Istruzione e cultura
Leonardo da Vinci

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(Multimedia System for an European Museum)
I/03/B/F/PP-154061

PERSPECTIVES AND FORECASTS FOR A PAN-EUROPEAN VIRTUAL MUSEUM OF ARCHAEOLOGY. ANALYSIS OF FORMATIVE REQUIREMENTS SCENERY

- METHOD DELPHI -

Leonardo Da Vinci Programme **Second Phase: 2000-2006** **MU.S.EU.M. Project** **I/03/B/F/PP-154061**	**Responsible author:** Eddleston Innovation Ltd **Co-authors:** EURO INNOVANET Srl Naturhistorisches Museum- Prähistorische Abteilung of Vienna National Museum of History of Sofia Museum für Vor-und Frühgeschichte of Berlin National Archaeological Museum Athens Budapest History Museum Museo Nazionale Preistorico ed Etnografico L.Pigorini Muzeul National de istorie a Romaniei of Bucharest University of Alba Julia 1 Decembrie 1918 University Pre- & Protohistorical, Research Centre **Printed on:** **To: MU.S.EU.M Consortium & CEC**

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Abstract
The report includes original data on the prospects for a pan-European virtual of archaeology gathered in 97 completed questionnaires from experts in seven states. In each case, respondents build upon an earlier SWOT report of the capacity and capabilities of M.U.S.EU.M.'s seven museum partners. A detailed analysis of the prospects for a pan-European virtual museum of archaeology concludes that prospects are promissory. The challenges of building a virtual museum of archaeology include building a wider network that includes IT and business partners along with e-learning stakeholders, a serious business planning exercise, widespread training of staff and a radical upgrading of technology available in most museums.

Executive summary

From original data on the prospects for a pan-European virtual of archaeology gathered in 97 detailed questionnaires from experts in seven states, the report builds upon an earlier SWOT report of the capacity and capabilities of MU.S.EU.M.'s seven museum partners.

The report begins with a detailed justification of the Delphic method and summary of our data sample. This sample features museums in six countries and experts from six relevant disciplines (58% archaeologists, 6% training and innovation experts, 13% ICT experts, 5% finance professionals, 5% marketing and PR professionals and 13% museum professionals).

- Ninety-three percent of panel members make positive comments on the prospects for a virtual museum.
- Eighty percent of panellists state that IPR protection is important. Of the 20% demurring: three give no answer and five are *don't know*.
- Fifty-seven percent of panellists favour a virtual museum presenting materials on sciences, arts, local history, twelve favour art and thirteen (including all of the Bulgarian respondents) mention local history.
- Sixty-two percent of panellists favour a multi-channel strategy including web advertising, Internet communities, specialist journals, universities and schools.
- Half of the panellists (37 or 47%) mention the products from the SWOT (virtual visits, specialist information, books and novelties) and seventeen (20%) educational materials and/or specialist exhibitions.
- Overall, 32 (39%) favour a freely access model funded by grants, sponsorship and advertising, with 31 (38%) favouring a model of institutional subscription coupled with individual pay-as-you-go and supported by sponsorship and advertising.
- Key success factors from business planning perspective include specific target customer requirements and project cashflow.
- The panel is virtually unanimous is concluding the virtual museum is unlikely to detract from physical visitors to museums.
- Most museum respondents focus upon lack of technology, training and staff as constraints on the development of a virtual museum, whilst most business respondents focus on the need for a clear business model, business partners and investment.
- The main opportunity for the virtual museum arises from exploiting the quality of the museum collections.
- It seems clear that until the project has a full business plan, based upon a clear business model, there is unlikely to be business investment, however, it may be that business sponsorship becomes available.
- Desirable partners include e-learning experts, a computer graphics firm, tourist and cultural networks, learning institutions (especially Universities and secondary schools).

Overall, the consortium needs to seek additional partners to build the necessary competences and prepare its business plan.

Contents

1 INTRODUCTION, PURPOSE AND STRUCTURE

MU.S.EU.M. (Multimedia System for a European Museum) is a EU-funded project, with the aim of realising *a Virtual museum with European roots*. This we envisage as an e-service, taking as a pilot the prehistoric collections in our partner museums. The choice of prehistoric artefacts and knowledge arises from the previous success of virtual museums featuring art and prehistory collections.

