

Kim H. Veltman

## **World Access to Cultural Heritage: an Integrating Strategy**

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### **1. Introduction**

In 1995, the European Commission organized a first exhibition on the Information Society in Brussels (February) at which time eleven pilot projects were proposed. This suggestion was accepted at the World Summit in Halifax (June 1995) which led to a first demonstration of work in progress at the ISAD (information Society and Developing Countries) Conference in Midrand (May 1996). For the ISAD Conference, four sections from Italy and Canada were chosen to represent pilot project five, Multimedia Access to World Cultural Heritage, which specifically addresses content found in museums and galleries :

Function	Exhibit	Organization	City
Capture	3-D Laser Camera	National Research Council	Ottawa
Archive	Leonardo	Museum for History of Science	Florence
Display	Tomb of Nefertari	Infobyte, ENEL	Rome
Navigate	SUMS	SUMS Corp.	Toronto

The objects from museums and galleries used in pilot project five require cross-references to books and articles in libraries and thus depend on pilot project four: *Bibliotheca universalis*. The combined contents of projects four and five are an important source for pilot project three: education. To achieve full access to projects three, four and five requires ATM and other high speed networks.

Pilot project two which deals with global interoperability is thus vital for their success. So too is a knowledge of the global inventory of projects in pilot project one. Since, the first five pilot projects are integrally connected, the country responsible for pilot project five needs a plan that embraces all of these. Indeed, a common framework for all eleven projects seems prudent.

Meanwhile, the European Commission (DGXIIIb), conscious of the need for an integrated approach to cultural heritage, has created a Memorandum of Understanding (MOU). This has two main goals: first, to ensure that European content is seriously represented in the

international networks and hence that 50% of the collections of member museums will be digitized by the year 2000; and second, to enlist the co-operation of the private sector in making this a reality. At the same time the memorandum serves as the museum community's equivalent of a union to assure that the combined strength of the individual players will not be intimidated in their dealings with large corporations. These recent developments of the European Commission and G7 promise to consolidate and give a common goal to a series of private initiatives which have occurred sporadically in the past.

## **2. Private Initiatives**

In the private sector, the major players in the realm of museums have shifted or rather realigned in the course of the past two decades. In the early 1980's most attention to cultural heritage was given by a few international publishers with interests in the whole range of media from pulp and paper, newspapers, journals and books to television and radio stations and satellites, notably Reed Publishers, Roy Thomson and Rupert Murdoch. These have since been joined by Berthelsmann and to a lesser extent Hachette.

Next came major computer companies who initially believed or at least hoped that they would be able to buy up the major collections, especially IBM, Digital and more recently Microsoft. Companies such as Siemens, Alcatel, Hewlett Packard and Apple have had some forays into this arena as have major electronics players such as Philips, Sony and NEC. The initiatives of large computer firms are not limited to owning materials. For instance, Digital is creating six "national" multimedia schools, one of them already working within the Canadian Museum of Civilization in Ottawa. These are being designed as service centres like those planned by Cività.

A next phase came when large entertainment companies began campaigns of buying up content and assumed that the same policies that they had applied to videos, television shows and cinema could be extended to the world of culture. One could see these developments as a natural extension of earlier publishing and media conglomerates. Those who assume that content is equivalent with Hollywood, overlook the enormity of cultural heritage that has been collected and restored in the course of several millennia.

More recently major telephone and cable companies have had the idea that since they are providing pipelines it would be convenient if they could also control the contents of the pipelines and provide a global interface which they could in turn sell around the world. The most obvious players in the United States are AT&T, Sprint and MCI; in Canada, Bell (Stentor) and Rogers Cable. Bell has created a company called Medialinx designed specifically to address content. France Telecom tried through Télésystemes via RAMA and HOMER, to gain a serious hold on the cultural scene and continues its attempts on a more local scale via a recent proposal to link Sophia Antipolis and Florence. Deutsche Telekom, through DTBerkom, is attempting to enter this market via their SAM tourism initiative and their TerraVision produced in conjunction with Art + Com. Telecom Italia and Stet have their own approach through Civita. In the framework of their respective countries Deutsche Telekom, France Telecom and Telecom Italia may seem large. In a global context with players such as AT&T they need to work together if they are to survive. France Telecom and Deutsche Telekom have already made some preliminary links as have Deutsche Telekom and Bell Canada. Further grounds for co-operation in the context of maps GIS and GPS are outlined below.

