Istruzione e cultura
Leonardo da Vinci

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(Multimedia System for an European Museum)
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NEW PROFESSIONAL ROLES CONCERNING THE EUROPEAN MUSEUMS TELECOMMUNICATION SUPPLY

- USE OF CHECK LISTS AND SWOT ANALYSIS -

Leonardo Da Vinci Programme **Second Phase: 2000-2006** **MU.S.EU.M. Project I/03/B/F/PP-154061**	**Responsible author: EIL** **Co-authors:** **EURO INNOVANET,** **Athens - National Archaeological Museum** **Berlin - Museum für Vor- und Frühgeschichte** **Bucharest - Muzeul National de istorie a Romaniei** **Budapest – Historical Museum** **Rome – Museo Nazionale Pigorini** **Sofia – National Museum of History** **Vienna - Naturhistorisches Museum- Prähistorische Abteilung** **Printed on:** **To: MU.S.EU.M Consortium & CEC**

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Abstract
The report summarises the results of a survey of seven European prehistory museums on their ability to become virtual museums and highlights the necessity of systematic ICT and communication competence training programmes.

Executive summary

The report is an output form workpackage 4 of the MU.S.EU.M. project. It details a questionnaire to seven European pre-history museums regarding their ability to migrate into becoming virtual museums. Data from this survey is presented in the form of a SWOT analysis of the e-readiness of the seven museums, followed by an analysis and conclusions.

The National Museum of History of Sofia and Museo Nazionale Preistorico ed Etnografico L. Pigorini in Rome are shown as having major challenges in both visitor numbers and establishing the level of connectivity necessary to become a virtual museum. In Athens, the National Archaeological Museum already has a high level of visitors, yet is almost equally constrained by lack of direct connectivity. Whilst Museum für Vor-und Frühgeschichte of Berlin, Muzeul National de istorie a Romaniei of Bucharest and Budapest History Museum vary in visitor numbers and possibly in potential numbers, they share similar challenges to migrate their existing web presence into one featuring a higher level of interactivity. In this, they face a similar challenge to Naturhistorisches Museum-Prähistorische Abteilung of Vienna. However, the Viennese museum has already established a systematic competence-building programme. Its challenge is to integrate these competences into its structures and ways or working to become a wholehearted e-service provider.

Contents

1 BACKGROUND AND PURPOSE

MU.S.EU.M. is an EU-funded project, with the aim of realising *the Virtual museum of the European roots*, which we envisage as an e-service and take as a pilot prehistoric collections in our partner museums. The choice of prehistoric artefacts and knowledge arises from the success of virtual museums featuring art and prehistory collections (see details in MU.S.EU.M. deliverable 4: *Characteristics, extent, profile of European museums' websites and case studies on best practices*).

The term museums, is employed here in the International Council of Museums (ICOM) sense, as an institution dedicated to the procurement, care, cataloguing, study and display of cultural objects of lasting interest and/or value and is wider than the conventional Anglo Saxon meaning, which often differentiates museums from art galleries. Conventionally museums specialise in art (Louvre, Prado, Uffizi, Tate, Guggenheim and Pompidou), history (Budapest National and Versailles) or science (British, Mexico City and Deutsches) – though many museums now avoid these distinctions and folk or social museums tend to thematise social trends. Museums vary in size, budgets, source of funds, staffing levels and in their focus: prehistoric, archaeological, art-historical, scientific and naturalistic collections (see details in MU.S.EU.M. deliverable 2: *Building a virtual museum: reference patterns of professional skills, training requirements, social dialogue and equal opportunity in training strategies*).

Prior to embarking upon a training exercise and business planning aimed at supporting a pilot virtual museum, the project conducted a survey of virtual museums (D.4.): *Characteristics, extent, profile of European museums' websites and case studies on best practices.* The current report is the results of a SWOT analysis designed to capture the current state of the art in partner museums. This report is the data for a Delphic panel exercise, which along with the SWOT analysis and earlier reports, feed into the pilot specification and business planning exercise.

Section one of the current report outlines its background and purpose and section two the method employed. Sections three to nine detail the results of the survey and SWOT analysis for the seven museums. Finally, section ten summarises the outcome of the SWOT analysis and draws the conclusion that systematic ICT competence training is an urgent priority if these museums are to migrate into virtual museums.

2 METHOD

Since MU.S.EU.M.'s seven museum partners vary greatly in their access to and competence with information and communications technologies (ICTs) the simple SWOT analysis tool (strengths, weaknesses, opportunities and threats) was chosen as a route into pilot and business planning. This tool provides a snapshot of internal and external structures, roles and relationships and invites decisions on a route map to a chosen strategic goal using a systematic managerialist framework.

SWOT analyses are a model used to help achieve a particular purpose (in this case the European Virtual Museum) and a SWOT therefore results in decision options. The outcome of a SWOT is decision choices and not simply a description of strengths, weaknesses, opportunities and threats. Strengths and weaknesses refer to matters over which the organisation has control, whereas opportunities and threats refer to external or environmental factors over which the organisation exercise little or no control. Put another way, listing strengths and weaknesses gives a state-of-the-art, whilst the opportunities and threats helps identify what museums might become in the future (i.e. a prototype virtual museum).

Strengths	**Weaknesses**
Opportunities	**Threats**

With a particular goal in mind, (in this case creating a virtual museum) the SWOT analysis helps analyse how opportunities can help amplify strengths and reduce weaknesses and how threats might pull or push in the opposite direction.

Appendix 1 of this report details the questionnaire circulated to partner museums, this along with discussions and interviews forms the data for the following SWOT analysis the purpose of which is to identify the following.

- The training needs of the museums in order to create a virtual museum pilot
- Existing ICT capacity
- Internal and external complementarities relevant to business planning

3 ATHENS - NATIONAL ARCHAEOLOGICAL MUSEUM

3.1 Background

With an annual budget of some €4 million and € 2.5 million current (variable) costs, the National Archaeological Museum in Athens has 170 permanent staff, along with some 100 temporary staff (mostly guards). Of the 800,000 annual visitors to the museum, some 500,000 are international.

The museum's treasures include a panorama of Greek civilisation from the Neolithic era until the late Roman period (6800 BC – 4th century AD), viewed through high quality artefacts, a number of which have world renown.

