CD).
– Multiple distributed copies ("cloning"): storing identical material in multiple locations and regularly backing up (in order to protect against loss due to media failure or human error).
– Format migration: converting documents to newer and probably less volatile standard formats to assist in maintaining access and facilitate later migration.

Medium- to long-term preservation solutions

– Technology preservation: preserving entire computer hardware platforms.

– Migration: periodically transferring digital material from one hardware and software configuration to another, or from one generation of computer technology to a subsequent generation.

– Emulation: using software that emulates obsolete encoding formats to provide access to programs across different platforms.

Solutions, when it is too late

– Digital archaeology: Applying different techniques to recover data that has already become inaccessible due to damage to/degradation of media, poor management or hardware/software obsolescence.

Emulation and Migration working papers

David Holdsworth and Paul Wheatley: Emulation, Preservation and Abstraction
<http://129.11.152.25/CAMiLEON/dh/ep5.html >

This paper argues that emulation is a valid method of digital preservation, both in terms of longevity and affordability. This argument is bolstered by presenting guidelines for use of emulation in this role, and by providing an illustrative and yet non-trivial example.

David Holdsworth: Emulation: C-ing ahead for digital longevity
<http://129.11.152.25/CAMiLEON/dh/cingahd.html >

It is proposed that a (the?) most cost-effective technique for implementing emulation for long-term preservation is to use a widely available programming language for which there are good prospects for long-term availability. There is the further suggestion that a subset of the language be used to avoid those features that are unlikely to carry forward into subsequent languages. The proposal is that the language to use for now is C.

Paul Wheatley: Migration – a CAMiLEON discussion paper
<http://www.personal.leeds.ac.uk/~issprw/camileon/migration.htm>

This paper is intended to open the debate on the different uses of migration for the long-term preservation of digital materials. This discussion will hopefully form the basis of future comparisons between migration and emulation as part of the CAMiLEON project's investigation of emulation as a digital preservation strategy.

Gregory W. Lawrence, William R. Kehoe, Oya Y. Rieger, William H. Waters, Anne R. Kenney (2000): Risk Management of Digital Information: A File Format Investigation
<http://www.clir.org/pubs/reports/pub93/pub93.pdf>

This report is based on an investigation conducted by Cornell University Library to assess the risks to digital file formats during migration. The study was carried out with support from CLIR. The report includes a workbook that will help library staff identify potential risks associated with migrating digital information. Each section of the workbook opens with a brief issue summary; this is followed by questions that will guide users in completing a risk assessment. The appendixes also include two case studies for migration: one for image files and the other for numeric files.

Short-term solutions to a long-term problem

Generally, migration and emulation are regarded the most promising methods for archiving and long-term preservation. At present, migration is considered a viable path for long-term preservation of specific types of material, such as text or other types of material that are not complex multimedia objects. For such material, a certain degree of automation might be reached in the future. Fact is, however, that each of these strategies and any kind of data transfer onto current computer systems entails a loss of information, and they are not yet sufficient strategies to preserve data over a longer time period without information loss.

Experts do not see any "rapid" technical solution to the problem of preservation on the horizon. The long-term preservation issues involved (media instability, software, hardware and format obsolescence, metadata, etc.) are known, but not solved so far. As Svein Arne Brygfjeld, Head of Research and Innovation at the National Library of Norway, summarises the situation: With regard to long-term preservation, "even a long-term perspective is short term. Whatever we do is short-term now. (...) We need to learn to use short-term methods for a long-term perspective." (DigiCULT ERT, Stockholm, June 14, 2001)

It is crucial to gain more experience in experimenting with migration as well as emulation as preservation strategies. As mentioned above, the higher the level of content abstraction, the more difficult and complex the preservation of digital objects. While we have already experience with migrating text, we have little experience with migrating or emulating more complex media types, such as interactive multimedia objects or GIS objects, not to mention about new information objects that will emerge as a result of future technologies.

Future solutions to the challenge of digital preservation must incorporate the capability to accommodate and incorporate changing technology and unforeseeable products of that technology as the equipment and software for creating, reading, and understanding digital information may not be available in a decade from now.

In addition, even if we were able to successfully emulate obsolete technology, we do not know if the "results" actually would meet user expectations. "It would be unrealistic to expect that future users will be satisfied with having their access to electronic records limited to what had been available under antiquated technology. Researchers today would hardly be satisfied if access to old records required entering queries on punch cards, in FORTRAN or COBOL, with output limited to printouts in upper case. Similarly, we must anticipate that in the future there will be improved options available for ingest, preservation and archives management as well as access." (Thibodeau, 2001).

At this stage, work in this area is still experimental and the theoretical concepts have not been sufficiently tested over a longer time period for different kinds of digital material to allow memory institutions to make informed decisions. Therefore, comprehensive strategies and detailed guidelines are needed that demonstrate the migration paths for different media types, including complex and interactive information objects. Strategic planning, an active approach and organisation are essential to successfully preserving digitised and born-digital information for the future.

In the meantime, cultural heritage institutions are well advised to adhere to open standards and protocols that keep open future migration paths.

Archivo General de Indias, Spain

One best practice example for implementing a large-scale migration strategy is the Archivo General de Indias in Spain. Originally set up as a pilot project for large-scale digitisation to test the possibility of digitising the holdings of all Spanish archives, the Archivo was set up in 1992 on proprietary technology, without considering long-distance, integrated access. The advent of the Internet brought a complete technological change, and forced the Archivo to migrate 45,398 bundles of digitised documents to a new platform. Although the computerisation of the Archivo General de Indias is well documented (see: <http://www.clir.org/pubs/reorts/gonzalez/contents.html>), the documentation on migrating the data to a new system is unfortunately, not publicly available. It would be this kind of information that is needed most for managers of memory institutions to make informed decisions about archiving and preservation strategies.

Instability of content

By digitising analogue materials, once finite cultural objects stored or in form of various "media" such as books, records, paintings, sculpture, manuscripts, etc. suddenly become very flexible and non-finite. This means that they can be easily altered, manipulated, copied, stored, and accessed, maybe resulting in a multiplicity of versions of a particular document.

As much as flexibility of digital information is to the advantage of creators and users, it greatly complicates matters for archives, libraries and museums who are mainly concerned with collecting and preserving cultural objects of long-term value that are final or in some sense definite. The simplicity to produce versions of digital documents that might in some respects have different functionality and interactivity, different relationships to other documents, or a different 'look and feel' creates a severe problem for cultural heritage institutions concerned with establishing and guaranteeing the integrity of digital cultural information objects. Similarly, confronted with a flood of unidentified resources on the Web, the ability for users to distinguish an "authoritative" digital representation from other resources is of great importance, especially to the scholarly community.

The ability of cultural heritage institutions to maintain the integrity, authenticity and validity of digital cultural material is both one of the greatest assets and selling points that distinguishes memory institutions from other content providers on the web, but also the greatest challenges cultural heritage institutions concerned with long-term preservation face today. "Whatever preservation method is applied, ..., the central goal must be to preserve information integrity; that is, to define and preserve those features of an information object that distinguish it as a whole and singular work. In the digital environment, the features that determine information integrity (...) include the following: content, fixity, reference, provenance, and context." (Task Force on Archiving of Digital Information, 1996: p. 12)

Content integrity

Content integrity refers to the requirement to preserve as much of the original content as possible. Yet, content exists at various levels of abstraction. This raises the question, at which level it will be preserved: at the bit stream level, where a digital object only consist of 0s and 1s, at the format and structure level, where also the layout, design, the resolution and accuracy of colour presentation is concerned? Or does one try to capture content at the highest level of abstraction, where content is defined in terms of knowledge and relationships?

The following graph depicts the increasing complexity of long-term preservation with regard to the level of content abstraction:

Complexity of long-term preservation
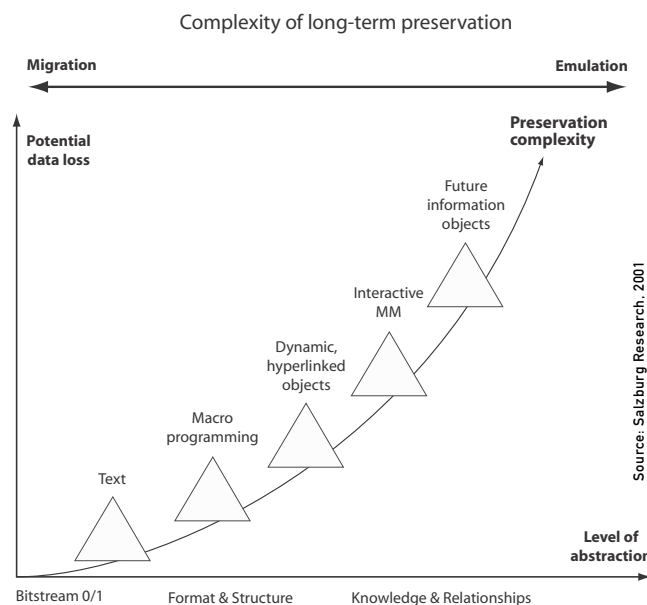
The higher the level of content abstraction, the higher the loss of information and finally, the more complex the question of preserving digital material successfully. Undoubtedly, capturing content at the knowledge level substantially increases the complexity of long-term preservation.

Fixity and Context

Integrity of digital information is also compromised by the lack of fixity, i.e. the ease with which digital objects can be altered, changed or duplicated, without leaving traces that the original resource has been corrupted. On the Internet, the issue of digital objects not being fixed multiplies with the increase of web sites that offer dynamically created content from databases. Such dynamic digital objects are even more transient than real objects or their digitised counterparts. The only way to fix those cultural heritage resources in time, is to take a snap shot of the database.

Closely related to the problem of fixity, is the issue of context and the fact that the integrity of information objects is also dependent on how they relate to other objects in the digital environment. For long-term preservation, the archiving organisation also needs to capture the context of a digital cultural resource. On the World Wide Web, however, where objects are placed in relation to other objects through hyperlinks, capturing the context can create a major problem. How much of this context should be preserved together with the actual digital object? As Jennifer Trant, Executive Director of AMICO, USA, points out: "What does it mean to preserve a search engine as of a particular date – this might imply preserving the whole web." (DigiCULT Delphi, July 17, 2001)

With born-digital objects, it is not always possible to "preserve all aspects of 'look and feel' as opposed to some sort of abstract information content. This can be crucial in some works, and even could prevent digital preservation activities for some art works where the look and feel is defined and required by the artist." (Chris Rusbridge, University of

Glasgow, UK; DigiCULT Delphi, June 21, 2001) This makes clear that the preservation of digital cultural resources as persistent and fixed "objects" is already conceptually problematic.

Different strategies to archiving the web

The idea of capturing and preserving dynamic web content which, in the future, will constitute a growing and ever more important part of our cultural heritage, is still in its infancy, and there are no adequate solutions yet. The experts participating in the ERT Technology in June 2001, gave examples of three different strategies how to capture and preserve dynamic digital objects today:

– selective capturing of web contents,
– comprehensive harvesting of web contents, and
– negotiating individual agreements with selected content providers.

PANDORA, Australia

The Australian National Library, takes a selective approach to preserving born-digital material. Since 1996, the PANDORA Archive captures and preserves a limited number of Australian web sites, including individual documents, collections, and e-journals. While some web sites, like the one of the Olympic Games 2000 in Sydney have been captured every day, other sites are harvested much less often. As such a selective approach only captures a very small portion of what is actually published on the web, there is great need to work with others and facilitate collaboration in terms of developing preservation standards and practices cataloguing web resources in a central database to avoid duplication of work and facilitate online search and retrieval, and finally, establish a notification system to register online resources that may qualify to be archived in PANDORA.

PANDORA is a combined archiving and preservation project, aiming at the one hand, to secure long-term public access to web-based materials, and, on the other hand, to preserve these materials for the future. Therefore, it is actively involved in conducting trials and tests with various long-term preservation strategies, including migration of data to new formats and operating systems as well as emulation of obsolete technologies.

The Royal Library, Sweden

The Royal Library, National Library of Sweden takes a very pragmatic, "snap shot" approach to preserving dynamic digital objects. Twice a year, the library automatically harvests all Swedish content that has been published on the web by running a robot on the net. Although some of the information is lost, the losses are deemed acceptable and the process is believed to deliver a fair sample of the Swedish Web.

Information that cannot be captured that way includes database-managed sites where users first need to login first. In this case, the proposed draft to a new deposit law for electronic material suggests to authorise the National Library to demand from selected publishers access to those databases that cannot be harvested automatically. Due to the fact that 97% of the harvested material is HTML pages or jpg and gif-files, there is a good chance that these resources will remain accessible for a longer time period. The remaining 3% of the material are problematic with regards to preservation and will demand special attention with emulation.

National Library, Norway

The National Library of Norway (NLN) takes yet another selective approach to capturing dynamic cultural resources from the web. The library is currently discussing with Norwegian newspaper publishers to place software engines at their sites. This automatic agent will report back to the library, if new information is to be harvested. This way, the library does not need to collect the full site after every change. According to Svein Arne Brygfjeld, Head of Research and Innovation at NLN, the newspaper publishers are very co-operative in this approach.

Facing the trend on the Internet to increasingly generate content directly from databases, on demand and on the fly, the difficulty of assuring fixity and providing the context of digital cultural resources will increase dramatically. In addition, as Seamus Ross remarks, the real difficulty is not to preserve the web pages on the Internet but "it is its other aspects, such as the social environments it fosters and the communication interfaces on which it depends that will prove the most difficult to preserve and for future researchers to reconstruct". (Ross, 2000: p. 22)

Today, there is no technological system that allows to capture and "freeze" the communicative context and the relationships people have developed by participating in web communities. To reconstruct these solcial relations will be the real challenge of the future.

Provenance and authenticity

The principle of provenance has become one of the central organising concepts in preserving and archiving resources. It stipulates that the integrity of an information object is partly embodied in tracing its origin. To preserve the integrity of an information object, digital archives must preserve a record of its origin and chain of custody. In practice, a record of provenance can be established in two ways, first, through a formal process of publication and distribution and second, by tracing the path of migration.

In the digital realm, however, creating a trusted record of provenance is increasingly difficult as there exist more and more chains of provenance that need to be followed to guarantee that a record is authentic. This includes, to confirm the identity of individuals and corporate bodies, or trace the creation process of data. In addition, digital archives need to prove what happens with information within their own organisation so that the chain of provenance remains intact and hence, authentic.

Authenticity, or content assurance, is the process of determining that a document or its reproduction is what it appears or purports to be. Based on methods of identification and verification, the origin, completeness and internal integrity of a document are assessed. In the cultural community, concern about authenticity are not new, yet "with the ubiquity of digital representations and the proliferation of source information on the Internet, these issues are further complicated." (Bearman, Trant, 1998)

There are two distinct technical strategies to assert authenticity (Bearman, Trant, 1998):

"Secret methods" to assert authenticity
This involves hiding data in the object to reveal its source, and include methods such as:
– digital watermarking,
– steganography, and
– digital signatures.

Functionally dependent methods

These are methods that employ specific technologies that are bound together with the information source. The information can only be used in combination with a particular technology:

– object encapsulation (whether physical or logical),

– cryptolopes™,

– encryption, and

– embedded active agents.

InterPARES – International Research on Permanent Authentic Records in Electronic Systems

InterPARES is a multi-disciplinary collaborative archival research project that seeks to understand better the nature of electronic records and the elements necessary for ensuring their authenticity over time. It is taking a record-centric approach to the

– development of a typology of requirements for maintaining the authenticity of records over time, and

– analysing appraisal and preservation processes in order to establish the extent to which they meet those requirements.

The research builds on an earlier project at University of British Columbia (UBC), "The Preservation of the Integrity of Electronic Records [1996]," which addressed issues surrounding the creation and maintenance of authentic and reliable electronic records in their active, pre-archival state.

A major goal of InterPARES is to use contemporary archival diplomatics[8] to analyse the elements of documentary form that occur in records associated with different types of actions and the juridical-administrative, procedural, provenancial, documentary, and technological contexts within which they occur. From this analysis, a typology of requirements for authenticity for records is being created. InterPARES team will also be studying existing strategies for digital preservation, such as migration, emulation, and persistent object preservation, as well as any new strategies that might be developed.

In order to develop the typology, the Project has developed a template for analysis as a working hypothesis about the necessary and sufficient elements of a record. The template is a model of an ideal record that, based upon prior archival knowledge of record types, contains all the possible known elements that a record may contain. This template is being developed as a predictive model that will assist archivist in identifying future record types and their associated requirements for maintaining their physical and intellectual integrity over time. To refine the template four case studies of electronic information are being used.

<http://www.interpares.org/>

As Bearman and Trant (1998) remark, a comparative assessment of the various technological solutions is only possible, if one has a clear understanding of the requirements in particular circumstances. The most commonly used technologies, however, are encryption, digital watermarks and digital signatures. These techniques are further discussed in the "New Tools"-section of this chapter.

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[8] Diplomatics was first developed in Europe in the eighteenth century as an analytical approach to the identification of the authenticity of medieval ecclesiastical documents. Its principles influenced the development of both modern history and theories of legal evidence. Diplomatics studies the genesis, forms, and transmission of archival documents, their relation to the facts represented in them, and their relation to their creator in order to evaluate and communicate their true nature.

Economic issues of long-term preservation

Besides the technological and intellectual problems that complicate the preservation and long-term archiving of digital cultural heritage resources, the cost involved are tremendous and hard to predict. In fact, decisions taken at the creation stage have an impact on the actual cost for preservation that need to be met at a later stage of the resource life cycle. Accordingly, the Cimtech cost-model (cf. National Preservation Office, Feeney, 1999), differentiates between cost that appear at different stages of the life cycle, which are partly preservation costs.

**Long-term preservation costs at different stages
of the resource life-cycle**

Promoting Best Practice
Cleaning up digital
resources

Practical and technical evolution

Reading, editing, managing documentatiom
Validation (assessment, copying, refreshment)
Data structure conversion
Offline archive storage
File recovery from media; crypt-analysis of
files of unknown origin

1. Creation

2. Selection / evaluation

3. Data Management

7. Data Use / Rights

6. Data Preservation

5. Data Use

4. Resource disclosure

Clearance, management
and authentification costs

Keep old hardware/software
Third party service costs
Change media (recording, archival storage)
Backward compatibility (set up, run, check)
Interoperability (test, set up, run, check)
Convert to standard forms (agree form,
test, run, test, delete)

Post preservation
use costs

Post preservation
disclosure costs

**Source: Feeney/National Preservation Office, 1999;
Salzburg Research, 2001**

In addition, cultural heritage institutions need to be aware that the cost for long-term preservation are by no means one time costs, but expenses that incurr regularly when migrating and maintaining digital resources.

As the overall cost for digital preservation are too high to be met by individual institutions, several European countries have already begun to set up networks of distributed archiving and preservation centres. These centres are either located within larger cultural heritage institutions who have already accumulated some experience with preserving large amounts of digital data, or have been set up as designated services especially for this purpose. In many cases, these preservation centres are closely affiliated with universities or other research facilities, like the distributed network of archiving centres of the Arts and Humanities Data Service in the UK <http://www.ahds.ac.uk>.

A proactive approach to digital preservation

"It is unlikely (…) that much material will be preserved by design. Accident is more likely to provide the mode of preservation as it has in the past."

Seamus Ross, HATII, University of Glasgow (2000: p. 23).

If Seamus Ross' prediction, that accident will remain the most common approach to preserving our cultural heritage, becomes true, then the risk of cultural heritage resources being lost or becoming inaccessible will increase dramatically. However, the worst thing to do is adopting a "sit and wait" attitude. Instead, cultural heritage institutions should actively approach the preservation issue and try to take as much control as possible. This means to actively manage the life cycle of digital resources, from data creation and data management to data use and rights management.

The life cycle approach to long-term preservation takes into account that "many stakeholders are involved with data resources at different stages, [yet] few have influence over (or even interest in) those resources throughout their entire life cycle. (…) This means that decisions which affect the prospects for and the costs involved in data preservation are distributed across a number of different (and often differently interested) groups." (National Preservation Office, Feeney, 1999) Long-term digital preservation is a distributed process where different stakeholders understand their involvement at a particular stage, but have no or little understanding on how their decisions influence the other stages in the life cycle of a digital resource.

Because decisions made at the early stages of the life cycle influence any future options with regards to long-term preservation, cultural heritage institutions should try to take control or at least influence decisions as early in the life cycle as possible.

Managing the life-cycle of digital resources
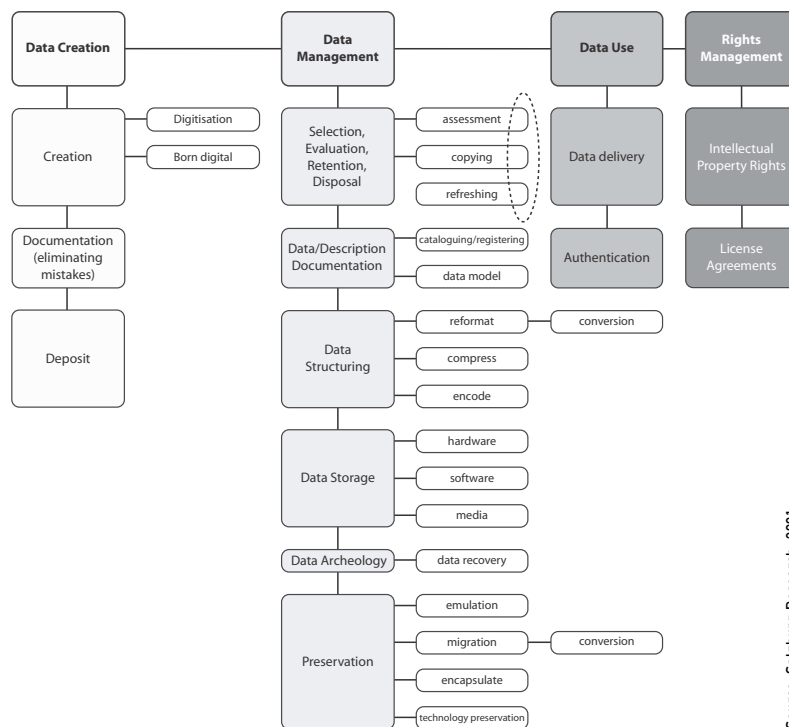
Source: Salzburg Research, 2001

Unfortunately, in many cases taking control over resource creation proves impossible. With the exception of public record archives and another few players concerned with long-term preservation, cultural institutions do not have control over data creation. Often, data arrives in the institutions in all kinds of (file) formats. As Christer Larsson, National Museum of Cultural History, Sweden, points out: "In the next decades, we will have to live with a format mess." (DigiCULT ERT, Stockholm, June 14, 2001)

Facing this situation, Seamus Ross, HATII, University of Glasgow, UK, predicts that digital archaeology, i.e. the profession of getting inaccessible bit streams off the storage medium, will turn into a booming business in response to the increasing amounts of unsecured digital information. (Ross, 2000: p. 25)

"We have to stop generating work for these people. (...) We must start to articulate our disciplinary needs to the people who are designing the protocols, which are intended to obviate the need for digital archaeology. Forward migration is the only conceivable path here. We must start realising how open standards are designed and where they are designed, and how precious little we can do in that process other than articulate our requirements to the protocol engineers." (Cary Karp, The Swedish Museum of Natural History; DigiCULT ERT, Stockholm, June 14, 2001)

Bert Degenhart-Drenth, Managing Director of ADLIB Information Systems, NL, also supports that born-digital objects are the primary problem. He argues that the biggest difference between digitised items and born-digital objects is, that "with born digital objects, you cannot afford to make any mistakes, as preservation errors of born-digital objects cannot be easily corrected." (DigiCULT ERT, Stockholm, June 14, 2001)

Nevertheless, given the urgency of the problem, it needs the combined effort of both national governments who need to develop national strategies for long-term preservation, and the future preservation archives, to at least turn some of the current, accidental preservation mode into a designed and reflected effort.

Recommended reading on digital preservation

Task Force on Archiving of Digital Information; Waters, Donald; Garrett, John (1996): Preserving Digital Information. Report of the Task Force on Archiving of Digital Information. May, 1996. <ftp://ftp.rlg.org/pub/archtf/final-report.pdf>

Preserving Access to Digital Information (PADI). The digital preservation offensive of the National Library of Australia. <http://www.nla.gov.au/dnc/tf2001/padi/>

National Preservation Office; Feeney, Mary (1999) (Ed.): Digital culture: maximising the nation's investment, February 1999.
<http://www.bl.uk/services/preservation/digcult.html> Besides this report, the NPO offers a series of guidelines and guidance material on digital preservation strategies and policies. <http://www.bl.uk/npo/>

For an excellent current bibliography on digital preservation see: The CEDARS Project report (April 1998 – March 2001). Published in June 2001. <http://www.leeds.ac.uk/cedars/indexold.htm>

The DigiCULT navigator to long-term preservation

"Digital preservation does not obviate the need for physical preservation. It accentuates it."

Kary Carp, the Swedish Museum of Natural History, DigiCULT ERT, Stockholm, June 14, 2001

As ever shorter technological innovation cycles replace existing technologies at a breath-taking pace of 2-5 years, the urgency to address long-term preservation to avoid the inevitable loss of our cultural heritage becomes ever more pressing.

Current methods of long-term preservation such as technology preservation, migration and emulation are regarded as insufficient methods to preserve digital objects over the long-term. In fact, they are considered short-term solutions to long-term problems. To make things worse, experts do not see any rapid technical solution to the problem in sight.

Yet, for cultural heritage institutions to take a "sit back and wait" approach until the whole scene has settled down and the results of research are known, would be the wrong strategy. Instead, they should develop sound principles and policies for the creation and acquisition of digital material that will help them to provide those materials with a significantly improved chance of survival.

Given the urgency of the problem, immediate action from all stakeholders at various levels is required.

58 **National governments and regional authorities need to take immediate action on long-term preservation and formulate a strategy for digital preservation as part of a national information policy. The strategy should involve setting up a network of certified organisations to archive and preserve digital cultural resources.**

A national preservation policy should include a clear idea on who should be responsible for the preservation of digital cultural heritage in the future. As digital preservation is a costly undertaking that requires great expertise, we recommend the establishment of a network of certified organisations that take care of different types of material. These organisations should closely co-operate at the national and international level and actively seek to participate in Research & Development trials to foster documentation and information exchange for guidelines. These organisations should also monitor all relevant developments in the digital preservation area. Features of such certified trustworthiness could include: experience in digital archiving, participation in R&D activities, organisational stability and longevity.

59 **The European Commission should support Research & Development in the following areas:**
   – long-term preservation strategies for *complex digital cultural heritage resources*, i.e. immersive environments, multimedia and rich, highly interactive applications, including the creation of a repository of preservation guidelines for different media types, showing migration paths for different materials,
   – best practice cases in *emulation* as a long-term preservation strategy, including the above mentioned media types.

IX.5   The new challenge: Born-digital resources

The concept of born-digital resources is rather new and reflects the difficulties cultural heritage institutions face today in managing these new kinds of cultural resources that have been created with the help of information and communication technologies. Contrary to analogue resources, archives, libraries and museums can only build on limited experience in dealing with electronic resources. The most pressing issues related to born-digital material are on the one hand, their transient, dynamic character and on the other hand, the fact that the current legal situation does not foresee and allow to properly take care of the exploding amount of born-digital resources.

As already mentioned, ensuring the integrity of born-digital objects is already conceptually problematic, especially, when it comes to capturing and maintaining resources on the World Wide Web. Yet another aspect that bears on the integrity of digital cultural objects is the referencing of digital assets. While memory institutions spend considerable resources to create means of reference such as bibliographies, catalogues, finding aids, indices, dictionaries, or directories, the referencing of web resources is only in its infancy. Yet, if users are to be able to reliably locate digital information resources in a networked environment, they need a source of reference to consistently discover, identify and retrieve information. Again, it is especially with born digital material that referencing causes a challenge as further explained in the following section.

Disappearing web resources

The reality on the web, however, looks differently, as disappearing web resources are the rule and not the exception. According to estimates, the average lifetime of a web page is just 70 days. (cf. Carley, 1999) There are many reasons why documents disappear from the web, i.e. the information is no longer of commercial value, the web site has been redesigned without updating the links, the information in the object has been superseded, or there is the opinion that there is no longer any public interest in a resource. The result are "broken links" and "file not found" error messages.

Given the fact, that ever more citations in scholarly papers are actually references to sources on the web, it is obvious that disappearing information objects are disastrous to the scholarly community. What is needed is a "web of trust" and the assurance that resources on the web can be referenced persistently, over longer time periods.

What is emerging in the cultural heritage sector, however, is an awareness that cataloguing (selected) web resources is a necessity to ensure long-term accessibility of information objects on the Internet. To do so, what is needed are unique identifiers that distinguish one digital object from another. Unlike in the analogue world, the use of unique object identifiers for web resources is not yet common practice. To consistently locate digital objects in a networked environment, they need to carry at least two identifiers: one identifier to specify the name and one identifier to specify the location.