Since hydro companies own rights of way and pipelines that could also be used for these purposes, their entry into the field of content, especially entertainment and culture is already being anticipated by the discerning. This is the more predictable because hydro companies traditionally have major GIS databases which they use for their power stations, and power lines. These databases are also very relevant for tourism and the environment.

In addition to the very large business concerns there have been some efforts of smaller consortia linked more closely with the museum world to offer their own solutions. The EVA cluster in London with links to Florence, Berlin etc. represents one of these efforts. The AMUSE project which links Canada, Britain and France is another. This grew partly out of initiatives of ICP who organized the first Information Society Exhibition in Brussels (February 1995).

### **3. Economic Opportunities**

The economic opportunities linked with museums and galleries are largely indirect. Places with major galleries and museums bring tourism which encourages the economy through hotels, restaurants, and entertainment. While it is generally agreed that access to basic level images of the great collections should be free of charge, new economic opportunities are posed by at least six major domains: exhibitions, publications, entertainment, souvenirs, advertising and education.

#### **Exhibitions**

With the advent of electronic networks new kinds of exhibitions are possible. There might be sample images of the exhibitions or even thumbnail versions of the entire exhibition which are free, while higher resolution versions would be charged accordingly. These exhibitions will entail different kinds of reconstructions:

- a) those which bring together rare pieces, which one could not move: e.g. the complete works of major artists such as Raphael or various examples of mayor paintings such as Leonardo's *Last Supper* in Milan, Tongerloo, London etc.
- b) places which are too sensitive to sustain large crowds of visitors such as the Tomb of Nefertari or the cave at Lascaux.
- c) places and objects which have become ruins such as the Roman Forum, or a statue such as the Laokoon concerning the original state of which there are a series of competing theories.
- d) different phases of historical towns such as Siena, major religious sites such as the Vatican which are continually being modified or cathedrals which took centuries to complete.
- e) original sites and contexts of objects now in museums, e.g. the original location of the Elgin Marbles (London, British Museum) on the Parthenon (Athens, Acropolis).

These new electronic networks also permit new, virtual or rather imaginary museums which:

- a) trace the growth and dispersal of private collections such that one can see the different settings of paintings and other works of art.
- b) study the growth of public collections such as the Louvre in order that one can study the changing history of taste.
- c) create imaginary collections which combine all the paintings by an artist such as Botticelli or Leonardo in a given electronic space.

## **Publications**

Persons have traditionally paid and will continue to pay for "books", i.e. systematic arrangements of images on a given artist or a theme such as landscape. The European Commission has new copyright policies with respect to such sequences and it may well be that this becomes one of the most important solutions to the copyright fears, namely, anyone is allowed to print an individual page, but one pays to download a series of images on a topic or to create a container, tomorrow's equivalent of a CD-ROM or a CD-I. A coherent strategy in this area will mean new roles for publishing.

In the past decades, especially in Germany and Italy, exhibition catalogues have evolved from brief descriptions to enormous scholarly monographs which are frequently only available at the exhibition site. Such catalogues could be made available in electronic versions on the Internet. Indeed, having access to them might be included as part of the online visit to the exhibition. Persons wishing to print individual pages from such a catalogue would be free to do so, but would pay a fee to print a full version of the catalogue. This fee would vary with the different resolutions of text and images, such that one could have a copy resembling a xerox or a luxury book version. Subsets of the catalogue, showing only highlights might also be offered. After an exhibition has finished at a given museum, the contents could be placed on a reference server. In this way catalogues would not go out of print, but storage costs might be reflected in the costs of printing such works.