3.2 Strengths and weaknesses

The Museum is a governmental institution with a director and nine departments (four collections of antiquities, archaeometry, conservation, technical, public relations, buro/economic), none of which deals – at least for the present - with digital, electronic or virtual practises. The Museum is included in the web site called ODYSSEUS created and enriched, by a central Direction in the Hellenic Ministry of Culture. This constitutes the museum's web presence and it does not have the hardware or technical competence to intervene in its web presence. Links to other museums are re via the Ministry site. The museum has no plans for web-related training or web-related investment or the development of e-learning materials.

3.3 Opportunities and threats

The National Archaeological Museum views prospective funding levels over the next five years as promissory, seeing the expansion of information and communications technologies as an opportunity to grow. In particular, the museum sees the development as ICT competences as necessary to widen the scope of its researcher's interactions with other museums (especially archaeologists or conservators) and generally to allow the museum to play a stronger role in Greece's information society.

The museum's policy is to become always better and more attractive for its physical visitors. A DVD is also being prepared as well as an Audio-guide. The latter two are the only electronic means programmed for the near future. The museum hopes to expand both its physical and virtual visitors, exploiting its reputation as being amongst the most important and famous museums world-wide.

3.4 SWOT summary and conclusions

As figure 3.1 illustrates, the position of the National Archaeological Museum of Athens is currently strong, but may be weakened because of the absence of digital competencies within the museum. In particular, the opportunity to increase physical visitor numbers, work with other museums and improve physical exhibitions as a result of work on virtual exhibits are being denied the museum because of its lack of digital competences.

Strengths	Weaknesses
• Good web presence • Financially secure • DVD and Audio-guide • High visitor numbers (especially international visitors), good location • Strong international reputation • Strong archaeology research competency	• Web presence externally controlled • Little internal ICT competence • No training plans • Static web exhibition • No digital catalogue • Few virtual links with non-Greek museums
Opportunities	**Threats**
• Plans to develop web competences • Advanced ICT infrastructure in Athens • Opportunity to further expand visitor numbers via virtual presence	• Not part of emergent virtual museum networks apart from MU.S.EU.M. project • No benefit into physical exhibitions from lessons of virtual exhibitions

Figure 3.1: Summary of National Archaeological Museum of Athens SWOT

To take advantage of the opportunities the museum faces and to avoid the threats it is imperative that it gains and exploits ICT competences.

4 BERLIN - MUSEUM FÜR VOR-UND FRÜHGESCHICHTE

4.1 Background

The *Museum für Vor-und Frühgeschichte* for pre- and early history is one of eighteen of the State Museums in Berlin and has no disaggregated annual budget. It receives support from the General Directory – an amount that varies each year. The State Museums' of Berlin budgets are thus set as part of the annual budget of the Federal Republic of Germany. The overheads (building, IT, marketing) and variable costs (staffing etc) are subsumed in the General Directory budget, with only a specific projects annual budget of €20,000 (new books, photography and equipment) held in the museum. The museum has 40 staff, including the Director and six scientific staff. Some 40,000 people each year visit the Museum für Vor-und Frühgeschichte, 5% of whom are international visitors. The State Museum in total, 2003: 3.558.508 visitors. By moving to the Museum's Island in 2009 the number of visitors in the Museum für Vor-und Frühgeschichte is expected to grow rapidly

The museum has a collection of 180,000 artefacts (Palaeolithic to medieval period) from European regions and objects from Eurasia, including the following.

- Skull of a Neanderthal man from Le Moustier, Southwest France. c100,000 to 40,000 BP
- Depiction of a horse on a bone, La Roche, Lalinde, Southwest France, c15,000 BP
- Idol of a woman, Cucuteni, Romania, c6,000 BP
- Drum, Ebendorf, Thuringia, Germany, c5,500 BP
- Hoard of pieces of jewellery and objects with ritual character from Heegermühle, Brandenburg, Germany, c1,000 BC
- Ceremonial golden hat, provenience unknown, c1,000 BC
- Golden chain made of rings, Pecs, Hungary, 2nd Millennium BC
- Several ceramic vessels from Cyprus, 2nd Millennium BC
- Bronze cuirass from a grave at Stična, Slovenia, c600 BC
- Several bronze helmets from Italy, Slovenia and Austria, 7th to 3rd century BC
- "House urns" from different sites in Sachsen-Anhalt, Germany, 7th to 6th century BC
- So-called "Linsenflasche", Matzhausen, Bavaria, Germany, 5th century BC
- Celtiberic Dagger, decorated in gold, provenience unknown, Spain, 6th to 2nd century BC
- Roman folding chair, Dunapentele, Hungary, 2nd to 3rd century AD
- Bracelets of the Wielbark culture, Poland, 2nd to 3rd century AD
- Decorated sword, Taman, Southern Russia, 5th century AD
- Fibulae with rune inscription, Weimar, Germany, 6th century AD
- Blue glass vessel, Nettersheim, Germany, 7th century AD
- Sword of Viking time with inscription Ulfberht, Schwedt, 10th century AD

4.2 Strengths and weaknesses

Located in the beautiful Charlottenburg palace, the museum is part of State Museums of Berlin – Prussian Cultural Heritage. It's web presence is part of the State Visitor's

Department site, hosted by the Department of Information and Communication, which out-sources site design and maintenance and key initiatives such as the creation of temporary exhibitions. Additionally, outsourced are database access (digital inventories and web-connect) via the public Internet and expertise in publishing materials on CD-rom. This presence features MS-Office and sister applications using HTML, PHP and JavaScript with content managed by MySQL on an Apache web-server driven by a Linux (SuSE) operating system and Unidata and Oracle (MuseumPlus) database management systems. The web interface is based on Musys and uses cgi-scripts.

The digital catalogue is almost complete in several Berlin State museums, (Picture Gallery, National Gallery, Sculpture Collection), is 10 to 50% complete in other SMB-museums and recently *Museum für Vor-und Frühgeschichte* has begun to digitise it's collection.

Through the Berlin State Museum's Department, the *Museum für Vor-und Frühgeschichte* participates in the DISKUS network (Digital Information System of art and social sciences), which unifies the catalogues of all German museums.[1] Berlin's State Museum's Department in active in this network (taking responsibility for EUROMUSE[2] and has been a partner in several EU projects such as RAMA (remote access on museum's archives) and EPOC (European Posters Collections). This structure means that *Frühgeschichte* does not have direct bilateral links with other prehistory museums. Berlin State Museum's Department are making an active contribution towards the MU.S.EU.M. project, contributing their Museum Documentation System guidelines.