Museum, 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

Seven museums, each from a different EU member state (plus Bulgaria and Romania as candidate states), participate in the MU.S.EU.M. project, along with the technical and analytical partners shown below.

- EURO INNOVANET Srl
- Naturhistorisches Museum- Prähistorische Abteilung of Vienna
- National Museum of History of Sofia
- Museum für Vor-und Frühgeschichte of Berlin
- National Archaeological Museum Athens
- Budapest History Museum
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- Museo Nazionale Preistorico ed Etnografico L.Pigorini
- UIL
- Muzeul National de istorie a Romaniei of Bucharest
- University of Alba Julia “1 Decembrie 1918” University – Pre- and Protohistorical Research Centre
- Eddleston Innovation Ltd

The purpose of the current report is to present the data from a six-country Delphic panel that has considered our earlier SWOT analysis with a view to recommending ways forward for a virtual museum project, analyse this data and draw conclusions for the project exploitation.

Section two of the report outlines the Delphic panel method used in this research, including the validity of our sample and our approach to analysis. The third section of the report contains our analysis of the Delphic Panel data, with conclusions for public policy and project exploitation in section four. Finally, sections five and six of the report present the raw data from the Delphic Panel.

2 DELPHIC METHOD

2.1 Method justification

Our project has completed a survey of virtual museums (D.4.2): *Characteristics, extent, profile of European museums' websites and case studies on best practices* and (D.4.1) a *SWOT analysis* of the e-readiness of the seven museums to create a pilot virtual museum featuring prehistoric artefacts.

The Delphic Panel method iteratively uses feedback from experts to analyse or improve interpretation of data or evaluation of options. Panel members are chosen for their mix of relevant expertise, do not consult with one another and are often asked to respond to specific questions. In effect, the Delphic Panel combines the advantages of blind peer review, with the focus of expert witnesses to provide degrees of confidence in interpreting cumulated facts or forecasting scenarios/events. In policy-making or business usage, Delphic Panels often feature an array of specialists, in the hope that the panel can provoke a multi-disciplinary outlook.

In some forms of usage, the panel's inferences are reiterated to panel members, seeking to arrive at consensual conclusions, though this invites the methodological criticism of *group think*, often levelled at focus groups and MU.S.EU.M. has not employed reiterative loops.

Delphic Panels work best with an apposite array of expertise and where the participating individuals spend an appropriate amount of time reflecting upon data and questions. One disadvantage of anonymity can be an absence of post-facto evaluation of the suitability/commitment of panel members. MU.S.EU.M. sought to overcome this difficulty by exploiting our access to a wide range of free expertise.

Two responds from Scotland kindly piloted the questionnaire and translation by project partners overcame language constraints, were necessary. In most cases, respondents completed the questionnaire digital, however, some partners conducted face-to-face or telephone interviews.

Project partners considered and rejected alternative methods of data generation, such as postal questionnaires to museums or interviews with museum managers as unlikely to generate the richness of data resulting from the Delphic Panel. However, the project recognised the vast amount of data generated necessitates careful analysis.

Originally, MU.S.EU.M. planned a population sample of 100 Delphic Panel participants – based upon ten nominated by each of the ten non-technical project partners. Two of these partners, due to staff changes, have been unable to nominate ten participants, therefore the panel population sample is eight-one. Like the *single-shot* (i.e. non-repeatable) case study, the generalisability of conclusions from a Delphic Panel, rests upon care in data selection (both data input and expert's knowledge in this case), rigour of analysis, and care in the context to which the results of the exercise are applied.

Data from the Delphic panel is analysed in this report by Dr Kinder, with project partners subsequently commenting upon the draft report using the normal conventions of

grounded research: triangulation (between data, analytical patterns and grounded theory), reflectivity and reference to general theory.

Circulation of this first report draft to partners will stimulate discussion and iterative debate around the policy conclusions in the report. Overall, our use of the Delphic Panel approach appears robust and able to generate serious scientific and business results.

2.2 Sample

Each participating project partner selected ten respondents. Where a respondent proved unable to complete the questionnaire, s/he was replaced by a further selection. Partners in Rome (Euro INNOVANET and Pigorini Museum), Berlin and Athens identified and interviewed more than ten respondents, building up the number towards the original hundred. As figure 1 illustrates, the eventual sample crosses six countries, with most being from Italy.