Unique identifiers for online resources

For digital resources, these unique identifiers are called Uniform Resource Name (URN) and Uniform Resource Locator (URL). The URL refers to the specific place where a digital object resides and is currently the dominant method of object location on the World Wide Web. The URN, on the other hand, is the unique and permanent name for a distinct object, which is independent of its current location and can serve as reference,

even if the resource has been moved to a different server. Using URNs as persistent identi-
fiers would ensure that when a document is moved or its ownership changes, the links to it
would remain active.

Yet, a persistent identifier system only works, if it is regularly maintained. If the location
of a web resources changes, the URN must be linked to this new location. Therefore, for
the system to be functional, a resolver database is needed. A resolver database automatically
maps, through server software, the unique resource name to its current location. The use of
Uniform Resource Names is still at an experimental stage and as current prototypes to
manage and track URNs are not functioning well, persistent identifier systems have not yet
reached a critical mass.

Naming on the web and the concept of Uniform Resource Identifiers (URIs) still are
hot areas that need considerable research. The objective would be to realise URI-
management systems that allow to track, monitor and manage persistent access to digital
uniquely identified information resources on the web. Such a system would support the
following properties of naming:

- Scope: names would be globally valid and location transparent,
- uniqueness: names would be globally unique and valid for the whole life-time of a
  resource,
- readability: usually well supported by current web URLs (except for e.g. cgi-based
  location),
- scalability: aspect of number of accesses, number of resources managed,
- mobility: re-location of resources, names should be location independent,
- querying: users might only know some properties of a resource but not the name.

Besides the Uniform Resource Name URN and the Uniform Resource Locator URL,
a persistent identifier system based on the URI concept also provides the Uniform
Resource Characteristics URC as general category to further describe the information
object. This category might include a reference to the terms of use and its cost.

**Persistent identifier system
Uniform Resource Identifier System**
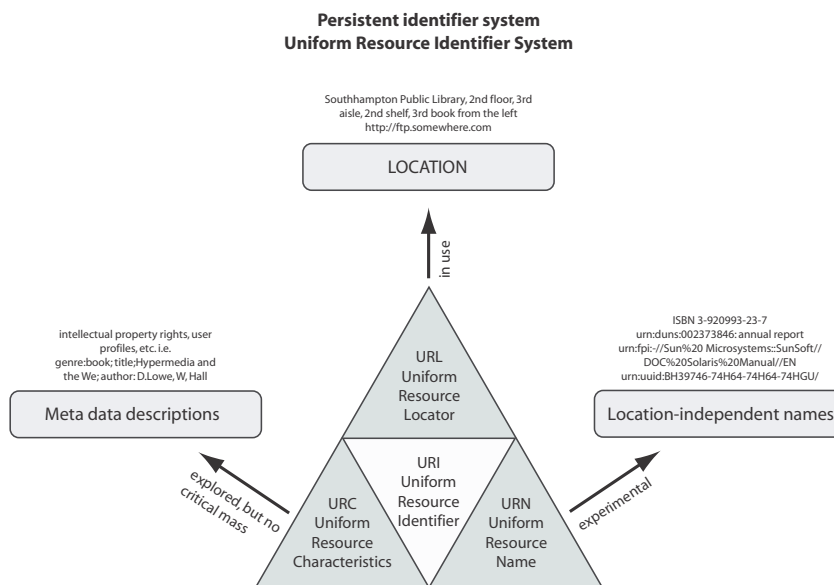
Source: Salzburg Research, 2001

The implementation of such a persistent identifier system based on URL, URN and URC is both an organisational issue as well as a technical issue. To implement a workable identifier system, there is a need for a network of name registries for the central registration of web resources. Such a network of name registries could be modelled on the already existing Domain Name Server-system, and should be initiated at an international level with one or more name registries at the national level.

With regard to the technological issues of a URI-system, only the URL-system is widely used, whereas the other two resources identifiers, URN and URC are still explored and have not been yet reached critical mass. Consequently, naming on the web should be one focus in future RTD-programmes as a way to establish a "web of trust", and as a basic requirement for any functioning rights management system for e-documents.

Persistent identifier services

There are a number of persistent identifier services available.
– Persistent Uniform Resource Locator (PURL) server software can be downloaded from the Online Computer Library Center (OCLC) site <http://purl.oclc.org>
– Digital Object Identifier (DOI) <http://www.doi.org>
– Handle system <http://www.handle.net>

BROWSER

Legal problems to long-term preservation

Presumably, the responsibility for archiving and preserving digital material rests with the creator or author of those resources. Yet, if the original owners fail to meet their responsibilities, there need to be others to step in to intervene before the digital material is lost. Traditionally, this kind of intervention has been done by libraries and archives. As copyright issues are addressed, there is the need for suitable legislation that regulates handing over this responsibility to a trusted authority. Such legislation needs to address intellectual property rights and ownership, as well as moral rights and needs to address the widespread uncertainty about the legal and organisational requirements for managing intellectual property of digital information.

As stated by the Task Force on Archiving of Digital Information: "Addressing and resolving the legal and practical questions of migrating intellectual property in digital form necessarily involves a complex set of interested parties including the creators and owners of intellectual property, managers of digital archives, representatives of public interest, and actual and potential users of intellectual property". (Task Force on Archiving of Digital Information, 1996: p. 6)

LOCKSS – Technological systems to safe-guard the loss of electronic materials

Can an automated, decentralised preservation system protect libraries against loss of access to digital materials such as electronic journals to which they have subscribed? Fear of the demise of journals or problems with their publishers has inhibited library investment in electronic resources. Staff members of the Stanford University Libraries, a major research library system experimenting with automation, believe they have found one solution in a system called LOCKSS.

LOCKSS, which stands for "Lots Of Copies Keep Stuff Safe," provides a bootable floppy disk that converts a generic PC into a preservation appliance. The PC runs an enhanced Web cache that collects new issues of the e-journal and continually but slowly compares its contents with other caches. If damage or corruption is detected, it can be repaired from the publisher or from other caches. The intent is to make it feasible and affordable even for

ON THE RADAR

smaller libraries to preserve access to the e-journals to which they subscribe. LOCKSS uses caching not for temporary storage, but for permanently keeping copies of electronic journals for preservation purposes. As more and more libraries use LOCKSS, a distributed preservation network for electronic journals is built.

At present, experts in the field discuss two viable approaches for setting up mechanisms that ensure availability of electronic cultural resources also in the future. These approaches are bound to the existing regulatory frameworks in different countries:

– In countries *with a national deposit law*, setting up general rules that regulate archiving and preservation responsibility on a general level, in form of an e-deposit legislation is considered the viable approach.

– In countries *without a national deposit law*, the agreement-based approach prevails. Here, libraries and archiving institutions clarify responsibilities at an institutional level, and negotiate individual agreements with content owners.

The first approach is currently pursued by Royal Library, the National Library of Sweden. Although there is no e-deposit system in place yet, the National Library actively lobbies at government level to put such a system in place. The objective is to extend the current deposit law also to electronic materials, to have the legal basis to collect, archive, and preserve born-digital cultural resources.

In comparison, the Mellon Foundation, USA takes the second approach. Based on the experience so far, that the debate on archiving electronic material was too broad to bear any fruit, the Mellon Foundation changed its strategies and decided to fund several pilot projects where libraries will negotiate individual rights agreements with specific journal publishers. The outcome of these projects will be both a set of rights agreements that regulate the copyright issues for a particular type of journal or e-publication, and a model that describes at a generical level, the legal, economic and organisational conditions under which archiving of electronic material occurs. In a second project phase, these models will then be implemented.

This shift from a broad discussion to very concrete projects on how to share the responsibility for future archiving of electronic material, already has changed the tenor focus of discussion dramatically. As Don Waters, Programme Officer, Mellon Foundation, USA, explains: "Now that these projects are under way, it seems to me that the level of discussion is very different from what it was before. Instead of 'I am responsible, you are responsible'-talks, now it is very concrete. We are talking about trigger events, i.e. what are the events that will enable a library to assert its way to be an archive for an electronic journal." (DigiCULT Interview, June 5, 2001) These trigger events are "worst case scenarios" that might threaten the existence of an electronic publication, for example, if the company or the journal is sold, or if publishing company and journal cease to exist. In such cases, a library would take over.

As voluntary responsibility is considered too risky, there is an urgent need to draft a legal framework that regulates the responsibility of archiving and preserving electronic material. Such regulations need to satisfy both authors and publishers as content rights holders, and the archival institutions that represent the interests of the users.

The DigiCULT navigator to collecting and managing born digital resources

60 **In those European Member States that have a legal deposit system, national governments should expand the legal deposit to include electronic and born-digital material.**

61 **In countries without a legal deposit system, national governments and regional authorities should nevertheless appoint trusted organisations to collect, make accessible and preserve born digital cultural resources. These trusted organisations should then enter into negotiations with content providers to approve on rights agreements for deposit and future use.**

62 **The European Commission should support actions to raise awareness for long-term preservation of born digital resources outside the cultural heritage community.**

In particular, such actions should address industry as well as all other areas where born-digital material is created, to facilitate awareness at the beginning of the resource life cycle, at the creation stage. To this purpose, the European Commission should also publish preservation guidelines for non-cultural sectors (e.g. accompanying measures, take-up actions, etc).

In addition, the European Commission should support R&D in the following areas:

– Preservation solutions for dynamic digital objects (e.g. how to preserve WWW content that has been generated dynamically from a database as the content resource).

– New approaches to naming on the web and further development of persistent identifier systems as basic requirement for effective rights management with digital cultural heritage resources.

IX.6. New tools in the box

"Consumers are not interested in records associated with a cultural object. They are actually interested in how that object links to their lives and problems in their lives."

Jennifer Trant, AMICO (DigiCULT Interview, August 8, 2001)

Simply providing information of where to find cultural heritage objects or giving access to digitised objects themselves may be of interest to scholarly users or highly knowledgeable communities, but is it sufficient to also attract new user groups and broader audiences?

What we can observe at present, especially in the library and archive sector, is that services are particularly targeted at the academic community, but are not necessarily meaningful to other audiences. For example, comprehensive thesauri or indexes to support resource discovery are mostly used by experts who understand the meaning and intricate differences between terminology. Yet, for teachers and the educational community such terminology is inappropriate it does not represent terms used within the educational domain.

For memory institutions to reach broader audiences they need to move beyond resource discovery and offer services that also relate to people's lives. This means using one's core competencies, i.e. the knowledge and expertise of curators, librarians and archivists on holdings and collections, to build knowledge-rich multimedia information resources that provide explanation and guidance as well as additional context. In addition, it also implies providing users with the tools to build their own significant stories. Both approaches suggest that memory institutions need to move beyond the level of offering simple resource discovery services. And they need new tools and systems that support their effort to truly unlock the value of the cultural heritage resources they are taking care of.

Discovery is the beginning, not the end: Requirements for new tools

The next step beyond resource discovery could be building meaningful context around cultural heritage resources, based on the expert knowledge memory institutions hold about their collections. This can be achieved by linking objects, building clusters of cultural resources, putting objects in relation to others, creating context and gluing everything together through creative stories and narratives. Traditionally, this has been the domain of museums in crafting exhibitions on particular themes.

What the Internet has to offer is a new dimension regarding the way in which these meaningful environments are created, namely *collaboratively*, in co-operation with others. From a technological point of view, this means not only providing systems that are interoperable, but offering the tools to better translate the knowledge of individual experts into virtual environment. What it comes down to, is not just integrating systems, but integrating people. "Interoperability has led to more fluid interchange of data. But we also need standards and tools that promote "interworkability" in order to build and sustain online culture." (Fink, Ronchi, 2001)

Taking this collaborative approach one step further means going beyond integrating institutional knowledge and letting individuals participate. This might include bringing in other experts, historians, scientists and other scholars, but also interested users who want to personalise the cultural content offered. For such a system to work, it must be highly *interactive* and allow users to manipulate objects, aggregate their own collections, annotate them, and enter metadata to describe the object from an individual perspective. Interested groups of individuals should be able to get together to discuss their shared interest or create

their own virtual exhibitions on their favourite subject. By offering these possibilities, users would create links between the cultural object and their own lives, thus taking "ownership" – not in a legal, but a personal sense - of the cultural collections they were using.

Of course, as neither the institutional staff nor the average user are necessarily computer wizards, such a system would require tools that are adequate for non-technical users, which means that they need to exhibit new levels of "intelligence" and user-friendliness.

EXAMPLE

Linking to people's lives: The Kennel Club Index
Jennifer Trant, AMICO, USA, gave an example how cultural heritage institutions can respond to the public's interest in cultural objects. A museum in San Francisco, USA, holds a large collection of pictures that happens to have dogs in the settings. The curator of this museum was approached by the local kennel club with the request to create an index of the dog breeds that are shown in the picture. Building on the museums existing index the kennel club created an accompanying index that classified the dogs in the picture according to their breed. Thus, this special interest group integrated their knowledge stream with that of the curator.
Being responsive to such requests from general users has a major social impact, as interested individuals and groups are able to develop a special kind of ownership for particular collections. As Trant comments: "Only by involving the public can you meet this level of public expectations." (DigiCULT Interview, August 8, 2001)

In the future, shared hybrid environments for cultural heritage need to provide the tools that support the following four requirements:

– interworkability, i.e. the integration of people and systems in collaboratively shared spaces,
– interactivity, i.e. the degree of user involvement and the level of control that is offered to users,
– intelligence, i.e. the ability to transfer knowledge into systems, and finally,
– ease of use, i.e. tools and systems that respond to the needs of non-technical users.

Interworkability: Connecting people through systems

Interworkability centres on stakeholders using a commonly shared workspace to collaboratively build a resource such as a portal, gateway, database, thesaurus, etc. Simply linking, hosting, and/or exchanging information is not interworkability.

From a technological point of view, interworkability implies to provide the technical support to effectively work together locally and remotely, at the same or at different times. Johansen (1991) differentiates between four modes of collaboration. Depending on time and distance, he distinguishes between local/synchronous, remote/synchronous, local/asynchronous and remote/asynchronous mode. Local/synchronous or real time encounter model, refers to face-to-face communication, at the same site, at the same time. In the remote/synchronous mode, people work together at the same time, but from different places; this mode is also called the simultaneously distributed model. Working together at the same place, but at different times, is a collaborative situation we find in most institutions today. People can share on site resources, but do not use them at the same time. Finally, the remote/asynchronous mode refers to collaboration of people working at different sites, at different times.

Today, collaborative work is supported by a whole range of technologies:

**Modes of computer-supported collaborative work
and supportive technologies
(cf. Johansen, 1991)**

Source: Warnecke, Stammwitz, Hallfell, 1998
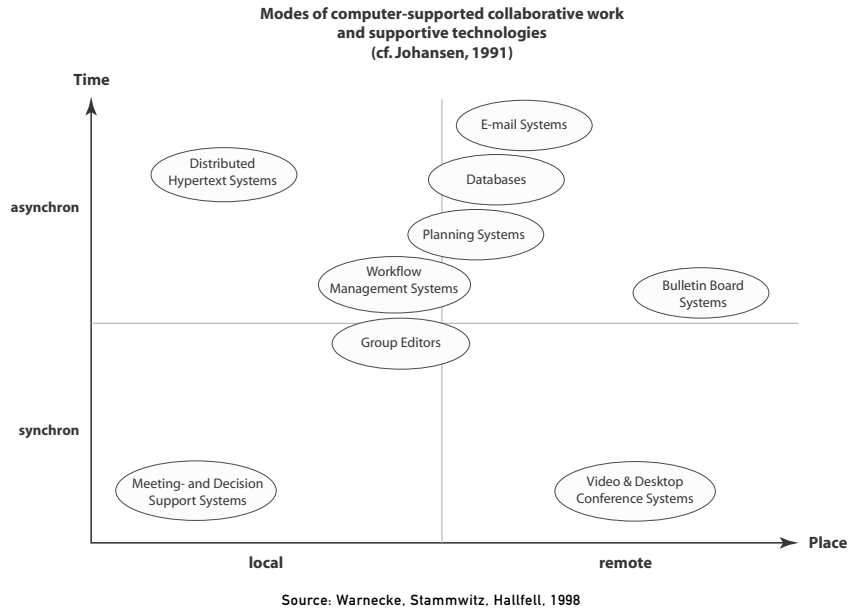
Most technologies work well in their support for asynchronous collaboration at different sites. Working at the same time from different locations (synchronous/remote collaboration mode) demands the most complex solutions in terms of technology, whereas real-time interaction causes the greatest problem.

Current technologies for interaction support offer different trade-offs in their functionalities for communication, co-ordination and co-operation:

Support of Interaction

Source: Warnecke, Stammwitz, Hallfell, 1998
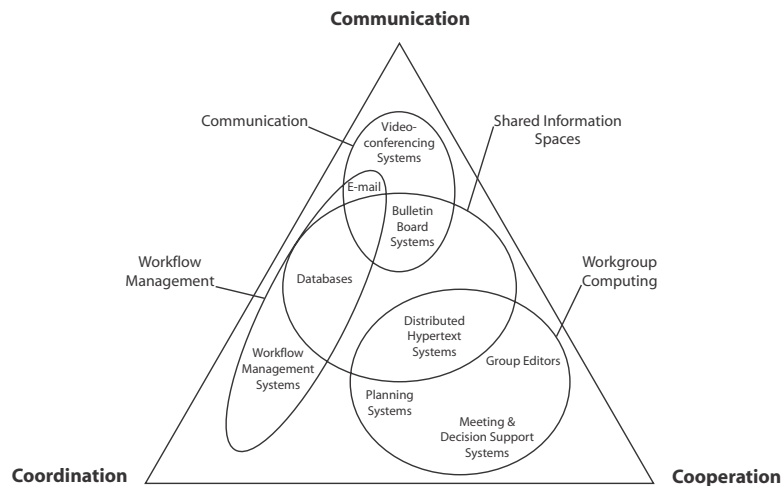
To create the kind of shared "collaboratory" that will allow cultural heritage institutions to work together towards a common goal, goes beyond sharing databases, mailing lists or using email. It requires designing and building distributed hypertext systems with advanced content authoring and management tools that are specifically designed for non-technical experts. Such systems could support cultural heritage institutions to collaboratively

- develop and realise virtual exhibitions,
- create knowledge-rich multimedia environments that offer not only objects but also context,
- build indexes, thesauri and controlled vocabulary for particular user groups, or
- aggregate topic-related resources beyond institutional and geographic boundaries.

COLLATE – Collaboratory for Annotation, Indexing and Retrieval of Digitised Historical Archive Material

Building a web-based, distributed collaborative space for archivists, researchers and end-users, is the aim of the COLLATE-project. Users of the "collaboratory" are able to index and annotate the digital surrogates of fragile cultural heritage resources, and create context by interlinking the individual resources. Thus, historians and domain experts are able to provide and share valuable information about the cultural, political and social contexts, to allow users to better understand and interpret the historic material. Through annotation, COLLATE also enables researchers to leave "traces" of their research in the digital archive, thus leaving some of their expert knowledge behind for others to use.

<http://www.collate.de>

Today, there are only few systems that allow collaborative work in the cultural heritage sector and those systems available are not yet in wide-spread-use. Thus, collaborative tools offers an area for research and development that should be further explored.

Are you ready to collaborate?

Collaboration is not just a technical question but is highly dependent on the willingness to work together. Thinking about cross-institutional, cross-sectoral collaboration must also involve some thought if we are yet ready to collaborate. Is there a common ground, i.e. knowledge that the participants have in common? How frequently do we need to communicate, given the fact that highly complex tasks demand frequent and complex communication? And is our technology ready, assuming that co-workers who need to share information also need to be willing to share and see a clear incentive for doing so?

This social aspects should not be underestimated as they can result in project failure if they are ignored. "One should not attempt to introduce groupware and remote technologies in organisations and communities that do not have a culture of sharing and collaborating. If it is decided that the organisation needs to collaborate more, that more knowledge needs to be shared, then one has to align the incentive structure with the desired behaviour." (Olson, Olson, 2000)

In fact, imposing technology on staff that is not yet ready to embrace complex tools, rarely works. This should also be kept in mind when we talk about closing the technology gap, later in this chapter.

Interactivity: Letting users take control

Levels of computer-based interactivity	Examples	State of the art in ALM sector
Linear interactivity (reactive pacing)		
Allows users to move forwards or backwards through a predetermined linear sequence of the content; also called electronic page turning. Overuse of linear interactivity is a sign that the web as a non-linear medium has not been understood.	Forwards, backwards, upwards, downwards navigation	Highly mature
Hyperlinked interactivity (proactive navigation)		
Provides access to a wealth of information that the user is allowed to navigate at will. There are multiple paths creating a maze of information that the user can utilise.	Hyperlinks	Highly mature
Hierarchical interactivity (reactive navigation)		
Provides users with a predefined set of options from which they can select a specific path or structure of accessing the content.	Main menu, navigation bar	Mature
Object interactivity (proactive inquiry)		
Objects (buttons, things, other metaphors) are activated by using a mouse or other pointer. Clicking generates a form of audio-visual response.	Pop-up menu, additional open window, online slide show, online PowerPoint presentation	Mature
Support interactivity (reactive inquiry)		
Involves providing users with a range of help options and messages, some of it can be very simple and others quite complex.	FAQ, help index	Fairly mature
Update interactivity		
Relates to components of the program that initiates a dialog between user and the computer-generated content. The program generates questions to which the user must respond.	Online forms	Fairly mature
Construct interactivity		
Is an extension of the update interactivity and requires the creation of an environment in which the user is required to manipulate component objects to achieve specific goals.		Fairly immature
Reflective interactivity (proactive integration)		
Refers to text responses. If n text responses are available to the user there is always the possibility that the user will require the n+1 answer and the program will judge the enquiry as incorrect. Reflective interactivity responds by providing answers recorded by others users and allows the current user to compare and reflect on their response.	Recommender systems, quizzes	Fairly immature
Non-immersive contextual interactivity (mutual elaboration)		
Combines all previous levels of interactivity and extends them into a complete virtual context. Users are transferred into a micro world that reflects their existing environment.	Virtual exhibitions	Immature
Immersive virtual interactivity (mutual elaboration)		
Projects the user into a complete computer-generated world that responds to individual movements and actions.	Virtual reality, 3D environment	Highly immature

Source: Sims, 1995

Computer-based interactivity is about letting users become active. Interactivity implies empowering users to control the environment by making choices while a presentation unfolds and interact spontaneously with the information and objects presented to them.

Today, most online and offline environments offer interactivity at various levels, starting with the most basic functionality, such as linear navigation (forwards and backwards, up-wards and downwards) and non-linear navigation (hyperlinks), to more complex levels of interactivity such as support features or object interactivity. However, the higher the degree of interactivity, the less mature the systems. Non-immersive and immersive interactive environments, such as virtual worlds, are still in a highly experimental stage and have not yet reached a critical mass. In between are environments that offer higher degrees of interactivity in rudimentary form, yet those systems still need improvement and more intelligence to reduce complexity and increase user friendliness.

The following graphic gives a classification of the maturity of environments that offer different levels of interactivity.

Maturity of systems with different interactivity levels
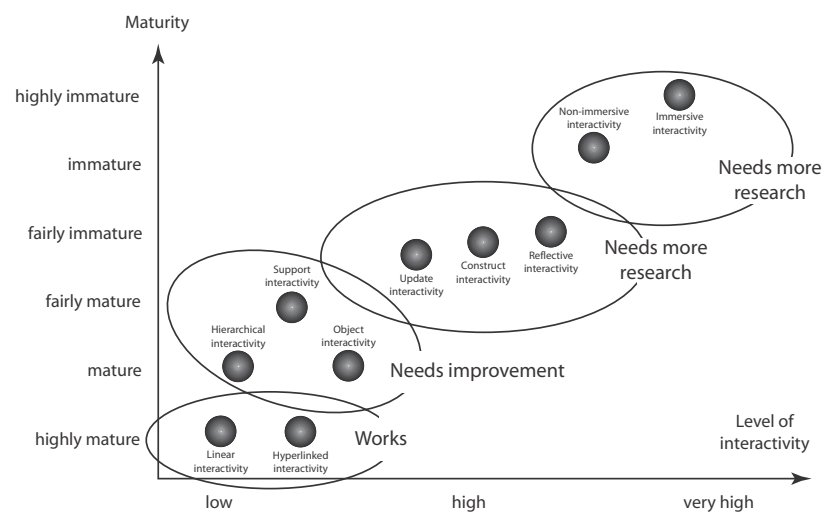
Source: Salzburg Research, 2001

In contrast to offline environments, delivering high interactivity over the Internet faces additional barriers with regard to the technological demands. The higher the degree of interactivity, the higher the requirements on technology. While low level interactive systems are mostly based on text and graphics alone which can be delivered through simple HTML pages using a browser, high level interactivity can only be delivered through built-on capabilities of the web and additional programming such as Java, JavaScript, cgi-script or Active X. Online forms, for example, often use JavaScript to provide interactivity to the form. In addition, to be able to deliver interactive multimedia, the built-in capabilities of the web are no longer enough, but requires users to install additional small programmes, so called plug-ins, to work in conjunction with the web browser. For example, an authoring system uses a plug-in to launch the authoring environment. In this case, the user is no longer totally within the web environment, but uses external modules to provide interactivity. Clearly, this may cause additional barriers for users who do not want to install additional software.

Interactivity for cultural heritage

Within the cultural sector, there are many areas where providing interactivity to users would clearly be an asset. Mark Jones, Director, Victoria and Albert Museum, UK, sees a great advantage in that the web allows the general public to get in contact with the institutional experts. "One of the traditional functions of museums (...) is to provide expertise about the objects in their collections. The ability to interact with curators online is going to improve this aspect dramatically." Yet, instead of contacting the curator directly by email, Jones thinks more about capturing online opinion sessions with the curator, where people can eavesdrop and have their own questions answered. Such sessions would be the basis to build and provide FAQs dealing with many of the general inquiries in an efficient way by producing interactive answers that can engage users. Jones argues that in the future, this might be a service that could be delivered over Digital TV.

Another great potential is seen in taking advantage of interactivity for building communities of interest. Besides simply using the web to announce exhibitions, Mark Jones, thinks that the general public should be involved in building exhibitions: "When we develop an exhibition, we advertise it on the web site. Yet, that is not the way we should be doing things. We should create the exhibition in a developing form on the web site as we work on it and create a community around it through the Internet at the same time as we work on it in the museum. (...) It is about creating global virtual communities who relate to what we do. Or, for example, the Wedgwood collectors can discuss their passion amongst themselves and with our curatorial staff on the Internet." (DigiCULT Interview, August 9–10, 2001)

According to David Bearman, AMICO, USA, offering a high degree of interactivity will become a competitive factor within the cultural heritage community. "In the future, we will expect that you can manipulate digital images in many ways, turn them around, look at the bottom, etc. Those that you cannot, will be perceived as second rate. (...) Moreover, the museums they come from will be perceived as second rate." (DigiCULT Interview, August 8, 2001)

What we can expect is an increasing user demand for more and higher levels of interactivity, which highlights the need for tools and systems that allow users:

- to control how content is presented,
- to regulate what kind of content is presented and stored for future use, and finally,
- to create content themselves.

Content presentation: new tools for innovative, interactive environments

The future of presenting information will be highly interactive, immersive environments that allow users to manipulate and control the presented resources, and handle information objects in unprecedented ways. On the one hand, these will be virtual, 3D environments that will enable users to manipulate and navigate between objects, and, on the other hand, there will be augmented realities that present information as a mixture of the virtual and the real world.

While 3D simulation over the web and three-dimensional environments on site are already reality, augmented realities are still highly experimental.

Adding another dimension: 3D

Technology today is sophisticated enough that we can expect to see more 3D environments in the near future, be it over the web or as truly interactive, immersive environments on site. However, it will still be a while until true 3D will be possible over

web. Today's desktop computers are enough powerful and network bandwidths sufficient to successfully render 3D simulations over the Internet. The trick is, to provide multiple 2D views that are stitched together to simulate a 3D experience. Users can manipulate these simulated 3D objects, can rotate 360° and tilt them by 90°. These simulated environments can be created at a fraction of time and cost than real 3D. In addition, as only images are transmitted, the requirement for bandwidth can be considerable reduced, as explained in the enclosed case study.

The disadvantage of this technique in comparison to real 3D rendering is the limited navigational possibilities and the fact that the physical form and dimensions of an object cannot be captured in enough for certain purpose. Real 3D presentation demands an accurate geometric model of an object in 3 dimensions, plus additional information on the texture and colour of the various surfaces.

At present, there are two techniques for the creation of 3D models. First, building models from scratch using particular software, or using a 3D scanner to scan the geometry of an object using laser range-finding technology and texture mapping. This model is then further worked on to create a 3D effect by adding light and viewpoints to the 2 dimensional model before it can be rendered; this step is called ray tracing. "Ray tracing is a computationally intensive process in which the path of every single ray of light is traced from the light source(s) as it reflects off or refracts through each of the surfaces in the model until it eventually reaches the viewpoint or camera." (Gill, 2001) The more viewpoints are added, the more realistic the 3D object or environment, but the longer also the rendering time. To create a single image can sometimes take days, at exploding costs. That is why very complex scenes with a high level of realism that is almost indistinguishable from reality such as in movie special effects are extremely expensive. In addition, objects can be programmed with particular behaviours that allows users to interact with them, rotate them, tilt them and navigate around.