These arrangements have already produced practical digital outcomes for the *Museum für Vor-und Frühgeschichte* in e-learning materials including several CD-rom picture gallery productions and the online publication of lost art.[3] Amongst recent virtual exhibitions are the GIOVE website featuring the Giustiniani Collection in virtual environment[4] and the digital museum island.[5] *Frühgeschichte* hopes to add online publications to the exhibition sites in the future.

Thus, the museum has a strong digital presence, though the associated expertise is external to the *Frühgeschichte* museum. The State Museums Department contains scientific expertise on content and documentation and technical and applied science expertise supporting creative processes. Museums encourage staff to enrol in life-long learning programmes to improve their digital competences. Berlin State Museums Department views digital access as a crucial strategy, the role of museum staff is to package information and support the central department's digitalisation and digital exhibition output.

4.3 Opportunities and threats

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1 See www.bildindex.de

2 See www.euromuse.net

3 See www.bildindex.de/smpk (the museum continues to strive to reassemble treasures lost as a result of war.

4 See www.fu-berlin.de/GIOVE

5 See www.museumsinsel-berlin.de

The *Museum für Vor-und Frühgeschichte* anticipates no growth in its budget over the next five-years and anticipates that strengthened digital presence will depend upon support and engagement with the Berlin State Museum's Department Visitor's section, in which it places great confidence. The Museum identifies its own staff training in digital competences as a key challenge over the coming period and sees this as a crucial part of its aim to increase its visitor numbers. Whilst other archaeological museums in Berlin (such as the Pergamon Museum or Egyptian museum may be currently more attractive to visitors) *Frühgeschichte* believes that its range of activities and events – in addition to strengthened digital offers – will enable it to attract more visitors.

4.4 Berlin SWOT summary and conclusions

As figure 4.1 illustrates, despite an internationally renown collection of artefacts and housed in the historic Charlottenburg Palace, the museum attracts a relative small number of visitors and few international visitors in a city that is rapidly expanding its tourist numbers.

Whilst the model of locating ICT competences at a departmental level means the museum gained an early web presence, the lack of ICT competences in the museum mean that the skills and knowledge of interactive exhibitions gained from virtual exhibitions are unavailable to the museum and a weak marketing presence on the web. Given Berlin's ICT infrastructure and visitor growth, creating and strengthening ICT competences within the museum is the first step towards avoiding the threats it faces and towards taking advantage of a promissory set of opportunities.

Strengths	Weaknesses
• Good web presence • Strong archaeology research competency • Financially secure • Strong ICT competences in state Museum Department • Web presence key strategy of Berlin state museums	• Cost centre not investment centre – no clear budget for ICT competence development • Low visitor numbers (location, marketing, few international visitors) • Web presence externally controlled • Just beginning catalogue digitisation
Opportunities	**Threats**
• Advanced ICT infrastructure in Berlin • Opportunity to further expand visitor numbers via virtual presence – major tourist destination	• No benefit into physical exhibitions from lessons of virtual exhibitions • Part of Germany pre-history museums network not able to mount joint virtual exhibitions with international museums

Figure 4.1: Summary of Frühgeschichte's SWOT

5 MUZEUL NATIONAL DE ISTORIE A ROMANIEI OF BUCHAREST

5.1 Background

The *Muzeul National de istorie a Romaniei* of Bucharest last year attracted 49,034 visitors each year (32,500 non-paying visitors) despite being closed for renovation for three-months and despite large amounts of exhibition space being in the process of construction. Some 2,593 visitors are international. The Museum's normal visitor numbers are near to 100,000 per year. It has an annual budget of 309,257,769 thousand lei (€ 7,731,444) and annual total costs of 309,257,769 thousand lei (€ 7,731,444) and employs 155 people.

Muzeul National de istorie a Romaniei of Bucharest's treasures feature in two main exhibitions: National Thesaurus and the Lapidarium, with the Trajan's Column copy. Its Treasure's room displays over 3,000 gold artefacts representing Romanian history's most relevant moments from the fifth millennium BC to the twentieth century. Trajan's Column copy is decorated with war scenes, which transform the column into a triumphal monument with exceptional historical value, representing the genesis of the Romanian people. The Lapidarium displays several stone objects in chronological order, representing a history written in stone.

5.2 Strengths and weaknesses

Muzeul National de istorie a Romaniei of Bucharest is organised on a departmental structure. These include Management, Education, Archaeology, Preventative Archaeology, History, a National Centre of Cross-Disciplinary Researches, Numismatics and Thesaurus, Heritage (Preservation group), Restoration and Investigations, a Legal Office and Information and Communications Technologies group (ICT). The Romanian National History Museum has a matrixed web team, with a web-master and other contributions on other fields such as links and legislation, and museum's publications abstracts to which its permanent employees contribute.

Network communications include a wireless radio modem (2,4GHz with 64-Kb bandwidth and unlimited traffic), shortly connecting via fibre optic cabling. Its internal network infrastructure has a three-layer fibre optic backbone (1,000 MB), with switches and 24 ports on each floor. The Museum has one Linux server supporting its communications and web presence, plus a fileserver for databases. It is about to install a further server for Internet databases.

Muzeul National has an accounting-type database (a digital copy of the heritage register) containing more than 219,000 recordings, 307,520 objects and 19,681 custody objects (continually declining as these are returned to their owners). It also holds a specialist database with detailed information containing 42,132 items and 7,182 digital photographs relating to 4,968 objects.

The Museum's strategy is to create in-house competences, supported by outsourced expertise – an affordable and efficient strategy. Included in *Muzeul National's* full time staff complement are a certificated webmaster, an intellectual property lawyer, curators

for the links section, programming assistants for museum's publications section and a (contract) network engineer for the server setup. Whilst the webmaster recently attended a national level training course, there are no other form training plans in the museum, however, the museum supports a programme of continuous skill development in the IT section aiming to improve Internet-related competences such as digital photography, editing, creating PDFs, text conversion and flash applications.

In 2004, the Romanian Culture and Religious Affairs Ministry initiated a site joining all nationally important cultural institutions (www.cultura-net.ro,) the link from *Muzeul National* being www.munais.ro. Already, Romania's *National History Museum* has its own site (www.mnir.ro,), which contains links to *Muzeul National's* joint research projects.

- www.culture.gouv.fr/culture/arcnat/harsova/ro/index.html
- www.srap.cardiff.ac.uk
- www.cimec.ro/Arheologie/orasul_de_floci/index.html.

