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ARE SMALL HERITAGE INSTITUTIONS READY FOR E-CULTURE?

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Abstract (EN)

As we progress towards a knowledge-based information society, a digital culture is emerging. This e-culture will be based on technologies that enhance the creation, management and provision of attractive cultural content and engaging interactions on a variety of platforms. This paper addresses the endeavours of small heritage institutions to prepare themselves for e-culture, while facing the 'trilemma' of lacking human resources, lacking funds, lacking technical skills. It concentrates on the question: which current and emerging technologies are most likely to find a broader adoption by large, medium and small institutions? It provides a classification of these sizes based on empirical data, and points out key issues that heritage institutions will need to consider when assessing the feasibility of adopting a certain technology. Based on this 'e-readiness check', the paper assesses 20 technologies especially from the perspective of smaller institutions. These technologies have been monitored in the DigiCULT Forum project, and include, for example, virtual reality, agents and avatars, digital asset management, mobile technologies, RFID technology, customer relationship management, virtual community and collaboration technologies. Although some of the technologies may be used by smaller institutions, the paper concludes that these institutions may only become 'e-ready' for, and benefit from, most of the technologies within a framework of larger cultural heritage initiatives. In such initiatives, funded mechanisms such as cultural networks/service centres enable smaller institutions to keep their costs and risks manageable while not being excluded from new technological developments.

Keywords: Small heritage institutions, e-culture, DigiCULT Forum, technology assessment

Zusammenfassung (DE)

Mit der Ausdifferenzierung der wissensbasierten Informationsgesellschaft entsteht auch eine neue, digitale Kultur. Diese nutzt Technologien, die die Schaffung, das Management und die Bereitstellung von attraktiven Inhalten und neuen Interaktionsformen auf verschiedenen Plattformen ermöglichen. Der Beitrag beleuchtet den Spielraum von kleinen Kulturerbeinstitutionen, trotz ihrer Beschränkungen hinsichtlich des Personals, der finanziellen Mittel und des technischen Know-how an dieser Kultur mitzuwirken. Er untersucht, welche gegenwärtigen und absehbaren Technologien in großen, mittleren und kleinen Institutionen am ehesten eine breitere Nutzung finden werden. Diese Größen werden anhand von empirischen Daten unterschieden. Weiters werden Punkte hervorgehoben, die

Kulturerbeinstitutionen bei der Abschätzung berücksichtigen sollten, ob eine bestimmte Technologie für sie geeignet ist. Aus der Perspektive von kleinen Institutionen nimmt der Beitrag sodann 20 Technologien in den Blick, die im Rahmen des Projekts DigiCULT Forum untersucht wurden. Hierzu gehören beispielsweise Technologien in den Bereichen virtuelle Realität, Agenten und Avatare, Digital Asset Management, Kundenmanagement, RFID, mobile Anwendungen, virtuelle Gemeinschaften und Kooperation. Der Beitrag benennt einige Technologien, die für kleinere Institutionen geeignet sein können, von den meisten werden sie jedoch nur im Rahmen von Kulturerbe-Programmen profitieren können. Diese sollten geförderte kulturelle Netzwerke bzw. Servicezentren beinhalten, die es kleinen Institutionen ermöglichen, an der digitalen Kultur mitzuwirken, dabei jedoch die Kosten und Risiken der digitalen Technologien möglichst gering zu halten.

Schlüsselwörter (DE): Kleine Kulturerbeinstitutionen, digitale Kultur, DigiCULT Forum, Technologiebewertung.