## **Entertainment**

Each of these new types of exhibitions offers new entertainment possibilities. The Japanese Goto Optical Corporation has developed new kinds of projectors that entail transforming a planetarium-like space into what they call a *Virtuarium*. This offers a new type of immersion, which will go even further than the latest IMAX theatres. In the short term this could become a new version of the panorama fashion which swept throughout Europe in the late eighteenth century. In the near future these immersive technologies, combined with the emerging avatar technologies could lead to virtual Roman circuses, interactive virtual reconstructions of major battles and great events. Because they are in electronic form it may well prove the case that the greatest demand for these possibilities is quite distant from the original location. Persons in Rome may have little interest in seeing virtual coliseums. Persons on other continents may be fascinated. By contrast persons in Rome might be more attracted by distant sites: a virtual tour of the Forbidden City in Beijing, the temple at Lhasa or Anghor Vat. As these sequences become more elaborate they will serve as footage for films and there will probably be new interactive films that combine these reconstructions in new ways.

These materials will also offer new resources for games. Educational CD-ROM's such as *Where in the World is Carmen Santiago?* It could be adapted to include materials from real museums and galleries. Films such as *Topkapi* could be transformed into interactive adventure games. Games of *Dungeons and Dragons* could have materials from mediaeval architecture, particularly crusader castles. While extreme versions of edu-tainment should be left to others, Europe should develop its own take on this approach.

## **Souvenirs**

Whether the tour is real or virtual, tourists traditionally buy souvenirs. These include reproductions in print as postcards and posters which will be available at centres throughout

the world. So tourists planning to go to the Uffizi can buy souvenirs before, during or after the visit. Given new developments in stereolithography images taken by the Canadian NRC's laser camera can be used to produce sculpture on demand. Since scale is technically not a problem these models can entail a whole range of sizes from tiny statuettes of three centimeters to full scale reproductions of statues such as Michelangelo's *David*. Special reproduction facilities for such large scale objects would be available in local multimedia service centres, which will obviate the costs of shipping across oceans these modern equivalents of plaster casts.

## **Advertising**

Advertising entails many applications. Persons wishing to use a painting such as Leonardo's *Mona Lisa* in print or television would pay a tariff based on the number of magazines or books in which it appears, the number of times it appears on a programme, at what time, how wide is the distribution etc. internet poses more complex applications.

One current trend is to sell companies space on one's homepage. This has flaws. Homepages typically function as tables of contents. As search mechanisms improve this innovations, persons will increasingly go straight to the subject desired rather than to the sites in between. On the other hand, if advertisements clutter up the end target sites they will distract the user from the subject for which they are searching. So we need new formulae for advertising electronically.

## **Education**

Education entails the most complex application of these new developments. While commercial interests are inevitably a factor here as well, the predominant criteria for use must remain academic validity and will require government sponsorship. Materials will need to be adapted for different levels of education. Historical and cultural aspects of knowledge will be important.

## **4. G-7 Project and Subprojects**

The initial G-7 pilot project, as shown in Midrand (May 1996), addressed four basic issues: how to capture, archive, display and navigate through museum materials (cf. fig. 1). There follow some thoughts as to how these might be expanded, as well as comments about a fifth issue, namely, networks.

### **Capture**

Capture entails at least three dimensions: imaging devices, cataloging standards, and comparative classifications. Imaging devices pose the same problem as computers. Needs range from high end to everyday and at present no single technology solves all the problems. The centres would thus be wise to show a series of alternative solutions. At the high end one would want to show Canada's NRC camera and the Vasari scanner. At the medium range one would wish to show the Italian CNR's portable suitcase camera.

