E-HERITAGE: THE FUTURE FOR INTEGRATED APPLICATIONS IN CULTURAL HERITAGE

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ABSTRACT

A number of factors are combining to change the structure and contents of documentation of cultural heritage: 1) the exponential growth in data generated by imaging techniques makes it possible for a site or an artifact to be recorded at a resolution of over 16 megapixels and at a density of several hundred million cloud points; 2) high-resolution imaging is becoming more affordable and/or available; 3) the economics and legal constraints of conservation practice are gradually pushing towards more stringent documentation standards; 4) improved communications infrastructure and mobile computing facilities are changing the way that data is recorded, processed, stored and – inevitably - used; 5) increasingly available computerized expert systems will be integrated into the very systems that conservators and documentation specialists carry around with them or access on a daily basis; 6) the advent of web-based systems will afford super-computer processing power and large-system database handling to the documentation specialist and the conservator in the field and permit greater flexibility for teleworking; 7) Computerised Project-based Management techniques will gradually spread from the realm of large institutions to SME's and individual practitioners making digital image processing in architecture and archaeology more akin to the exchange of engineering drawings in automobile design industry. 8) The availability of cheap local or distributed processing power means that most of the above advantages will be present in both developed and developing countries. This paper explores. ***e-heritage*** as an integrated project which aims at providing a seamless yet structurally and inherently up-gradeable technological platform for all activities within cultural heritage conservation and management

1. FROM E-CULTURE AS CONTEXT TO OBJECTIVES

1.1 From 'e-culture' to e-heritage'

1.1.1 "Anything, Anybody, Anytime, Anyhow, Anywhere" has been the all-encapsulating way of defining the objectives of proponents of "*e-culture*". This notion attempts to break down the barriers previously posed by physical distance (and therefore geographic location) as well as time-zones or working-hour traditions in a way which promises to revolutionise work-patterns and methods of collaboration. The fact that computers and Internet access are rapidly becoming more accessible world-wide also points to a growing democratization inherent in a technology that makes so much more available to so many more members of society at such a lower cost.

The last five years of the "e-anything" phenomenon, starting with 'e-commerce', transiting through 'e-money', rapidly building up 'e-government' and now culminating in 'e-prints', has unfortunately tended to devalue the "e-XXX" designation. Politicians and management gurus alike have tended to add the prefix "e-" to most anything that catches their fancy with the result that already many members of the academic community (not to mention the general public) are losing sight of the original thrust of the e-revolution. Yet, while fast approaching cliché status, there is no better way of defining an all-encompassing approach than as "*e-heritage*", especially if this seeks to implement the objectives of "anything, anybody, anytime, anyhow, anywhere" in the cultural heritage sector.

1.2 Defining objectives for *e-heritage*

1.2.1 The ultimate objectives of *e-heritage* are to enable students, conservators, documentation specialists, museum curators, heritage managers and members of the general public to plug in anywhere in Europe (indeed in the world) and study and work together in the cultural heritage sector which is striving to preserve the common heritage of mankind. *E-heritage* therefore achieves consistency in documentation at more cost-effective levels, it helps create new educational opportunities where these did not exist beforehand, it enables fast, easy and cost-effective collaboration in research projects and also resource-management on a scale previously unthinkable. It also enables the public and the research community to access a wealth of knowledge and information that has lain hitherto untapped. The objectives of *e-heritage* and integrated software and hardware systems in the heritage sector are understandably very closely linked to various forms of systems that exist or are being introduced for the purpose of documentation/management of heritage sites and artefacts.

1.3 Technological change defines documentation standard

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1.3.1 When Napoleon Bonaparte embarked on his Egyptian Campaign in 1798 he took 167 scholars with him to document cultural heritage in the work which has come down to us as the "*Description de l'Egypte*". Of these, 22 civil engineers, 4 architects and 8 draughtsmen (to name but a few) were compelled to use the most primitive of documentation techniques "Most of my drawings were made on my knees. Soon, I had to make them standing up, then on horse-back; not one of them was finished as I would have desired…"*

1.3.2 Whereas 400 copper-engravers worked for some 20 years to give us the 837 copper-engravings which form part of over 3,000 illustrations that make up the *Description de l'Egypte,* within fifty years of its publication a new technology was to dramatically reduce costs, shorten time-frames and improve the quality of documentation available for archaeologists, researchers on antiquity and architects. Analogue photography and photogrammetry were both born in the 19th Century and remained the main non-text tools used in documentation of cultural heritage throughout most of the 20th Century.