With regard to the cultural heritage sector, Gill identifies especially the following areas where 3D can be especially useful:

– *3D in archaeology:* Archaeologist rely heavily on spatial information for reconstructing ancient sites. However, as layers and layers of sediments are removed during excavations the details of a location get lost and the site is actually destroyed. In this case, 3D in combination with geographical information systems helps to capture as much spatial information as possible. Hence, it comes as no surprise that archaeology was one of the first disciplines to embrace 3D technology.

– *Constructing complex virtual worlds:* Reconstructing worlds that are not easily accessible or that did not exist at all is another area for 3D use in culture. Reconstructing the objects and their context allows to prove/disprove hypotheses and theories about those environments.

– *Online exhibitions in 3 dimensions.*

– *Virtual repatriation:* Objects that are dispersed all over the world return to their original settings and cultures in virtual form.

Simulated 3D on the web

Online exhibitions in 3 dimensions: The Philadelphia Museum, Constantin Brancusi's
    Mademoiselle Pogany <http://www.narrativerooms.com/pogany/vr/index_a.html>
Reconstructing worlds: The Museum of Reconstructions
    <http://www.reconstructions.org/frames.html>
Creating new worlds: The Virtual Museum of Art El Pais
    <http://www3.diarioelpais.com/muva2/

3D technologies and standards

Today, we see a range of standards emerging that support 3D development. The most
important standards are listed below:

Web3D	Family of related standards and technologies approved by W3C-Consortium	True interactive 3D over the web
VRML 97	Latest release of the Virtual Reality Mo-delling Language; ISO/IEC open standard	True interactive 3D, but demands browser plug-ins
Java 3D	Collection of classes that define a high-level application-programming interface for interactive 3D development within Java	
MPEG-4	ISO/IEC approved standard that defines how digital audio and video media can be encoded, compressed, streamed for efficient delivery over networks, and reassembled for presentation	Interactive scenes in 2 and 3 dimensions
X3D – Extensible 3D	Standards development initiative to capture the best capabilities of VRML 97 and allow them to be expressed in XML	Lightweight version of VRML 97
QuickTime VR	Not a 3D image file format, but uses an interactive set of compressed 2D still images that are stitched together with a special authoring tool to simulate 3D effect	More widely used today; simulated 3D

In the near future, we will see more and more 3D experiences of cultural heritage on the
web and on site. For Tony Gill, Programme Officer at the Research Libraries Group, USA,
users and technology are ready for an explosion of 3D: "Most industry pundits agree that
the Web 3D revolution is now long overdue. Typical desktop computers are now sufficiently
powerful to render reasonably detailed 3D models in real time, network bandwidth is
improving all the time, users are increasingly sophisticated and demanding, and there is a
growing standards framework that will support collaborative development. All that is needed
now is the killer app – the application that transforms it from an esoteric gimmick into an
indispensable business tool. Perhaps the presentation of cultural information on the web is
that killer app." (Gill, 2001)

A glimpse in the more distant future: Augmented Reality (AR)

Another glimpse into the toolbox of the future is augmented reality which is a marriage
between virtual reality and reality. At the heart of this presentation technology is a pair of
eyeglasses, the AR headset. Developed by Hughes Research Laboratories in the mid-90s,
the headset works with a visual-data display similar to those projected into the helmets of

jet fighter pilots and supplements the wearer's view of the real world with a virtual data overlay.

The AR headset uses tiny displays embedded in its glass lenses. Images are sent from a handheld computer, for example a PALM pilot, via a radio frequency or short-range wireless networking devices such as Bluetooth. The AR system also includes a GPS chip so that the headset knows where it is, and a gyroscope to identify the direction the wearer is looking. The technology as developed originally that did not work very well in sunlight and consumed a lot of power, but it has been further improved since than. Researchers at the University of Washington developed a so-called retinal scanning display (RSD) that uses a laser to write an image on the retina at the back of the eye. The image is sharp, shows up in bright sunlight, and needs significantly less power than projecting text onto an external lens.

One potential application that is currently developed and also of interest to cultural heritage institutions are so-called guidebook glasses. They allow the wearer to receive localised information that is displayed as data overlay on the glasses and supplement his/her view of visual field with a data layer.

In the future, this technology could replace current audio guides in museums, although it will definitely need some acclimatising on the part of the visitor.

User-focused content management: new tools for personalisation and customisation

Traditionally, acting as intermediaries and helping users to discover resources or make recommendations has been a core task of librarians, archivists and to a lesser extent, to museum curators. Now, "personalisation offers a technology that empowers users to become more participative in this process; it can be employed by the intermediaries (i.e. librarians, curators, archivists) as an assistive tool in the selection and filtering of information to provide the user with what they need most." (Bonett, 2001)

Personalisation services can help users of cultural heritage resources to:

– collect and group favourite or most used resources and store them for future use ("link baskets", "my resources", etc.),
– customise the content on the page, by selecting general preferences (particular subjects, resource locations, etc.),
– be informed about changes on the web site (news alerts),
– customise the interface according to personal preferences,
– have direct access to the intermediaries,
– receive notifications on their favourite subjects and areas of interest from cultural heritage institutions (i.e. list of recently acquired books, planned exhibitions or lectures, etc.),
– join mailing lists in one's areas of interest.

The idea behind personalisation and customisation systems is to employ technology to get a more complete picture of the users preferences, desires and needs. This allows identifying customer segments that can then be served with content that fits their particular needs. *Customisation* usually means providing a finite set of choices that can be selected from customisation templates. This requires active participation of the user. Here the user is actively in control which kind of content will be presented. *Personalisation*, on the other hand, is more technology and behaviour driven, and involves predicting the needs of a user based on analysis of previous actions or by making recommendations based on what like-minded people enjoyed.

Current personalisation and customisation systems are based on the following technologies:

Technology	Description	Advantage	Disadvantage
Fill-in profile (customisation)	User interests are acquired by customers filling out online forms where they can set personal preferences with regard to content delivered and the layout, i.e. the look and feel of the site.	Most accurate personal profile; information is available up front	Time consuming; users therefore need good moti-vation; profile remains static
Click-stream analysis / web usage mining systems (personalisation)	Automatically tracks the movement of users as they navigate through the site. Track record is used to characterise user groups and segment users as part of group profiling. Information gathered includes: time spent on page, conse-quences of clicking link, sequence of links, etc.	Users do not spend time to create profile	Profile builds over time; privacy issues as users are not aware that information is collected
Collaborative filtering (personalisation)	Allows to make suggestions or recommendations of like-minded people, to help individual users to discover resources. Based on the assumption that users have similar preferences and will value what others have enjoyed. Two techniques: a) a user's preferences are inferred from previous actions; b) users themselves rate products. Recommender systems work on bases of this kind of collaborative social filtering.	System delivers rapid feedback without the necessity to build up a user's profile before	Needs a large enough sample to deliver good results. Most effective with large, heterogeneous audiences
Cookies (personalisation)	Small data packets that are sent by a web site and stored on the browser side. Cookies function as browser Ids and can be traced within and across sessions. User data is stored in cookies and can be recalled as soon as the user visits particular sites more frequently.	No intrusion on part of the user	Privacy issue Users can disable cookies

Most personalisation systems in use today work with a combination of the above-mentioned technologies to allow customisation as well as personalisation.

Implementation of personalisation systems in cultural heritage institutions

Implementing personalisation systems needs three components: structured content, segmented target groups, and a set of rules that matches users groups with structured content.

Personalisation: matching user interests with structured content

Source: Salzburg Research, 2001
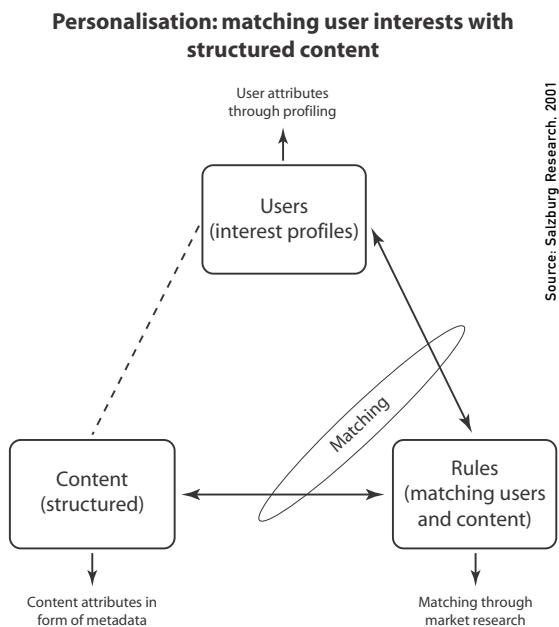
What is already in place in cultural heritage institutions is highly structured content in form of metadata and in some cases, a very precise understanding of who the customers are. However, what is missing are the rules that allow to match users and content as well as the vocabularies or attributes to describe user segments in detail. At present, these vocabularies are less developed or not available in cultural heritage institutions. They are also not reflected in the metadata that is currently collected to describe content. In addition, to allow cross-sector searches, the use of controlled vocabulary would be necessary, as pointed out earlier in this chapter.

Personalised services in cultural heritage

BROWSER

SchoolNet <http://www.ercim.org/scholnet/>: How can the dissemination of information be personalised by alerting users in correspondence to their profiles? This was the focus of the SchoolNet-project that was funded within the IST Programme of the European Union. *My Library* <http://my.lib.ncsu.edu>: My library is a user-centred front end to the NCSU libraries collection of Internet and information resources. It provides a customisable interface to several types of information, including full-text databases, data sets, bibliographic databases, electronic text, and direct access to librarians. *Headline* <http://www.headline.ac.uk>: The project create the Headline Personal Information Environment (PIE) to provide tailored responsive service to its users.

In addition, there are some issues that cultural heritage institutions should reflect on before establishing personalisation services.

First, there is usability. Personalisation should not be an excuse for bad design, and the focus should be on setting up a useful and usable service that allows users to intelligently navigate and discover resources themselves. The second issue is related to privacy. As personalisation means collecting personal information of users, there is a threat of interfering with the user's privacy. Therefore, with regard to the active collection with data as through fill in forms, users need to explicitly part with the information they provide. In cases where information is gathered passively, without users being aware of it, there should be a policy in place, informing users what information is collected and how it is used (privacy statement, information disclosure). Thirdly, before setting up a personalisation service, cultural heritage institutions need to define of how they measure "success". Success could be many things. On commercial sites, it could be increase in sales or conversion of "lookers" into buyers. For cultural heritage institutions it could be frequency of use or returns to site.

So, what's in there for cultural heritage institutions? A lot, as maintained by recent user studies carried out by the Canadian Cultural Heritage Information Network CHIN. According to Lyn Eliot-Sherwood, Director-General of CHIN, Canada, as exploding information quantities make it increasingly harder for customers to locate what they want, in the future they will increasingly rely on a limited number of trusted sources. Users will stay within their portal of interest at the expense of free surfing on the Internet. Personalisation offers one way for cultural heritage institutions to create and maintain a loyal audience who likes to return to *their* site.

Users creating content: new authoring tools for non-technical users

"The promise of the web was that everyone could publish, that a thousand voices could flourish, communicate, and connect. The truth was that only those people who knew how to code a web page could make their voices heard. Blogger, Pitas and all the rest have given people with little or no knowledge of HTML the ability to publish on the web."
Rebecca Blood, 2000.

In the future, it will be increasingly important for cultural heritage institutions to get users actively involved by letting them create their own content as an integral part of connecting cultural heritage resources to people's live. The electronic publishing explosion on the web itself is the best indicator that users seem to have a sincere need to create content about themselves, their lives and their interests. On site, this could be achieved by providing the means that allow users to "take home" part of the exhibition in digital form for further use. Online, it implies providing the tools that enable users to create their own content, to contribute their expert knowledge, their personal "exhibition" or private link basket. In both cases, a requirement for making this happen are easy-to-use, non-technical tools that make publishing as simple as possible.

At present, those simple authoring tools that let users put together their own content are missing from most cultural heritage sites, although we see glimpses, like the Hypermuseum Theme Generator.

On the radar: The Hypermuseum Theme Generator

The HyperMuseum Theme Generator System (TGS) is part of the HyperMuseum system, a European virtual museum portal. Its function is to assist in the creation of so-called *personalised themes*. A personalised theme allows the end user to bring together a unique collection of multimedia objects from the HyperMuseum Server, and to create a personalised rendering of the perceived and/or recorded relationships between these objects, realised as a new multimedia document (web site, PowerPoint[®] presentation, hypertext or Word[®] document etc.). The TGS supports this creative expression both during the *discovery* phase, exploring the collection and discovering thematic relationships, as well as the *realisation* phase, the construction of the resulting documents. The primary target audience is non-expert users mainly from the secondary education community.

cf. Stuer, Meersman, Bruyne, STARLab VUB, 2001

Some of the authoring tools for easy content creation may be found on the Internet itself. As Pia Vigh, Manager of CultureNet Denmark, remarks: "It is important for us to know when our audience takes the role as content providers themselves: How do they do it and what do they find important?" (DigiCULT ERT, Edinburgh, July 24, 2001) This makes clear that cultural heritage institutions should be open to monitor the latest trends as they give many clues of how and what users want to communicate, and which channels they use.

One of the most recent developments on the web are weblogs. Vigh observes a wavelike development on the Internet, where first, individual web sites have developed into larger communities and portals, which is now followed by a kind of opposite development, with more and more personal web sites appearing. "Now we are seeing the opposite trend again, i.e. weblogs. People's personal weblogs are the strongest and fastest growing feature on the Internet right now. To me that is a clear signal that communities of even cultural contents as well as personal weblogs is something we should monitor and something we should learn from when we are building our own big and complex portals. (...) I think that we should pay close attention to what our users are doing on the Internet, not just how they are using it to seek out information but also when they publish information themselves." (DigiCULT ERT, Edinburgh, July 24, 2001)

Weblogs help users to instantly publish on the web, without writing any code or worrying about installing any server software. Weblogs are web pages that contain short, frequently updated posts that are arranged chronologically. The content and purpose of weblogs varies greatly, from links and commentary about other web sites, to news about companies, persons or ideas, to diaries, photos, poetry, project updates, even fiction. Weblogs also allow people to work collaboratively, as they can contribute to one weblog, share information, support communication among groups, or within an intranet, share resources and posts with team members.

Using weblog tools like Blogger or Metafilter, users can automate the publishing process through templates. Current weblog tools provide only little space in which to write an entry, which forces authors to be extremely concise in producing this sort of micro–content. Weblog users can update their site automatically, by simply adding content to the existing page instead of uploading the newest version of ones page. The results show up immediately, in the design the user has chosen. Contrary to normal web pages, weblogs are updated frequently, sometimes daily.

Today, weblog technology is picked up by industry such as the London Newspaper "The Guardian" to publish regular columns and commentaries.

Weblog tools

Blogger <http://www.blogger.com>: Blogger offers a web-interface that is accessible from any browser. It consists of an empty form box into which users can type their entries. With a single mouse click, the weblog is posted to the writer's web site and is archived in the proper place. The result are journal-style entries.

Metafilter <http://www.metafilter.com/>: Metafilter is an example of a community weblog that offers three form boxes: one to enter the URL of the referenced site, one for the title of the entry, and another one to write ones commentary.

Pitas <http://www.pitas.com >

However, the need for non-technical tools also exists within institutions themselves. There is a high demand for templates or tools for presenting knowledge in innovative ways or tools that enhance the capabilities of institutions to produce material for diverse channels and end user devices. This demand should not be overlooked.

Introducing machine intelligence

Most basically, machine intelligence refers to the ability of computers to perform seemingly intelligent knowledge-based tasks and/or "learn" certain behaviours. Intelligent technology is able to "learn" the user's preferences and patterns of thought to more effectively help users find things. As Mark Jones, Victoria and Albert Museum, UK, notes: "We are starting to see this beginning to work on better sites on the web already. You get the sense that your pattern of activities has been noted and your are getting better service than you would from, say, a shop assistant who does not know you." (DigiCULT Interview, August 9-10, 2001)

Collins (1988) distinguishes the following elements of computer intelligence:

– *Representation:* Refers to the ability to map human knowledge structures into models; those models for knowledge representation or ontologies are the basis for intelligent querying, whereas a the query gives a selective view on the knowledge model.

– *Categorisation:* The computer performs "intelligent" tasks on the basis of comparison, through similarity and analogy. Categorisation is used in recommender systems or filtering systems.

– *Learning:* How does a human being learn and how can this process be simulated by a machine?

– *Thinking:* There are three elements of machine thinking: reasoning, problem solving and planning:
  – reasoning uses facts and rules about facts to intelligently perform tasks; during so-called inferencing, rules are applied to facts to deduce new facts,
  – problem solving works differently as it starts with a pre-given objective and applies reasoning to reach this particular objective,
  – planning means to provide the system with the possibility to take intermediary steps and reach a goal through immediate goals; thus, the machine can solve more complex problems more efficiently, as complex tasks are split up in sub-tasks with immediate goals that can be achieved individually. The system is able to combine different immediate goals to reach the overall goal more efficiently.

– *Perception:* Vision and imagery.

– *Collaborative behaviour:* System can exchange information and behaviour with other systems in an adaptive way. Agent needs a model of itself and a model of the outside world. To communicate with the outside world the agent needs an own language, an agent communication language and an agent communication protocol.

Introducing intelligence to the Net: the semantic web

The current problem with web content is that it is designed for humans to read but not for machines to automatically process the semantics. The concept of the semantic web aims at making web content machine-readable, which is a basic requirement for automated services. "The Semantic Web will bring structure to the meaningful content of Web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users." (Berners-Lee, Hendler, Lassila, 2001)

Today's Internet relies on traditional knowledge models that are based on centralised models where everybody shares the same understanding of words and their meaning. They represent closed systems, where users can ask only a limited set of questions for the computer to answer reliably. In addition, traditional knowledge systems rely on rules that determine inference, yet those rules only apply within this closed system and cannot be transferred to other systems.

The semantic web, in contrast, tries to make knowledge systems more versatile by opening up the closed structures. This happens, however, at the expense that some questions and paradoxes remain unanswered. Hence, as Tim Berners-Lee explains, the challenges of building the semantic web are twofold:

- first, to provide a language that expresses both data and rules for reasoning, and
- second, to create rules that can be exported to other systems.

"Adding logic to the web – the means to use rules to make inferences, choose courses of action and answer questions – is the task before the semantic web community in the moment." (Berners-Lee, Hendler, Lassila, 2001)

At the heart of the semantic web are personal agents, i.e. software programmes that will allow their users to automatically collect content from diverse resources on the web, process this information and exchange the results with other programmes. A typical process will involve the creation of a "value chain" where content from different resources will be assembled in single steps, with each step adding value to the final "information product" that answers the user's request. In the future, the effectiveness of these personal agents will increase tremendously as new machine-readable web content and automated services become available.

Semantic web applications in cultural heritage

In the cultural heritage domain, one example of a semantic web application could be an agent system/avatar system to exchange information on cultural heritage events. For example, knowing that I need to go on a business trip to Berlin, my personal agent that knows my preference for modern art, would automatically contact a cultural service provider to obtain information about modern art events and exhibitions in Berlin during the time of my stay. The agent would report back the event dates and opening hours and after my confirmation, automatically book tickets. The scenario could be developed further, involving paying the tickets, sending them to the hotel where I am staying during my trip, etc.

However, for such systems to work and be accepted by users, a secure and protected data exchange is of utmost importance. This means that all the personal information remains with one's personal agent, while the service providers that facilitate the information exchange do not have access to any of this personal data. Based on open standards, the personal agent should also work independently of any user device and be "portable", meaning that it could "travel" between different end user tools, be it a personal

communicator, a mobile phone or any other innovative communication device to appear in the future.

In the moment, such highly sophisticated systems are not yet available, but will become a reality within the next ten years.

Putting it all together: smart integration

Immersive, interactive environments, personalisation and customisation tools, intelligent recommender systems, new forms of navigation support and intelligent guides as well as non-technical authoring tools and distributed hypertext systems for collaborative work are only a selection of tools that cultural heritage institutions will need at their disposal in the future. In addition, there will be a range of other systems that are currently used and further developed in other industry sectors, that will support memory institutions to deliver the kind of tailor-made and highly interactive services that allow them to fully unlock the value of their resources. Among the supportive systems are, for example, payment and rights management systems as well as access management systems. The next section provides a short overview on these supportive systems, and highlight the issues of relevance to cultural heritage.

Access management systems

In networked environments where sharing and licensing access to information resources becomes prevalent, managing authentication and access is a major issue. Access management systems are needed to manage:

– licensing agreements for networked information,
– shared limited access resources with other institutions, and finally,
– resource sharing collaborations.

Access management systems help to find out if users who seek access to resources are actually members of the user community that are part of the license agreement. The system tests and verifies whether individuals are eligible for access to particular resources, according to a licence agreement.

Access management involves two procedures, which are mostly carried out by the same system, but that can also be separated. Those procedures are:

– *Authorisation:* The process of determining whether an identified user is permitted to perform some action, i.e. accessing a resource;
– *Authentication:* Network users establish an identity and receive a "name" which identifies them uniquely. The most common technologies to give users an identity is through:
  – secrets: users receive a PIN or a username and password,
  – tokens: users are identified uniquely through smart cards or certificates,
  – biometrics: users are identified on the basis of some natural characteristics, i.e. fingerprints or voice recognition.

When choosing access management solutions, memory institutions should carefully investigate the following issues:

– *Feasibility and deployability:* Is the solution practical and does it work on the shop floor? Is it scalable and can it be adjusted to a large and fluctuating number of users?
– How much *maintenance* does the system need?

- *Authentication strength:* Is the solution reasonably secure? Can user information and credentials be protected?
- *Granularity and extensibility:* How fine-grained can access control be? Can the access of individuals be controlled separately?
- *Cross-protocol flexibility:* To enable cross-sectoral access, do the application protocols of the systems support a wide range?
- *Privacy considerations:* Can the privacy of users be protected sufficiently? How much user data can be collected, despite the need to protect his/her privacy?
- *Accountability:* Closely related to the privacy issue, can users be held accountable for copyright infringements or inappropriate use of material? Here, accountability is often in conflict with privacy, as one needs to know the identity of the user to hold him/her accountable.
- *Ability to collect management data:* Cultural heritage institutions have a need to collect data about their users to legitimate the expense for acquiring licenses for electronic resources. Again, institutions need to find a balance here between protecting the privacy of one's users on the one side, and aggregating important information about usage of resources.

At present, there are three technologies in use to manage and control access to resources: proxies, IP source address filtering and credential-based approaches to access management. While proxies and IP source address filtering are mostly used to control access on site, i.e. for fixed location, institutionally managed public terminals, credential-based access management (PINs, passwords and other credentials) is the most common approach to control web-based access. Each of the systems has different advantages and disadvantages with regards to the issues discussed above, which are discussed in full detail in a recent paper by Clifford Lynch (1998). The problem with all those technologies is how to manage cross-sectoral, cross-organi-sational access to information resources, and the central challenge consists in lowering the barriers for users. At present, if users are eligible to access information resources at various sites, they are also issued different passwords and usernames they need to manage and keep track of. To avoid that hassle, a central access management authority would be needed which, at the one side, would make cross-institutional access much easier, yet, on the other side, also multiplies issues of data protection and security as a central organisation would be much more vulnerable against hacker attacks.

Nevertheless, despite those security concerns, central access management organisations that take care of distributed user administration are slowly emerging in the cultural heritage sector. One of these services is Athens in the UK.

Athens Access Management System

ON THE RADAR

Athens centrally authenticates and authorises users for access to online services, especially to the UK educational services and the NHS. Users receive a single username and password to enter several online resource services. Currently, Athens handles over one million users. Content providers can manage users remotely, over the web, open accounts for new users, or delete existing accounts if users stop the service. Athens also issues statistics to the content providers who want to collect management data of their audience.

<http://www.athens.ac.uk>

Access management further readings

Glenn, Ariel, Millman, David (1998): Access Management of Web-based Services. In: D-Lib Magazine, September 1998.

    <http://www.dlib.org/dlib/september98/millman/09millman.html>

Arms, William Y. (1998): Implementing Policies for Access Management. In: D-Lib Magazine, February 1998. <http://www.dlib.org/dlib/february98/02arms.html>

Lynch, Clifford (1998): A White Paper on Authentication and Access Management Issues in Cross-organisational Use of Networked Information Resources.

    <http://www.cni.org/projects/authentication/authentication-wp.html>

M-Tech Mercury Information Technology, Inc. (2000): Password Management Best Practice. <http://www.psynch/documents/bestpractice/bp2.tex>

BROWSER

Electronic Copyright Management Systems (ECMS)

Electronic copyright management systems are basically databases that contain information about content (discrete works, manifestations of works, products, etc.), about the author/creator and current rights holder. This information is needed to support the process of authorising the use of those works to others and to track a repository of works (blanket licences or umbrella licenses that cover entire repertories) as well as to track each right holder's rights and works (transaction licenses which cover only a specific use).

At the most basic level, an electronic copyright management system consists of 2 modules, the *information databases*, for the identification of content, plus a *licensing or rights transaction tool*. However, the system may be supplemented with additional systems, such as payment systems to enable the immediate transaction, or access management systems.

Fully automated rights management

Most electronic copyright management systems in use today, are not yet fully automated. In most cases, the information databases are fully functional, yet the licensing procedures are in fact by and large done manually. Although email has replaced letters and faxes, the license requests are still traded by hand. As Daniel Gervais describes it: "A fully automated licensing function that includes searchable online catalogues of prices, available content, and authorised uses, along with a 'lights-out' licensing function (available 24 hours a day seven days a week) is still quite rare, but is coming." (Gervais, 1998)

In fully automated systems for managing transactional licenses, users would search available content and rights online, submit a license request electronically, and receive a response from the electronic copyright management system without any human intervention. Ideally, the user would also be able to immediately receive the content, and pay for the license. What's missing to realise such a system today, are global identification standards to share works, rights and information relating thereto with another electronic copyright management system.

To be able to track resources through the digital networks, each work, manifestation as well as the rights holder must be identified uniquely in order to secure authorisations from the right person, assign permissions and then send payments to the rights holder. At present there are several competing standards for various types of materials under consideration and in use, including the International Standard Work Code International Standard Recording Code, ISBN/ISSN, Barcodes, Publisher Item Identifier, Book Item and Component Identifier, and Digital Object Identifier for electronic material (the issue of uniquely identifying digital objects has already been discussed at a different place in this chapter).

Yet, this situation makes full automation of copyright management very difficult.

As Daniel Gervais notes: "Until and unless a single global identification system can be agreed upon, electronic copyright management systems must be able to function in a multi-code environment. And that means that information about information – metadata – must be made available in a usable format." (Gervais, 1998) While there are coherent metadata standards in single cultural heritage sectors, the situation is less clear in other sectors. This brings us back to the initial discussion about the need to develop coherent metadata standards as a requirement to uniquely identify digital resources in electronic networks.

Security technologies for rights management

In addition, a fully automated ECMS also needs to include mechanisms that allow to track copyright infringements and unauthorised use. There are currently two technologies of relevance to digital information resource services: encryption and digital watermarking.

– *Encryption:* Encryption provides security against unauthorised access or reading. Most simply, it can be described as converting legible content into content that cannot be understood. The encrypted content is sent to the customer who requested it. The customer holds an encryption key that allows him/her to decode the content back into intelligible form. Encryption technologies include secret key (i.e. Data Encryption Standard) and public key algorithms, which are currently used by many systems involving the transfer of high value data. Although popular, encryption systems do not solve the problem of unauthorised use. Tracking unauthorised use today is mostly done with watermarking technology.

– *Watermarking:* Before sending out, a digital watermark is attached to the digital object, either visibly or invisibly, to point to information possession in two ways: first, to identify whom the material/content originates; and second, identifying the recipient of the material has been distributed. This second form of recipient watermark is most commonly used today, as it allows better control of the redistribution of material. The goal of visible identification is mainly to avoid the dissemination or unauthorised use of the material *a priori*. By contrast, applying an invisible watermark serves the purpose of searching the web to locate distributed or uses materials without proper authorisation *post priori*.

Both techniques are used today, yet as expert in the DigiCULT study remarked, are not yet totally safe against manipulation.

However, the technology alone does not make a fully automated electronic rights management system. The protection of rights management information requires a synergy between technology and law, and hence, a fully automated ECMS would also need to address the following legal issues:

– Ownership: Who owns the rights? This may be straightforward with individual works, but is not such an easy question to answer with respect to genres such as films or plays.

– Which rights are involved? There are a number of different rights that apply in different parts of the world. It involves moral rights (right of paternity or , right to oppose to mutilation) and economic rights (reproduction right, right of communication to the public, right of adaptation).