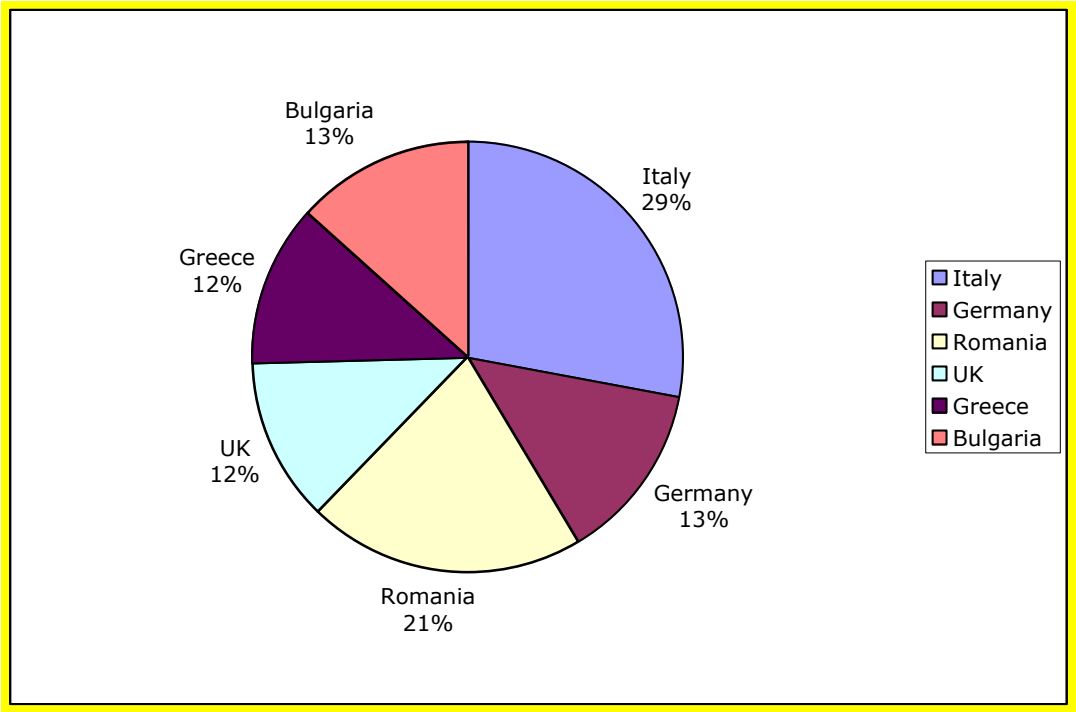

Figure 1: Sample distribution by state

As figure 2 illustrates, the distribution of expertise is as follows: Archaeologists (48 panel members from 82); Museum professional (11); Marketing and PR (4); Finance (4); ICT professionals (11); and Training and innovation (5).