1.3.3 It is the way that digital has ousted analogue during the last 15 years of the 20th Century that is changing documentation in a fundamental manner. The cultural heritage documentation specialist is now faced with an ever-growing array of tools made available by the information communications technologies (ICT) which are the hallmark of the information society. Some of these tools may be used in a stand-alone manner while others achieve their true potential when linked up to other ICT tools. The new digital tools include various forms of 2D imaging (photography, X-ray), 3D imaging (laser scanning, photogrammetry), relational databases, the Internet, web-based systems, The very nature of these tools helps define the objectives of *e-heritage* most specific to documentation.

1.4 New standards lead to the birth of a new profession

Documentation is perhaps that sector of conservation of cultural heritage which has been most affected by the advent of the information society. So much so that whereas the 20th Century saw the birth of a new discipline, profession and area of academic study ie. that of the conservator-restorer, the 21st Century has seen the birth of a new profession to complement that of the conservator-restorer. The extent of knowledge required from the cultural heritage documentationalist has recently even prompted the creation of specific university degrees** which will enable the documentation specialist to better fulfil his or her role as part of the multi-disciplinary team required to properly carry out a conservation project.

1.5 Specific objectives for documentation within *e-heritage*

1.5.1 1.5.1 The cultural heritage documentation specialist (CHDS) can, by inferring from ICT capabilities, expect *e-heritage* to meet a number of domain-specific objectives:

1.5.1.1 *Accuracy & volume* – 2D imaging in cultural heritage is now increasingly producing single digital photographs with a resolution in excess of 16 megapixels and a file size of anything between 300Mb and 550Mb per frame***. Not only has digital photography now caught up with and in many cases overtaken analogue photography – with evident implications for photogrammetry – but 3D imaging has been substantially enhanced by the arrival of the laser scanner which produces clouds of points, each of which is an X,Y.Z co-ordinate in a matter of minutes. The problems of space, storage and manipulation which the resultant huge data files are currently posing are only a short-term problem which will be overcome in the mid-term as corresponding data handling and storage technologies become more powerful and cheaper. The CHDS would expect *e-heritage* compliant systems to handle such large 2D and 3D files across platforms both mobile and static, preferably through a single user interface rather than having to master at least 6 different software packages as may currently be required in some cases.

1.5.1.2 *Affordability* – The cost of acquiring fast, reliable and highly accurate 2D and 3D imaging is plummeting. The cost of the hardware required to store the huge volumes of data generated is also proportionally very low. A CHDS would expect that this affordability would extend to SMEs as well as large national conservation institutions and this expectation would have an impact on the delivery platforms chosen for such systems.

1.5.1.3 *Legally Mandatory QA* – The ease with which one can document digitally, together with the speed and low cost of communicating data collected in cultural heritage conservation is influencing legislators to improve quality assurance in heritage projects by making a growing number of types of documentation mandatory. The next step is logically that of the timeliness of communicating conservation project data to a Trusted Third-Party repository enabling proper superintendence and on-line off-site data security to be achieved at one stroke.

1.5.1.4 *Speed, quality & nature of communications* – In a world where 0.5 – 2Mbps data transfer rates for home ADSL have become the norm, where office networks permit communications at 10-100 Mbps and where laptop computers are now linked via GRPS, satellite or other mobile technologies, the conservator-restorer as well as the documentation specialist can today work in a totally different manner to the one of a few years back. It is already possible for a conservator-restorer working on site in a neolithic temple or medieval church to store digital images on his portable computer, integrate these into a structured account of the conservation intervention and transmit everything to his office base, client or central repository without much more than a

* Vivant DENON, Head of the Egyptian Institute as quoted in Description de l'Egypte, Taschen, Koln, 1997, p.13

** Vide for example the B.Doc. (Hons) degree introduced by MCR and the University of Malta at http://www.mcr.edu.mt/icrs/degrees/bdoc.html (accessed 20th May 2003)

*** These figures are typical of the tri-linear scanning back technologies employed by the 2D Imaging Department within MCR's Documentation Division

click of the button. This ease and relatively low cost permits high quality standards of documentation to be achieved at all levels. From a design and implementation point of view, although transparent to a CHDS, the user interface and the communications protocols and gateways need to be carefully worked out to ensure the ease and cost-effective communications that the technology promises to deliver.