Résumé (FR)

Alors que nous progressons vers une société de l'information basée sur la connaissance, une culture numérique émerge. Cette *e-culture* reposera sur des technologies qui mettent en valeur la création, la gestion et la fourniture de contenus culturels attractifs et d'interactions engageantes sur une variété de plate-formes. Cette communication considère les efforts que les petits établissements patrimoniaux doivent fournir pour se préparer pour l'*e-culture*, tout en faisant face au trilemme du manque d'effectif, du manque de compétences et du manque de financements. Nous nous concentrons sur la question de savoir quelles technologies existantes ou émergentes sont le plus à même d'être adoptées largement par les grandes, moyennes et petites institutions. Nous proposons une classification de ces tailles critiques basée sur des données empiriques, et nous soulignons les points clés que les établissements de conservation doivent considérer lors de l'étude de faisabilité pour la mise en oeuvre de certaines technologies. Sur la base de ces critères de "compatibilité à l'*e-culture*" nous évaluons 20 technologies dans la perspective particulière des plus petits établissements. Ces technologies ont été suivies dans le cadre du forum DigiCULT, et incluent, par exemple, la réalité virtuelle, les agents et les avatars, la gestion des fonds numériques, les technologies mobiles, le RFID (*Radio Frequency IDentification*), la gestion des relations avec la clientèle, les communautés virtuelles et les technologies collaboratives. Bien que certaines des technologies puissent être

employées par de plus petits établissements, le papier conclut que ces institutions ne pourraient seulement devenir prêtes pour l'*e-culture* et tirer avantage de la plupart des technologies, que dans le cadre d'une adhésion à de plus grandes initiatives sur le patrimoine culturel. Dans de tels projets, un système de financement de centres de ressources ou de réseaux culturels permet aux établissements plus petits de maintenir leurs coûts et la gestion des risques sans être privé des nouveaux développements technologiques.

Mots-clés : Petites institutions patrimoniales, e-culture, DigiCULT, Evaluation de la technologie

I. Ready for e-culture?

In recent years, substantial progress has been made in the access to digitised and born-digital resources held by cultural heritage organisations. As we progress towards a knowledge-based information society, a digital culture is emerging. This culture will be based on technologies that enhance the creation, management and provision of attractive cultural content and engaging interactions on a variety of platforms. This includes, to name but a few end-user oriented technologies, new displays and human interfaces, mobile access to heritage information, location-based services, virtual communities, 3D games and learning environments, agents and avatars, and Semantic Web applications. Yet, there is a growing risk that small cultural heritage institutions will be left behind as the main focus of information and communication technology (ICT) development in the heritage sector concentrates on medium to larger institutions. The reasons for this unfavourable development are not primarily technological in nature but organisational. They can be summarised as the institutional ‘trilemma’ of lacking human resources, lacking funds, lacking technical skills, which will be discussed below. A much broader perspective is given in the DigiCULT Report (2002), which addresses key issues of political frameworks, organisational change, exploitation, and existing and emerging technologies. Valuable further recommendations that concentrate mainly on improvements for smaller institutions may be found in a recent report on an ‘eEurope agenda for local services’ by the PULMAN Network of Excellence (PULMAN, 2003).

1. The ‘trilemma’ of small CH institutions: lack of human resources, lack of funds, lack of technical skills

Frequently, small cultural heritage institutions function as shoestring operations that exist and live on due only to the enthusiasm, endurance and creativity of key individuals who manage them. These cultural enthusiasts spend not only their leisure time but often also their own funds to keep the institution running and to provide similar services to the local community to those provided by larger institutions. Yet, when it comes to making use and taking advantage of new technologies, these organisations reach their limits especially with regard to qualified personnel and funding resources.

The most pressing factor that hampers small institutions in their efforts to participate in the information society is the lack of staff. A typical small institution will have fewer than five full-time equivalents, with only a fraction being professional staff concerned with the

institution's core business (e.g. curators, librarians, archivists, pedagogues), while the others are support staff (e.g. administration, security, supervisors, janitors). A common problem in small institutions is that the limited professional staff available may simply be able to ensure that the institution can provide its core services, but will not find the time to track down the necessary funds that would allow them to finance any ICT venture.

The second restricting factor for small cultural heritage institutions in following up a new technology venture is the limited financial leeway. A typical small institution will work on an operational budget that does not exceed EUR 100,000, while a medium-sized institution may have EUR 200,000-400,000 at its disposal. Needless to say, these budgets leave scarcely any room to finance ICT projects out of the operational financial resources. Consequently, institutions that are interested in developing and realising technology projects need to look for additional funding elsewhere. However, for many institutions applying for project grants demands stretching already limited personnel resources not only during the planning phase but also during the implementation phase of a project.