– What rights are conveyed? Addresses the above mentioned rights.

– Which country's laws take precedence? There exist different copyright laws in different territories; therefore, it needs to be clarified which law applies in case of copyright infringements.

Rights management in cultural heritage institutions

Given the complexity of the issues involved with transactional licenses, many of the cultural heritage institutions that have to deal with rights management have gone a different path. Instead of handling single licenses for individual works, they have successfully negotiated user agreements with content providers for certain kinds of usages. Users are then paying subscription fees to pay for the service. Two examples of cultural heritage institutions that work with a user agreement-subscription model for educational cultural resources are AMICO and SCRAN. The difficulty is negotiating adequate user agreements that sufficiently protect the rights of the content owners by laying out strict rules on how and by whom the content can be used. Yet, to Don Waters, Programme Officer at Mellon Foundation, USA, none of the technologies available today can replace the need for user agreements to protect the rights holder's rights. "The fundamental protection that has to be provided is in user agreements and legal enforcement. A watermark is a tool, but not a substitute for that kind of enforcement." (DigiCULT Interview, June 5, 2001)

Thus, Waters thinks the right way to go is setting up "protected environments" which guarantee rights holders that their rights will be maintained: "In all our granting agreements we set up that the Foundation will have the right to aggregate the material and distribute it for educational purposes and that we will create a protected environment in the Internet so that we can assure the owners of a property that it is only being used for educational purposes. (…) The whole notion of a protective environment is one that has to be aimed at particular sets of users for certain purposes. That environment may not be available for free, although it may appear to be free to the end user." (DigiCULT Interview, June 5, 2001)

Browser: Electronic rights management – further reading

Gervais, Daniel J. (1998): Electronic Rights Management and Digital Identifier Systems.
   In: Journal of Electronic Publishing, University of Michigan Press.
   <http://www.press.umich.edu/jep/04-03/gervais.html>
Iannella, Renato (2001): Digital Rights Management (DRM) Architectures. In: D–Lib
   Magazine, No. 6, Vol. 7, June 2001.
   <http://www.dlib.org/dlib/june01/iannella/06iannella.html>
Erickson, John S. (2001): Information Objects and Rights Management, In: D–Lib
   Magazine, No. 4, Vol. 7, April 2001.
   <http://www.dlib.org/dlib/april01/erickson/04erickson.html>

Payment systems

Although the opinion that content on the Internet is free still prevails among users, it will be clear that in the near future premium, high quality content will bear a charge. This will also be true for high-quality cultural heritage content and services. To be able to charge for content, however, a reliable and secure payment system needs to be in place that enables users to pay content by the piece.

For payment systems to be reliable, the following criteria need to apply (Isaias, 1999):
   – security and integrity: the system must offer security measures to guarantee the safety of transactions and to prevent that data is illegally modified,
   – robustness: the system must be reliable under any circumstances and guarantee that a transaction has occurred,
   – economic viability: the transaction costs and the economic value of the "product" transferred should be compatible,

> – scalability: the system should be able to grow without significant lack of performance,
> – interoperability: the system must make it possible to exchange payment means between different systems,
> – audit-ability: audits must be possible to look for individual records of operations and detect possible errors,
> – anonymous transactions: the system should support anonymous transactions, i.e. the buyers and sellers identity remains unknown.

There are two broad categories of payment systems in use today, that build on different models to fulfil the above-mentioned criteria: token-based systems and notational-based systems. Token-based or cash-like systems use tokens instead of money. The tokens have a certain value assigned to them and must be bought from a central authority before they are ready to use.

Token-based system - how it works

1. Bank: exchanges real money into e-money and applies a digital signature for the verification process.
2. E-currency: is transferred to the client in form of an electronic wallet card or a software client.
3. Client can spend electronic money with suppliers.
4. Suppliers: exchange e-money against real money at pre-defined banks.

Advantages:
- anyone could sell and buy,
- algorithms against copying of monetary units and overspending as well as fraud records,
- information on usage/statistics are available.

Notational-based or credit/debit systems, on the other hand, make use of an account and a central authority keeps a record of this account. Consumers exchange documents that are equivalent to the value transfer, debiting the consumer's account and crediting the seller's account.

Notational-based systems – how it works

1. Client sends credit card data, seller ID and selected products to the server (encrypted with a public key and also a symmetric key)
2. Server executes the operation with a financial institute
3. Server transmits to the seller the client ID, products he wishes to buy, number of transaction and symmetric key (encrypted information)
4. Seller encrypts information with symmetric key and sends it to the client

Advantages:
- cryptography guarantees security and privacy to the client.

The following table gives an overview of some of the more commonly used electronic payment systems:

Token-based systems	Description	Model
NetCash	NetCash, as all token systems, is real electronic money. Distributed system of currency servers. The Net Cash coin carries the name of the issuing server and a specific serial number. The system allows to exchange e-currency for digital checks; here, NetCash is embedded into a digital check.	Direct cash-like payment model with online validation
MilliCent	A Japanese system and strong alternative to Netcash. The system supports micropayments (1/10th of a dollar), and therefore would allow consumers to buy content by the piece. The value unit is "Scrip", which – unlike real e-cash – functions like a pre-paid coupon that can only be used with specific vendors. The system relies on brokers who exchange Scrips from one particular vendor against Scrips from other vendors. Customers can buy Scrips using a credit card.	Direct cash-like payment model with semi-online validation
CyberCash	Charges the client's credit card; allows transactions with immediate payment between seller/consumers through a financial institution. Transactions are performed by credit card.	Secure credit card presentation notational payment model with online validation
InstaBuy	A spin-off of Cybercash that deals with small payments and micropayments.	Direct account-based notational payment model with online validation
NetBill	Developed at Carnegie Mellon University. System can handle micropayments and carries our authentication, verifies credits, controls access and records transactions. Works with open protocols. Is used with electronic goods only. Uses encryption and digital signature; low transaction costs.	Direct account-based notational payment model with online validation
SET – Secure Electronic Transaction	This standard was developed as a co-operation of the major credit card companies, including Visa and MasterCard, after none of the companies were successful in developing their own proprietary standard. It works slightly differently from the other notational systems. Although uptake of the standard was slow in the beginning, it is now more commonly used.	Secure credit card presentation notational payment model with online validation

In general, consumers are less willing to accept electronic payment over the Internet than expected. There may be several reasons for this, including a lack of awareness and/or trust into system security, and the fact, that there are several other payment systems as alternatives in place. Yet, using electronic payment on the Internet also means a change in social behaviour, a step that customers are not yet willing to take.

As micropayments on the Internet have not yet reached a critical mass, in the cultural heritage sector subscription seems to be the only business model that works right now. Instead of selling content piecemeal, those cultural services that sell access to digital culture online do it on a subscription basis. However, as trusted micropayments systems will become available in the near future, this may change.

Micropayments

"At the present moment the only way that charging can be done is on some sort of large scale basis. Micropayments frankly do not work, there are a lot of companies who have talked about it but their start-up costs have been such that either they have gone belly-up or they have had to charge a £5 minimum charge for 75 pence in order to recover their costs. And until such time as micropayments become feasible, really feasible and collectable, even in fractions of a penny or whatever, then this revenue stream is not going to happen.

When it does, it is going to represent as significant a change in many ways as the advent of the whole digitalisation venture, because it is going to put power and responsibility in the hands of the real consumers. But the banks cannot get there, because they cannot get the unit costs down and yet there is a group of people [the telecom companies] sitting out there, who have the mechanism in place, who have the money in place, who have the technology in place and are sitting watching.

And somebody, somewhere, is going to form a partnership or something with Vodafone or Orange or whoever, who are designed to capture micropayments, because what else is a one-minute phone call but another micropayment? And at that point all of a sudden there is going to be a complete empowering." (Colin Moss, CCConsultants, UK, DigiCULT ERT, Edinburgh, July 24, 2001)

Access management systems, rights management solution and payment systems are only a few of the newly emerging systems that will be needed to build the kind of tailor-made, customisable, highly interactive, cultural heritage resources of the future. However, the true achievement does not necessarily lie in the ability to understand all those systems in their technical detail, but to put them together and integrate them with existing collection management systems.

Smart integration

The true achievement with regard to future high-end cultural heritage service is with putting everything together in a smart way and adapt existing technologies for use in cultural heritage services. This demands an exhaustive understanding of not only the technology involved, but of user demands, business models, and project management to finally implement the service.

**Smart integration:
putting it all together**

Source: Salzburg Research, 2001
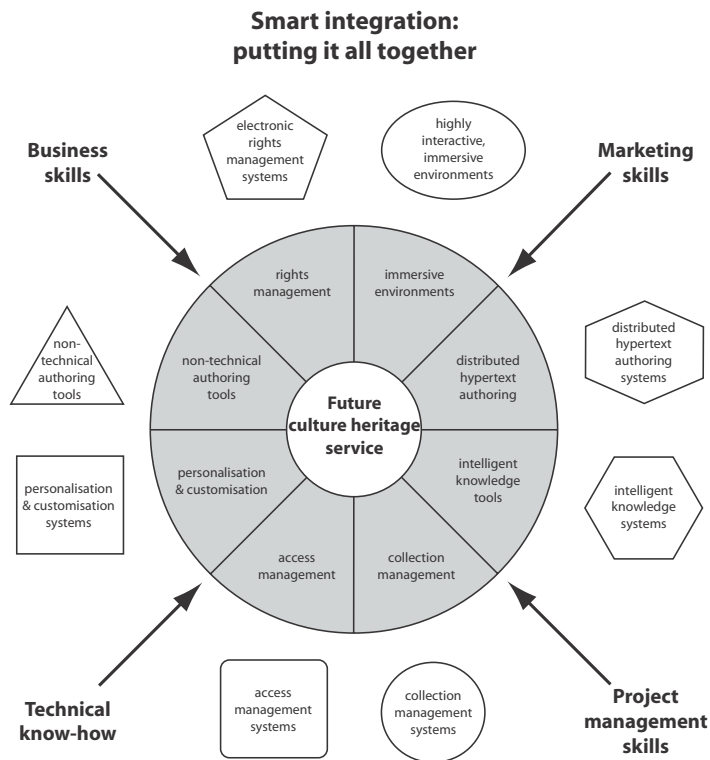
Unfortunately, this is not necessarily the skills set found within cultural heritage institutions. Therefore, it does not seem surprising that today such services are not offered by traditional cultural heritage institutions (with the exception of some very large institutions), but by new kinds of organisations that bring in the new skills and know-how. Players in this league are AMICO or SCRAN who act as competent partners for traditional cultural heritage institutions and put together services that respond to user demands. Other players we find at this level are spin-offs of projects originally initiated by traditional cultural heritage institutions, such as Museum Images Online in France or Picture Australia. They also act as proficient intermediaries between the traditional institution and the market, yet the organisations they grew out of, concentrate on their core business.

**Unlocking the value: core functions
of cultural heritage organisations**
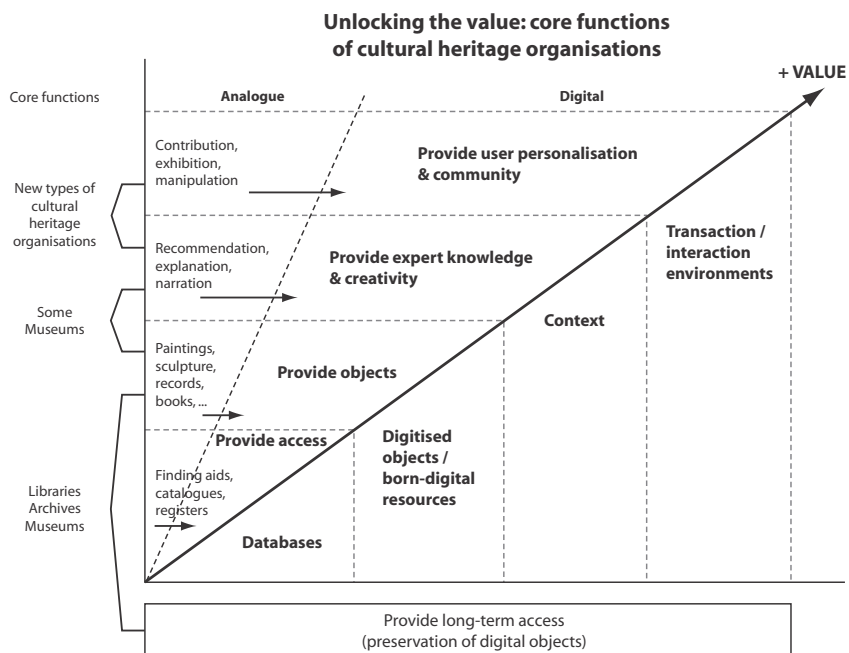
Source: Salzburg Research, 2001

With the exception of some very large memory institutions, it seems very unlikely that traditional cultural heritage institutions themselves will offer the kind of advanced, user–centred service we envision users of cultural heritage resources to demand in the future. This was also confirmed by the experts participating in the 2nd round of the DigiCULT online Delphi, by rating the tasks they think cultural heritage institutions will outsource in the future.

Outsourcing of tasks (n=52)
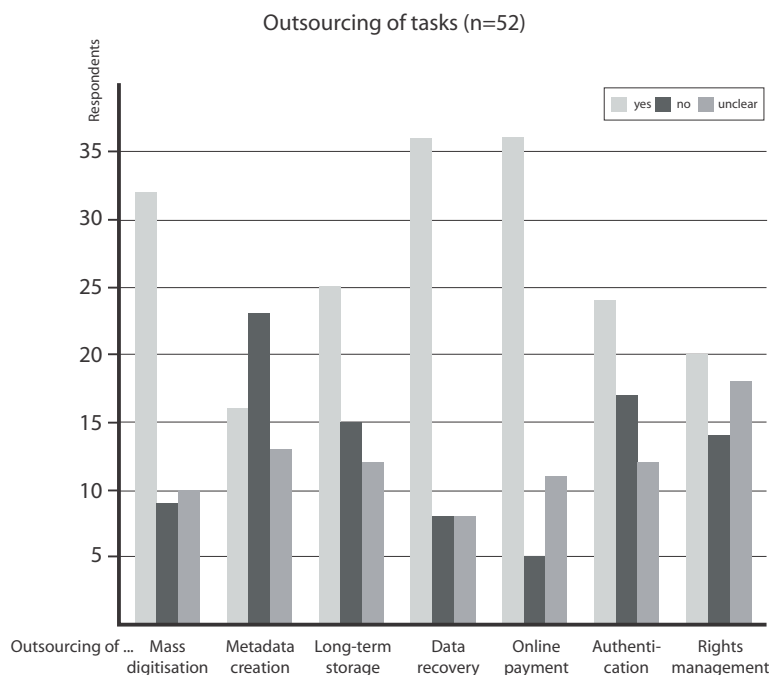
Source: Salzburg Research, 2001

Obviously, cultural heritage institutions increasingly regard outsourcing as an option. This holds true especially for tasks that require special expertise or equipment, such as data recovery, mass digitisation or long term preservation, but also tasks that would lead institutions too far away from their core business, such as authentication or online payment.

As it seems, traditional cultural heritage institutions do not consider themselves in providing those kinds of services. To do so, they would need to work intensively with intermediary institutions and enter into strategic partnerships with other organisations that are able and willing to provide the missing functions to build high-end cultural heritage services.

On the one hand, there should be strategic partnership with information technology companies as Andrea De Polo, Archivo Fratelli Alinari, Italy, suggested. (DigiCULT Interview, July 25, 2001) De Polo sees great potential in co-operation where IT companies would support traditional memory institutions by turning them into showcases for technology. The benefit would be mutual: While cultural heritage institutions could provide high-end services, technology partners would receive helpful feedback and assessment of their technology. On the other side, there is also great potential in strategic partnership that involves small institutions that could team up with larger organisations, intermediaries or regional service centres, which can provide dedicated staff, latest technology and consultancy services.

Bruno Brunelli, responsible for multimedia services at major Italian IT-service provider Finsiel, even is convinced that cultural heritage institutions should increasingly co-operate with commercial companies, as he sees a clear separation of roles. Memory institutions would provide their expertise, knowledge and scientific advice, as well as access to cultural heritage resources, while the commercial aspect should be left to private companies. For their effort, cultural heritage institutions should be reimbursed by private companies. In the near future, enhancing the commercial aspect of providing cultural services, part of the financial contribution should also come from private companies. (DigiCULT Interview, June 26, 2001)

Co-operating with intermediaries and private companies could also minimise the risk, especially for those institutions who are not big enough and do not have at their disposal the necessary resources to develop such highly interactive, user-centred environments. As a consequence, co-operation and collaboration with others seems to be the only viable solution for those cultural heritage institutions that strive to play in this league.

The DigiCULT navigator to new tools for cultural heritage

For memory institutions to reach broader audiences they need to move beyond resource discovery and offer services that also relate to people's lives. This means to use one's core competencies, i.e. the knowledge and expertise of curators, librarians and archivists on holdings and collections, to build knowledge-rich multimedia information resources that provide explanation and guidance as well as additional context. In addition, cultural heritage institutions need to provide the tools to enable users to create their own meaningful stories.

To generate those knowledge-rich, interactive multimedia services, memory institutions need tools and systems that are interworkable. These tools and systems should integrate people in collaboratively shared spaces that are both interactive, allowing a high degree of user involvement and control, and intelligent, systems that are able to "learn". Finally, easy to use tools and systems that respond to the needs of non-technical users.

Immersive interactive environments as one key area for museums, personalisation and customisation tools, intelligent recommender systems, new forms of navigation support and

intelligent guides as well as non-technical authoring tools and distributed hypertext systems for collaborative work, are only a selection of tools that cultural heritage institutions will need at their disposal in the future. In addition, there will be a range of other systems that are currently used and further developed in other industry sectors that will support memory institutions to deliver the kind of tailor-made and highly interactive services that allows them to fully unlock the value of their resources.

However, the true achievement does not necessarily lie in the ability to understand all those systems in their technical detail, but to put them together and integrate them with existing collection management systems. Due to the lack of technology skills but also of business and marketing know-how, cultural heritage institutions should seek co-operation with private companies, larger institutions or new types of cultural heritage institutions that provide the skills and know-how they lack.

63 **In the 6th Framework Programme for Research, Technological Development and Demonstration Activities, the European Commission should solicit proposals in the following areas:**

- high productivity tools for non-technical users, for example knowledge based authoring,
- interactivity through a wide range of human-machine interfaces (e.g. supporting a variety of user-system interaction models, user models, etc.), e.g. three-dimensional, highly immersive, interactive environments, augmented reality,
- collaborative tools supporting various modes: expert-to-expert, layman-to-expert, layman-to-layman, e.g. distributed hypertext systems for advanced content authoring and management,
- intelligent systems that support users at different levels, e.g. recommender systems, personalisation and customisation systems, knowledge-based intelligent agents, etc.

64 **To minimise the risk and gain access to knowledge and skills they lack, cultural heritage institutions should seek strategic partnership with intermediaries, private companies, and/or larger cultural heritage institutions to commonly build the kind of new cultural services customers will demand in the future.**

IX.7   The widening technology gap

Archives, libraries and museums that have already become hybrid institutions have developed a good understanding of what the technological challenges of the digital domain are. Although they still struggle to solve the problems involved, they have at least entered the digital value chain by making cultural heritage resources more readily accessible.

However, experts involved in the study estimated that less than 10 % of all cultural heritage institutions in Europe are actually in the position to participate in the digital era. The big majority of memory institutions, – the local museum focusing on the history of a village, the community or church library or the highly specialised historic archive – do not even possess the human, financial and technological resources to accomplish the most basic things, such as digitally cataloguing their holdings or establishing a web presence. As they are still in the pre-digital age they cannot participate in the Information Society.

In fact, we can sense a growing gap between the highly specialised, technology-focused, new types of cultural organisations that function as intermediaries between the traditional "content holders" and the public, and the traditional archives, libraries and museums. As Edmund Lee, Data Standards Supervisor at the National Monuments Record Center, UK, put it: "There is perhaps, an increasing gap between 'service providers' that facilitate access to cultural information (held by others), and who see dynamic and exciting new technologies as key to attracting new audiences, and "content providers" who place priorities on solutions that can be applied to very large databases and archival holdings within very limited resources" (DigiCULT Delphi, June 26, 2001)

Instead, what became obvious during the field phase of the study is that traditional archives, libraries and museums have developed a kind of technological "radar" that very selectively focuses on the technological issues and problems related to especially three areas: providing access information, digitisation and long-term preservation. There is less awareness among experts in the cultural heritage sector for the technological problems of, for example, managing customer relationships or handling copyright.

As archives, libraries and museums are not commercial businesses, they are not at all prepared to take the risk involved in implementing, testing and experimenting with technology prototypes for new and innovative services. As a matter of fact, the majority of institutions is not in the position to take any risk at all, due to their limited resources.

In addition, by focusing research and development efforts exclusively on technological innovation, the threat of technology becoming the essential separator between those cultural institutions that are publicly visible while others are not, is growing. This would further widen the gap between those institutions working with technology and those who do not.

Therefore, it needs the combined support of both the European Commission and national governments to counteract this widening gap through targeted support measures for less developed cultural heritage institutions.

The DigiCULT navigator to reducing the technology gap

Experts estimate that less than 10 % of all cultural heritage institutions in Europe are in a position to participate in the digital era. The great majority of memory institutions – the local museum focusing on the history of a village, the community or church library or the highly specialised historic archive – do not even possess the human, financial and technological resources to participate in the Information Society. There is a risk of widening the gap between the leaders in the cultural heritage sector and the technologically less developed

institutions by focusing Research & Development (R&D) projects exclusively on technological innovation. In addition, the formal and administrative criteria to partake in European Union R&D projects are too high. The biggest impediment here is the lack of capacity in the cultural heritage sector.

65 **The European Commission needs to lower the entry barriers for small memory institutions and develop a slip-stream model for R&D participation.**
Similar to the SME programmes that are an established part of EU-funding, future European R&D programmes should leave room for initiatives that allow smaller cultural heritage institutions, that do not yet work with information and communication technologies, to participate. Such programmes should focus on consolidation, sustainability and technological innovation but also on teaming up between the leaders in the field and technologically less developed memory institutions. Teaming up with organisations that already have much experience and using them as centres of excellence, could be one way of approaching the threat of a technology gap between cultural heritage institutions. In the proposal evaluation, a bonus should be given not only for technological innovation, but for projects that demonstrate knowledge-transfer to technologically less developed institutions (slip stream model).

66 **National governments and regional authorities need to lower the entry barriers for small memory institutions and actively foster co-operation between large and small cultural heritage institutions for knowledge transfer.**

67 **In the 6th Framework Programme, the European Commission should find a good balance between the funding of innovative, high risk projects and R&D programmes that allow smaller cultural heritage institutions to catch up.**
Experts estimate that 90% of all cultural heritage institutions are not yet ready technologically to participate in the Information Society. On the other side, we have a small percentage of technological innovators and early adopters who successfully implement the latest technologies in their business. The two groups have very different needs. The greatest challenge for the 6th Framework Programme for Research, Technological Development and Demonstration Activities is to find the right balance for funding targeted R&D programmes that support both the leaders and laggards in the cultural heritage sectors.

Diffusion of technology in cultural heritage institutions:
Stimulus through targeted R&D programmes

Laggards, skeptics	Late majority conservatists	Early majority pragmatists	Early adopters	Innovators
	Take-up & Dissemination measures for late adopters and laggards	Trial & Demonstration for the conservative majority	Technology transfer for early pragmatists	Blue sky R&D for early adoptors and innovators
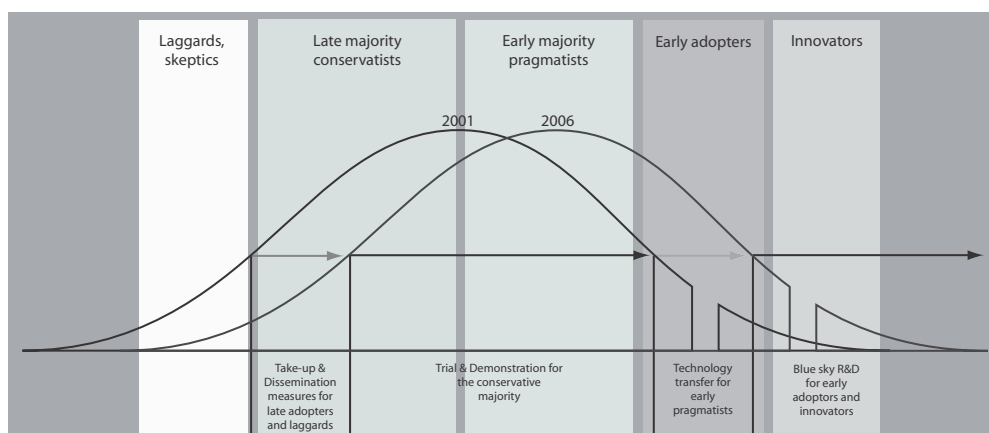
Source: cf. Rogers (1995); Salzburg Research, 2001

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IX.8   A roadmap for intelligence in cultural heritage applications of the future

One of the key objectives of the 6th Framework Programme is to increase the level of "ambient intelligence" in people's everyday lives. For the cultural sector, this objective can be translated into a shift from "easy access to information" to "facilitated interaction with knowledge". This implies two strands of research: from access to interaction (two-way access as explained in detail in the section on interactivity) and moving from static information structures (databases) to dynamic, adaptive, high-quality knowledge structures (knowledge systems). The objective is by no means a new one: The Japanese 5th Generation Project, the British Alvey Project, and several other European initiatives of the mid-80s had similar objectives, but lacked a "killer application" as well as an immediate need.

The situation changed dramatically in the mid-90s when the widespread acceptance of the World-Wide-Web highlighted the need for semantic information integration (hence the resurgence of "ontology-based" database interoperation themes since the mid-90s). At that time, however, the 5th Framework Programme, in response to the realisation that knowledge-based technologies of the 80s had been "over-hyped", had reverted back to "proven technologies" and had re-focused on more modest aims. One lesson could be that 5-year programme cycles may be reasonable for technological advances along "known research roads" but that far-sighted research needs a longer time horizon. It is argued that Europe would be more competitive now , in "semantic web technologies", if a more ambitious research policy had been maintained to carry over the advances of the early (pre-WWW) 90s, for example in Logic Programming, Natural Language Processing (in particular NL generation), and knowledge representation languages, as well as the combination of neural networks, fuzzy logics, and symbolic reasoning.

Cultural Heritage Applications must be seen as one possible application domain for systems that exhibit intelligent behaviour according to whichever metrics one chooses. Therefore, it is necessary to look at the core services required at different levels of maturity, and to derive from the generic advances needed in the relevant fields, those features that will benefit cultural applications in particular. The following table distinguishes four levels of increasing quality of service to be expected from future information systems. The table entries are indicative rather than exhaustive, and the focus is on research and technology related to "intelligence", rather than on any specific requirements of the cultural sector.

Level of "ambient intelligence"	Required quality of service	Required core functionality	Applicable core technologies	Scientific state of the art (End 2001)	Scientific expectations for the next 5–8 years
Database (structured data)	"what you put into it is what you get out of it"	E-R Schema Modelling, SQL Queries	Relational database management systems	highly mature	Marginal advances in performance
Information Base (object-based models)	Modelling of real-world objects	Unified Modelling Language, Object-oriented Design, Object query language	Object-oriented databases	fairly mature	Advances in performance and support for design and query languages
	Increasing agreement for association (relation-ship) modelling	Support for domain-specific patterns and relationships		fairly immature	Advances in formal models that underlie object-oriented systems
	Standardised association modelling	Standards for generic and domain-specific patterns a and relationships		fairly immature	
Knowledge Base (re-usable knowledge)	Discrete knowledge modules	Knowledge Representation Languages Domain-specific ontologies	First-order logic, termino-logical logics introspection (query the model and data)	fairly immature	Better understanding of knowledge modelling requirements
	Interoperating single-domain knowledge modules	Generic, multi-lingual terminology resolving mechanisms	Description logics, Feature logics	immature	Better understanding of domain model-ling at the process level; overcoming of known performance problems for description/feature logics
	Interoperating disparate knowledge modules	Interaction between generic knowledge modules and domain-specific modules (cf. Lenat, "micro-theories")	Feature Logics Mixed-paradigm systems (symbolic/subsymbolic)	immature	Breakthroughs in fuzzy matching techniques for mixed-paradigm systems
Knowledge Assistant (interactive knowledge)	Natural interaction via structured interaction language	Belief models, Agent interaction models	Modal logics, temporal logics, Multi-agent systems	immature	Working prototypes for significant domain-specific problems
	Natural interaction via free-text input	Context-sensitive natural language understanding and generation	Process description logics	very immature	Working prototypes for restricted domains
	Natural interaction through multi-modal interfaces, including free speech	Context-sensitive free-speech generation	Fuzzy, adaptive processes	very immature	Speculative, "toy systems"

The DigiCULT compass to future R&D

Cultural heritage is an application domain that traditionally does not drive technological innovation. Nevertheless, cultural heritage poses some of the most challenging questions for technology that are not yet solved, e.g. highly complicated knowledge representation problems with extremely complex requirements such as fuzzy concepts, temporally changing views of knowledge objects and different schools of interpretation. Contrary to popular thinking, the cultural heritage sector could in fact, be a very good application area for building new technologies as it offers many technological challenges that could be drivers for significant innovation.