1.5.1.5 *Knowledge-based systems* - While a number of conservator-restorers are general practitioners, many are increasingly specialised in one area (eg. Metals, glass, ceramics, stone, paintings, etc.) or even a sub-set of that area. ICT makes it increasingly possible to use knowledge engineering to capture the fruits of hard-won experience of conservation specialists in any particular field and integrate such a knowledge-base into a decision-support system which the conservator-restorer may wish to consult on site or within the restoration workshop. It follows that one of the *e-heritage* objectives would be to build such "expert systems" to consistent quality standards and integrate them into other systems in a way which makes them available through mobile systems, on-site as well as in the laboratory.

1.5.1.6 *Back-end processing* - Web-based systems have the advantage of presenting a single simple-to-use interface (the browser) while the user does not really have to bother at all about the computing power required to effect some of the billions of transactions on the Web. Whether using the Web to click on to Fred's Garage to check out opening times or to Citibank for a complex set of transactions, the nature of the computing power lying behind and underneath the application is generally transparent to the user. Yet there exist a number of design imperatives which need to be respected if the conservator-restorer or CHDS need to access complex databases handling huge data files and all they may have at their disposal is a standard PC. The *e-heritage* concept must take these functional requirements and design objectives into account when integrating a single end-user interface approach to the other functional requirements within the *e-heritage* family of applications.

1.5.1.7 *Project-based management science* was once the reserve of management consultants attempting to introduce culture change in hierarchical pyramids or monolithic organisations. To day it is a widely-accepted way of ensuring that projects are delivered to specification, on budget, on time. Conservation projects are slowly but surely being moved out of the realm of never-never land into one where structured planning and use of resources is achieved with the help of Project Management software. Since conservation projects are increasingly tackled by multi-disciplinary teams with members who do not necessarily hail from the same institution, an added dimension is being added to the conservation project manager's software requirements. It follows that both large-scale conservation centres with software requirements that must track the passage of a project from one department to another as well as SMEs and sole practitioners need extensions to their PC-based systems which will enable them to integrate project-management functionality within the other *e-heritage* applications and objectives.

1.5.1.8 The relative *ubiquity* of PCs and the Internet, even in developing countries, brings with it a number of implications. The advantages described above are therefore available to most countries, whatever their stage of development. Thus, a large *Thealasermetry*[*] survey carried out in Jordan may have restitution processing carried out in Algeria, Malta and Morocco working in synch. This distributed processing capability inherent in *e-heritage* means that certain design criteria may usefully be developed to maximise the ability of a CHDS in one country to participate in a documentation project being carried out in another country.

2. ECONOMICS & E-HERITAGE

2.1 Economic imperatives, ICT industry & heritage

2.1.1 Unlike other areas of economic activity, like, say, defense technologies, financial services or tourism, the cultural heritage sector has never been an attractive commercial proposition for the ICT industry and this means that relatively very little attention, if any, has been given by the industry to the particular ICT needs of the sector. Moreover, since Cultural Heritage is very much the poor relation of public funding across Europe, individual countries and institutions have been unable to put together the investment required to make a quantum leap in ICT applications in the sector.

2.1.2 The economic imperatives and the realities of the ICT industry have meant that the promise of an *e-heritage* scenario has remained just that, ie. a promise. The ICT industry will not bother to invest in cultural heritage applications with the result that most ICT development in the cultural heritage sector is funded by institutions which have enough muscle to realise the potential of ICT and are committed to harnessing its power for their organisation. This has produced a handful of systems which share a number of characteristics. These systems are generally (though some notable exceptions do exist):

1. available only in-house to members of the organisation;
2. limited in scope to one particular application (eg a database on artefacts);
3. chronically under-funded;
4. incapable of handling the huge amounts of data generated by state-of-the-art 2D and 3D imaging systems;
5. not linked (or designed to be linked) to real-time, on-line Trusted Third-Party repositories;
6. devoid of knowledge-based functionality;
7. incapable of front-ending web-based access to large-scale database systems;
8. devoid of Project Management functionality;
9. not designed to enable distributed processing across the Web;
10. rapidly growing obsolete

- Vide Borg C.E. and Cannataci J.A., Thealasermetry: a hybrid approach to documentation of cultural heritage sites and artefacts, *Proceedings of the CIPA WG 6 International Workshop on Scanning for Cultural Heritage Recording,Sep 1-2 2002*,p.93-104, http://www.mcr.edu.mt/research/papers/thealasermetry.pdf .