The Ministry of Cultural Heritage (*Beni Culturali*) has very rightly stressed the importance of automated cataloging systems (*Mercurio*) giving due attention to problems of certification of the facts entered and the standardization of names. While all this is as fundamental as it is

excellent, it will be necessary to co-ordinate these Italian efforts more closely with parallel efforts elsewhere in the world such as the Marburg Archive, the *Allgemeine Künstler Lexikon* (Leipzig), IFLA RUN, OCLC and with G-7's pilot project four on libraries which is coordinating the national catalogues of five countries (Belgium, England, France, Portugal and Spain), without Italy so far. In these efforts at standardization due attention to variant names is necessary. It is also important to create links between these contents and be ensured that they are using the technologies listed in the global inventory (pilot project one) and the latest standards in interoperability (pilot project two). Individual committees can deal with standardization of author names, subjects, and place names.

Related to these questions of cataloging are problems of comparative classification: an object listed somewhere in the Library of Congress may appear somewhere very different in other systems. Pilot project five, in conjunction with three and the other pilot projects should have a section working on correlation of these various systems. One would begin with the two major visual classification systems (Iconclass and the Art and Architectural Thesaurus), expand to include Library of Congress, Dewey, Göttingen and Ranganathan. Some 950 relevant classification systems have been identified. At the Johanneum Research Centre in Graz, important work is being done on personal and local thesaurus systems such that these can be co-ordinated within the framework of networks.

### **Archive**

The Museum for the History of Science in Florence was rightly chosen as an example of this area for the ISAD conference because it illustrates complex links among 1) museum objects; 2) library manuscripts and books which contain drawings and descriptions of these objects; 3) physical models of the objects and 4) new technologies which offer electronic reconstructions of these same objects. The centres would make this material accessible online over ATM. Related material in other collections (e.g. Pavia) would be added subsequently.

Closely related to problems of archiving are problems of storage which can also be seen as a version of the publication problem: having gathered the material how does the user keep it? Here devices such as CD-ROM, and re-writeable CD-I's would be featured. Since Philips has been a pioneer in this field through their publication of the contents of the Musées Nationaux de la France, it will be valuable to make them a member of a French or Dutch version of the Cività consortium.

### **Display**

As in the case of computers and imaging techniques, the centres should show the whole range of display techniques including virtual reality, HDTV, monitors, and light boards. In terms of virtual reality one would begin with the Infobyte examples, IBM examples (Cluny, Frauenkirche) and those of the GMD (Schloss Birlinghoven). Connections with virtual sets of the DVP project and the Virtuarium of Goto Optical could be included. In terms of HDTV (High Definition Television) one would include Japanese examples with the Edo Museum and others as they become available. With respect to light boards, the relative value of these methods could be the subject of experiments with groups of students who come to the centres. As the technology develops the results can be shown over ATM in school auditoria directly. These problems could serve as a starting point for concrete links with education as the scope of G7 pilot project three expands.

## Navigate

A prototype of SUMS (System for Universal Media Searching) was shown at the ISAD Conference (Midrand) and needs to be developed. Maps are one aspect of this interface that requires an integration of various technologies. Italian Telecom has already produced a map of Italy in its bid for global emergency (G-7 pilot project seven). This map, combined with the information available in ENEL's *Ipermappa* and the methods developed by DTBerkom and Art+Com in *Terravision* can become a starting point for a geographic approach to pilot project five and serve as one of the integrating features for all the pilot projects. Using the SUMS interface one would begin by determining the purpose or scope of one's search. If the scope is museums, the map will show museums, which will also be relevant for tourism. If one's scope is business, the map will show the location of all SME's etc. If one's scope is health, one will get a list of all hospitals, doctors etc. Besides its applications to all of the G7 pilot projects, this approach can transform present day notions of yellow pages and our approach to knowledge in general.