The above assertion can be justified: cultural heritage is about *knowledge*. Furthermore, it is about *knowledge in a societal context* and even more complex, about *knowledge* whose societal *context changes* over time. Thus, cultural heritage institutions should be prime users of knowledge technologies and, interestingly, by creating catalogues and classification schemes, they are themselves in the *business of developing knowledge technologies* (albeit with often inadequate tools).

One of the major policy recommendations is to foster the use, adaptation and adoption of knowledge technologies by cultural heritage institutions, and to foster further exchanges of expertise between cultural heritage experts and knowledge technologists.

DigiCULT R&D Compass
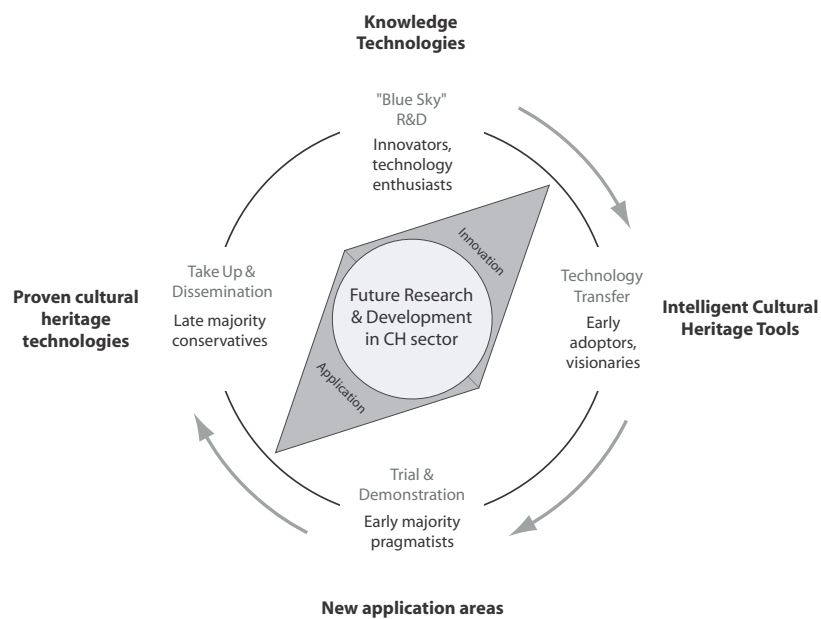
Source: Salzburg Research, 2001

68 **Foster collaboration between ICH and FP6 Knowledge Technologies**
In future R&D programmes, CH applications should become testbeds for innovative knowledge technologies. the recent emphasis on ICH – Intelligent Cultural Heritage has been an important step towards the inclusion of knowledge technologies in CH. To further ensure this kind of cross-fertilisation, the CH RTD programme should be compatible with the proposed work programme for RTD in knowledge technologies (see PCM-9, Programme Consultation Meeting, Brussels, 27th April, 2001). At the top-level, the key challenges as identified by PCM-9 apply for C/H as well:
- usability of knowledge systems,
- content as knowledge (the transformation of multimedia content into knowledge),
- standards and interoperability,
- knowledge communities and knowledge portals.

69 **Apply knowledge life cycle themes to the CH domain**
Future R&D projects should address the following key areas for Knowledge Technologies (R. Studer, Karlsruhe): knowledge extraction; knowledge maintenance; knowledge management; knowledge presentation. For the CH domain, it is recommended that project proposals demonstrate particular awareness of the processes leading from extraction to maintenance, from maintenance to (active) management, and from management to presentation.

70 **Combine research on knowledge interfaces with CH applications**
In line with proposals by Missikoff (IASI-CNR, Rome), future R&D projects should address:
- interoperation / communication between "neighbouring" knowledge communities (e.g. archives, libraries, museums addressing "similar" topics with their collections);
- interaction between humans and devices (HDI);
- human-to-human interaction (HHI) using knowledge based systems. The fourth line proposed (automatic configuration for casual device-to-device interaction) is probably not immediately relevant for applications in the C/H domain, except perhaps when combined with multi-lingual services (e.g. as multi-lingual guides in ALMs).

71 **Include language technologies with knowledge-based CH applications**
In line with a proposal by Uszkoreit (DFKI, Germany) for combining language and knowledge technologies, future R&D projects in CH could address:
- knowledge discovery from written sources (natural language analysis for semantic classification);
- natural language fragments for knowledge sharing and corporate memories (e.g. multi-lingual, restricted natural language interfaces to classification schemes;
- multi-lingual analysis and semantic classification for cross-lingual knowledge management; natural language understanding and generation for natural interactivity with partly automated collection management systems.

72 **Improve usability, knowledge enjoyment, and support for knowledge seeking**

One of the key issues of usability is the provision of content in a form that is adequate for its intended use. Future R&D projects should put emphasis on content description schemes that support flexible modes of querying, flexible modes of knowledge presentation to the user, and innovative interfaces that enable users to "look for more", i.e. extend their knowledge through interaction with CH systems.

73 **Combine knowledge bases, learning systems and agent communication systems under a common vision related to CH and on some of the ISTAG scenarios for ambient intelligence**

The vision of "ambient intelligence" as proposed in the ISTAG scenarios requires a combination of technologies: existing knowledge repositories must be made accessible through appropriate knowledge exchange standards. Systems have to be able to respond to the acquisition of knowledge by acting more intelligently after acquiring appropriate knowledge – this shall be called "learning". For distributed systems to learn from each other, they must be able to exchange knowledge autonomously, through some form of higher-level communication. Future R&D programmes should encourage research proposals that envision distributed knowledge bases that enhance users' knowledge through system based communication and learning. The ISTAG scenarios, as well as the associated enabling technologies can be translated into the CH domain. Programme lines for RTD in

ISTAG - Original Scenarios   ### ISTAG - Scenarios for C/H
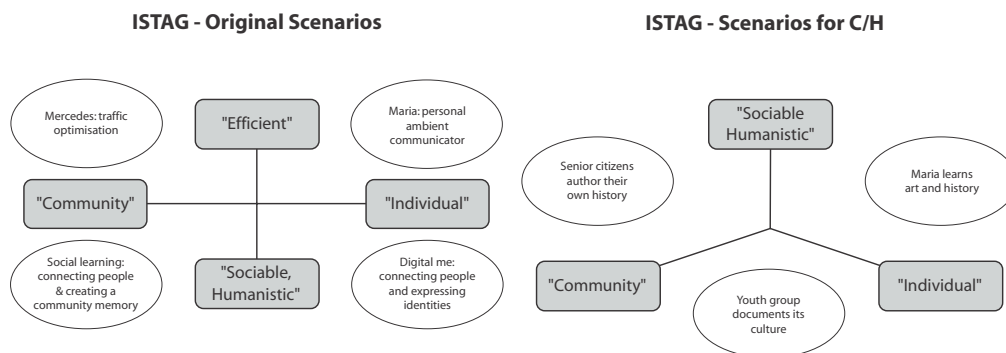
Source: Salzburg Research, 2001

CH should focus on three of the four ISTAG dimensions: Community, Individual, and "Sociable, Humanistic". Examples:

Maria, the efficient individual of the ISTAG scenario joins a learned society on Art & History for her spare time. Her personal ambient communicator needs to create for her, an individual curriculum which will identify relevant items of knowledge for certain areas of study and which is able to order content according to Maria's needs and interests. The communicator's decisions are based on an (evolving) model of the user's knowledge of the subject in question.

Digital Me: Youth culture groups wants to document their genesis so as to create its own community memory. The community memories should be communicable between groups from different regions, cultural backgrounds, etc.

Sociable Learning: Senior citizens with special needs and age-related challenges wish to create a community record of their own youth, relating historical multimedia documents to their own collection of memorabilia, thus telling "their story".

74 **Foster research into business models and systems for trading cultural content, leading to the exchange of knowledge goods between diverse societies.**

Media companies are interested in acquiring content in order to create media products from it (Microsoft, Warner, Bertelsmann, etc). ALMs are prime holders of content but have little experience in adding sufficient value to it in order to develop the content they own into products. Cultural Heritage policy will have to address the danger of sell-out: cultural heritage institutions have been built up by private as well as public money over generations and therefore, neither Europe nor any other cultural communities should "sell out" one of their most precious resources simply because nobody knows how to make use of it, or because the societal value system has shifted away from cultural content, temporarily.

It is therefore suggested that business models are researched and developed that relate culture and economy in ways that demonstrate the value of cultural heritage not only in quantitative terms, but also in qualitative terms. The "value" of Shakespeare cannot be appreciated simply through "the content" (i.e. his sonnets and plays): Stratford-upon-Avon does not generate its wealth through selling his books, but through a network of value chains, primarily centred around tourism. The same holds for Salzburg, or many Italian cities. Research proposals should demonstrate an understanding of dependencies between cultural and socio-economic factors. The impact of newly developed technology in such complex value networks should be assessed using well defined measuring hypotheses.

Research into business models can be approached from three avenues:
- Business needs standards, why should cultural heritage related standards differ from other metadata standards?
- Business needs markets, why should cultural topics not be able to create new markets or demand on existing markets?
- Business needs political stability, understanding other cultures and their value systems may make Western societies more sensitive to the issues that ultimately lead to conflict and political instability. Why not use cultural heritage as part of the dialogue? Why not use new technology as the medium for that dialogue?

75 **Explore the possibility of standards convergence between ALMs, the Internet communities and broadcasting**

In the media industries, the MPEG family of standards is receiving wide-spread support. In the Internet-based software industries, RDF and the XML family of standards are playing a similar role. In the ALM community, exchange of information is based upon a number of weakly-related archiving standards.

We recommend programmes that combine syntactic conventions with ontological commitment, thus developing description languages based on syntactic standards and enhanced by group-acknowledged and user-group driven, semantics. This includes knowledge based reference models which demonstrate usability for machine inferencing.

76 **Explore research opportunities where cultural applications can be technology drivers, e.g. because of the challenging questions they pose, and where other domains profit from the research because the findings can be applied.**

77 **Support cultural exchange between diverse regions through virtual exhibitions**
Writing at a time (after September 2001) when the cost of cultural conflict is measurable in economic terms, we suggest that educational as well as cultural exchange programmes between e.g. Eastern and Western cultures should be fostered.

78 **Foster research into cognitive engines that process artefacts of cultural heritage autonomously (advanced research programme)**

79 **From digitisation to feature recognition (in vision, music, performing arts)**
Standard digitisation systems should be augmented for feature recognition to ultimately enable semi-automatic cataloguing against various description standards.

80 **From feature recognition to symbolic representation**
Symbolic representations are abstraction gained from a multitude of recognised features (therein lies the economy of language). In order to describe artefacts automatically from raw media (images, voice, music, etc.) systems must be able to aggregate features spaces to symbolic representations.

81 **From feature recognition to associative reasoning (recognition and partial interpretation of cultural codes)**
Systems need to be able to interpret symbolic abstractions gained from feature spaces in changing contexts. This requires culturally aware interpretation of interactions between agents, be they human or machine-based.

IX.9   ZKM – Zentrum für Kunst und Medientechnologie – Center for Arts and Media, Karlsruhe[9]: A cultural centre of excellence for technological innovation

Obviously, there is a kind of natural affiliation between a museum for new media art and its focus on new technologies. What else could be expected in an institution that has dedicated itself to "explore the creative potential of the new technologies, assess their character and their impact on contemporary art and define their current and future influences on our lives"? (ZKM, 1997) Under this mission statement, the ZKM – Zentrum für Kunst und Medientechnologie (Center for Art and Media), Karlsruhe, Germany, since 1996 has developed into a world-wide focal point not only for new media art, but also into a place where technological innovation is happening.

This case study presents a cultural organisation that has a strong technological focus and spearheads technological development in many of the areas addressed in this chapter. In particular, the study highlights:

– the unique institutional model of the ZKM, and in particular the research and production components as basis for technological innovation in art practice,
– the centre's approach to the Internet and the development of an online archive,
– art as driver of technological innovation and difficulties of technology transfer, and finally,
– the possibility of the ZKM serving as blueprint for other cultural institutions.

A short history of the ZKM

Political foresight paired with vision fuelled the discussion around creating a centre for the emerging media art already in the mid-80s. Based on a broad concept of the user-value of technologically based art, the to-be-built centre should demonstrate the possibilities of new media and its influences on our lives. The primary agenda of the ZKM was never limited to technological and educational aspects only, but clearly focused on social advancement. As such, the ZKM strives to become a new kind of museum, a museum of the third kind, as described by the British telematics art pioneer Roy Ascott:

"The digital museum of the third kind will be anticipatory, not imposing perspectives of the history art, but opening up a pool of possibilities from which art might emerge, working at the forward edge of contrary culture, as an agent of culture change, as a course of art practice rather than as a cultural effect." (Schwarz, 1997: p. 11)

The stimulating discussions and floating ideas won solid contours in 1986, when the steering and working group formed by local politicians, representatives of the university, the art academy, and the nuclear research centre and other institutions of the city of Karlsruhe, published a first concept entitled "concept88". Inspired and motivated especially through two model institutions in the USA, the then artists-driven research centre MIT Media Lab in Boston (<http://www.media.mit.edu/>), and the popular, interactive, hands-on science museum Exploratory in San Francisco (<http://www.exploratorium.edu/>), the idea was to create a "hybrid" institution that would combine both those components: interactive new media art that had its origins in artist-driven research and development.

The original concept foresaw three working areas: image, music and media for citizens, which today are represented through the Institute for Visual Media, the Institute for Music

[9] Sources used in this case study: DigiCULT Interview with Thomas Fürstner, Head of the Institute for Net Development. Vienna, June 26, 2001. DigiCULT Interviews with Jeffrey Shaw, Head of the Institute for Visual Media, and Boris Kirchner, Head of the Administrative Department; Karlsruhe, June 29, 2001. ZKM – Zentrum für Kunst und Medientechnologie Karlsruhe (Museumsführer) (1997) München. Schwarz, Hans-Peter (1997): Media Art History: Media Museum, ZKM Center for Art and Media Karlsruhe. Munich.

and Acoustics, and the Institute for Net Development. In addition, public forums such as the Mediathek, the Media Museum, and the Media Theatre were also part of the original concept.

The economic perspective played also a crucial role in this future-oriented project: The planned media art centre was perceived as the cultural component of the Technology Region Karlsruhe (<http://www.trk.de/>). As such, it should become a place of artistic expression that would inspire and support the commercial development in the technology region.

In May 1988, encouraged by the optimism and wealth that characterised Germany in the years before the reunification and with ample funds available to finance an initiative of such scale, the ZKM – Zentrum für Kunst und Medientechnologie (Centre for Art and Media) was established the in City of Karlsruhe. The initial budget was DEM 120 Mio. In November 1988, the state of Baden-Wuerttemberg joined the project by taking over 50% of the running cost, and the ZKM was set up as a public foundation.

At that time, the newly founded centre did not inhibit an own building, but the ZKM's institutes were spread throughout the city of Karlsruhe. It was planned, that the ZKM institutes should move into a new building designed by the well-known Dutch architect Rem Koolhaas in 1993. Yet, instead of building a new museum after the Koolhaas-plans, the former industrial complex of the Industriewerke Karlsruhe-Augsburg (IWKA), a former ammunition factory that has been declared an industrial monument, was favoured as new location for the ZKM. Within 4 years, the building was completely revitalised and opened its gate to the public in 1997.

Institutional model: Along the value chain of new media art production

One of the main reasons for the centre's innovative power lies with the *unique institutional model* of the ZKM. This model differs considerably from traditional museums, as it leaves broad of room for research and experimentation. Unlike other museums that focus on collection building and presentation, the ZKM, under one roof, accommodates all the essential stages in the value chain of new media art production: research, production, presentation and collection, and finally, publication and archiving. Here, new media artists find the space and the kind of high-level technological equipment to critically work with the rapidly developing new technologies and explore new paths in art practice. The results of this research and production process are unique works of new media art, and, as a kind of "by-product", innovative hard- and software prototypes designed as generic tools to particularly serve the artist's needs.

ZKM Institutional Model: Along the Value Chain of New Media Art Production
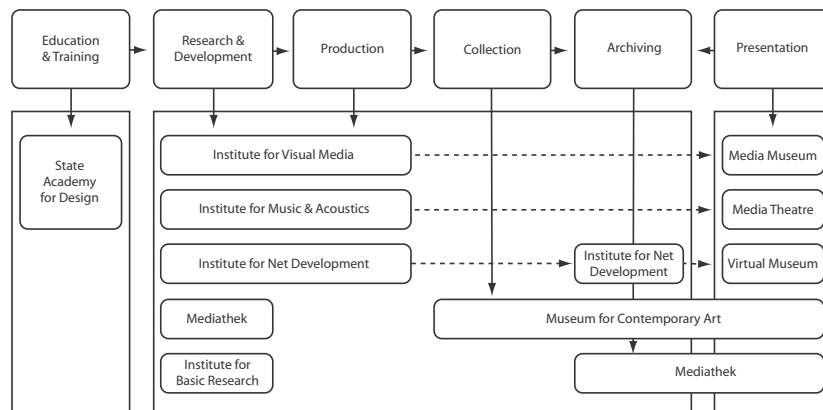
Source: Salzburg Research, 2001

The ZKM has been the first cultural institution in the world that has created, under one roof, a place for new media art research, production, presentation, collection and publication. Today, the ZKM houses a variety of different institutes and museums, a media theatre as well as the State Academy for Design (Hochschule für Gestaltung).[10] Apart from the Academy for Design, which is the "prodigal sister" of the ZKM but a separate organisational entity, the Centre for Arts and Media combines all the essential facilities along the value chain of new media art production.

The research and production components: The innovative back ends

The ZKM maintains two research and production departments, the *Institute for Music and Acoustics* and the *Institute for Visual Media*. Both institutes see their main function in providing artists with the best possible support in creating innovative new media art. As Jeffrey Shaw, Head of the Institute for Visual Media, put it: "We decided the most valuable thing we could do was to set up a facilitative environment for professional artists working with new media that would give them the opportunity to do research, to have access to high level technical and intellectual resources, and offer a stimulating context in which to produce new work. On the other hand we would not be involved in teaching artists new to this field how to work with these technologies as we felt this aspect was being handled by the new media art schools (such as the Hochschule für Gestaltung in Karlsruhe), and would distract us from our main research and production focus." (DigiCULT Interview, June 29, 2001)

Both ZKM institutes offer an environment that gives artists access to two things normally not available to new media artists: high level equipment and the opportunity to work over extended time periods.

Institute for Visual Media

The Institute for Visual Media understands itself as centre of creativity and an experimental space where invited artists from all over the world can research, experiment and explore innovative uses of new media technologies through their art projects. Artists have unlimited, free-of-charge access to high-end graphic computers, digital video equipment, a virtual studio and a multimedia laboratory to realise art works based on technologies that represent the most recent focus of artistic practice. Besides offering access to a functioning infrastructure, the institute's technical staff also consults with the artists and is in-volved in the development of generic hard- and software tools that explicitly serve the artistic needs.

In the last years, an enormous research and development effort has been invested into the following areas, many times in co-operative, interdisciplinary projects of artists, companies and other cultural institutions around the world:

- digital video: development of the virtual studio which allows the combination of virtually created images with motion captured live action,
- interactivity: special focus is given on developing innovative interactive interfaces between the audience and the art work,
- virtual reality: development of custom virtual reality techniques for real time graphics applications in interactive situations,
- simulation: for example, synchronising actual body movement and visual movements in virtual environments, using a hydraulic simulation platform developed in the ZKM,
- telecommunication: experimenting with different forms of tele-presence using the broadband, fibre-optic network available at ZKM, as well as distributed connectivity between remote locations,

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[10] The State Academy for Design was conceptualised and founded as the educational "branch" in parallel and complementary to the ZKM and understands itself as partner in the production and presentation of new media art.

– multimedia productions related to the extensive publication of original CD-ROM and DVD-ROM titles,

– new techniques for interactive cinema and as a consequence interactive narrative, based on innovative panoramic and full dome projection systems and real time 3D processing of digital video data.

This research and development effort resulted in a broad range of generic hard- and software tools, designed specifically for artistic needs.

Institute for Music and Acoustics

With the Blue Cube, the Institute for Music and Acoustics owns a professionally equipped sound and recording facility. Artists can integrate the same state of the art technology used in the media industry in their works. The results of the highly experimental exposure with electronic music and acoustics – often in co-operative projects with the Institute for Visual Media – are presented to the public in performances, workshops and lectures. The spectrum covers such productions as live electronic works for the concert stage, music theatre with interactive technology, digital sound synthesis, algorithmic compositions, and studio production of film music, radio plays and CD-ROMs.

The results of this fruitful, artist-driven research and production process can be seen in the ZKM Media Museum or in the many events and performances.

ZKM Artist-in-Residence programme

Basis for the fruitful co-operation between international artists and the ZKM's research institutes is the Artist-in-Residence programme that allows invited artists to live and work at the ZKM. The artist-in-residence programme offers artists:

– use of high-level equipment, free of charge and over extended periods of time,

– office space at the ZKM,

– free access to the skilled know-how of the institute's staff,

– a six months stipend of DEM 2500 per month to cover living expenses (the stipend can be renewed if the project is considered worth the additional support by the department heads; it may be extended to up to 1 ? years or as long as it takes to finish the art work).

Institute for Basic Research

In addition to the two production and experimentation facilities, the ZKM also houses the Institute for Basic Research. This institute positions itself at the intersection of basic and applied research that is not necessarily justified by any commercial or industrial intention. The main attention of the department is turned to the development and application of visual-haptic interfaces for fundamental experiments in the fields of the "object-subject-relationship". Such developments and experiments are of media-technological relevance to gain insight in the cognitive and interactive processes. Methods comprise different feedback and interaction mechanisms between simulated subsystems of dynamical systems as well as between real operators and virtual realities.

The collection and presentation components: the public front ends

Besides the R&D units, which are not accessible to the public, the ZKM further accommodates two museums, the Museum for Contemporary Art and the Media Museum, as well as the Media Theatre that serves as forum for innovative real time performances.

Media Museum

The Media Museum constitutes the presentational front end of the research and production processes initiated in the Institute for Visual Media and the Institute for Music and Acoustics. Through its focus on interactive art, the ZKM Media Museum exemplifies the hands-on, exploratory aspects and the didactic-educational component of the ZKM, similar to the San Francisco Exploratorium. The concept behind the Media Museum is that of a productive media art museum. In this context, productive means that visitors are not just observers of pre-fabricated works of media art, but they can actively participate in a discourse where they can make their own sense.

The focus of the Media Museum are different kinds of new media art installations, based on six themes: media body, media space, media visions, media art, media experiments and media games. About 40% of the art works exhibited in the museum have been produced in-house, while another 20% of the interactive art works have been produced by artists affiliated with the ZKM.

Museum for Contemporary Art (MCA)

Conceptualised as museum of all genres, the MCA today represents the more traditional art genres painting, graphic, sculpture, and photography but also media and video art. Since 1990, the museum has built up one of the most significant collections of media art world-wide. The collection includes some of the major works from the beginning of video art, holography and electronic installations. Each year, the museum organises three to four exhibitions, featuring European and American art trends and positions since 1960.

Media Theatre

With the Media Theatre, the ZKM has an own performance place for multimedia productions that is fully networked with all the other facilities in the house. The Media Theatre is used for innovative shows where real time performance merges with computer art to create new visual and sound impressions. In a recent performance, for example, dancers have been connected with new media technologies to create a new experience.

The archiving component

The ZKM also houses a research library, the Mediathek, that is one of the most comprehensive special interest libraries on new media art in the world.

Mediathek

The Mediathek is the library and archive of the ZKM, and offers, besides its own publications and in-house works, one of the most comprehensive collections on contemporary music, literature and videos art. It is the home for about 25.000 books and CDs, 12.000 music titles, 600 art videos and 120 journals on media art, architecture, and media theory. The Mediathek is also the official archive of the German Association for Electro-acoustic Music (DegeM) and the International Digital Electro-acoustic Music Archive (IDEAMA), which has been built up in co-operation with the University of Stanford. The archive also collects and preserves the most important pieces of electro-

acoustic music from 1929-1970, as one of the most important tasks of the Mediathek concerns the digitisation and preservation of older pieces of music and video art that are in danger of being lost.

The diverse media collection is fully searchable, and combined with the latest jukebox technology to call up individual audio and video titles. The databases of the Mediathek archives can also be accessed and searched over the Internet.

The institutional model differentiates the ZKM from any traditional museum. Although it creates an enormous organisational challenge to keep the individual departments – each with its own particular structure and function – from drifting apart, it is in the unique combination of research, production and presentation of new media art, where the ZKM can develop its innovative power. Thus, although still a relatively young institution, the ZKM can already demonstrate an impressive track record of technological innovation in areas like virtual reality, real time simulation and visualisation, computer animation, network installations, digital sound technologies, and new electronic instruments.

The ZKM approach to the Internet

In 1999, an in-house Internet research department, the Institute for Net Development, was added to the other facilities of the ZKM.

Institute for Net Development

While there have been a number of seminal networked tele-presence projects done at the Institute for Visual Media in the context of its virtual reality activities, it was only two years ago with the founding of the Institute for Net Development that the ZKM identified the Internet as art medium in its own terms that is worth exploring and experimenting with. Since that point, however, the Internet has been embraced in its totality with a concept that sees the Web not only as the "domestic extension" of the ZKM by establishing a web presence, but – following its understanding as a museum of all future media – as a digital museum in its own right.

In the realisation of the digital museum, it became instantly obvious, that the purpose was not to give a 3D-visualisation of the ZKM, but that the primary function is social relations. Any kind of reproduction of the museum on the Internet was thought to be doomed to fail. As such, the Internet front-end of the ZKM understands itself as a sort of "metamuseum" that shows both the institutional and social relationships that drive new media art production. Monitoring the latest trends in new media art, the outcome is a digital museum that looks more like a logbook than a virtual exhibition.

Today, the ZKM digital museum publishes the latest trends in new media art on a daily basis: museums that go online, important online projects in the museum context, the tools necessary to realise those ventures, artists on the Internet and their exhibitions in the real world. In addition, each in-house exhibition of the ZKM is supplemented with an own web site that includes 200-300 pages of content in at least two languages.

In course of monitoring the happenings in new media art on the Internet, the Institute for Net Developments in the last two years built its own XML-based *content management and archiving system* that runs on all major platforms, UNIX, Windows and Macintosh. This content management system has an object-oriented database in the back and offers a set of easy to handle tools for editing, hierarchical access management, time-controlled data entry, image and multimedia upload, discussion forums, user profiling and management, user tracking and reporting, internal as well as external communication, and creating an own web site. The content management system is based on templates that even allows non-

technical persons to manage the system. This system works so well, that in the meantime, two volunteer students are responsible for updating and maintaining the entire ZKM web site.

The ZKM content management system is also available to other cultural heritage institutions. If the data remains on the ZKM-servers, the system can be used for free; if the organisation wants to keep the data on their own server, they need to pay DEM 2000 (EUR 1000) for a site license. Besides a couple of smaller museums in Germany, the ZKM is currently working on a reference project with the Volkshochschule Vienna, an adult education institute, that intends to install the system for the internal and external communication with their course participants in the many offices distributed over the city.

Creating an extended archive through automated context creation

Besides recording current trends in new media art, the content management system has also been used to document in retrospect, ten years of new media art production and presentation at the ZKM. The entire documentation has been converted into exchangeable formats and integrated into a fully searchable online archive. The concept behind the ZKM electronic archive is clear: the computer terminal and in the future also mobile devices, are the primary access points to the digital archive or the analogue assets. The basis to make such a system work are standardised interfaces based on open standards.

Usually, archiving the works of a particular artist starts with building a web page based on the more traditional features, such as the artists biography, artistic/creative background, a chronology of the artist's work, etc. In a second step, metadata is added: What other information on the artist is available on the web, are there other pieces of art online, where did the artist exhibit (and is there information available online?), when did a piece of art appear first on the Internet, where is it available on the Net, who was the curator, is there literature available, who has written what and when about the artist? This kind of meta-information, which is based on industry standards such as ISDN, GPS, etc., is harvested automatically by tools and agents built by the Institute for Net Development.

Automatic data harvesting is accomplished through web templates in the structured data format XML, which allows to carry out XML-queries. These queries return many results in form of structured text files that are automatically read into the ZKM database. To guarantee good quality, only the first 30 results returned by queries are saved into the database so that data can be checked by in-house staff. With this method, the Institute for Net Development accumulated over 36.000 references in the last two years. The database archive is automatically updated every day; the ZKM web site itself is updated 2-3 times a day.