Muzeul National also links to other important archaeological sites such as www.alburnusmaior.ro and at www.cimec.ro/Arheologie/autostrada.htm to the *Motorway Project*. Apart from Romanian tourism and international websites, Romanian National History Museum also feature on the Romanian museum index at www.cimec.ro/scripts/muzee/selen.asp

The *Muzeul National de istorie a Romaniei* of Bucharest plans to introduce touch screen technology in its permanent exhibits (the National Thesaurus and the Lapidarium – Trajan's Column) and to continue updating its website to enrich the content and interactivity of its heritage sections. It's server hosts a restricted area for professional theoretical discussion, which the Museum wishes to expand and it is constructing an ASP web page dedicated to specialists' opinions in various fields (*Revue* on-line), page that will be available for the public in read only format.

5.3 Opportunities and threats

Muzeul National de istorie a Romaniei of Bucharest is able to maintain funding present levels of ICT investment and to exploit strong network links into network infrastructure. Enriching digital information, especially in presentable e-learning formats is the main challenge facing the museum. It sees its technology and databases are supporting this enrichment.

Muzeul National staff view EU membership as a catalyst for more international comparison and benchmarking of its digital offer, challenging the staff to create content that goes beyond the best in Romania, towards comparing favourably with the best in the world.

The Museum is determined to increase visitor numbers and views EU accession – and subsequent increased visitor numbers to Bucharest – as an opportunity to do so. They expect that finishing work on permanent exhibitions, including presentations in English, will help achieve the goal of increasing both physical and virtual visitor numbers.

5.4 Bucharest SWOT summary and conclusions

As figure 5.1 illustrates, the museum is benefiting from the surge of tourism to Bucharest with high physical visitor numbers. Using its own resources and grant applications, it has successfully developed a web presence and is now constrained from enriching this virtual presence by a lack of ICT competences within the museum and shortage of hardware to exploit its extensive collection.

Strengths	Weaknesses
• Growing visitor numbers • Audio-guide system (migratable to web) • 4 staff with web competences • Financially secure	• 10% collection digitally catalogued • Web staff act in departments not as team • No ICT training plans • Server capacity constraint • ICT developments depend on grant applications and are not in core budget • Good ICT infrastructure in Bucharest
Opportunities	**Threats**
• Opportunity to further expand visitor numbers via virtual presence – major tourist destination • Strategy to development virtual exhibitions	• No benefit into physical exhibitions from lessons of virtual exhibitions • Not part of emergent virtual museum networks apart from MU.S.EU.M. project • Urgent need for multilinguality

Figure 8.1: Summary of *Muzeul National de istorie a Romaniei* of Bucharest SWOT

Expanding its virtual presence, international research networking and ability to participate in multinational exhibitions requires an ICT training programme, hardware and resources to present its physical and virtual exhibitions in a multilingual format.

6 BUDAPEST - HISTORY MUSEUM

6.1 Background

Situated east of the Buda Castle, Budapest History Museum's most significant archaeological finds come from the Palaeolithic sites of Érd and Remete cave and from the sites of the Bell Beaker-Csepel group. The main body of the collection is composed of the finds unearthed in the hundreds of graves of the Early and Late Bronze Age cemeteries of *Békásmegyer*. Budapest History Museum (200,000 visitors per year) and the *Aquincum* Museum, house the finest items from the prehistoric collection on permanent display. Some 130,000 of these visitors are international. Employing 125 full-time and 42 part-time staff, in 2004, Budapest History Museum's budget was Ft 1,558,075,000 (c€ 6,232,300) and its running costs were Ft 2,043,246,000 (c€ 8,172,984).

Founded in 1887, overall Budapest History Museum's collection contains 1.8 million objects; its prehistoric collection includes clay artefacts from the late Bronze age and headless idols with symbolic decorations and pots in form in sitting statue from the Neolithic age. All of the Roman monuments in Budapest are part of the Aquincum Museum. One-third of the central settlement are excavated and the visible ruins can be seen in the Aquincum Civil Town. Other collections from the Roman period are the lapidarium, wall paintings, coins and animal bones and bone tools. The ruins and remains of the medieval Buda castle are part of the building of the Budapest History Museum (the only the Museum in Budapest, in which is it possible to find information about the city in the middle ages). For example the second oldest textile object of Hungary, a silk carpet with the Hungarian and Anjou weapons from the 14th century, is the part of the museums collections and exhibited in the permanent display. The modern history collections and the municipal picture gallery are in the one of Budapest's largest and most attractive baroque buildings and features everyday objects and architectural plans showing the evolution of life in the city.

6.2 Strengths and weaknesses

The Budapest History Museum has a hierarchic structure, the leadership of which covers the following departments: Library, Archaeological archives, Restoration, Middle ages, Aquincum (Ancient ages), Modern city history, Municipal picture gallery and Prehistoric ages. Service departments include companies, economic, operations and security. In addition to collection, archiving, displaying and educating the museum is also responsible for excavations in Budapest.

Budapest History Museum's website is in three parts. The Aquincum Museum (two-staff) relates to prehistoric ages (part of the MU.S.EU.M. project), with the Municipal Picture Gallery and Castle (Middle Ages and New Ages History Departments of the City) parts, each supported by one member of staff. At times, temporary exhibitions, prepared by outside contractors, feature on these sites. Some ten percent of the museum's collection is in a digital catalogue (text not images) in MS Access. Whilst co-operating, the museum's four web-related staff work for departments rather than as a team for the museum as a whole. The Museum has its own mail-server, and uses Explorer, Netscape and pop3 and is in the process of upgrading its email services.

Indeed, further development of the musuem's web presence is currently held back by the need for a more advanced server to improve the system's capacity.

Staff are self-taught and each perform non-web functions within the museum. There are no current training plans beyond those associated with the MU.S.EU.M. project. Whilst the museum has a small budget (c € 200 per month) to develop its web presence, it relies on the voluntary contributions of staff members. In 2004, the museum won a Ministry of Infomatics and Communication grant of Ft 20,000,000 (€ 80,000), eighty percent of which was spent on digit equipment (cameras, scanners, printers and software), with twenty percent being used to prepare digital exhibitions.

The museum is planning to let to make some 3D movies about the history of buildings in parts of Budapest for which it has already successfully competed for a grant, however, it needs to upgrade its ICT infrastructure before this can be exhibited on the Internet.