Furthermore, experience from many initiatives shows that projects harbour the risk of 'distracting' institutions from their core business, and imposing new activities that most often prove to be unsustainable beyond the funding period. Critics further point out that the majority of such projects favour financing the technological infrastructure, i.e. the hard- and software equipment, over the development of the 'wetware', i.e. the technical skills of the human beings (programmers, operators, system administrators) 'attached' to a computer system. The cost of ownership for the technological infrastructure is usually underestimated or not even considered. As small institutions are usually not in the position to hire dedicated personnel to take care of their computer infrastructure, there is an urgent need for ICT training programmes to train non-technical staff on how to handle new technologies. Finally, developing an understanding for ICT through such programmes will help to ensure that the institutions better utilise the full potential of the technologies.

2. Size matters: A classification of heritage institutions

In order to establish quantitative reference points for our discussion, we gathered data on the varying sizes of heritage institutions. As we did not find a widely used and empirically based scheme, we compared available data from statistically relevant surveys and other sources. The table below summarises the results in a scheme that may be elaborated further, but is sufficiently detailed for the present purpose.

	Small	Medium	Large
Annual operational budget (in EUR)	< 100,000	100,000 – 1 million	> 1 million
Staff in full-time equivalents (FTE) (professional, support); volunteers not included	< 5 FTE	5-10 FTE	> 10 FTE
Number of collection objects	< 10,000	10,000-100,000	> 100,000
Number of annual visitors: museums	< 7,000	7,000-30,000	> 30,000

We will not discuss this scheme in detail, but add some short explanations and interesting observations. Our focus here is on better understanding what distinguishes small from larger-size institutions quantitatively. Therefore, we did not, for example, include a category ‘very large’ or ‘major’ institutions, which may have an annual operation budget of over EUR 10 million.

Operation budget: In the USA and Canada, an operation budget of less than \$100,000 [about EUR 120,000] is very often used to characterise small institutions (cf. Alliance for the Arts, 2002; ExhibitsUSA, 2000). The Canadian Heritage Information Network’s surveys (CHIN 1999, 2004) report that 60% of the participating institutions fell within this operation budget category. The National Audit of Scotland’s Museums and Galleries (Scottish Museums Council, 2002) reports that the majority of the institutions had an annual budget of £50,000 [about EUR 75,000] or less.

Staff in full-time equivalents (FTE): The analysis of the UK Museums Retrospective Statistics (LISU, 2001) for 1999 gives mean numbers of 11 FTE for permanent staff (median: 2!) and 2 FTE for temporary staff. CHIN (2004) reports that about 42% of their survey respondents said their organisation has from 2 to 5 full-time employees and 36% from 2 to 5 part-time employees; roughly 38% had either no or one full-time or part-time employee (about 75% of members had 6 or more volunteers).

Number of collection objects: The CHIN survey (1999) provides detailed information on collection sizes. About 70% of the participating institutions had fewer than 10,000, 25% had 10,000-99,999, and 5% had more than 100,000 objects/specimens.

Number of annual (museum) visitors: The UK Museums Retrospective Statistics (LISU, 2001) found that, based on their available data, the best option was to define the institution size by the number of visits, as shown above.

3. An illustrative example

The *Museum in der Fronfeste*, a small regional museum in Neumarkt am Wallersee in the State of Salzburg with about 4,600 objects, typifies a European cultural heritage institution facing the institutional ‘trilemma’ of lacking personnel, lacking funds and lacking technical skills. Of the six employees, only two, the director/custodian and the archaeologist/museum pedagogue – both functioning in a double role – are professional staff. The others are responsible for administrative and care-taking work (accountant, supervisor, janitor and cleaner). In addition, seven volunteers support the effort of the museum staff.