This framework would be extended to include: GIS (Geographical Information Systems), AM/FM (Area Management/Facilities Management), GPS (Global Positioning Systems). As a result satellite images, maps (present and historical), and CAD versions of the world could be seamlessly linked, thus providing a conceptual framework for reconstructions such as the Cathedral of Florence by the History of Science Museum (Florence). In addition to obvious implications for tourism, this approach has important implications for traffic, for understanding of the environment and education (geography, history, social studies, etc.). Extended to include the sea this project will dovetail in turn with maritime information systems (pilot project eleven). The creation of such a multilayered map will include historical versions. Since the Vatican also contains the famous corridor with detailed maps of the whole of Italy, a future project of ENEL-Infobyte can allow the user to choose any place, go through to earlier maps and then fly over it in virtual reality. Simpler versions as printed maps will be available on lower-end systems. This map approach linked with the SUMS interface can become a front-end for all of the eleven pilot projects of G7, which would require a co-ordinating committee that concerns itself with liaison to the efforts of the European Commission.

## Networks

To function properly complex networks linking museums and other institutions are needed. This aspect of pilot project five requires co-ordination with global interoperability (pilot project two) for which Canada is the lead country. Canada already has an operating nationwide ATM network and has demonstrated its capacity to Germany and Belgium in real time ATM experiments. It is therefore advisable for Italy (as project five) to co-operate with Canada (as project two), all the more so because there would never be a question of Canada competing with Italy in terms of historical cultural content.

The challenge is to produce a framework that allows Italy to develop electronic forms of its cultural heritage and make that available. A framework for this and the development of an ATM network in Italy linked with the rest of the world has already been outlined by the Cività group. The Cività concept of a systematic approach by a consortium of companies is useful and probably necessary. However if this is done purely on a national scale there will be international criticism for trying to do cultural imperialism in electronic form. Therefore, from the outset, there should be accords with companies in other countries such that they can

develop complementary consortia for their own country. Since France is the other partner country in world heritage (pilot project five) and because it is also responsible for libraries (pilot project four), France is an obvious candidate to create its own version of Cività, which will assure that the strong independent tradition of that country with respect to cultural heritage be maintained.

Assuming the links between pilot projects five and two outlined above, Canada is another obvious candidate. Italy's links between STET and Italian Telecom have some parallels with Canada's Stentor and Bell. There are links in varying degrees between these telcos and IBM in both countries. Thus a Canadian equivalent of Cività would be very feasible. Given a tradition of links between Canada and France through the Canadian Heritage Information Network (CHIN) which have been strengthened through the Canada-France accord, a framework for an Italy-France-Canada project effectively exists. Canada's presence would help assure that this triumvirate will become a concrete starting point for global and universal participation.

As a proof of concept there will need to be ongoing ATM experiments using actual content. It is suggested that there might initially be three places linked by high speed networks: Rome, Paris, and Toronto soon followed by Berlin, London, Tokyo and Washington. Experiments would start at 35Mb/second and move upwards through OC312 and beyond as the technology evolves. Each of these cities would have a new kind of permanent exhibition space which would be open to the public at certain times and available for groups. Connected with these exhibition centres would be new technologies for publication (in print, CD-ROM, CD-I, videotape etc.) such that they are working models for the service centres envisaged by Cività. These centres will raise awareness among the press, politicians, business community and the general public about what exists and is available today. This awareness will inspire the enthusiasm that will lead to new markets.

In order to demonstrate interoperability, the centres must show alternative technologies in terms of computers. On the high end they might begin with the ENEL-Infobyte materials, particularly the Vatican, Colloseum and Nefertari on an SGI platform and Pompeii, Cluny and the Frauenkirche on an IBM platform. The ENEL-Infobyte Vatican project presently includes Saint Peters Basilica and will soon include Raphael's Stanze. If this is extended to include the library and museum, then one could go seamlessly from ENEL-Infobyte walkthroughs in virtual reality to the library and then read the full contents of books scanned in through the IBM Vatican library project.

At the medium level these centres might show the Vectar restoration material connected with the Church of San Francesco in Arezzo on a Sun platform. On a lower level they might show the Vectar reconstruction of Florence on an HP and other platforms. This selection would soon be extended to include examples from France (INRIA and Musées Nationaux de la France), Canada (Museum of Civilization), Africa (CAMA), Germany (Marburg Archive), Netherlands (Iconclass).