Hungarian museums all feature on a national information website at www.museum.hu and the Aquincum Museum site is linked via the following external sites: CIVICI MUSEI DI UDINE, RÖMERSTADT AUGUSTA RAURICA, CITY OF PRAGUE MU.S.EU.M. and http://www.carnuntum.co.at

6.3 Opportunities and threats

Without a significant increase in resources (from the public and/or private sector), the museum will be unable to improve its virtual presence since 85% of current budgets go on the staff complement. Internet connections at main building of the Museum, in the castle is state-of-the-art quality, however, the Internet server and connection of the Aquincum Museum and Municipal Gallery at Kiscell lack the capacity to store and manipulate large amounts of data or interactive materials. Additionally, whilst the sites contain good quality materials, these need translating to give wider access. In short, technical incapacity and lack of training and not strategic will or quality of content, threaten to constrain the museum's virtual presence. Additionally, the museum is short of resources for marketing.

Competition between Hungarian museums to attract visitors is intensifying, with the Budapest History Museum disadvantaged by charging, whereas other remain free entry. It goal is to increase visitor numbers by 2,000 (2.5%) per year. Developing a virtual presence is seen by the museum as a key factor in achieving additional visitor numbers, including physical visitors, especially since it is the only museum in Budapest offering pre-history exhibitions. The museum has installed an audio guide system.

6.4 Budapest History Museum: SWOT summary and conclusions

As figure 6.1 illustrates, the Budapest History Museum is already benefiting from the expansion of the city's ICT infrastructure and growth in visitor numbers, which it is well-located to exploit, especially with EU accession.

Strengths	Weaknesses
• High and growing visitor numbers • Good location for physical visitors • Good ICT infrastructure in Budapest • Key aim of using virtual presence to increase physical visitors • Part of national and international virtual museum networks	• Needs to complete images in digital catalogue • Staff self-taught on ICT skills, no systematic training programme • Server capacity constraint
Opportunities	**Threats**
• Opportunity to further expand visitor numbers via virtual presence – growing tourist destination • Opportunity to exploit participation in international networks	• No benefit into physical exhibitions from lessons of virtual exhibitions • Urgent need for multilinguality

Figure 6.1: Summary of Budapest History Museum's SWOT

Staff competence in ICT skills and creative design are a key constraint on expanding the museum's virtual presence and migrating work in the virtual arena into enhancing the interactivity of it physical exhibitions. Developing these competences and overcoming hardware and multilinguality constraints are key to exploiting the undoubted promissory outlook facing the museum.

7 SOFIA - NATIONAL MUSEUM OF HISTORY

7.1 Background

Sofia's National Museum of History collects, researches and publishes materials relating to pre-history and has an annual budget of 2,100,000 leva (c €1,050,000), most of which pays for staff and non-capital costs. The museum, which employs 170 staff, attracts 69,460 visitors each year, 14,227 of whom are international.

The museum has a Directorate, finance and administration department, and departments of archaeology, history, art-learning, ethnography and inter-disciplinary research, restoration and PR.

7.2 Strengths and weaknesses

The National Museum of History seeks to gather more artefacts from Hungary's regional museums to create a centre of excellence.

Currently, it has no web presence. It digital catalogue has two hundred items from its collection.

Current web-related staff competences include Archaeologists, economists, photographs and technical support. The museum is currently developing a training programme on digital competences and has a budget of 4,000 leva (€ 2,000) for a web project. There are no current web links to other museums.

7.3 Opportunities and threats

The museum views its lack of digital capability as an opportunity to leap frog the stages of innovation and costly learning curves that other museums have gone through as the quality of the information and communications (ICT) infrastructure in Sofia improves and as the city increases international visitor numbers.

7.4 Sofia National Museum of History: SWOT summary and conclusions

Figure 7.1 illustrates the challenges facing Sofia's National Museum of History are those of having a strong product offer without the capability to bring the product to a wider market. The museum houses important collections and undertakes significant research, however, until it can develop the ICT competences to upgrade the interactivity of its physical exhibitions and begin presenting virtual exhibitions, it is unlikely to dramatically grow its visitor numbers.

Strengths	Weaknesses
• Important collection of artefacts • Beginnings of digital catalogue • Research competence especially of archaeologists • Improving ICT infrastructure in Sofia	• Low physical visitor numbers • No web presence • Lack of digital competences and investment budget • No virtual links to other museums
Opportunities	**Threats**
• Sofia growing as tourist destination, museum well-located • High quality of research work in museum	• No benefit into physical exhibitions from lessons of virtual exhibitions • Urgent need for multilinguality

Figure 7.1: Summary of Sofia National Museum of History SWOT

8 ROME: SOPRINTENDENZA AL MUSEO NAZIONALE PREISTORICO ETNOGRAFICO LUIGI PIGORINI

8.1 Background

The Pigorini is not able to disaggregate its budget from that of the Italian state, Ministry of Culture. A rough estimate of salaries and property rent (the building is privately owned) is some €5 million per year. Pigorini has 77 employees (a Director, 24 researchers and technicians, 16 guardians and 35 clerks and secretaries). It has 48,000 visitors per year and estimates that 3% of these are foreign visitors.

Pigorini holds 200,000 prehistoric and ethnographic artefacts many of which are in storage. Part of its collection dates back to the 16th century papal Museo Kircheriano collection, though most are 19th and 20th century finds by Italian archaeologists. Its most important items include the following.

- Neanderthal cranium from the *Guattari Cave*
- Upper Palaeolithic statuette from *Savignano*
- 16th century *Taino Zemi*
- *Fibula Prenestina* bearing the oldest latin inscription
- Two 16th century Aztec turquoise masks
- Collection of African wooden statues
- Neolithic wooden canoe from *la Marmotta*
- Neolithic burial of *Grotta Patrizi*
- Several bell-beakers contexts
- Several bronze axe hoards
- Aegean Bronze Age collection
- Italic collections of Iron age artefacts

8.2 Strengths and weaknesses

Pigorini is a nationally supported institution and featured as a case study in the EU-funded Minerva project handbook. Its website was internally designed and developed by its internal Publishing section Director, who maintains the site and mounts digital exhibitions, which is hosted by the Ministry of Culture and is self-taught in computer graphics and web design.

Almost all of Pigorini's collection is on a text database, with an increasing number accompanied by digital photographs. Budget available for catalogue digitisation and web development is aggregated within the overall budget. There is no P2P direct intranet network between Italy's museums.