The museum attracts about 3,000 visitors each year during its six months opening period (from May until end of October). In 2003, entrance fees and shop sales accounted for about 11% of the operating budget of EUR 57,444. Another 19% of this budget was financed by the State of Salzburg, with the remaining 70% contributed by the town of Neumarkt am Wallersee, in recognition of the museum’s role in promoting a local sense of identity.

Although the museum is constrained by limited financial flexibility, it is very active and innovative. Thanks to the enthusiasm of the museum’s custodian, this small institution is successful in attracting grants, especially from the EU-funded Interreg III programme. Over recent years, the museum initiated and co-ordinated five such projects, which totalled EUR 278,000. In 2004, one such project, which developed a regional cultural trail, was recognised with a special award by the State of Salzburg.

The ICT infrastructure of the museum includes three personal computers (1 i-mac G4 powerbook, 1 Power PC and 1 PC Windows) for collection management and administrative tasks.

Recent educational work involving local schools provided students with the opportunity to plan and realise their own exhibitions via ICT and the release of an audio-guide for children on CD-ROM.

Further information (in German) is available on the museum’s Website, /www.fronfeste.at, which also offers 360-degree panoramic views of the exhibition rooms with zooms for some groups of objects and accompanying short descriptions.

II. E-readiness check

Why should small cultural heritage institutions that are obviously not in the best position to manage the complexity of ICT take the risks? What are the chief incentives and benefits for small institutions in adopting advanced technologies? From the institution's point of view, there are essentially two arguments for the adoption of ICT: first, employing technologies may help to cut the internal costs by streamlining work flows and improving internal business processes; and, secondly, ICT can help to increase an institution's visibility and presence, and thus attract new users. There is a certain immediacy with the latter, as changing expectations from younger, technology-literate users place increased pressure on heritage institutions to be creative, innovative and experimental in the use of new technologies. An institution's Web presence will need to mature beyond the static one-way communication format of most present-day Websites.

Before looking at a broad panorama of relevant technologies, we would like to point out some key issues that heritage institutions will need to consider when assessing the feasibility of adopting a certain technology. We will later make use of this 'e-readiness check' when assessing the technologies present on the panorama.

1. When is a technology ready for the institutions?

Our first point relates to the maturity of a technology, and the key question here is whether the technology is immediately applicable. To assess this question, we will consider the standard model of how technologies develop and gain a broader level of use (cf. Moore, 1991): The process starts once technological research and development has reached a functioning and tested (prototype) solution, which is adopted by an innovative company in search of a competitive edge. Then, an industry solution appears which usually targets larger organisations, and finds some early adopters, based on a more stable and scalable solution. Next, competing industry solutions appear which may also target smaller organisations, and are adopted by a much broader group of organisations, the so-called 'early majority'. Then, the mature and well-serviced technical solution will find a large, perhaps industry-wide 'late majority'. Finally, even the most confirmed sceptics will decide to use it.

The recommendation for small institutions, of course, is to wait until there is a robust 'off-the-shelf' product available, which adheres to open standards, is easy to use, well serviced, and is likely to receive only incremental upgrades. When considering employing a certain technology, the institutions should investigate if there are examples of comparable institutions

that already use the technology, report favourably on having the technology in place, and may be asked to give some valuable advice.

2. Measurable benefits

When an institution considers making a major investment in a new technology, the decision makers and financial stakeholders (e.g. public and/or private funding bodies, sponsors, etc.) will ask for the expected and measurable benefits. There are two main categories of benefits: lowering costs for institutional core functions through improved institutional processes and workflows (mainly internal view); and enhancing attraction and service provision to customers (mainly external view). An institution can only afford to invest in a technology if it can reasonably expect to achieve a clear and sustainable benefit. This must be assessed taking into account the type and size of the institution, the institutional function that would be enhanced (e.g. collection management or exhibition), and the ratio of costs of using the technology vs cost savings through improved processes and/or additional revenues through, for example, more paying visitors, shop items sold, licensing fees, subscriptions. For the many institutions for which the latter economic benefits will not be feasible, cost savings and other measurable benefits such as increased use of online and/or in-house services (e.g. download of study or learning material, increased user satisfaction, etc.) should constitute the business case.