Simulating 3D

With the collected data, the ZKM provides a virtual, 3D exhibition, yet without using 3D technology. As bandwidth to properly represent images in 3D over the Internet is still not available, on the ZKM web site all 3D representations are actually simulations built around spherical panorama images. Virtually putting the user in the centre of a sphere, the visitor can then move and follow any kind of angle to explore the data space. They can go through virtual exhibitions that offer more context then the real world presentation. Through the XML-structured data, users can also decide how deep they want to immerse into the online environment. This technology uses only a fraction of the bandwidth of full 3D visualisation (60-100 Kb instead of 3-4 Mb necessary for 3D), yet it achieves the same result at a portion of the cost.

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The first virtual exhibition produced by ZKM in this manner was net_condition that was published in 1999. 115.000 individuals visited net_condition online. The exhibition itself generated a good press echo, where it turned out that ? of the persons who wrote about the net_condition exhibition have researched their information only online and never visited the real thing.

Who are the users?

In the meantime, the ZKM web site generates 500.000 – 750.000 page impressions every month. 50.000 – 60.000 persons visit the web site on a monthly basis that is about the maximum that can be reached by institutions like the ZKM.

What's critical to understand for virtual museums is that the Internet is first and foremost a social space that offers room to communicate. Yet, the desire for communication is not necessarily satisfied by offering a discussion forum, as the ZKM-example shows. When installing a discussion forum to give users the opportunity to debate new media art online, the forum was hardly used. It only worked, when the forum was moderated by key persons such as artists or new media art critics. Instead, other strategies like the daily posting of global news about new media art or publishing information on new media art projects online or new virtual museums, works well. Insofar, Thomas Fürstner, Head of the ZKM Institute for Net Development, is convinced that not those museum web sites that have the most flashy, leading-edge technology interface will be the winners, but those who are able to constantly update their content. Transferring competence to the users and offering them to take control is the key to a successful online presence.

Art as driver of innovation

The track record of R&D projects in the ZKM research units, the Institute for Visual Media and the Institute for Music and Acoustics at the ZKM, is impressive. Over the last four years, they generated a whole repository of innovative hard- and software prototypes supporting artistic expression. Undoubtedly, what artists achieve at the ZKM is fundamental innovation. This innovation goes far beyond the level of designing hard- and software tools, but touches a deeper, conceptual level as the following example illustrates:

This makes the palm pilot look old

Today, the idea of walking through a museum with a palm-pilot in your hand that can deliver personalised, context- and location sensitive information, seems to be leading edge and innovative. Although there is still a technological challenge to make this work, the basic concept of this idea was already introduced in the mid-70s. Back then, an artist developed a computer-based system that would allow to display location-sensitive information. Instead of a palm-pilot, he used an ordinary computer with monitor and a battery that he pushed through an empty room in a shopping cart. The room was equipped with a tracking system and allowed him to receive data on his monitor as he was pushing the cart through the room. Conceptually, there is no difference to the palm pilot idea.

In the world of new media art, there exist many similar examples of artistic innovation. Yet, the technology is not in the forefront, but always technology in its social context as artists try to grasp of what the new media are all about in relation to humans, and what the possible creative uses could be. "Artists are the antennas of the shape of things to come. They recognise and give form to possibilities, to perceptions, that are not yet common

knowledge. In fact this has been one of the traditional roles of the artist throughout history." (Shaw, ZKM; DigiCULT Interview, June 29, 2001)

So why do commercial companies not queue up in front of the ZKM to catch some of those innovative concepts for new uses of technology?

It's not coffee, it's not cheese ... it's something new

There are mainly two reasons that create obstacles for a successful technology transfer from the creative, artistic world into the commercial world.

First, there exists a lack of a real understanding of what artists are doing as in many cases, artistic research in new media is three to five years ahead of its time. Of course, this has also an impact on the ZKM as cultural institution that displays this kind of radically new art. Although industry works closely together with the ZKM in many projects – the Institute for Visual Media raises 50% of its budget from third party funds and the Institute for Net Development is financed up to 75% through projects – the ZKM has not been successful so far in creating long-term private partnerships that are not project-based. It seems, that private companies are not yet willing to invest larger sums into artist-driven research and development.

In this respect, the ZKM has an 'identity problem' because it does not conform to the traditional perception of the boundaries between art and science. While the ZKM embodies a uniquely new synergy of research, production and exhibition activities, it is still largely perceived as just a museum where people go to look at exhibits. On the other side, what's going on behind the scenes – the turf-breaking research and development in new media - remains mostly invisible to the public (and industry) because that sort of activity is not expected of or understood within the context of a cultural institution. "It's not coffee, it's not cheese – it's not the stuff that's already around you. The ZKM is offering something new and challenging that crosses the boundaries between art, science, industry and society." (Shaw, ZKM; DigiCULT Interview, June 29, 2001)

Industrial pragmatism

The second factor that hampers technology transfer has to do with the way industry works. Fundamental innovation implies taking high risks, yet most of industry is really conservative – from the point of view of arts and culture. Private companies are enormously pragmatic and under severe financial and time pressures with the objective to deliver affordable, market-ready products in short term. Developments that do not have a guarantee of providing a commercial benefit at the end, are not followed through. "The problem with most artist driven research work is that it's technically speculative and conceptually experimental, so that industry is not able to immediately recognise its commercial implications. And these implications are all the more valuable because they derive from an adventurous content driven and socially sensitive understanding of the technology." (Shaw, ZKM; DigiCULT Interview, June 29, 2001)

Within ZKM, the need to build bridges and establish relationships to private industries has long been recognised. There are also ideas of how to better manage technology transfer, for example by creating a new employment position for a skilled professional concerned only with technology transfer. But building bridges and generating trust is a big challenge to this young institution which needs the "right formula" for public-private partnership to gel, so that both private companies and an arts-focused new media research facility would feel comfortable working together.

ZKM as blueprint

... for new media centres

In the meantime, the ZKM has become an important model of reference for many cultural institutions around the world focusing on new media art. Among them are such renowned institutions as the NTT Inter Communication Center in Tokyo, Japan, the Ars Electronica Center in Linz, Austria or the yet-to-be-built Las Palmas in Rotterdam, Netherlands. Although all these institutions created their own profile and their distinct identity, ZKM to them has been a point of reference to distinguish themselves.

The underlying model is that of establishing, around the globe, unique centres of artistic creativity and production that supplement each other. ZKM and other new media arts centres are partners in a network of institutions that have developed complementary focal points. As the technologies used to produce new media art are exceptionally expensive, each of the partnering institutes has specialised in certain areas where they try to purchase and maintain high-level equipment. Thus, within the new media art scene, the ZKM is known for virtual reality and real time computer graphics and visualisation systems, whereas, for example, the Centre d'Arts Electroniques Virtual à Vocation Internationale Pierre Schaeffer in France is known for video, video postproduction and more recently its streaming video projects.

BROWSER

ZKM as blueprint
– Intercommunication Centre, Tokyo, Japan <http://www.ntticc.or.jp/>
– Ars Electronica Center, Linz, Austria <http://www.aec.at/>
– Las Palmas, Rotterdam, Netherlands <http://www.werkstadinlaspalmas.nl/>

ZKM as reference model
– Centre d'Arts Electroniques Virtuel à Vocation Internationale Pierre Schaeffer <http://www.cicv.fr>
– V2, Netherlands <http://www.v2.nl/index.php>

... for traditional museums

Yet, can the ZKM also serve as a role model for traditional museums?

Not very likely, although some organisations, like the Guggenheim Foundation, tried and discovered later how difficult it is to do so. Introducing technological research and production components into a cultural institution actually means to introduce a completely new philosophy into the organisation, not to talk about the enormous investment it takes. The institution also needs new knowledge and skills normally not available in traditional museums to be able to manage the complexity of technology-based art.

The complexity of the technology, to Jeffrey Shaw, is one of the primary reasons why new media art is "so slow in its penetration in the traditional art world. Basically museum directors are frightened of this stuff: they don't understand the technology, they don't know how to maintain it, so they keep their distance." And he adds: "It's only recently that video art has been fully incorporated into museums, and this has a lot to do with the fact that current DVD playback and LCD projection technologies allow for the simple installation and maintenance of such works. On the other hand, computer based interactive installations still demand a much higher level of expertise from museum staff – and of course everyone is panicked by the idea that the artwork might 'break down'.

The good news is that the recent rapid development of robust technologies in the video-game industry now also offers a very high level of operational stability for interactive art

works in museums. And institutions like the Langlois Foundation in Montreal are currently developing common methodologies for the very long term maintenance of such works that can overcome the obsolescence of their original materials." (Shaw, ZKM; DigiCULT Interview, June 29, 2001)

The complexity of technology is also one reason, why traditional institutions have trouble to fully take advantage of the possibilities new technologies promise. For example, when establishing a web presence, museum managers prefer out-of-the-box solutions sold by commercial companies at calculable costs than developing their own web site that would best serve their needs. Lacking the competence to adequately assess new technologies, what they might end up with are solutions that look like the future but that are not as good as it should be. "The territory of the new technologies is quite esoteric," says Jeffrey Shaw, "and there is a lot of hype going on that takes advantage of people's lack of understanding. Industry and even artists are offering things that are far less interesting than what they purport to be". (Shaw, ZKM; DigiCULT Interview, June 29, 2001) The technological challenges are too big, and the people who are working at it are not competent enough to rise to the challenge. This is one reason, why traditional museums are not prepared to take too big a risk with regard to new technologies and rather prefer to take little steps before taking one big step towards innovation.

Another major obstacle that impedes on a broader use of new technologies in museums is the price tag attached to it. While there is no questioning of the immense sums spent on maintaining buildings or traditional art work, many institutions are extremely cost sensitive and cost conscious when it comes to expenditures for new media. "There are real costs here," acknowledges Jeffrey Shaw, yet "one should not try to avoid those costs, otherwise you cannot enjoy the real benefits of having such works in a museum." And he adds: "The already demonstrated public interest and enjoyment of new media art works warrants this investment. But in the same way that a good web site is always in a state of dynamic renewal, engaging with media art is not a one-time investment. Rather it is a long-term commitment to participate in an evolving and expanding territory of heterogeneous art practices, where the 'investor' should become a real partner in its processes of research, creation, presentation and conservation." (Shaw, ZKM; DigiCULT Interview, June 29, 2001)

Yet, knowing that implementation of new technologies involves some risk, what can other museums learn from the ZKM to make new technologies work for them?

ZKM as centre of excellence and intermediary

Although traditional cultural institutions most likely will not be able to duplicate the ZKM-model within their organisations, there is, of course a lot to learn with regards to how to best integrate new technologies into a cultural organisation and how to make them work for oneself.

As centre of excellence and as intermediary who supports and helps other cultural institutions, the ZKM, although still a young institution itself, has vast experience with new technologies in different contexts. One area other institutions can learn from is how to use new technologies to enhance on-site presentations and generate new experiences. Yet another area where the ZKM can serve as an example of best practice is on how to create a functional extension of the physical museum on the Internet.

In any case, the knowledge the ZKM can provide in these areas goes far beyond simply digitising cultural objects, but is a far deeper understanding of how new technologies might be used within the museum context, be it on-site or as virtual extension.

ZKM financing

The annual budget mainly consists of public contributions for the ZKM, plus additional public contribution for the Museum of Contemporary Art that has its own budget.

Annual turnover ZKM: DEM 24 mio./EUR 12 mio. (excluding the budget for the Museum of Contemporary Art)

Complementary financing from the City of Karlsruhe and the State Baden-Wuerttemberg: DEM 8 mio./EUR 4 mio. each.

Additional DEM 3 mio./EUR 1.5 mio. by the City of Karlsruhe for projects

Own contribution - entry fees, renting out building and third party funds (for example, co-operation for the EXPO 2000 with large commercial companies, such as Soda): 5 Mio DEM/EUR 2.5 mio.

Expenses:

DEM 3 mio./EUR 1.5 mio. for renting the building (flows back to the City of Karlsruhe)

Annual personnel costs: DEM 7 Mio./EUR 3.5 mio.

Leaves DEM 6 mio./EUR 3 mio. which is spread among the research institutes and the media museum as annual budget

Additional budget Museum of Contemporary Art: DEM 6 mio./EUR 3 mio.

Contribution by the state: DEM 4,4 mio./EUR 2.2 mio.

Contribution from ZKM-budget: DEM 1,3 mio./EUR 750.000

Own contribution (from entry fees, publications, etc.): DEM 300.000/EUR 150.000.

ZKM visitors

Museum visitors*: 1999/2000: 400 – 600 visitors per week

Total number of ZKM-visitors** 1999: 170.000

Total number of museums visitors in 1999: 125.000

Total number of ZKM-visitors 2000: 208.000

Total number of museums visitors in 2000: 120.000

* Museum visitors: all visitors to the two museums., ** Total number of ZKM visitors: visitors to all ZKM facilities – events, Mediathek (the ZKM multimedia library and archive), the museums.

X STUDY METHODOLOGY

Ndebele from the Exhibition "AmaNdebele" (1991)

Oriented towards future options and possibilities for cultural heritage institutions, the DigiCULT study could not rely on statistical data, yet sought the input and perspective of practitioners in the cultural heritage field. This is also reflected in the methodological approach of the study, which used a range of qualitative research tools to engage experts in the cultural heritage field to gain a deeper insight in the critical issues and neuralgic points that would drive development in the cultural heritage sector in the future.

The following graphic gives an overview of the main research areas the study has covered as well as the research instruments and the results generated with regards to the primary target groups of the DigiCULT study.

DigiCULT STUDY

	Overall view: Information Society, ICTs and Memory Institutions					**METHODS**: Desk Research, Interviews, Expert Round Tables, Case Studies, Online Delphi
RESEARCH ISSUES	Technology	Organisational & Financial Aspects	Exploitation	Services/Demands Policies/Initiatives		
	Future Focus					
RECOMMENDATIONS	RECOMMENDATIONS: – EC – DG Information Society – National, regional and local governments – Funding and professional bodies – Individual ALM institutions – Private sector / industry players					

Source: Salzburg Research, 2001

The study was divided into three research phases:
 – Phase 1: Fact finding
 – Phase 2: Expert opinion and trend finding
 – Phase 3: Analysis, conclusions and recommendations

X.1   Fact finding phase

The *fact finding phase* in the first two months of the study should provide an overview of the state-of-the-art with regards to the five thematic topics of the study, national policies and initiatives, organisational and financial issues, exploitation and services/demands as well as technology. A literature review and desk research formed the basis to formulate a final set of 64 working hypotheses and to formulate a set of research questions as basic instruments for the field research.

X.2 Expert opinion and trend finding

In the second phase, *expert opinion and trend finding*, the objective was to gain an expert's point of view on the technological development and future trends in the cultural heritage sector by discussing the working hypotheses with experts in the cultural heritage field, to further verify or falsify our assumptions.

In total, over 180 experts from all of Europe, the United States and Australia were involved in the study, through interviews, expert round table, an online Delphi survey, and in the case studies. Over a six month period, the DigiCULT consortium carried out:

- 29 interviews,
- five expert round tables and a half-day meeting with representatives of the French Ministry of Culture,
- a web-based Delphi study in 2 phases,
- and five case studies.

Interviews

Interviews as research instruments were chosen to gain in-depth information on a very specific topic, rather than giving a broad account on various issues involved. The interviewers used the research questions as entry points to move to a detailed account on particular issues in the cultural heritage sector. In addition, the interview partners were encouraged to make recommendations with respect to the four target groups of the study, i.e. ALM+ institutions, national policy makers, the European Commission, and funding and professional bodies.

Interview partners were selected in a two month consultation process involving the Steering Committee, the Consortium as well as the European Commission. The result of this consultation process was a pool of over 140 experts to be consulted in interviews as well as the expert round tables. A full list of all the experts that participated in the DigiCULT study is enclosed in the Appendix.

Selection of the experts was based on several criteria. Potential interview partners and round table participants should:

- be able to give an account on a special aspect of the study topics,
- be experts in the field for which the institution stands (with regard to the DigiCULT topic areas),
- possess proven knowledge, based on experience,
- provide an industry point of view or possess best available knowledge on markets and/or sector knowledge,
- be future oriented and/or visionaries.

Almost all interviews were audio recorded and took approximately 2 hours.

Expert round tables (ERT)

By contrast to the interviews, expert round tables were designed to cover one of the five DigiCULT focal topics comprehensively. For this purpose, a good balance of experts was needed i.e. technologists, business representatives and policy makers, so that a great diversity of opinions was represented within the group. All round tables were recorded and fully transcribed. The round table participants are listed in the Annex to this report.

The following section gives an overview on the emphasis (including some questions) of the five expert round tables organised by the DigiCULT Consortium.

ERT on Technology in Stockholm, Sweden, June 14, 2001 (hosted by the Royal Library, National Library of Sweden)

At the ERT in Stockholm, three different issues were explored in more detail:

– User concerns, access and availability: Is it possible to provide seamless access to cultural resources across sectors? What would be necessary to achieve this?).

– Digitisation and preservation: What are the problems associated with the digitisation of existing collections? What challenges exist in preservation to ensure access to digital items in 30 years from now?

– Packaging and exploitation issues: Which models of packaging of cultural resources are available today or in the next five years? Which are recommendable?

ERT on National Policies and Initiatives in Vienna, Austria, June 25-26, 2001 (hosted by the Austrian National Library)

The objectives of this meeting were to identify and describe the national policy framework to allow cultural heritage initiatives to grow. The following issues were discusses:

– Missing focal points of national digitisation policies and initiatives: What kind of methodology is needed to be integrated in action and digitisation plans?

– Elaborating a common position on specific themes such as risks in "going digital", empowerment of cultural institutions, enablers and co-operation: What is the philosophy behind digitising regarding the economic shift, i.e. economic aspect has become stronger regarding what should be done with public information?

– What could be recommendations for national governments?

ERT on Organisational and Financial Issues in Berlin, Germany, July 6, 2001 (hosted by the House of World Cultures)

The ERT in Berlin concentrated on the following issues:

– Main roles and "core business" of memory institutions: Has your core business changed / expanded, and if yes, how has your core business changed? What changes in your core business do you foresee within the next five years?

– Strategic partnerships and co-operations: What are the challenges and driving factors that might foster co-operation and partnerships in the future? What kind of co-operative arrangements would be needed to create value added for innovative services?

– Impact of digitisation on the internal and external workflow of memory institutions: How do you expect your work to change in the next five years? What will be the influential factors for change?

– Financing models: What could be financing models for cultural institutions to provide sustainable cultural heritage services for the future?

ERT on Services & Demands / Exploitation Issues in Edinburgh, UK, July 24, 2001 (hosted by SCRAN)

The emphasis of this workshop was put on the following points:

- Promising markets, pricing, alternative business models: Who will be the future clientele for intelligent heritage? What kind of cultural services possess the highest potential to become profitable services? How do you price your products/services? Have you came across alternative business models?
- Copyright clearance, protecting rights: Which tools/methods do you use for copyright clearance? Are those methods sufficient? What kind of copyright clearance can you envision for the future?
- Marketing and packaging: How do you market your services? What marketing budget do you have available?

ERT on Future Trends in Amsterdam, September 25-26, 2001 (hosted by the Filmmuseum of the Netherlands)

This workshop proceeded under the leitmotif of "unlocking the value of the cultural heritage", based on a four layer model of adding value to cultural heritage resources:

- Unlocking the value with political action: What kind of political actions and measures are needed to give positive impulses to the cultural heritage sector?
- Unlocking the value with new technologies: What future technologies do you foresee, providing expert knowledge and creativity, and providing user personalisation and community? From the technological point of view, how can cultural institutions make the jump to provide resources of higher value?
- Unlocking the value with organisational measures: What concepts and opportunities, organisational as well as technological do you see to unlock the intellectual capital of cultural heritage institutions in the information and knowledge society? What are the major obstacles?
- Unlocking the value in terms of specific user segments, and revenues: What strategies do you see to better "mine" the commercially relevant fractions of cultural heritage institutions?

Half-day workshop in Paris, France, September 6, 2001 (hosted by the French Ministry of Culture)

The issues discussed at the Paris meeting focused especially on cultural heritage policy:

- French cultural policy: What features differentiates the French cultural heritage policy in comparison to other European national cultural heritage policy models?
- Which are the advantages and the main obstacles of the French cultural heritage policy model?
- New economy models for cultural heritage in France: Do you see any relevant economic models in the cultural heritage sector in France, e.g. between cultural institution and the industry?

Case studies

From May to September, the consortium carried out five case studies. The case studies were selected according to their illustrative character with regards to the primary study themes with the help of the Consortium and the Steering Committee. The following case studies were chosen.

- Scottish Cultural Resource and Access Network (SCRAN), UK (Organisational change),
- KultureNet, Denmark (National policies and initiatives),
  Zentrum für Kunst und Medientechnologie (ZKM), Germany (Technology),
- Genealogy services: Examples include Ancestry.com, Genealogy.com and Origins.net (Exploitation),
- National Research Council (CNR), project: "Safeguard of Cultural Heritage", Italy (National Policies and Initiatives).

Online delphi survey

To make the consulting process more transparent and broaden the opportunity for experts to give us their input, an online Delphi study in two rounds was carried out with the help of an electronic questionnaire. The target groups for this study were the small and medium institutions, umbrella organisations, local and regional cultural decision and policy makers as well as cultural industry representatives. The study was promoted through over 100 mailing lists.

1st Exploratory Round

In the 1st round of the online survey, cultural experts were invited to give their opinion on major trends arising in the cultural heritage sector by answering open questions. 48 experts participated in this 1st Delphi round and submitted a total of 66 questionnaires. The results of this first survey, together with the contributions from Interviews and Expert Round Tables served as input statements in the second Delphi round.

2nd Validating Round

Round 2 of the Delphi survey intended to validate the statements previously provided by the experts by rating them along a structured three point scale (yes, no, not clear). The thematic issues were the same as in the round I. In this second round we received 154 questionnaires from 62 experts. The list of participating experts can be found in Annex of this report.

Delphi Basic Facts	Round 1	Round 2	Round 3
Questionnaires received	66	154	220
Experts Responded	48	62	110*
Duration (2001)	May 21 – July 30	Aug. 20 – Sept. 25	
Number of experts came from …			
Archives	8	6	12
Libraries	6	13	17
Museums	8	13	20
Cultural industries	3	2	5
Governmental Organisation	7	6	11
Special interest**	3	5	8
Other***	13	17	25

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* 12 experts participated in both rounds. ** Experts related to an association, council, commission, trust, or project.

*** Mainly experts related to university institutes and research centres.

X.3   Analysis, conclusion and recommendations

In the analysis, the compiled results from the field phase were evaluated, condensed and interpreted in order to draw conclusions and formulate action- and future-oriented strategic recommendations. The aim of the recommendations is to motivate in terms of *what could be*, using communication techniques such as scenarios and visualisations, but also to put a strong emphasis on the aspect of realisation in terms of *what will most probably be*, integrating those techniques into concrete and comprehensive planning processes of cultural institutions.

Hence, the recommendations are focusing simultaneously on the possibility and probability looked through the prism of feasibility.

XI APPENDICES

Ladderback armchair made for Derngate, Northampton
Charles Rennie Mackintosh, 1917

The appendices include:
- Information on Steering Committee Members
- The list of all Participants in Expert Round Tables, Interviews and Online Delphi
- A list of selected European Cultural Heritage Projects
- The bibliography
- A glossary

XI.1   Steering Committee Members

We would like to thank the members of the DigiCULT Study Steering Committee for their valuable comments and assistance during the course of the study.

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Dr. Costis Dallas, Chairman and Senior Researcher of criticalpublics.com, holds Master's and Doctoral degrees from the University of Oxford. He is currently a lecturer in the Department of Communication and Mass Media of Panteion University, and has over 15 years of research and professional experience in hypermedia applications, human factors issues and cultural information systems. He has been Special Secretary of the Greek Ministry of Education in charge of libraries, archives and instructional technologies, and Special Advisor of the Greek Foreign Minister on cultural and information technology issues.

Paul Fiander

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Paul Fiander first joined BBC Worldwide in 1992. In June 1998, he joined Information & Archives as was given the task of positioning the business unit for the digital age and stabilising it's losses which were running at approximately £2m per year. His responsibility as head of the Department is to give I&A financial stability. One of his main functions with the management team is to formulate the strategy for I&A's future: To ensure it builds the skills, systems and technology to put I&A in the best position to help it's customers, stakeholders and staff.

Walter Koch

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Prof. Dr. Walter Koch is shareholder and director of Angewandte Informationstechnik Ges.m.b.H., Associate Professor at the University of Graz and Guest Professor at the University of Krems. Since 1998 he is president of the CSC-Cultural Service Centre Austria. Prof. Koch was head of different research institutes at Joanneum Research Ltd. in Graz, and consultant to different national and international organisations. His experience in the cultural heritage field include national and international projects on in the field of information systems, e.g. the recent European RTD project "Contemporary Culture Virtual Archives in XML."

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Dr. Klaus-Dieter Lehmann was appointed honorary professor of business information studies in 1986, with numerous publications and the editorship of a research journal to his credit. In 1988, Prof. Lehmann became the German national librarian, being appointed Director General of the Deutsche Bibliothek. His deep knowledge of German academic life, cultural institutions and administrative structures have qualified Prof. Lehmann for his appointment, in February 1999, as president of the Foundation Prussian Cultural Heritage. This Foundation represents a unique cultural domain, consisting of 17 museums, the Berlin State Library, the Prussian State Archives, and various other research institutions.

XI.2 Participants in expert round tables, interviews and online delphi

(in alphabetical order)

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XI.3   List of European cultural heritage projects

This list gives a non-comprehensive overview of examplary ICT-related cultural heritage projects in European countries since 1996. The projects are listed according to the co-ordinating institution.