8.3 Opportunities and threats

The museum's external funding has been reduced by 10% for each of the last five years. At the same time, Pigorini is committed to constantly enhancing the quality of information it provides to visitors and to improving its ICT infrastructure. Inadequate

training opportunities are a major threat. Located somewhat out of the main tourist centre of the city, the museum enjoys less visitors than it deserves.

In late 2006, finances permitting, Pigorini will open a new America ethnographic section – an important opportunity for the museum. Pigorini remains the only museum for Prehistory in the City of Rome. Its ethnographic section is the most extensive in the city and its attractive building is a remarkable example of Rationalist architecture.

8.4 Pigorini – SWOT summary and conclusions

Pigorini, as figure 8.1 illustrates, has an international renowned collection and reputation for excavation and research. Its low visitor numbers partly reflect its peripheral location and partly competition from other visitor attractions in the City of Rome.

Strengths	Weaknesses
• International renown collection • High and growing visitor numbers • Good ICT infrastructure in Roma • Part of national and international virtual museum networks • Web presence	• Poor location for physical visitors • Incomplete digital catalogue • No clear budget for investment • No systematic staff training in ICT skills and interactive exhibition presentation • No national virtual museum network
Opportunities	**Threats**
• Opportunity to exploit participation in international networks • Expanding research competences e.g. American ethnographic section • Opportunity to further expand visitor numbers via virtual presence – major tourist destination	• Reducing funding • Cost centre not investment centre – no clear budget for ICT competence development • Not part of emergent virtual museum networks apart from MU.S.EU.M. project • No benefit into physical exhibitions from lessons of virtual exhibitions

Figure 8.1: Summary of Pigorini SWOT

Pigorini is constrained from enriching its virtual presence by a lack of ICT competences within the museum and shortage of hardware to exploit its extensive collection. However, it is part of a number of international networks and has many opportunities to benchmark its product offer against the best museums in the world.

9 VIENNA: NATURHISTORISCHES MUSEUM PRÄHISTORISCHE ABTEILUNG (NHM)

9.1 Background

The Naturhistorisches Museum Prähistorische Abteilung (NHM) of Vienna houses one of Europe's most important pre-history collections. Founded in the 1870s as an Imperial museum, it has outstanding finds from across central-Europe including the Venus of Willendorf, Figurine of Stratzing (Dancing Fanny), the Hallstatt collection, Situla of Kuffarn and objects from a wide variety of important archaeological sites.

The museum's pre-history research department has an annual budget of € 40,000 for field research and a further € 40,000 for other research, investment and preparation of exhibitions. These budgets are in addition to staffing and building budgets (for which no disaggregated data is available). NHM employs 50 scientists and 200 other staff (50 on temporary contracts). Of NHM's 500,000 annual visitors, some 10% are international.

9.2 Strengths and weaknesses

NHM is a former state natural history museum, with twelve departments and views itself as a research and knowledge transfer centre aiming to efficiently transfer research into new exhibitions. A Directorate run the museum, which is partly financially autonomous.

In 2003, NHM won the accolade of being on the ten best museums in the world and currently enjoys 500,000 virtual visitors per year.

The museum's ICT capability is out-sourced, and uses state-of-the-art servers, software, security and advanced communications networks. NHM's digital catalogue is complete, the image database is continually refreshed and updated and e-learning materials prepared.

A continuous life-long learning programme supports museum staff in gaining and upgrading ICT skills in which many staff enrol on in-house training courses. Currently, NHM is creating and upgrading the web presence of each department of the museum, which is part of the digital network covering all of Austria's state museums.

9.3 Opportunities and threats

NHM views the enrichment of its web presence as an important strategic goal over the next five-years and an important opportunity to increase the number of virtual and physical visitors and more widely disseminate the results of its research output. In particular, over the next years NHM will improve the quality of its home pages, introducing further multimedia elements in conjunction with higher levels of interactivity in its physical exhibitions.

With 500,000 virtual visitors per year and the accolade of being one of the ten best museums in the world, NHM's goal is to retain and enhance its product offers.

9.4 Vienna NHM: SWOT summary and conclusions

The Naturhistorisches Museum Prähistorische Abteilung is a successful museum and acknowledged as one of the best pre-history museums in the world. As figure 9.1 shows, whilst its strengths greatly out-weight its weaknesses, there is always room for improvement in visitor numbers and the quality of exhibitions. NHM's competition in the arena of virtual museums and e-learning materials are the best museums in the world. As such, it faces the challenge of embedding within its virtual product offer the best design capability that Vienna has to offer. In short, its success criterion are higher than those of the other six museums.

Strengths	Weaknesses
• International renown collection • Strong archaeology research competency • High visitor numbers (especially international visitors), good location • Good web presence • Financially secure • Strong multilinguality • Strong international reputation • Investment budget for ICT • ICT competence training programme	• Low % of international visitors • Under-performing in visitor numbers? • Needs to increase interactivity in some of physical exhibitions
Opportunities	**Threats**
• Advanced ICT infrastructure in Vienna • Links to world-class design houses	• Competition from other visitor attractions in city • Needs to compete with best in world in quality of e-learning materials

Figure 9.1: Summary of Naturhistorisches Museum Prähistorische Abteilung SWOT

In particular, to embed new design techniques into exhibitions will require NHM to revise the previous role of ICT as an add-on to the museum's activities and incorporate it (agility) into all of its ways of working. This is likely to be a major task where professionals have established structures and routines.

10 SUMMARY AND CONCLUSIONS

Museums vary widely in the size and quality of their collections and their ability to research, catalogue and display in permanent and special exhibitions their stock of treasures. Virtuality adds the further dimensions of connectivity, interactivity and agility to the points differentiating museums (see below). After a brief comparison of the size, budgets visitor numbers and location of these seven museums, this section uses the CIA model featuring connectivity, interactivity and agility to evaluate the SWOT data from the museums from the viewpoint of creating a pan-European virtual prehistory museum. In doing so particular attention is given to the staff competences and training needs of the museums. It concludes by drawing together the challenges facing the MU.S.EU.M. project.