3. Total cost of ownership

Here we cannot address the many important issues involved in cost/benefit assessments. However, for the present purpose it should suffice to note that the total cost of ownership includes the initial investment for developing and implementing a technological application as well as all further costs of running the application/service on a regular basis (e.g. during the opening time of the institution or 24 hours/7 days a week), including technical administration, upgrades, etc. as well as staff training and other organisational costs.

III. A panorama of technologies

Which technologies that go beyond, for example, a simple Web presence or a low-cost collection management application are suitable for small cultural heritage institutions without their running the risk of adopting technologies that become unsustainable and unmanageable? With digital technologies developing rapidly, the heritage sector needs some mechanism to be

able to identify those technologies that will bring benefits and provide a certain amount of sustainability over a reasonable time horizon. Over the last 30 months, this has been one of the tasks of the DigiCULT Forum project, an EU-funded accompanying measure in the Fifth Framework IST Programme. The project consortium consists of Salzburg Research and the University of Glasgow's Humanities Advanced Technology and Information Institute (HATII). Further information may be found on the project's Website: www.digicult.info.

Since March 2002, the consortium has identified and evaluated a total of 20 (families of) technologies, proven ones as well as currently developing and newly emerging technologies, with respect to their benefit, potential, and appropriateness to the cultural heritage sector. One of the evaluation criteria has been the question of whether a featured technology could be exploited by different types and sizes of organisations and if it can be brought to use easily and is stable enough to run. In the monitoring process, the term 'technology' has been understood and used in its broadest sense to cover methods, standards, hardware, software applications, as well as interesting concepts (e.g. Learning Objects) and service models (e.g. ASP).

All of the technologies addressed below are covered in a chapter of one of the DigiCULT Technology Watch Reports (2003, 2004) and/or a Thematic Issue (2002-2004) that are already or will shortly become available (free of charge). The publications contain case studies of interesting projects, and the Reports also provide many scenarios of how institutions in different domains (i.e. archives, libraries, museums, galleries, and cultural sites) and of different size may implement and use the technologies.

The following tables provide an overview of a technology analysis that looked into the following questions: Which technologies monitored by DigiCULT will most likely find a broader adoption by institutions of different sizes, why (benefits/TCO), and in what time span? We do not present a detailed benefit/risk analysis, which may be found in the DigiCULT publications mentioned above. However, we will assess the technologies from the perspective of smaller institutions.

1. Adoption by some large institutions; longer-term: 6 years and more

Technologies	Benefits	From the perspective of smaller institutions
Games technology	Attracting on-site and online visitors through more compelling interactive and/or immersive ways of mediating cultural knowledge and experiences, addressing intellectual and emotional dimensions of cultural heritage.	These technologies will most likely remain beyond the reach of small- and most medium-sized institutions. They will need to follow other strategies of attracting on-site and online visitors, such as (virtual) community projects, regional history or creativity workshops.
Virtual Reality (VR) technologies		
Cultural Agents and Avatars		
New Human Interfaces (e.g. multimodal)		
Haptics and Robotics	Allow for creating distributed databases of semantically marked-up information, maintaining them, and reasoning over them assisted by Semantic Web services.	Relevant only in a long-term perspective.
Semantic Web technologies		

Short e-readiness check: In our check we only consider the first group of technologies. We regard the initial investment for developing and implementing state-of-the-art applications as well as the further costs of running the application on a regular basis (i.e. the total cost of ownership) as prohibitive for most institutions. There may be scope for simple, low-cost Web-based applications (e.g. games, VR); however, these are unlikely to become strong and longer-term attractions.