2.2 *e-heritage* – critical mass is the way forward

2.2.1 The *e-heritage* vision of "anybody, anything, anytime, anyhow" is therefore far from being achieved. Instead we have witnessed an under-funded, fragmented effort by a handful of organisations in a number of countries. This will clearly not deliver the promise of *e-heritage*. If not, then what will?

2.2.2 It is proposed that *e-heritage* be converted from a vision into a concrete project, a collaborative effort that will produce deliverables. The detailed organisation of this project is the subject of a separate paper but, broadly speaking:

2.2.2.1 *e-heritage* attempts to bring together enough leading institutions in the field of cultural heritage to provide the critical mass necessary to succeed together in those areas where any single member would find it impossible to achieve alone.

2.2.2.2 *e-heritage* also builds upon successful national and European pilot projects to further increase critical mass and the level of networking within the cultural heritage sector. The *e-heritage* project must be examined in a context of a highly fragmented European scenario where each country has only one (or never more than a handful) of hopelessly under-funded institutions which alone simply cannot arrest the ravages of time on historical sites and artefacts.

2.2.2.3 Put simply, in unity there is strength, and *e-heritage* has a better chance of being achieved through the efforts of a consortium of organisations across a number of countries rather than through the efforts of any single entity acting in isolation. The Malta Centre for Restoration (MCR) is providing the home-base for, and has embarked upon the creation of, a consortium which has as its main aim, making *e-heritage* a reality.

3. CONCRETE DELIVERABLES FOR E-HERITAGE

3.1 E-learning within e-heritage

3.1.1 Small (and sometimes even large) European countries have often proven incapable of organizing undergraduate and especially post-graduate education in applied conservation of cultural heritage. Eg. A Masters degree in conservation science (diagnostics) is an expensive option both for students as well as for institutions.

3.1.2 Experts in the field capable of teaching are hard to find and often difficult to group within a single institution.

3.1.3 Imagine instead a network of institutions all linked together using satellite-enabled video-conferencing (SEVC) or (where-available) TBVC (Terrestrial Broadband Video-Conferencing). The broadband service thus made immediately available permits the *e-heritage* project to combine SEVC. TBVC and e-learning techniques via internet to create a virtual classroom where the best teachers from different institutions can offer their own specialisms to students spread across a number of other students in the network who otherwise would never had the opportunity to access such a first-class education.

3.2 New forms of collaboration for research projects

3.2.1 Once connected via a common infrastructure, researchers in different institutions participating in *e-heritage* can come together to work in a multitude of research projects. Networking across Europe, say co-developing a new protective coating for metals or stone, becomes as easy as walking down the corridor of one's home institution towards the SEVC-equipped room and meeting one's co-researchers in a multi-way video-conference. Research Working Group Meetings become more regular, cheaper and more productive.

3.2.2 Once integrated into a single virtual community, institutions within the *e-heritage* network can work together to design and produce databases replete with text, 2D and 3D images of heritage sites and artifacts. The databases will incorporate innovative criteria such as didactic value and risk assessment while recording and monitoring the success or otherwise of a variety of intervention techniques. Thus conservator-restorers in a variety of institutions can tap into a wealth of knowledge hitherto unavailable.

3.3 Resource management across national boundaries

3.3.1 The broadband network available will also enable instant access to these databases and permit hitherto impossible resource management.

3.3.2 One or more institutions will be able to set up expensive ICT data processing resources and put them at the disposal of all members of the *e-heritage* network. This would greatly reduce the need for investment in multi-user hardware and software in most participating institutions.

3.3.3 Once set-up, these databases would also be web-enabled with a multi-tiered structure that would permit both institutional workers, SMEs and conservator-restorers working as sole practitioners to log in anywhere, on site or at home to document their projects or carry out research on successful intervention techniques.

3.3.4 Heritage workers in different countries face similar problems when it comes to documentation of cultural heritage sites and artifacts. The *e-heritage* network will permit unprecedented resource-management across the whole consortium:

3.3.4.1 Advanced 3D imaging techniques today depend on expensive (Euro 300,000) data acquisition equipment which is used for 15% of a project's requirements and then relatively inexpensive PC technology for the post-processing that makes up 85% of the documentation project's needs.