10.1 Size, b

Tourism in Europe employs 8 million people - a figure projected to increase by 25% over the next ten years. Whilst transport, accommodation and catering make up three of the four pillars of tourism, the fourth – attractions – is increasingly important as the industry segments away from mass-tourism models of delivery. Cultural visitor attractions, such as the Louvre (6 million visitors per year), the British Museum (5.4 million) and the Vatican (3.5 million) are capable of attracting large numbers of visitors, though not as many as recreational attractions such as the 12.5 million visiting Paris Disneyland or 125 million visiting Europe's zoos each year.[6]

Of course, visitor attractions perform best where transport access is easy – location is highly significant. As figure 10.1 illustrates, a central location in a city renown for antiquities such as Athens produces 1,963 visitors per staff member. Whilst Pigorini is in a higher tourist destination city, its peripheral location that city perhaps helps explain its lower throughput.

	Staff total	Budget (€ m)	Visitors	Foreign visitors	Cost per visitor	Visitors per staff
Prähistorische Abteilung of Vienna	200	unknown	350,000	35,000	unknown	1,750
National Museum of History, Sofia	170	1,050,000	69,460	14,227	409	409
Museum für Vor-und Frühgeschichte, Berlin	40	unknown	40,000	2,000	unknown	1,000
National Archaeological Museum Athens	270	4,000,000	800,000	500,000	2,963	2,963
Budapest History Museum	167	6,232,000	200,000	130,000	1,198	1,198
L.Pigorini, Rome	77	5,000,000	48,000	1,440	623	623
National de istorie a Romaniei of Bucharest	155	7,731,444	49,043	2,593	316	316

Figure 10.1: summary of staff and visitor data

Vienna, as far as is known, is the only museum enjoying a greater number of virtual (500,000) than physical (350,000) visitors.

[6] European Commission, 2003, **Structure, performance and competitiveness of European tourismand its enterprises,** Luxembourg: Office for Official Publications of the European Communities, ISBN 92-894-4464-9.

The wide distribution of visitor numbers between these museums is matched by a spread of budgets ranging from one to seven million Euro (though perhaps the Bucharest figure needs some disaggregation). Further differentiation is seen in the degree of dependence on charges as opposed to public funding and the extent to which (in accountant's parlance) they are cost centres within aggregated budgets or can act as investment centres enjoying budgetary autonomy.

10.2 E-readiness: connectivity, interactivity and agility

The virtual museum is an e-service, part of which is the provision of e-learning materials and opportunities for knowledge networking, in addition to shared design and content of virtual exhibitions. All e-services share the three dimensions of connectivity, interactivity and agility.[7]

- Interactivity here refers to virtual and physical presence and the relation between them (the 'click-and-brick' balance). The emphasis here is upon functional integration i.e. qualitative deployment of knowledge, rather than simply the multiplication of functions. Interactivity is purposive and not an end to itself.
- Connectivity is both technical and social; it entails both communications linkages and knowledge networking via inter-organisational links and the integration of (previously) fragmented functions within the museum.
- Agility (see Nagel and Dove, 1992) suggests long-term inter-organisational relationships from which museums learn in addition to learning from their environmental. Hence, agility also means having the absorptive capacity and/or knowledge generating ability to resourcefully participate in knowledge networks. Critically, the term means the capability and desire to continually innovate organisational or technological change in order to remain aligned with unfolding business opportunities. Agility is knowledge and action, *agilmente.*

Figure 10.2 summarises the outcome of the SWOT analysis by comparing the e-readiness of the seven museums.

[7] Kinder T, 2002, *Emerging ecommerce business models: an analysis of case studies from West Lothian, Scotland*, European Journal for Innovation Management, Vol. 5, No. 3, pg. 130 – 151.

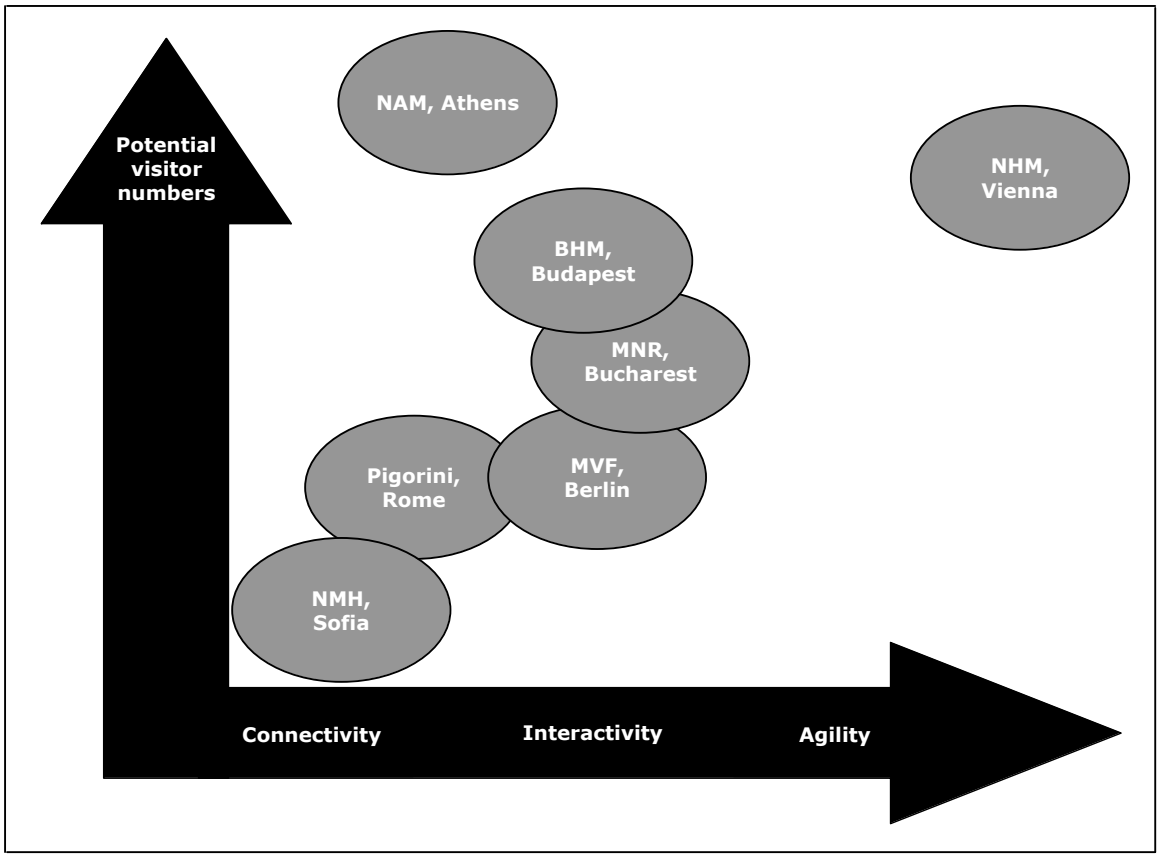

Figure 10.2: Distribution of connectivity, interactivity and agility challenges facing seven museums to become a virtual museum

The National Museum of History of Sofia and Museo Nazionale Preistorico ed Etnografico L. Pigorini in Rome are shown as having major challenges in both visitor numbers and establishing the level of connectivity necessary to become a virtual museum.