2. Adoption by large and medium-size institutions; medium-term: c. 3-5 years

Technologies	Benefits	From the perspective of smaller institutions
Digital Asset Management systems	Enhancing the creation, management and Web-based or other publication of assets; better exploitation of assets, e.g. through re-use, re-purposing, licensing, etc.	Relevant if collections are digitised in the framework of a national or larger regional initiative, and the <i>digital</i> assets, rights, and related transactions are then managed by a cultural network/service centre.
Digital Rights Management systems	Improving management of copyrights with respect to collection objects and intellectual property rights, e.g. in licensing of images, learning objects, etc.	
Automatic payment systems	Outsourcing of financial transactions to a service provider, e.g. for licensing, subscriptions or online museum shop sales.	
Electronic programming guides	Relevant mainly for organisations with certain content and services, e.g. streaming media.	
Mobile technologies	Providing information to tourists (e.g. location-based services) and other visitors, for example, on nearby exhibitions, events or buildings and objects at	Relevant if driven by a cultural network/service centre in the framework of a larger initiative.

	cultural sites or areas (e.g. historic city centre, archaeological excavation area).	
Smart labels and tags/RFID technology	Improving handling, control and inventory of objects; with more advanced technology also relevant for applications such as museum tours.	Although in the longer term the technology may become affordable for smaller institutions also, broader adoption seems unlikely.

Short e-readiness check: For the technologies addressed above, smaller institutions themselves will not find a business case as they do not, for example, hold an appropriate volume of marketable collection objects. They may only become ‘e-ready’ for, and benefit from, these technologies within a framework of larger cultural heritage initiatives. In such initiatives, funded mechanisms such as cultural networks/service centres enable smaller institutions to keep their costs and risks manageable while not being excluded from new technological developments.

3. Adoption by large to small institutions; near-term: c. 2 years

Technologies	Benefits	From the perspective of smaller institutions
XML family of technologies	XML is an established non-system and non-application specific data exchange standard.	All major software suppliers support XML, so smaller institutions may expect a ‘trickle down effect’.
Application Service Provider (ASP) model	Outsourcing of application management, better control of costs and risks.	Should definitely be considered by smaller institutions. Ideally, a regional cultural network/service centre would provide such a service at low

		cost.
Customer Relationship Management systems	More efficient and effective management, thereby strengthening relationships with customers.	Low-cost and simple to use technologies are available.
Virtual Community technologies	Stronger liaison with users and professional colleagues.	Low-cost and simple to use technologies are available.
Collaboration technologies	Opportunities for remote collaboration on projects with professional colleagues.	Relevant if driven by a cultural network and/or professional association.
Learning Objects	Better servicing learning communities.	Relevant in the framework of a national or larger regional e-learning initiative.
Display technologies	Opportunity to present exhibition information, (more) collection items, and previous exhibitions in an interactive way.	Feasible for some smaller institutions that concentrate on the exhibition function.

Short e-readiness check: The above table contains an assortment of ready-to-use technological applications or models that may be used by institutions of all sizes. They allow for a considerable leverage of the e-readiness of smaller institutions, and are related to different key areas such as reduction of costs and risks, community building, and education. However, to benefit from the concept of learning objects as well as collaboration technologies it will be vital for cultural networks/service centres to take the lead.

IV. Concluding remarks

We started off by pointing out the ‘trilemma’ of small cultural heritage institutions of lacking human resources, lacking funds, lacking technical skills. Although there are encouraging

examples of highly creative small institutions such as the *Museum in der Fronfeste*, we do not expect that the overall unfavourable situation of small institutions will change considerably over the coming years.

As stressed in our assessment, the benefits of most of the technologies in the above portfolio for small institutions will need to be realised within the context of national or major regional initiatives. In such initiatives the leading role will require to be played by cultural networks/service centres. Inspiring examples do exist – such as, to name but one example, the Erfgoednet.be which involves many local institutions and among other aims aspires to create a ‘cultural biography’ of the region of Flanders. We definitely see the need for much stronger e-culture strategies on the regional level.

However, there are also other future challenges for the small institutions in parallel to locking into such initiatives. They will need to ensure that they are embedded in their regional communities (e.g. regional history circles, schools, tourist organisations, folk music associations, creative industry), serve vital needs and become highly community-driven rather than concentrating on collection-related tasks.

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