3.3.4.2 The *e-heritage* network will permit the know-how transfer and expensive data acquisition technology to be shared by many institutions in many countries and the labour-intensive post-processing to be farmed out to such spare capacity as may exist amongst participating institutions and individuals.

3.4 Priority for portable systems as benchmarks

3.4.1 *e-heritage* also envisages greater focus on the advantages of portable PC technology on the work-site foocumentation, project-management and decision-support purposes.

3.4.2 Thousands of heritage workers across Europe would benefit from the creation and use of a common structured (but multi-language enabled) software package that would also be capable of linking up with and uploading/downloading data with the larger databases harboured within state institutions.

4. SPECIFIC DELIVERABLES FOR E-HERITAGE

4.1 Delivering the ICT infrastructure

4.1.1 The concrete deliverables outlined above require a basic ICT infrastructure to be put in place as well as a concerted design and development effort.

4.1.2 For much of the basic ICT infrastructure, *e-heritage* will depend on the level of ICT development at the national level in participating countries, but part of the infrastructure may be developed and delivered as part of the *e-heritage* project, where it is perceived that awaiting provision of broadband communications facilities by third-parties would hold up the project for an unreasonable length of time.

4.1.3 The first phase of ***e-heritage*** would seek to build upon the success of the IKONOS project* which currently links Euromed countries such as Algeria, Jordan, Greece, Morocco, Malta and the Netherlands. The objective here would be, over a period of 18 months, to install SEVC facilities in participating institutions in France, Poland, Hungary, Czech republic and Slovenia. This would nearly double the IKONOS consortium to 12 countries. It is important to emphasise that the facilities and common infrastructure already established in IKONOS would be extended to these other countries.

4.1.4 The second part of this first phase would see the establishment of e-heritage pedagogic co-ordinators in each centre and the installation of ***e-learning management software*** in each country to enable tutors from each country to give on-line tutorial support.

4.2 Laser scanning & photogrammetry part of new degree

4.2.1 The discussion at the CIPA Working Group 6 Workshop and the ISPRS Commission V Seminar in Corfu in September 2002 included mention of the need to set up a Working Group on Education for Heritage Documentation. This was in turn prompted by the need to train CHDS in the various new sciences and techniques now available thanks to development in ICT, a type of training which is currently not being provided by most universities.

4.2.2 The second phase of the *e-heritage* project therefore responds to these training requirements and envisages the launch of the first B.Doc (Hons) course on-line. Here, Europe's first degree course on Documentation of Cultural Heritage would be delivered across the ***e-heritage*** network.

4.2.3 This part of the project would not only use the SEVC facilities established through IKONOS but would also build upon Malta's national investment in technology for documentation of Cultural Heritage. MCR has developed *TheaLasermetry* (fusing laser scanning, digital photogrammetry and theodolite total station technologies) and this, together with Digital Photography for Cultural Heritage, Radiography etc will be taught across the network.

4.2.4 Students following the course in a number of countries will then undertake stages across various parts of the network learning how to use various parts of the technology hands-on for the field-work and then learning and practicing the post-processing techniques in the computer laboratories in the participating institutions.

4.2.5 MCR has already been involved in the testing of prototypes of laser scanners and continuously provides up-dates to functional requirements to leading manufacturers. Participation by industry at this stage of *e-heritage* would also ensure that the currently available European technology is up-dated and tested in the field through close collaboration with the demanding cultural heritage sector.

4.3 An M.Sc degree through distributed E-learning

4.3.1 The third phase of the ***e-heritage*** project would see the launch of a degree M.Sc Conservation Science across the new platform where the teaching uses SEVC and e-learning software established in Phase 1.

4.3.2 Practicum would be undertaken in the laboratories of participating institutions and stages across the network, on the same model as that established for the B.Doc (Hons) programme outlined above.

4.4 Establishment of the *e-heritage* repository service

4.4.1 The first three stages of the project described above will make *e-heritage* a reality primarily for institutional users and students within the network. The fourth stage aims at extending the "anytime, anywhere" reality to individuals, sole practitioners, SMEs and field workers through the creation of a new on-line database system. This database provides a triple facility:

4.4.1.1 The HerITage database will permit all conservation project data held by a public institution or SME, including 2D and 3D images to be stored, managed and accessed, on-line real-time if so required;

4.4.1.2 Sole practitioners and SMEs, as well as other institutions will be able to register and maintain a security copy of their conservation project data on the HerITage system thus ensuring that they are enjoying complete off-site back-up for their valuable project data.