In Athens, the National Archaeological Museum already has a high level of visitors, yet is almost equally constrained by lack of direct connectivity.

Whilst Museum für Vor-und Frühgeschichte of Berlin, Muzeul National de istorie a Romaniei of Bucharest and Budapest History Museum vary in visitor numbers and possibly in potential numbers, they share similar challenges to migrate their existing web presence into one featuring a higher level of interactivity.

In this, the above mentioned museums face a similar challenge to Naturhistorisches Museum-Prähistorische Abteilung of Vienna. However, the Viennese museum has already established a systematic competence-building programme. Its challenge is to integrate these competences into its structures and ways or working to become a wholehearted e-service provider.

10.3 Opportunities and threats facing virtual museums- conclusions

In setting out its vision of creating a pilot virtual prehistory, the MU.S.EU.M. project identified as a key need the systematic upgrading of ICT and web-related competences in museums. This survey and SWOT analysis vindicates this perspective by identifying training needs as a key constraint and opportunity for developing a virtual museum.

In one sense this conclusion simply mirrors the general economic development conclusions of the Lisbon summit – that to become internationally competitive Europe's service sector must embrace new technologies and the skills associated with exploiting them. However, since museums themselves feature in learning processes, the urgency of acquiring the pedagogic competences necessary to support e-learning appear more urgent, if museums are to continue to play an important role in education and the transmission of culture in addition to supporting Europe's tourism industry.

Despite the fact that the seven museums studied have this urgent need for systematic ICT competence building, what is remarkable is how far they have progressed without systematic training (Vienna being the exception to the availability of systematic training). This demonstrates the commitment of museum staff to the dissemination of their work and opening access to their collections and is particularly illustrated in the cases of Bucharest and Budapest.

APPENDIX 1

Questionnaire circulated to partner museums

This checklist has two purposes. Firstly, it gathers data that supports a SWOT analysis (strengths, weaknesses, opportunities and threats) of the current position and readiness of museums to become virtual – in short the e-readiness of the museum partners. Secondly, the data gathered and SWOT analysis will help guide the building and strengthening virtual museums. Thus, the checklist aims to identify the current competences of each museum partner relevant to creating a new e-service: a prototype virtual museum. Competences are both social and technical and include professional capabilities and *know-how*, organisational structures and information technology.

The objective of this checklist is to find out the following for each museum.

- Resources currently dedicated to a web presence including:
    - organisation (including outsourcing)
    - hardware and software
    - human resources (including professional profiles and training)
    - start-up and running costs
    - period of development time
    - evaluation of web-presence usage and success
    - target market and audience
    - innovations especially in graphics and e-learning materials
    - attractiveness of museum offer relative to competitors
- Key technologies employed and its capability of supporting a prototype virtual museum.
- Profiles of key professionals (competence and task specification, person specification and roles including project management) and shortages of professional competences

Upon completion of this data gathering, MU.S.EU.M. will complete a SWOT analysis using the data.

A.1 SWOT ANALYSIS

SWOT analyses are a model used to help achieve a particular purpose (in this case the European Virtual Museum) and a SWOT therefore results in decision options. The outcome of a SWOT is decision choices and not simply a description of strengths, weaknesses, opportunities and threats. Strengths and weaknesses refer to matters over which the organisation has control, whereas opportunities and threats refer to external or environmental factors over which the organisation exercise little or no control. Put another way, listing strengths and weaknesses gives a state-of-the-art (your museum now), whilst the opportunities and threats helps identify what your museum might become in the future (prototype virtual museum).

Strengths	**Weaknesses**
Opportunities	**Threats**

With a particular goal in mind, (in this case creating a virtual museum) the SWOT analysis helps analyse how opportunities can help amplify strengths and reduce weaknesses and how threats might pull or push in the opposite direction.

A.2 BACKGROUND DATA ON YOUR MUSEUM

A.2.1 What is your current annual budget?

A.2.2 What are your current total costs?

A.2.3 How many people a year visit your museum?

A.2.4 How many people does your museum are employ?

A.2.5 Give some examples of the quality and scope of artefacts that you hold.

A.2.6 How many international visitors a year do you get?

A.3 STRENGTHS AND WEAKNESSES OF YOUR MUSEUM

A.3.1 List the strengths and then the weaknesses of your museum in terms of building a virtual presence. The following categories are given as helpful examples - add any others that you wish.

A.3.2 What is the basic structure of your museum?

A.3.3 How is your current web presence organised? For example, is there a dedicated project team, a matrixed team and do you use any outsourcing?

A.3.4 What hardware and software do you currently use for communications in general and your web presence in particular?

A.3.5 To what extent do you currently have objects digitally catalogued.

A.3.6 What are the professional profiles of the staff who support your current web presence?

A.3.7 What training is currently happening or planned to strengthen professional

competences relevant to a web presence?

A.3.8 How much time and money has your museum spent on creating a web presence? What plans for further investment do you have?

A.3.9 Are you digitally linked to other (local, national or international) museums – give some examples.

A.3.10 Can you give an example of a realised or planned innovation in graphics or e-learning materials in your museum?

A.4 OPPORTUNITIES AND THREATS FACING YOUR MUSEUM

A.4.1 List the opportunities and then the threats facing your museum in terms of building a virtual presence. The following categories are given as helpful examples - add any others that you wish.

A.4.2 Over the next five years, does your museum see changes in funding levels or funding arrangements as an opportunity or a threat.

A.4.3 Do you see the quality of your information and communications infrastructure be a threat or opportunity?

A.4.4 Are the training opportunities for museum staff on web presence adequate to meet the challenges of the information society?

A.4.5 Does your museum have targets for physical and virtual visitors over the next five years?

A.4.6 How attractive is your museum to (physical and virtual) visitors compared to competitor museums that might alternatively be visited?