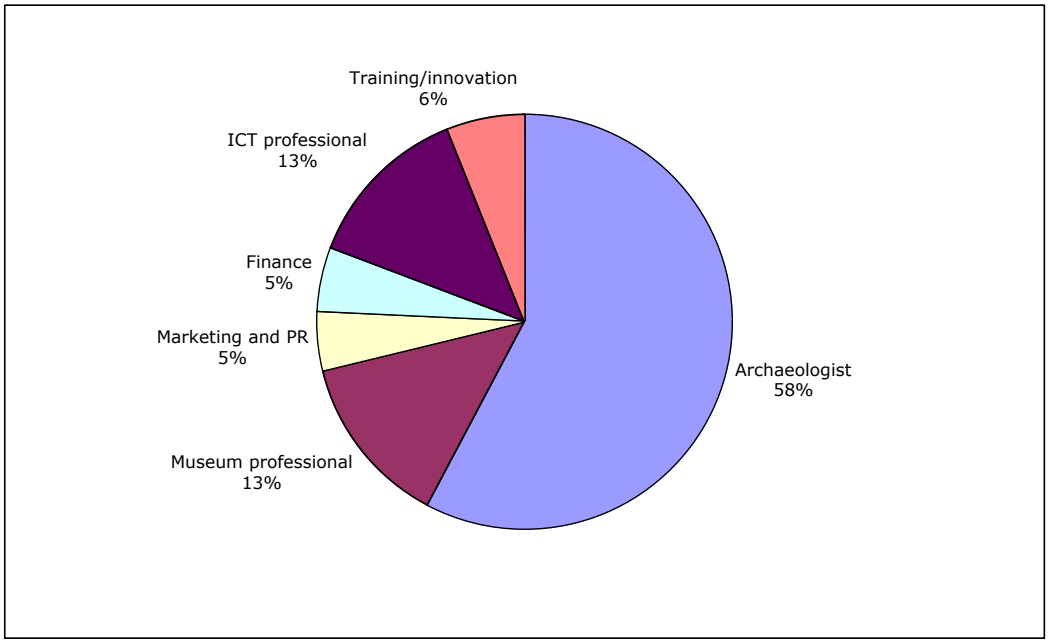

Figure 2: Sample distribution by expertise

Between states, the distribution of expertise (perhaps naturally) reflected the expertise of partners and their own network connections, as figure 3 illustrates.

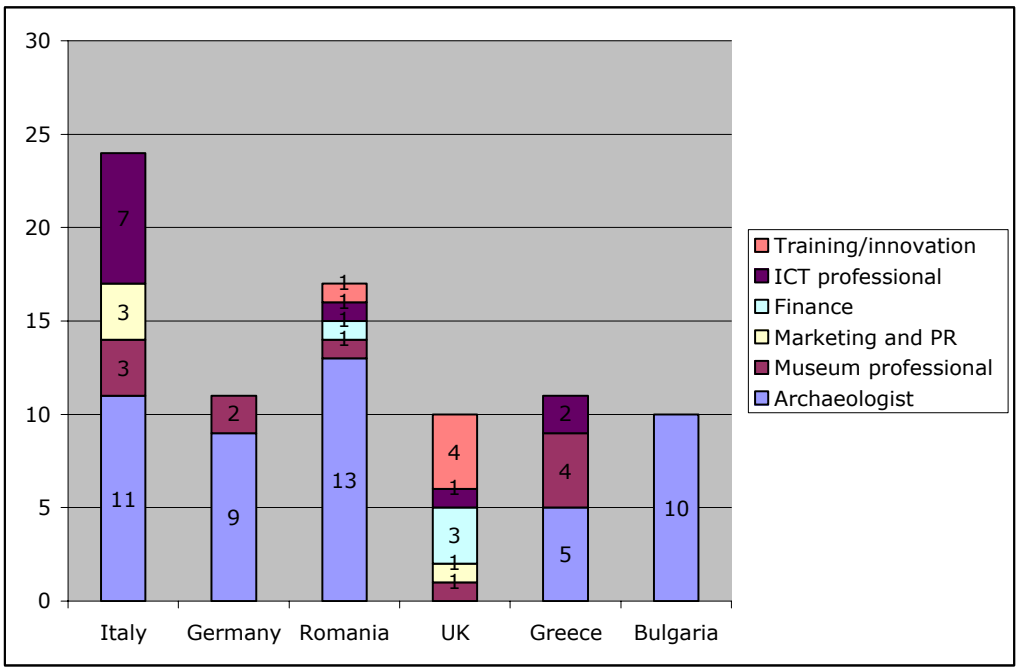

Figure 3: Sample distribution by expertise between states

Overall, at 71% the sample biases towards archaeologists and museum professionals (such as conservators). Arguably, this is the normal bias at product development stage towards technical expertise, migrating later towards market and operational competences.

3 ANALYSIS[1]

3.1 Does the virtual museum fill a need?

Ninety-three percent of panel members make positive comments on the prospects for a virtual museum. For example, Giuseppe Caporaso (section 5.1) argues that a virtual museum can offer multimedia exhibitions and remotely accessed visits. GL Romanian archaeologist (5.4) emphasises the potential of 3-dimensional exhibitions and MM Romanian archaeologist (5.6), 24-hour access.

Massimo Vidale (5.9) stresses the potential of virtual exhibitions combining artefacts and knowledge from numerous museums.

Many panel members, stress the importance of the virtual museum as a potential pan-European initiative - see for example Gundula Lidke (5.26), Mathias Will (5.28) and Radu Ciobanu (5.76) – that can combine resources currently dispersed across the continent.