* For details about IKONOS visit www.ikonosheritage.org

4.4.1.3 Sole practitioners and SMEs, as well as all conservator-restorers in a given jurisdiction may use the HerITage system as a Trusted Third Party for project documentation repository purposes. It is expected that this will increasingly become a legal requirement in many jurisdictions. As long as it is easily accessible "anytime, anywhere" (like some other forms of data eg airline or banking), many countries will possibly not really bother as to where the data resides (especially if the country does not have to pay the outlay for the infrastructure itself).

4.5 Enhanced access to databases through language

4.5.1 The fifth phase of the ***e-heritage*** project is the development of the databases established within IKONOS into multi-language enabled databases.

4.5.2 In IKONOS, the current project language is English. ***E-heritage*** would seek to make the databases more accessible by first providing multi-language versions of the variable fields and then keyword abstracts of French, Dutch and German language database holdings.

4.6 Portable Integrated Project Management & Knowledge-Based Systems

4.6.1 The sixth phase of the project would attempt to make even more portable those database technologies developed further in the different phases above. The emphasis here would be on quick and easy integration of digital images and project management software with specially designed databases in laptop and hand-held computers to be used on-location in the conservation workshop, archaeological or historical site.

4.6.2 The second part of the sixth phase of *e-heritage* will tackle the design and development of knowledge-based system extensions to the various portable database systems. Thus, for example, knowledge-based systems would be developed for paintings conservation and would reside on the same portable computer used by the paintings conservator on site or in the workshop, enabling consultation of a decision-support system as the need may arise. The same system would also have great potential for self-paced learning in a pedagogic application.

5. INTEGRATING MULTIPLE APPLICATIONS

5.1 Birth of a concept: from 3D to integration

5.1.1 *E-heritage* was actually born out of in-depth experimentation with 3D imaging techniques such as laser scanning and photogrammetry in a cultural heritage environment. It was the post-processing rather than the data acquisition stage that led to the realisation that having to master six different types of expensive software to create a 3D model of a Neolithic temple was only a tiny part of the overall effort required to document heritage. When all the tasks in a conservation project were taken into account it became clear that unless a concerted effort is made to achieve a certain level of integration between different applications the true potential of ICT in cultural heritage would not be realised in a timely or cost-effective manner.

5.1.2 Whereas the advent of the CHDS as a member of the conservation multi-disciplinary team allows for more specialisation, it is clear that to the conservator-restorer (not to mention the client) the documentation of the project is simply a means to an end and not an end in itself. Thus, the conservator on-site is interested in 2D and 3D images insofar as he or she can link these to the texts pertaining to the condition or nature of the intervention on the site or artefact. The main concern is documenting as quickly and as cheaply as possible without compromising quality and shunting the data to some faraway safe place, again as quickly and as cheaply as possible. Except in those cases where he or she wishes to check something in a project effected by somebody else or when the time comes for making an invoice or showing off a project to sell one's services, the conservator-restorer will rarely have recourse to much archived documentation.

5.1.3 Thus, while 3D imaging may continue to exist as a stand-alone area of interest and specialisation one may reasonably also look forward to a growing level of integration between 3D imaging and many other parts of the heritage documentation scenario.

5.1.4 Through a design and development effort concerted between a dozen institutions, a number of de facto standards can quickly be established, thus ensuring that different applications, both new and existing, in the cultural heritage sector, will achieve a high level of integration. This concerted design and development effort will enable the inter-operability of different software applications while preserving user-friendliness to an unprecedented degree.

5.2 Funding & other challenges for e-heritage

5.2.1 Establishing objectives and deliverables for *e-heritage* is relatively easy if one seeks inspiration from other e-sectors such as e-banking , e-commerce and e-government. This is evident in the objectives outlined above while the technical challenges are varied but are largely close to being resolved.

5.2.2 Forging an international agreement on the standards for e-heritage and then project managing the realisation of the concept does not have the same imperatives as e-banking and therefore risks to be very much a matter of one percent inspiration and ninety-nine percent perspiration.

5.2.3 The fact that over 20 organisations have already responded positively to MCR's published expression of interest for the *e-heritage* project augurs well for the creation of a substantial consortium. The consortium is expected to tap EU and other funding sources for the establishment of a network which could actually in time move considerably towards a self-financing status.

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