Austria

CULTOS – Cultural Units of Learning: Tools & Services

The CULTOS project will develop concepts, systems and tools for knowledge publishing. The conceptual results from the project will be a knowledge architecture, a publishing service architecture, and a publishing process architecture. The application domain of CULTOS is intertextual studies in literature and art where scientists make explicit the different relationships between texts in a way that approximates the process of cultural contextualisation characteristic of interpretative processes. The experts use well defined sets of typical conceptual relationships that can occur (e.g., "is a parody of", "is an allegory of"). CULTOS will produce an authoring environment for intertextual threads. The output of authoring by such experts will be multimedia objects called "Intertextual cultural threads" (ITC threads). These are based on a novel type of structured multimedia meta object containing expert knowledge conforming to current and emerging standards such as XML/SMIL (with interactive extensions), MPEG-7, RDF.

http://www.cultos.org/

Digital Image Archive

The project Digital Image Archive (1991-2001) is sponsored by the Federal Ministry of Education, Science and Culture and the Austrian Industrial Research Promotion Fund and aims at restructuring the "Collection of Portraits, Picture Archive and Fidei Commissa Library", Austria's largest picture documentation centre. This division of the Austrian National Library holds more than 1.5 million pictures focussing on historical portraits, architecture, topography and history of Austria. The project's main target is to create an efficient model for a Digital Image Archive, which is based on the existing organisational structures of the collection.

http://www.onb.ac.at/sammlungen/bildarchiv/
http://www.bildarchiv.at

PRESTO – Preservation Technology

PRESTO will develop state of the art technology in the preservation of film, video and audio media. The main partners include the largest archives in Europe: BBC (UK), INA (France) and RAI (Italy). Information is also collected from other major European archives.

http://presto.joanneum.ac.at/index.asp

REGNET – Cultural Heritage in Regional Networks

REGNET's aims are to set up a functional network of service centres in Europe which provides IT-services dedicated to cultural heritage organisations and to enable eBusiness activities of cultural heritage organisations. Multimedia industries supporting the production of electronic publications will be integrated. REGNET will provide access to digital data (scientific and cultural) as well as physical goods as provided by museum shops.

http://www.regnet.org/

Belgium

BOLD – Belgian Online Libraries Directory

The BOLD project was initiated by the Belnet User Forum Workgroup on Libraries and is carried out by the Université Libre de Bruxelles, the Universiteit Antwerpen and the Vrije Universiteit Brussel. BOLD aims at creating an on line library directory using LDAP (Lightweight Directory Access Protocol)-technology.

http://bold.belnet.be

CARMEN –Computerised Archival Retrieval in MM Enhanced Networking

In the project CARMEN De munt/La Monnaie, the National Opera House, has developed a digital database with the ambitious objective of preserving its very extensive archives in digital form.

http://www.lamonnaie.be/en/company/archief.html

EOLE

The aim of EOLE is to provide access to databases with multimedia content (images and text) about the Belgian cultural patrimony. The database is a selection of documents from different domains: architecture, sculpture, painting, silversmith's, ceramics, prints, drawings.

http://leon.muse.ucl.ac.be/Eole

VAKHUM – Virtual Animation of the Kinematics of Human for Industrial, Educational and Research Purposes

The VAKHUM project aims to develop an interactive database for industrial, educational and research purposes. Users will access the database through a virtual interface and be able to download high-quality data for their own applications, or take an online class on functional anatomy. The data collection procedure being used to amass the above data must also solve theoretical problems, and the consortium aims to tackle these issues at the same time.

http://www.ulb.ac.be/project/vakhum/

VIRLIB – Virtual Library

The VIRLIB project is a co-operative project between the Royal Library Albert I, the libraries of the University of Antwerp, the Université Libre de Bruxelles and IRIS, a company specialised in digital image processing. The purpose of the project is to develop an electronic document delivery system to be used by ILL departments in Belgian university libraries. It can be considered as an extension to the Impala system. This system is based on the concept of distributed VIRLIB servers used for the transmission and receipt of PDF documents through FTP or TIFF files through email.

http://www.kbr.be/virlib2/start_eng.html

WG-PAT – Belnet Working group "Cultural Heritage"

The Belnet workgroup "Cultural Heritage" is a forum for discussion and information exchange concerning the technical aspects of databases in the field of cultural heritage. The project aims: to build a discussion forum concerning cultural heritage (and specially digital images); to list and evaluate standards; to publish a yearbook with persons and institutions who are specialist in the field of cultural heritage; to make public reference databases available.

http://www.belspo.be/wgpat

Denmark

Art Index Denmark (KID) – The National Database on Art in Danish Museums

Art Index Denmark represents a further development of a 1996 project under KulturNet Denmark. In this project, basic information about some 36,000 works of art from 55 museums was made accessible online. Some 1,000 works of art from 36 museums were illustrated.

http://www.kulturnet.dk/en/omknet203p.html and http://www.kid.dk/root.asp

ARTISTE – An Integrated Art Analysis and Navigation Environment

ARTISTE will give providers, publishers, distributors, rights protectors and end users of art images information, as well as the multimedia information market as a whole, a more efficient system for storing, classifying, linking, matching and retrieving art images. The system will be useable e.g. in publishing, collection management, decision making and life long training applications.

http://www.artisteweb.org/index2.html

Danish Audio History – From the early days of sound recording up till the present day

The State and University Library in Aarhus in 1996 has opened a second version of the web project 'Danish Audio History' which is run in collaboration with other Danish institutions. Financial support is provided by the Danish Ministry of Culture as part of KulturNet Denmark. The main aims of the project are: to present audio history information and examples on the Internet; to provide sample collections for teaching purposes; to achieve agreements with copyright holders; to test and use compression formats and ECMS (Electronic Copyright Management Systems).

http://www.kulturnet.dk/en/omknet579p.html

Danish Composers on the Internet – Database listing of contemporary Danish composers and their works

Composers on the Internet is a project established by the Danish Music Council and the Danish Music Information Centre (MIC) with the aim to provide public access to the MIC database listing of contemporary Danish music. As of July 2000, this listing comprises some 13,000 works by 300 composers. The project includes the development of a user-friendly interface and search options useful to the general public as well as scholars and other professionals. Information from the database is supplemented by some 200 brief composers' portraits in prose, further supplemented by photographs and annotated links; in the case of a number of selected portraits, biographical treatment is extensive and music examples are added.

http://www.kulturnet.dk/en/omknet1034p.html

DEFF – Denmark's Electronic Research Library

The Danish national project DEFF (1998-2002) aims to move libraries from the state of automated, conventional, co-operating individual libraries to the state of one large, coherent electronic library structure providing integrated information services. DEFF's vision is to offer the end-user: a single point of access, a unified login (including one user id), one common user interface, i.e. one presentation structure, one uniform and user-friendly retrieval system, direct access to electronic media and a unified request service. In co-operation with the Ministry of Research and the Ministry of Education, the Ministry of

Culture has decided to invest 200 million DKK in the project which aims to provide researchers, students, business, and other professionals with easier, faster, and more effective access to the latest research information. The project is part of the government's current initiative for research and IT.

http://www.deff.dk/

DMOL – Danish Museums online

Danish Museums on-line is supported by KultureNet Denmark. It will become a joint web-portal for Danish museums. As a step towards the national widespread virtual museum, DMOL will present 10 - 15 artefacts or pieces of art from each museum. This presentation will give an impression of the great variety of collections in the app. 150 legislated or state museums in Denmark.

http://www.dmol.dk/

Eskimo Treasures

The Eskimo Treasures project (1997) is the first step of the National Museum of Denmark to publish one of its object databases on the Internet in order to provide access to information for a broad audience.

http://www.natmus.dk/skatkamre/

Flora Danica Online

The digitising of Flora Danica is part of a KultureNet Denmark project carried out at The Danish National Library of Science and Medicine (DNLB). The purpose of the project is to publish Danish plates of natural history on the Internet. The project began in the spring of 1997 was finished at the end of the year. All 3240 plates are available on the Internet, and it is possible to search individual plants and to browse the plates.

http://www.pictures.dnlb.dk/Homepage/info03eng.html

Literaturnet – Aspects of Danish literature represented on the Internet 1999

The Danish Literature Centre is setting up a system of access to all aspects of Danish literature represented on the Internet. Literaturnet is being developed alongside the Centre's author profiles and is intended as a collective interface from which users can link to the various services. The author profiles site, Danish Authors - Profiles (http://www.danlit.dk/forfatterprofiler/), will form the basis of Literaturnet. In 2001, it consisted of about 100 profiles - the most extensive bilingual access point to Danish literature to be found on the Internet. Furthermore, Literaturnet offers a categorised assortment of links about Danish literature.

http://www.litteraturnet.dk/

n2art – A curated exhibition venue for netart in the Nordic region

n2art is a platform for net art, an exhibition of new art forms. It is also a political construction, a prototype for Nordic co-operation, and an experimental funding structure for net art. n2art is the first common Nordic project within the national CultureNets. The purpose of n2art is to establish a curated exhibition venue for netart in the Nordic region. The National CultureNets operate under the Ministry of Culture in the different Nordic Countries. n2art is one of the first publicly funded netart sites in the Nordic region.

http://n2art.nu/

Finland

ELEKTRA – Electronic publishing and network access to publications

ELEKTRA is a joint project of libraries, publishers, learned societies and copyright organisations, being part of the strategic program: Education, Training and Research in the Information Society of the Ministry of Education. ELEKTRA aims at enhancing both the services and the technical and contractual conditions of electronic publishing and network access to electronic publications in Finland.

http://www.lib.helsinki.fi/elektra/english.html

EVA – Acquisition and archiving of electronic network publications

EVA is a joint project of libraries, publishers and expert organisations, being part of the strategy program: Education, Training and Research in the Information Society by the Finnish Ministry of Education. The central aim of the project is to create methods and tools to collect, register and archive electronic publications distributed on the Internet and to investigate conditions for long-term preservation of those publications in libraries.

http://www.lib.helsinki.fi/eva/english.html

The Finnish Virtual Library Project

The Finnish Virtual Library Project is a subject gateway which field-specifically assorts and describes Internet resources. The resources are of high quality and the descriptions are edited by information service experts. In all, the Virtual Library includes 13000 references decribing Internet resources covering 56 subject fields.

http://www.jyu.fi/library/virtuaalikirjasto/index.html

FinElib – The National electronic Library

The National Electronic Library is a programme launched by the Ministry of Education that aims at supporting higher education and research in Finland. From the beginning of 2000, the National Library of Finland is responsible for the activities. FinELib acquires Finnish and foreign electronic material, such as scientific journals and reference databases for specialist fields. The goal is to provide material serving as many scientific disciplines as possible. It is also the intention to offer a more effective way of finding material from the Net and to provide common access to information using the data network.

http://www.lib.helsinki.fi/finelib/english/index.html

Publiclibraries.fi

Publiclibraries.fi provides access to Finnish Networked Library Services under one user interface. The portal serves as a starting point especially for users seeking information about libraries, culture and information services. The Finnish Networked Library Services is a unit of Helsinki City Library (the central library for public libraries in Finland) and is financed by the Ministry of Education.

http://www.publiclibraries.fi/index.asp?languageid=3

France

Aquarelle – Information Network on Cultural Heritage

Aquarelle is an R&D Project supported by the Telematics Application Programme of the European Union. It was initially set up through a tight co-operation of public authorities from four countries, namely Greece, Italy, France and the UK, associated with research organisations and IT companies from the same countries. The main challenge that is

addressed in the project is the requirement to provide access to legacy data which has been created well before the emergence of the Internet, and which is supported by very heterogeneous systems.

http://aquarelle.inria.fr/aquarelle/EN/home-eng.html

BRAVA – Broadcast Restoration of Archives through Video Analysis

The project aims at developing tools for digital restoration of large amounts of broadcast archive documents (video and film), for re-exploitation purposes. It will build upon earlier developments realised within the framework of the Aurora project. BRAVA will provide tools for re-exploiting the huge archives programme stocks available from archives such as INA, BBC, RTP or RAI.

http://www.ina.fr/Recherche/Brava/index.en.html

CYCLADES – An open Collaborative Virtual Archive Environment

The main objective of CYCLADES is to develop advanced Internet accessible mediator services to support scholars both individually and as members of networked communities when interacting with large interdisciplinary electronic (e-print) archives. Such archives are important vehicles for the dissemination of preliminary results and non-peer reviewed "grey literature". CYCLADES aims at supporting the transition of e-print systems into genuine building blocks of a transformed scholarly communication model by developing a set of leading edge technologies providing innovative methods for information access, dissemi-nation, sharing and collaborative work.

http://www.iei.pi.cnr.it/cyclades/

MESMUSES – Metaphors for Science Museums

MESMUSES (2001-2003) aims at designing and experimenting metaphors for organi-sing, structuring and presenting the scientific and technical knowledge offered to the public by scientific museums. These metaphors are built upon knowledge maps which define and connect neighbouring knowledge domains. These maps enable the creation of semantic portals through which users will easily locate information relevant to their current interest, and from which they navigate either on predefined itineraries, or on new routes that they will choose freely on the map.

http://aquarelle.inria.fr/mesmuses/cameo.html

Germany

AMICITIA – Asset Management Integration of Cultural Heritage in the Interexchange between Archives

AMICITIA aims at building the base for a continued and viable digital preservation of and access to television and video content through the construction of various vital compo-nents enabling a digital archiving system to serve all required roles in ingest, management, access and distribution of audio-visual material. A special focus is placed on enabling remote, multilingual access to archive content stored in a distributed environment. The system will be designed to serve both the needs of professional users (regarding preser-vation, quality, access flexibility and usability) and the needs of public access (regarding simplicity of use, security and availability.

http://www.amicitia-project.net/ami_home.html

CARMEN – Content Analysis Retrieval and MetaData: Effective Networking

CARMEN (1999-2002) is a Global-Info funded project. The focus of CARMEN is on content analysis. It will develop new tools in the subject with strong connection to content retrieval. Efforts to give homogeneity and consistency to decentralised information environments try to create information systems for distributed data repositories. The project will approach content analysis with developments and prototypical implementations in three fields: Metadata, treatment of (remaining) heterogeneity, retrieval for structured documents and heterogeneous data types.

http://www.mathematik.uni-osnabrueck.de/projects/carmen

COLLATE – Collaboratory for Annotation, Indexing and Retrieval of Digitised Historical Archive Material

The term "collaboratory" (a merger of collaboration and laboratory) has been defined as a virtual centre in the Web, where professionals and lay persons are provided with means for interacting with colleagues, accessing instrumentation, sharing data and computational resources, and accessing information, e.g., in digital libraries and archives. COLLATE sets out to implement a "collaboratory in use" for the preservation and study of film censorship documents, photos and film fragments. The test collection is provided by three major European film institutes/archives. The project has two complementary overall goals: To ensure collaborative accessibility of cultural heritage, and to establish evidence for the applicability and usefulness of a collabo-ratory in the film historical domain.

http://www.collate.de/

DIEPER – Digitised European Periodicals

Partners from ten European countries, including the University of Göttingen, have joined to build a virtual network and a central access point to make accessible periodicals that have been retrospectively digitised in Europe or anywhere else in the world.

See also the digitsation projects of the University of Göttingen that will make accessible material of the Asch Collection (rare books, maps, manuscripts) and academic sources of the 18th and early 19th century (handbooks, compendia and otther key sources).

http://gdz.sub.uni-goettingen.de/dieper/
http://www.sub.uni-goettingen.de/ebene_1/1_projek-e.htm

GLOBAL INFO – The German Digital Library Project

The German Digital Libraries Project is imbedded in the Information Infrastructure Program of the German Federal Government for the years 1996-2000. It fosters co-operation between universities, scientific publishing houses (including various international publishers), book dealers, and special subject information centres, as well as academic and research libraries.

http://www.global-info.org

LEAF – Linking and Exploring Authority Files

LEAF (2001-2003) is developing a model architecture for a distributed search system that harvests existing name authority information. The goal is to automatically establish a user needs-based common name authority file in a specific sector highly relevant to the cultural heritage of Europe.

http://www.crxnet.com/leaf/index.html

MALVINE – Manuscripts and Letters via Integrated Networks in Europe

The MALVINE project opened new and enhanced access to disparate holdings of modern manuscripts and letters, kept and catalogued in European libraries, archives, documentation centres and museums. The idea of MALVINE is to build a network of these institutions in Europe; a network which is independent of heterogeneous technical solutions and which is accessible from all over the world as if being a homogenous unified database.

http://www.malvine.org/malvine/eng/index.html

Greece

ARCHEOGUIDE – Augmented Reality-based Cultural Heritage On-site Guide

The ARCHEOGUIDE project intends to provide new approaches for accessing information at cultural heritage sites in a compelling, user-friendly way through the development of a system based on advanced IT including augmented reality, 3D-visualization, mobile computing, and multimodal interaction techniques.

http://archeoguide.intranet.gr/

ARION – An Advanced Lightweight Architecture for Accessing Scientific Collections

ARION aims at providing a new generation of digital library services for search and retrieval of digital scientific collections that reside within research and consulting organisations. These collections contain data, programs and tools in various scientific areas and incorporate applications of different domains of knowledge.

http://dlforum.external.forth.gr:8080/

TOURBOT – Interactive Museum Tele-presence through Robotic Avatars

The goal of this project is to develop an interactive TOUr-guide RoBOT (TOURBOT) able to provide individual access to museums' exhibits and cultural heritage over the Internet. TOURBOT will operate as the user's avatar in a museum by accepting commands over the Web that direct it to move in its workspace and visit specific exhibits. As a result, the user enjoys a personalised tele-presence to the museum, being able to choose the exhibits to visit as well as the preferred viewing conditions (point of view, distance to the exhibit, resolution, etc). Furthermore, TOURBOT will be able to guide on-site museum visitors providing either group or personalised tours.

http://www.ics.forth.gr/tourbot/index.html

Ireland

Breaking the Silence — Voicing the Experience of 'Staying-at-home' in an Emigrant Society

The project will explore the social impact of emigration on Irish society by developing an on-line oral archive based on life history interviews on selected subjects. The project forms part of a tripartite study of migration and Irish life, being carried out together with the University of North London and New York University. It will capture living memories of Irish life in the 1940s and 1950s by interviewing those who remained in Ireland in these decades when so many were leaving. 'Breaking the Silence' will establish a national archive of digitally recorded interviews and make it widely accessible online.

http://migration.ucc.ie/oralarchive/

CHILDE – Children's Historical Literature Disseminated throughout Europe

CHILDE (2000-2002) will use web technology to allow wider and open access to each partner's collection of 19th century European children's literature. The aim is not only to develop a digitised selection of European historical children's illustrations, but also an education programme based on the collection and a body of knowledge and expertise in the preservation and conservation of children's literature. It is intended that the project will also provide the foundation for the development of an EU-wide network for historical children's literature.

http://www.iol.ie/resource/dublincitylibrary/CHILDE.htm

Text and Image

This project will lay the foundations of an electronic archive of images in all media produced in Ireland and Britain in the 6th-12th centuries, with a particular focus on the relationships between texts and images. The first stage of the project will involve the creation of an illustrated, annotated database of the iconographic sculpture of the insular world. In the long-term, it is hoped to expand this into an archive (electronic and photographic) of iconographic images in all media (manuscripts, metalwork, sculpture, painting, etc.) that were produced in Britain and Ireland during the early Middle Ages.

http://www.ucc.ie/textandimage/

Tracing Ireland's Lost Archaeology

By computerising and matching antiquarian records with museum registers this project aims to re-identify unprovenanced artefacts in Irish national collections and to trace objects of Irish provenance in museums abroad. A database of Irish antiquarian collectors and dealers also will be compiled.

http://doi.ucc.ie/archcoll.html

Italy

DELOS – Network of Excellence on Digital Libraries

The DELOS Network (2000-2003) is a support measure that aims at providing an open context in which an international research agenda for future research activities in the digital libraries domain is developed and continuously updated. The Network constitutes a reference point for all Digital Library projects funded in the 5th Framework Programme, stimulating the exchange of experiences and know-how in this multidisciplinary domain, and establishes close contacts with relevant application communities. It makes test-beds available, facilitates their interoperability, and provides mechanisms for the evaluation of models, techniques, and approaches, and the exchange of open-source software components.

http://www.ercim.org/delos/

ECHO – European Chronicles Online

ECHO (2000-2002) aims at developing a digital library service for historical films belonging to large national audio-visual archives. It will develop and demonstrate an open architecture approach to distributed digital film archive services. The open architecture will support service extensibility and interoperability.

http://pc-erato2.iei.pi.cnr.it/echo/

OpenHeritage – Enabling the European Culture Economy

The OpenHeritage is an IST-research project (2001-2002) funded under the 5th Framework Programme aiming to create an IT infrastructure and service to improve access to information resources and collections held by regional museums and galleries.

http://www.spacespa.it/openheritage/index.html

RENAISSANCE – A Virtual Journey in a Renaissance Court

Virtual Renaissance Court is a R&D project that aims at developing a new genre of edutainment applications featuring: a high quality graphical interface, networked co-operative environments, scientifically validated contents and an innovative pedagogical approach. This will enable the reproduction of historically fascinating environments while using the appealing interface of a game in order to teach history. The project foresees the development of a prototype reproducing life in a Renaissance court, a 3D multi player Internet application where the users can play the role of different courtiers at the same court.

http://renaissance.iridon.com/

Luxembourg

SCHEMAS – Forum for Metadata Schema Implementers

SCHEMAS provides a forum for metadata schema designers involved in projects under the IST Programme and national initiatives in Europe. SCHEMAS informs schema implementers about the status and proper use of new and emerging metadata standards. The project will support development of good-practice guidelines for the use of standards in local implementations and will investigate how metadata registries can support these aims.

http://www.schemas-forum.org/

Netherlands

EVA – European Visual Archive

The project aims at investigating issues of enhancing access to historical photographic collections. These issues include: copyright, selection procedures, user surveys, digitisation techniques, description standards, pricing policy and digital information management systems. Based on the outcomes of this research a web-based information system is being developed. The system will contain descriptions and digital images that belong to the photographic holdings of two City archives: the London Metropolitan Archives and the City Archives of Antwerp.

http://www.eva-eu.org

Projects of the Koninklijke Bibliotheek, National Library of the Netherlands

Atlas Van der Hagen en Atlas Beudeker (1997-1998), in co-operation with the British Library

Medieval Illuminated Manuscripts Digitised (1998-1999), in co-operation with Utrecht University, Department of Computer & Humanities.

Digitisation of black & white and colour microfilms (1998-1999)

Digital Historical Atlas (1999-2001), in co-operation with the Rijksmusem, Amsterdam.

http://www.kb.nl/kb/resources/frameset_kb.html?/kb/sbo/digi/digdoc-en.html

NEDLIB – Networked European Deposit Library

NEDLIB started in 1998 with funding from the European Commission's Telematics Application Programme. It aims at developing a common architectural framework and basic tools for building deposit systems for electronic publications (DSEP). The project addresses major technical issues confronting national deposit libraries that are in the process of extending their deposit, whether by legal or voluntary means, to digital works.

http://www.konbib.nl/nedlib/

PULMAN Network of Excellence

The PULMAN Network of Excellence was launched in 2001 under the European Commission's research programme for a User-Friendly Information Society (DG Information Society). Europe's public libraries and cultural organisations have a vital role to play in the development of an e-Europe. The PULMAN Network will stimulate and promote sharing of policies and practices for the digital era, in public libraries and cultural organisations which operate at local and regional level. Initial membership of the PULMAN Network includes representatives of 26 European countries.

http://www.pulmanweb.org/

RENARDUS – Academic Subject Gateway Service Europe

Renardus is a collaborative project that aims to improve academic users' access to a range of existing Internet-based information services across Europe. The project will improve access to existing Internet-accessible collections of cultural and scientific resources across Europe through a single interface. The collaborative approach has implications for organisational, technical and metadata standards.

http://www.renardus.org/

SEPIA – Safeguarding European Photographic Images for Access

SEPIA promotes awareness of the need to preserve photographic collections, provides training for professionals involved in preservation and digitisation of photographic collections and develops an overall framework for future projects in the area of preservation and access of photographic materials.

http://www.knaw.nl/ecpa/sepia/

Norway

CultureNet Norway

CultureNet Norway, launched in 1999, is a government sponsored multi-purpose gateway to cultural institutions and events in Norway. It was established in accordance with recommendations made by the Ministry of Cultural Affairs in a 1997 report on ICT in the culture sector. CultureNet is structured in four networks: Archives, Libraries, Art and Museums.

http://www.kulturnett.no/html/cnn.html

Netting Local History in Norway – An ALM Project

Netting Local History is an initiative that follows up the request from the Norwegian government for a closer collaboration between archives, libraries and museums (ALM). This network-project, initiated and organised by the Norwegian Directorate for Public Libraries, covers seven local projects with different aims and activities. Its main objectives are to develop collaboration in the sector of museums, libraries and archives, and try out network

organisation in the development of public libraries in order to improve the public's access to records on local history by utilising the digital technologies.

http://www.cultivate-int.org/issue3/history/
http://samson.bibtils.no/Tilskudd/prosjekter/skjerm/index.htm

ONE

ONE (1997) was a collaborative project co-financed by the European Commission's Libraries Programme involving 15 organisations in 8 European countries. ONE's goal was to provide library users with better ways to access library OPACs and national catalogues and to stimulate and facilitate networking between libraries in Europe.

http://www.dbc.dk/ONE/oneweb.index.html

Portugal

Past Signs and Present Memories – Euro Pre-Art

The project aim at establishing a database of European prehistoric art documentation, including images, to provide a basis of an European institutional network of units devoted to this domain. It will improve methodologies on techniques of inventory, storing data, interdisciplinarity, networking and accessibility/diffusion through the use of information technologies. Furthermore, it will contribute to the awareness, among European population, of the diversity and richness of European Prehistoric Art, as one of the oldest artistic expression of humankind.

http://europreart.net/index.htm

GEIRA – Multimedia Information Services on the Scientific and Cultural Hheritage in North Portugal

Goals of this project are to promote the Portuguese scientific and cultural heritage and to stimulate an adequate use of the natural environment. Topics of the project include: observatory of science and technology in higher education; online cataloguing and access to the documented heritage in libraries and archives; multidisciplinary characterisation of the natural heritage - archaeology, biology, geology.

http://www.geira.pt/

25th April 1974 – From Ephemera to History

25th April 1974 – from ephemera to history is a project of the National Library of Portugal that aims to record and digitise ephemeral collections, from the National Library and from private collectors, on the subject of the 1974 revolution in Portugal.

http://portico.bl.uk/gabriel/en/reports/portugal-98-99.html

Vidion - An On-Line Archive for Video

Vidion is a national project involving RTP (public national TV broadcaster), INESC (research institute) and Europarque (responsible for a science centre). It is concerned with the conversion, restoring and preservation of an audio-visual library of more than 400.000 documents representing more than 300 000 hours of video. Vidion will propose a strategy for the evolution towards the digital domain of the complete RTP archive, and will develop an archive to be used by the news service of RTP.

http://newton.inescu.pt/projects/vidion/

Spain

Clásicos Tavera

Clásicos Tavera is a project undertaken by the Biblioteca Nacional in co-operation with the Fundación Histórica Tavera. It includes the digitised text of classic and key works in the history of Spain and Iberoamérica in every field of learning. Some 4,000 titles will be scanned within 4 years. Clásicos Tavera will include two complementary areas: general information sources and specific themes. The former will include manuscript collections, specialist archives, theses, bibliographies, and the like; while the latter will cover colonial and constitutional legislation, genealogy, cartography, architecture, medicine, science, and the history of literature on the Iberian peninsula.

http://www.lib.uchicago.edu/e/su/hist/taveratitles.html

COVAX – Contemporary Culture Virtual Archive in XML

The main purpose of COVAX is to test the use of XML to combine document descriptions and digitised surrogates of cultural documents to build a global system for search and retrieval, increasing accessibility via the Internet to electronic resources, regardless of their location.

http://www.covax.org/

Memoria Hispanica

Memoria Hispanica (started in 1995) is the main digitisation project of the Biblioteca Nacional of Spain. The project involves the digitisation of unique works, items of extreme rarity and other treasures of the Biblioteca Nacional, the books most often sought by readers – provided these are not subject to copyright – and the volumes most susceptible to deterioration. The scanned images will be linked up with the corresponding bibliographical description in the data base of the Biblioteca Nacional, ARIADNA, and made accessible online.

http://www.bne.es/ingles/europ4.htm

Sweden

CulturNet Sweden

CultureNet Sweden was initiated by the Swedish government to increase access to Swedish culture through the Internet. CultureNet Sweden started out as a three-year project between 1997-1999 and is now a permanent responsibility of the Swedish National Council for Cultural Affairs. CultureNet Sweden is a centre of competence in the use of IT for culture, and maintains close links to Swedish cultural web sites.

http://www.kultur.nu

DERAL – Distance Education in Rural Areas via Libraries

DERAL (1998-2000) encouraged public libraries to play an increasingly important part in transferring information, knowledge and education to users who have difficulty in following courses of study delivered through formal education institutions.

http://www.iol.ie/resource/dublincitylibrary/deral.htm

ETB – The European Schools Treasury Browser

The ETB is the European SchoolNet's web-based educational resource infrastructure for schools in Europe. It is linking together existing national, local or specialised repositories, encouraging new online publication, and providing a reliable level of quality and structure. It wants to create a dynamic metadata network; gateways to existing metadata-driven

education systems; a multilingual educational subject classification; an intelligent metadata authoring tool for educators; quality assurance systems; searchable metadata registries — a full set of harmonisation actions.

http://www.eun.org

Kulturarw3

Kulturarw3 is a project of The Royal Library, National Library of Sweden, focusing on archiving and long-term preservation of electronic documents. The aim of the project is to test methods of harvesting, preserving and providing access to Swedish electronic documents which are accessible on line in such a way that they can be regarded as published. Through this project, the library is building a collection of Swedish electronic publishing for our time and for coming generations.

http://kulturarw3.kb.se/html/kulturarw3.eng.html

LCSH – Library of Congress Subject Headings

The Royal Library is co-developing a project of adapting Swedish subject headings to the Library of Congress Subject Headings (LCSH) and their guidelines. The database Svenska ämnesord (Swedish subject headings) is in the process of being translated and adapted to LCSH. The overall planning aims to raise the quality rating of LIBRIS subject headings, to facilitate and promote matters concerning subject headings, and co-operation on a national and international level.

http://www.kb.se/Bus/lcsheng.htm

RUNEBERG

This project aims at publishing free electronic editions of old (out of copyright) books from Sweden and other Nordic countries on the Internet. The catalogue of Nordic Literature on the Internet since 1992 lists more than 200 titles, most of which are in Swedish. Project Runeberg is built on voluntary co-operation — with hundreds of volunteers around the world.

http://www.lysator.liu.se/runeberg/

United Kingdom

AGORA

Agora's objective is to explore issues of distributed, mixed-media information management, based on an open standards-based platform. This objective includes developing the scalability, enabling infrastructure and change-management tools for successful widespread dissemination and implementation throughout the community.

http://hosted.ukoln.ac.uk/agora/

CEDARS – CURL Exemplars in Digital Archives

The project aims to promote awareness of the importance of digital preservation, to produce strategic frameworks for digital collection management policies and to promote methods appropriate for long-term preservation. The Cedars project is a UK digital preservation project funded by JISC/CEI through the Electronic Libraries Programme (eLib). The project is under the overall direction of the Consortium of University Research Libraries (CURL).

http://www.ukoln.ac.uk/metadata/cedars/

IMesh Toolkit – An architecture and toolkit for distributed subject gateways

The IMesh Toolkit project is funded under the NSF/JISC International Digital Libraries Initiative. The project runs for a period of three years starting from September 1999. The project will build on existing subject gateway software to develop a configurable, reusable and extensible toolkit for subject gateway providers. A complementary research strand will consider issues of relevance in the distributed, international subject gateway environment, including metadata sharing and reuse. The toolkit will support the research activity and the research activity will guide the development of the toolkit.

http://www.imesh.org/toolkit/

MODELS

MODELS is a UKOLN initiative supported by the Electronic Libraries Programme and the British Library. It is motivated by the recognised need to develop an applications framework to manage the rapidly multiplying range of distributed heterogeneous information resources and services being offered to libraries and their users. Without an appropriate framework, use of networked information will not be as effective as it should be. MODELS is providing a forum within which the UK library and information communities can explore shared concerns, address design and implementation issues, initiate concerted actions, and work towards a shared view of preferred systems and architectural solutions.

http://www.ukoln.ac.uk/dlis/models/

XI.4 Bibliography

Archivschule Marburg; Metzing Andreas (2000): Digitale Archive – Ein neues Paradigma? Beiträge des Vierten Archivwissenschaftlichen Kolloquiums. Marburg.