In addition to displaying contents, the ATM exhibitions at the centres (Rome, Paris, Toronto etc.) will serve as on-line high speed web-sites demonstrating the comparative virtues of alternative hardware and software solutions, thus dovetailing with the aims of global interoperability and at the same time allowing the major players to experiment with a new kind of advertising which entails real content rather than empty statistics about processor speed and capacity. The centres will thus be a new kind of showroom where each company



shows its latest products as part of its marketing strategy. Since each of the players is contributing in their own interests no single person or body will be faced with the otherwise prohibitive costs of paying for constantly changing new technologies. As the value of this approach is confirmed in the original centres, the principles can then be extended step by step (e.g. Florence, Venice, Milan, Naples in Italy; Lyon, Sophia Antipolis, Bordeaux in France; Ottawa, Montreal, Vancouver, Calgary in Canada etc.). Having proved the principle for the initial countries, one will extend the principle to all others with a sufficient infrastructure to create their own consortia. To prove interoperability in the full sense, the G7 pilot project needs to focus on a few prototypes for a global approach to cultural heritage. Some examples are listed below:

#### A) Artists

Leonardo da Vinci offers an excellent choice. He is at once uniquely Italian and yet global in his appeal. His work covers the whole spectrum of culture from paintings and drawings to manuscripts, science, medicine, and instruments. His works are scattered throughout the world. Any on-line demonstration of how these can be connected will be immensely impressive. It will also help set up a working set of standards for the problems of how to capture, archive, display and navigate through material which can readily be extended to other artists, scientists, institutions, objects etc. Picasso has been suggested by the French as another obvious choice. Born in Spain, active in Paris, and famous worldwide he is another individual whose work has had a truly international impact.

#### B) Museums

Given that all the works of the Uffizi exist in digital form at various levels of resolution, it would make sense to start with this and then add the national galleries of the other G7 countries, London, Ottawa, Washington, etc.

#### B) Styles

The excellent project of INRIA on Art Deco can serve as a point of departure. This is particularly instructive because it not only illustrates the use of a style in one city but also traces the spread of this style throughout different regions and countries.

#### C) Non-Western Art

To be truly international, G7 must establish that it is concerned with more than European art or even Western art in general. Obvious examples are the CAMA network of (South) African art (on an SGI platform) and materials from the Edo Museum in Tokyo (on an IBM platform).

#### E) Different Categories of Art

In preparing its MOU the European Commission has identified seven different kinds of museums:

- a) Fine Art
- b) Natural history
- c) Archeology
- d) Modern Art
- e) Science
- f) Maritime
- g) Ethnographic and Other

The Italian Ministry of Cultural Heritage (Beni Culturali) has already identified over thirty projects (shown at Mediartech in Florence, June 1996). Ideally these could be used as a point of departure for dealing with these themes. Co-ordination with the European Commission's projects would then ensure that the full range of cultural heritage is reflected within pilot project five.

As part of the exercise standardized entry templates will be developed and made available within the SUMS software. There will also be an inventory of all hardware, software and connectivity standards being used. Thereafter, any museum, gallery or other institution can enter their contents as they wish, provided they align them with the pilot projects standards, protocols and criteria. To prepare the way for these, subprojects will deal with the individual problems to capture, catalogue, archive and navigate in greater detail.

## **5. Conclusions**

At present Italy is officially involved in only one of the eleven pilot projects of G7. As noted above this theme of cultural heritage is centrally important because it is intimately connected with pilot projects four and three (libraries and education), brings into play pilot projects one and two global inventory and global interoperability, and has implications for practically all of the projects.

Given an integrating strategy such as the one here outlined Italy has a chance to become a key player in these developments. This will have enormous economic implications for tourism, publishing, education and the whole, of what is being called the knowledge economy. No single country can cover all aspects of the challenge. If countries such as Italy, France and Canada do not take a lead, they will be led. In the spirit of Dumas' *Three Musketeers*, they need to work: "All for one and one for all". Only thus will the dreams of the G7 projects lead to a true information society.