Baldini, Umberto (1999): Foreword to the newsletter of the project Safeguard of Cultural Heritage, www.culturalheritage.cnr.it/news/safeguard/default.htm (26-11-2001).

Beagrie, Neil (1998): Developing a Policy Framework for Digital Preservation. Presentation at: 6th DELOS Workshop. Preservation of Digital Information, Tomar, Portugal, 17-19 June 1998. <http://www.ercim.org/publication/ws-proceedings/DELOS6/neil.pdf>

Barber, Benjamin R. (1996): Jihad vs. McWorld. New York.

Bearman, David; Trant, Jennifer (1998): Authenticity of Digital Resources. In: D-Lib Magazine, No. 6, Vol. 4, June 1998, http://www.dlib.org/dlib/june98/06bearman.html (14-08-2001).

Berners-Lee, Tim; Hendler, James; Lassila, Ora (2001): The Semantic Web. In: Scientific American, Issue 5, May 2001, http://www.sciam.com/2001/0501issue/0501berners-lee.html (29-08-2001).

Blood, Rebecca (2000): Weblogs: a history and perspective, http://www.rebeccablood.net/essays/weblog_history.html (26-10-2001).

Bluestone, Daniel; Klamer, Arjo; Throsby, David; Mason, Randall (1998): The Economics of Heritage Conservation: A Discussion. In: Getty Conservation Institute (1998): Economics and Heritage Conservation. A Meeting Organised by the Getty Conservation Institute, December 1998, p. 19-22, http://www.getty.edu/conservation/resources/econrpt.pdf (12-03-2001).

Bonett, Monica (2001): Personalisation of Web Services: Opportunities and Challenges. In: Ariadne, Issue 28, June 2001,
http://www.ariadne.ac.uk/issue28/personalization/intro.html (26-10-2001).

Bower, Jim; Roberts, Andrew (1995): Developments in museum and cultural heritage information standards, http://www.cidoc.icom.org/stand1.htm (10-10-2001).

Boyd, Frank; Brickwood, Cathy; Broeckmann, Andreas; Haskel, Lisa; Kluitenberg, Eric; Stikker, Marleen (1999) (Eds.): New Media Culture in Europe. Amsterdam.

Brand, Stewart (1998): Written in the Wind. In: Civilisation Magazine, October/November 1998, http://www.britannica.com/magazine/article?content_id=105596&query=amiga (22-10-2001).

Brenton, Hilary (2000): The Moving Frontier: Archiving, Preservation and Tomorrow's Digital Heritage. <http://www.nla.gov.au/nla/staffpaper/hberthon2.html>

Buchanan, Sandy (1999): Unlocking the Treasure Chest Using SCRAN Tools, http://www.archimuse.com/mw99/papers/buchanan/buchanan.html (15-10-2001).

Buckman, Rebbeca (2001): Writing a New Chapter: Libraries aren't going away. But they are going to be very different. In: The Wall Street Journal, March 12, 2001, http://www.wsj.com/public/current/articles/SB984075124314617961.htm (14-09-2001).

Carley, Michael J. (1999): Publish Well and Wisely: A Brief Guide for New Scholars, http://www.matrix.msu.edu/innermatrix/writingguide.cfm (27-10-2001).

Castells, Manuel (1996): The Rise of the Network Society. The Information Age: Economy, Society and Culture. Volume I. Malden, Oxford.

Cathro, Warwick (2001): Smashing the Silos: Towards Convergence in Information Mana-
gement and Resource Discovery. Paper presented at: The Information Orienteering
Conference, Canberra, Australia, April 5, 2001,
http://www.nla.gov.au/nla/staffpaper/2001/cathro2.html (28-07-2001).

Chatrie, Isabelle; Wraight, Paul; LL&A (2000): Public Strategies for the Information Society
in the Member States of the European Union – An ESIS report,
http://europa.eu.int/ISPO/docs/services/docs/2000/October/
ESIS_IS_Strategies_en.pdf (21-02-2001).

CHIN, Canadian Heritage Information Network (1999): Like Light Through a Prism:
Analyzing Commercial Markets for Cultural Heritage Content, Prepared for CHIN by
The/Marketing/Works and Phase 5 Consulting Group. January 1999.

Collins Allan; Smith, Edward E. (1988) (Eds.): Readings in Cognitive Science – a
Perspective from Psychology and Artificial Intelligence. Morgan Kaufmann Publishers.

Commission of the European Communities (2000a): Designing tomorrow's education.
Promoting innovation with new technologies. Report from the Commission to the
Council and the European Parliament, January 1, 2000, COM(2000) 23 final. Brussels.
<http://europa.eu.int/comm/education/socrates/minerva/design.pdf>

Commission of the European Communities (2000b): e-Learning – Designing tomorrow's
education. Communication from the Commission. May 24, 2000, COM(2000) 318 final.
Brussels, <http://europa.eu.int/comm/education/elearning/comen.pdf>

ContentBiz (2001): Resource Review: Selling Subscriptions to Internet Content, May 24,
2001, http://www.contentbiz.com/sample.cfm?contentID=1690 (25-10-2001).

Cook, Lynn (2001): Academic Overture. In: Forbes Magazine, February 4, 2001,
http://www.questia.com/forbes.jsp (01-10-2001).

Council for Cultural Co-operation, Culture Committee (1999): New information
technologies: Training, qualifications and professional profiles. Strasbourg, France, August
18,1999. DECS/CULT-NT/qual (99) 4.

Council of the European Union; Commission of the European Communities (2000):
eEurope 2002 Action Plan. An Information Society for All,
http://europa.eu.int/information_society/eeurope/action_plan/pdf/actionplan_en.pdf
(22-04-2001).

Danish Ministry of Culture, http://www.kum.dk (12-03-2001).

Davenport, Thomas; Prusak, Laurence (1998): Working Knowledge. How Organizations
Manage What They Know. Boston.

DCMS Creative Industries Task Force (1998): Creative Industries Mapping Document,
October 1988, http://www.culture.gov.uk/creative/mapping.html (05-04-2001).

DCMS, Department for Culture, Media and Sport: Culture Online,
http://www.cultureonline.gov.uk/html/intro/intro01.html (03-11-2001).

Edvinsson, Leif; Malone, Michael S. (1997): Intellectual Capital. The proven way to establish
your company's real value by measuring its hidden brainpower. London.

EUREKA: Using EUREKA to secure our heritage. In EUREKA News 54, August 2001,
www3.eureka.be/home/eurekanews/54/heritage.html (26-11-2001).

European Commission, DG Information Society, Unit D2, Cultural heritage applications
(2000a): Digital Culture & the Information Society. Report of the workshop on
digitisation. 24 January 2000, <Luxembourg,
ftp://ftp.cordis.lu/pub/ist/docs/DigiCULT/digitisation–march00.pdf>

European Commission, DG Information Society, Unit D2, Cultural heritage applications (2000b): Libraries, museums and archives: an analysis of cross-domain collaboration using new technologies. PROLIB ALM – Ref.: PB/KS/el - XIII

EVA 2001 Florence; Cappellini, Vito; Hemsley, James (2001) (Eds.): Electronic Imaging & the Visual Arts. Proceedings of the EVA 2001 conference, March 26-30, Florence, Italy.

Ferrari, Angelo (2000): Il contributo del CNR alla salvaguardia del nostro patrimonio culturale. In: Ricerca & Futuro, Nr. 18 / 2000, www.area.fi.cnr.it/r&f/n18/ferrari1.htm (26-11-2001).

Ferrari, Angelo, Tardiola, Stefano (2000): L'anagrafe dei ricercatori e delle emprese che operano nel settore dei beni culturali. In: Ricerca & Futuro, Nr. 16 / 2000, www.area.fi.cnr.it/r&f/n16/ferrari1.htm (26-11-2001).

Finnish Library Journal (2000): Crazy about the net?, November 7, 2000, http://www.kaapeli.fi/~fla/flj/topics/netcrazy.htm (09-04-2001).

Fink, Eleanor E.; Ronchi, Alfredo (2001): Future of Online Culture. Opening address at: 10th World Wide Web Conference. WWW10 Culture Track: Promoting the Future of Online Culture, Hong Kong, May 3, 2001, http://www.medicif.org/nevents/MEDICI_events/Www10/Fink_Ronchi.htm (20-09-2001).

Fiore, Sandra: Al CNR un incontro italo-statunitense sulle tecnologie per i beni culturali (interview with Angelo Guarino). In: Ricerca & Futuro, Nr. 20 / 2001, www.area.fi.cnr.it/r&f/n20/eventi2.htm (26-11-2001).

Gallart, Núria (2000): The Future of Copyright Management: Library Perspectives. Paper at: 66th IFLA Council and General Conference, Jerusalem, Israel, August 13-18, 2000, http://www.ifla.org/IV/ifla66/papers/172-184e.htm (30-10-2001).

Gates, Dominic (2001): Art.com has too much red ink. In: The Standard, May 19, 2001, www.thestandard.com/article/0,1902,24574,00.html (12-09-2001).

Gervais, Daniel J. (1999): Electronic Rights Management and Digital Identifier Systems. In: Journal of Electronic Publishing, Issue 3, Vol. 4, March 1999, http://www.pressumich.edu/jep/04-03/gervais.html (22-08-2001)

Getchell, Phillip; LaKind, Debra (2000): Zero to Million $ in one year flat, http://www.archimuse.com/mw2000/papers/getchell/getchell.html (22-10-2001).

Gill, Tony (2001): 3D Culture on the Web. In: RLG (Research Libraries Group) –DigiNews, No. 3, Vol. 5, June 15, 2001, http://www.rlg.org/preserv/diginews/diginews5-3.html (29-10-2001).

Greenstein, Daniel (2001): Preface. In: Pitschmann, Louis A. (2001): Building Sustainable Collections of Free Third-Party Web Resources. Council on Library and Information Resources (CLIR), June 2001, http://www.clir.org/pubs/reports/pub98/contents.html (05-08-2001).

Guarino, Angelo (1999): Introduction to the newsletter of the project Safeguard of Cultural Heritage, www.culturalheritage.cnr.it/news/safeguard/default.htm (25-11-2001).

Guarino, Angelo (2001): Portale beni culturali. Piano di fattibilità. Progetto finalizzato beni culturali. CNR, marzio 2001.

Harris, Lesley Ellen (2000): Librarians and E-Commerce: Making E-Commerce Work for you. In: IFLA journal, No. 2, Vol. 26, 2000, http://www.ifla.org/V/iflaj/jour2602.pdf (14-05-2001).

Hartigan, Rachel (2001): Notes from an E-lecture: MIT's Web giveaway, In: usnews.com, Science & Ideas, April 16, 2001, http://www.usnews.com/usnews/issue/010416/mit.htm (30-10-2001).

Hendley, Tony (1988): Comparison of Methods & Costs of Digital Preservation. British Library Research and Innovation Report 106. A Consultancy Study.

Hindal, Sidsel; Moseid, Tone (2001): Netting Local History in Norway – An ALM Project. In: Cultivate Interactive, issue 3, January 29, 2001, http://www.cultivate-int.org/issue3/history/#ref–05 (07-03-2001).

Hudson, Kenneth (1996): Ecomuseums become more realistic. In: Nordisk Museologi, No. 2, Vol. 4, 1996, http://www.umu.se/nordic.museology/NM/962/hudson962.html (27-09-2001).

IFLA (2000): Licensing Principles. Prepared by IFLA's Committee on Copyright and other Legal Matters, http://ifla.inist.fr/V/ebpb/copy.htm (29-09-2001).

Institute for the Future (2000): Marketing Strategies: What's new in the new economy?, Jannuary 2000, http://www. iftf.org (17-06-2001).

Isaias, Pedro (1999): Technology Issues and Electronic Copyright Management Systems. In: Ariadne, Issue 21, September 1999, http://www.ariadne.ac.uk/issue21/ecms/ (17-09-2001).

Jackson, Tim (2001): Over Here: Tried-and-true business models are back. In: Red Herring magazine, June 1, 2001,
http://www.redherring.com/index.asp?layout=story_imu&doc_id=880019488&channel=40000004 (03-09-2001).

Jameson, Frederic; Miyoshi, Masao (1998) (Eds.): The Cultures of Globalization. London.

Johansen, Robert (1991): Groupware: Future directions and wild cards. In: Journal of Organizational Computing, No. 1, Vol. 2 (1991), p. 219-227.

Jones, Maggie (2000): A Workbook for the Preservation Management of Digital Materials. Paper presented at: Preservation 2000. An International Conference on the Preservation and Long Term Accessibility of Digital Materials, York, UK, December 7-8, 2000, http://www.rlg.ac.uk/eventsa/pres-2000/jones.html. (15-04-2001).

Kennisnet, http://www.kennisnet.nl/ (18-05-2001).

Klein, Alec; Johnson, Carrie (2000): Number of women on the Internet surpasses men. In: Washington Post, August 9, 2000, www.genealogy.com/news-081000.html (25-10-2001).

Krohnengold, Jay (1996): Pacific Bell Sponsors Opening of San Francisco's New Main Library, http://www.kn.pacbell.com/news/1996/sflib2.htm (22-10-2001).

KulturNet Denmark: http://www.kulturnet.dk/index.html (17-07-2001).

Kuny, Terry; Cleveland, Gary (1998): The Digital Library: Myths and Challenges. In: IFLA Journal, No. 2, Vol. 24, 1998, http://www.ifla.org/V/iflaj/jour2402.pdf (28-08-2001).

Leadbeater, Charles (2001): Culture Online: The Vision. Department of Culture, Media and Sport, http://www.cultureonline.gov.uk/vision.pdf (03-11-2001).

LEAF – Linking and Exploring Authority Files Homepage, http://roadrunner.crxnet.com/leaf2/leaf_june_2001/index.html (04-09-2001).

Lord, Barry; Lord, Gail Dexter (1998): The Manual of Museum Management. London: The Stationary Office.

The Lund Principles: Conclusions of the expert meeting, Lund, Sweden, April 4, 2001, ftp://ftp.cordis.lu/pub/ist/docs/DigiCULT/lund_principles-en.pdf (29-08-2001).

Lyman, Peter; Kahle, Brewster (1998): Archiving Digital Cultural Artefacts. Organizing an Agenda for Action. In: D-Lib Magazine, No. 7/8, Vol. 4, July/August 1998, http://www.dlib.org/dlib/july98/07lyman.html (23-02-2001).

Lynch, Clifford (1998): A White Paper on Authentication and Access Management Issues in Cross Organizational Use of Networked Information Resources, http://www.cni.org/projects/authentication/authentication-wp.html (16-08-2001).

MacLeod, Donald (2001): Fathom it out. In: The Guardian, May 8, 2001, http://education.guardian.co.uk/Print/0,3858,4182126,00.html (30-10-2001).

Mallinson, John C. (1986): Preserving Machine-Readable Archival Records for the Millennia. In: Archivaria 22 (Summer), 1986, p. 147-52.

Mannerheim, Johan (2000): The WWW and our digital heritage – the new preservation tasks of the library community. Paper at: 66th IFLA Council and General Conference, Jerusalem, Israel, August 13-18, 2000, http://ifla.org/IV/ifla66/papers/158-157e.htm (14-03-2001).

Mannoni, Bruno (1996): Bringing Museums On Line, June 1996, http://www.multimania.com/mannoni/cacm.htm (07-09-2001).

McGuigan, Jim (1996): Culture and the Public Sphere. London.

Miller, Paul (2000): Interoperability. What is it and Why should I want it? In: Ariadne, Issue 24, June 2000, http://www.ariadne.ac.uk/issue24/interoperability/ (24-08-2001).

Ministère de la Culture et de la Communication (2001): Dossier Les espaces culture multimedia. Lettre d'Information, Nr. 79, March 26, 2001, http://www.culture.gouv.fr/culture/actualites/politique/culture-recherche/index-recherche.htm (19-04-2001).

Ministry of Education/Culture and Media Division; Kekki, Kirsti (2001): Public Libraries in Finland – Gateways to Knowledge and Culture. <http://www.minedu.fi/minedu/culture/libraries_gateways.html>

Ministry of Education, Culture and Science; Information Department (1996): Cultural Policy 1997-2000 – Armour or Backbone, Summary. <http://www.minocw.nl/por/uk/voorwrd.htm>

Ministry of Education, Culture and Science (1998): Cultural Policy in the Netherlands. <http://www.minocw.nl/english/cubeleid_engels/index.htm>

Ministry of Education, Culture and Science (1998): Cultural policy in the Netherlands, http://www.minocw.nl/english/cubeleid_engels/index.htm (05-05-2001).

Ministry of Education, Culture and Science, ICT Directorate (2000): ICT in Education in the Netherlands – Current situation and agenda for the future, http://www.ictonderwijs.nl/documenten/ict_in_Education_november2000.pdf (18-05-2001).

Ministry of Research and Information Technology (1996): Info-Society for all- the Danish model. IT Policy Statement 1996 to the Folketing and IT Policy Action Plan 1996, http://www.fsk.dk/fsk/publ/1996/it96-uk/ (10-03-2001).

Mirapaul, Matthew (2001): Guggenheim's latest branch is to open in cyberspace. In: The New York Times on the web, April 30, 2001 (09-09-2001).

Mundy, Simon (2000): Cultural policy. A short guide. Council for Cultural Co-operation, Council of Europe Publishing.

National Library of Australia (2001): Managing Web Resources for Persistent Access, http://www.nla.gov.au/guidelines/2000/persistence.html (13-10-2001).

National Preservation Office; Feeney, Mary (1999) (Ed.): Digital culture: maximising the nation's investment, February 1999, http://www.bl.uk/services/preservation/digcult.html (15-08-2001).

NEDLIB 3; Bide, Mark & Associates (2000): Standards for Electronic Publishing. An Overview. Report 3 of the NEDLIB report series. Koninklijke Biblioteek, The Hague.

NEDLIB 4; Feenstra, Bendert (2000): Standards for the Implementation of a Deposit System for Electronic Publications (DSEP). Report 4 of the NEDLIB report series. Koninklijke Biblioteek, The Hague.

Norman, Donald A.; Nielsen Norman Group Report (1998): The life cycle of a technology: Why it is so difficult for large companies to innovate, http://www.nngroup.com/reports/life_cycle_of_tech.html (29-10-2001).

Österreichische Kulturdokumentation. Internationales Archiv für Kulturanalysen; Ellmeier, Andrea; Ratzenböck, Veronika (Eds.) (1999): Cultural Competence: New Technologies, Culture & Employment. Proceedings of the Publication of the EU Conference, 1-3 October 1998 in Linz, Vienna.

Olson, Gary M.; Olson, Judith S. (2000): Distance matters. In: Human Computer Interaction, No. 2/3, Vol. 15, p. 139-179.

Oppenheim, Charles (2000): How Should Libraries Respond to Changing Market Conditions, http://www.ub.uni-bielefeld.de/aktuell/2000conf/vortrag/Opp1.pdf (02-07-2001).

Peacock, Alan (1994): A Future for the Past. The Political Economy of Heritage. Edinburgh.

Pedler, Mike; Burgoyne, John; Boydell, Tom; (1996): The Learning Company: A Strategy for Sustainable Development. London.

QUEST (2000): Creating e-Value. The Department for Culture, Media and Sport's Sponsored Bodies and the Internet. A report to the Secretary of State for Culture, Media and Sport from the Quality, Efficiency and Standards Team (QUEST), August 2000. <http://www.culture.gov.uk/role/index.html> (12-04-2001).

Rappa, Michael (2000): Business models on the web, http://ecommerce.ncsu.edu/business_models.html (29-06-2001).

Rayport, Jeffrey F (1999): The Truth about Internet Business Models. In the end, an e-business is just another business, http://www.strategy-business.com/briefs/99301/page1.html (28-06-2001). Also available at: http://www.strategy-business.com/pdf/099301.pdf (05-09-2001).

Rogers, Everett (1995): Diffusion of innovations. New York.

Ross, Seamus (2000): Changing Trains at Wigan: Digital Preservation and the Future of Scholarship. National Preservation Office, Preservation Guidance, UK. <http://www.bl.uk/services/preservation/occpaper.pdf>

Ross, Seamus; Economou, Maria; Anderson, Jane (1998): Funding Information and Communications Technology in the Heritage Sector. Policy Recommendations to the Heritage Lottery Fund. <http://www.hatii.arts.gla.ac.uk/HLFICT/>

Rusbridge, Chris (1998): Towards the Hybrid Library. In: D-Lib Magazine, No. 7/8, Vol. 4, July/August 1998, http://www.dlib.org/dlib/july98/rusbridge/07rusbridge.html (05-04-2001).

Rusbridge, Chris (2001): After eLib. In: Ariadne, Issue 26, January 10, 2001, http://www.ariadne.ac.uk/issue26/chris/intro.htm (22-09-2001).

Russell, Rosemary; Gardner, Tracy; Miller, Paul (1999): MIA Requirements Analysis Study: Hybrid Information Environments – Overview and requirements. UKOLN, Version 0.1, Draft, July 22, 1999, http://www.ukoln.ac.uk/dlis/models/requirements/overview/ (10-10-2001).

Ryll, Christine; Collier, Phillippe (2001): Wrinkles and all. In: Connectis, September 2001, http://specials.ft.com/connectis/FT393C3SRRC.html (25-10-2001).

San Francisco Public Library: Post Occupancy Evalution, http://206.14.7.53/documents/poe_executive_summary.html (23-09-2001).

Scali, Gabriele; Tariffi, Flavio; Cuomo, Stefano; Kockelkorn, Hub; DeLouis, Dominique; Mallen, George (2001): OpenHeritage: Enabling the European Culture Economy. In: Cultivate Interactive, issue 5, October 1, 2001, http://www.cultivate-int.org/issue5/openheritage/ (09-10-2001).

Schwarz, Hans-Peter (1997): Media Art History: Media Museum, ZKM Center for Art and Media Karlsruhe. Munich.

Senge, Peter M. (1990): The Fifth Discipline. The Art and Science of the Learning Organization. New York, London.

Sims, Rod (1995): Interactivity: A Forgotten Art?, http://www.gsu.edu/~wwwitr/docs/interact/ (25-10-2001).

SITRA, The Finnish National Fund for Research and Development (1998): Quality of life, knowledge and competitiveness – Premises and objectives for strategic development of the Finnish information society. Helsinky.
<http://194.100.30.11/tietoyhteiskunta/english/st51/eng206b.htm>

Smith, Abby (2000): Building Digital Libraries: Small Is Beautiful. In: CLIR issues, Nr. 18, November/December 2000, http://www.clir.org/pubs/issues/issues18.htmL#building (12-02-2001).

Smith, Abby (2001): Building and Sustaining Digital Collections: Models for Libraries and Museums. Council on Library and Information Resources (CLIR), August 2001, http://www.clir.org/pubs/reports/pub100/contents.html (02-11-2001).

Society of American Archivists (1994): Standards for Archival Description: A Handbook, http://www.archivists.org/catalog/stds99/intro.html (4-09-2001).

Stone, Amey (2000): Interactive TV's Really Big Picture. In: Business Weak online, Sept. 7, 2000, http://www.businessweek.com/bwdaily/dnflash/sep2000/nf2000097_655.htm (05-07-2001).

Streeten, Paul (2000): Culture and sustainable development: another perspective. In: The International Bank for Reconstruction And Development/THE WORLD BANK (2000): Culture counts. Financing, Resources, and the Economics of Culture in Sustainable Development. Proceedings of the Conference, Florence, Italy, October 4-7, 2001. Washington, p. 41-48.

Stuer, Peter; Meersman, Robert; Bruyne, Steven De; STARLab VUB (2001): The HyperMuseum Theme Generator System: Ontology-based Internet Support for the Active Use of Digital Museum Data for Teaching and Presentation, http://www.archimuse.com/mw2001/papers/stuer/stuer.html (25-10-2001).

Task Force on Archiving of Digital Information; Waters, Donald; Garrett, John (1996): Preserving Digital Information. Report of the Task Force on Archiving of Digital Information, May 1996, ftp://ftp.rlg.org/pub/archtf/final-report.pdf (24-08-2001).

Tennant, Roy (2001): Different Paths to Interoperability. In: Library Journal, 02/2001, http://www.libraryjournal.com/articles/ifotech/digitallibraries/20010215_17495.asp (23-10-2001).

Thibodeau, Kenneth (2001): Building the Archives of the Future: Advances in Preserving Electronic Records at the National Archives and Records Administration. In: D-Lib Magazine, No. 2, Vol. 7, February 2001, http://www.dlib.org/dlib/february01/thibodeau/02thibodeau.html (08-10-2001).

Throsby, David (1999): Economic and Cultural Value in the Work of Creative Artists. In: The Getty Conservation Institute (2000): Values and Heritage Conservation. Research Report, the Getty Conservation Institute, http://www.getty.edu/conservation/resources/valuesrpt.pdf (12-03-2001).

Throsby, David (2000): The economic dimension of culture: An analytic perspective. In: The International Bank for Reconstruction And Development/THE WORLD BANK (2000): Culture counts. Financing, Resources, and the Economics of Culture in Sustainable Development. Proceedings of the Conference, Florence, Italy, October 4-7, 2001. Washington, p. 38-41.

Timmers, Paul (1998): Business Models for Electronic Markets. In: Electronic Markets, No. 2, Vol. 8, April 1998, 3-8, http://www.electronicmarkets.org/netacademy/publications.nsf/all_pk/949/$file/v8n2_timmers.pdf?OpenElement&id=949 (05-07-2001).

Top, Derek (2001): Business Model Focus: The Case for Syndication. In: Streamingmedia.com Newsletter, January 2, 2001, http://www.streamingmedia.com/newsletter/010401.html (07-05-2001).

Varine, Hugues de (1993): Tomorrow's Community Museums, http://www.hdg.de/Final/deu/page508.htm (03-07-2001).

Warnecke, Günter; Stammwitz, Gerd; Hallfell, Frank (1998): Intranets als Platform für Groupware-Anwendungen. In: Industrie Management, No. 14, Vol. 1, 1998, p. 24-28, http://www.cck.uni-kl.de/CCK/Zusatz/CSCW/ (21-10-2001).

Waters, Donald J. (1998): What Are Digital Libraries? In: CLIR issues, No. 4, July/August, 1998, http://www.clir.org/pubs/issues/issues04.html (11-06-2001).

Webb, Colin (2000): Limitations and pitfalls of digitisation. Paper presented at: Pacific History Association Conference, Canberra, Australia, June 2000, http://www.nla.gov.au/nla/staffpaper/2000/webb5.html (28-07-2001).

Webster, Duane (2000): Emerging Responses to the Science Journal Crisis. In: IFLA journal, No. 2, Vol. 26, 2000, http://www.ifla.org/V/iflaj/jour2602.pdf (06-08-2001).

Weise, Elizabeth (2000): In a Web first, women are in the majority. In: USA today, August 9, 2000, http://www.genealogy.com/news-080900.html (25-10-2001).

Wilson, Rob; Dissanayake, Wimal (1996) (Eds.): Global/ Local. Cultural Production and the Transnational Imaginary. London.

Wynne, Peter; Edwards, Catherine; Jackson, Maureen (2001): Hylife: Ten steps to Success. In: Ariadne Issue 27, March 23, 2001, http://www.ariadne.ac.uk /issue27/hylife/ (25-10-2001).

ZKM – Zentrum für Kunst und Medientechnologie Karlsruhe (Museumsführer) (1997) München.

XI.5 Glossary

ALM	Archives, libraries and museums, the memory institutions
CH	Cultural Heritage
CIMI	Computer Interchange of Museum Information (the CIMI Consortium)
CLIR	Council on Library and Information Resources
DTD	Document Type Definition
EAD	Encoded Archival Description
ECMS	Electronic Copyright Management Systems
FAQ	Frequently Asked Questions
GIS	Geographic Information Systems
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
ICA	International Council on Archives
ICH	Intelligent Cultural Heritage
ICOM	International Council of Museums
ICT	Information and Communication Technologies
IFLA	International Federation of Library Associations and Institutions
IP	Internet Protocol
IT	Information Technologies
MARC	Machine Readable Cataloguing
NGOs	Non-governmental organisations
OPAC	Online Public Access Catalogue
PDA	Personal Digital Assistant
PIN	Personal Identification Number
R&D	Research and Development
TEI	Text Encoding Initiative
URC	Uniform Resource Characterstics
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
URN	Uniform Resource Name
XML	Extended Markup Language

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