Virtual access for disabled visitors to on-line exhibitions and customisation to suit differing education needs, is emphasised by ST Roman Web consultant (see 5.12). Elena Calitola (5.13) and Martin Baumeister (5.24) too emphasise the large size of the potential market for virtual museum, whilst Amanda Burgauer (5.43) suggests that the market gap is B2B and not B2C.

Sue Pinder (5.38) and Christodoulou Kyriaki (5.58) argue that virtual museums can become an integral resource for e-learning. David Frayer (5.16) suggests that virtual museum can help upgrade the quality of information available on the internet. Refining this point, Alessandro Vanzetti (5.23) and SD expert of rock art and museology (5.56) urge virtual museum to avoid simply focusing upon *blockbuster* exhibitions and instead addressing the needs of serious investigators, (see also Suciu Cosmin, 5.66).

Of the seven percent (6 respondents) commenting negatively about the need for a virtual museum, Rolf Krauss (5.29) and Wagner (5.31) suggest that any gap is a *minor* gap.

Three of the Scottish respondents comment on the market viability of any gap (see Kathy Greenwood 5.39), with Mike Harrison (5.36) arguing for a detailed market survey, Roddy McKechnie (42) commercial plan.

Overall, the Panel's conclusions is that there is a gap in the market, with the proviso that some panellists question the size and viability of filling the gap.

[1] The request for anonymity by some respondents is respected with the use of alphabetic coding and eliminating the appendix with the single interviews.

3.2 How important is IPR?

Eighty percent of panellists state that IPR protection is important. Of the 20% demurring: three give no answer and five are *don't know*. Jim Dickson (5.35) suggests it is an expensive diversion and four of the Bulgarian panellists wonder how effective IPR laws are. Mathias Will (5.28) argues that IPR protection is not important as the quality of up-loaded photographs make them difficult to use commercially.

Finally, EN Roman entrepreneur TLC (5.18) and PU prehistorian and archaeologist from Pisa University (5.22) see IPR as a barrier to creating a virtual museum. Various panellists (e.g. Elena Calitola, 5.13) comment on the difficulties of defending copyright once materials have been up-loaded.

Sixty-six of the eight-two panellists believe that IPR protection is important. Francesco de Filippo (5.3) suggests the virtual museum might use the IMPRIMATUR tool. Mike Harrison (5.36) suggests that a simple copyright is sufficient. Leo Nascia (5.5) and MM Romanian archaeologist (5.6) argue that national copyright is sufficient, whereas AN senior software developer from Rome (5.8) insists that international copyright is necessary.

Several panellists favour non-legal forms of protection. For example, David Frayer (5.16) favours encryption, Alessandro Grimaldi (5.17) and Christine Reich (5.27) watermarking and Andra Tomescu (5.74) written consents for all use.

Finally, Sue Pinder (5.38) urges the virtual museum to take care with the legal entity holding any IPR. In summary, the majority of panellists see IPR as important, and make a variety of suggests as to the appropriate legal and non-legal forms of obtaining protection.

3.3 Additional disciplines to prehistoric artefacts

Fifty-seven percent of panellists favour a virtual museum presenting materials on sciences, arts, local history, twelve favour art and thirteen (including all of the Bulgarian respondents) mention local history.

PU prehistorian and archaeologist from Pisa (5.22) suggests that links with local museums are an important opportunity. Many panellists make particular suggestions: Maria Kodaki (5.57) favours technology exhibitions and Angela Karsten (5.30) links to conservation. Christodoulou Kyriaki (5.58) and Drimb Rean Matei (5.80) favour European ethnographic themes, and similarly Panagiota Tsankanikou (5.63) themes from everyday life. Panagiota Dalakoura (5.62) suggests palaeontology, in particular dinosaurs.

Some panellists, including four from Scotland are less keen on pre-history. For example, Jim Dickson (5.35) suggest the virtual museum should pursue popular themes and Alistair Shaw (5.41) that choice of disciplines should be based on market research. Alternatively, Andrea Carosio (5.2) argues that themes rather than disciplines should guide choice of content and exhibitions. Leo Nascia (5.5) and ST Roman Web consultant (5.12) suggest that the quality of exhibitions is more important than disciplinary content. Similarly, Massimo Vidale (5.9) argues that levels of interactivity are more important than particular areas of content.

Filippo Delpino (5.15) makes a case for links between disciplines, rather than any particular discipline being important. Finally, EN Roman entrepreneur TLC (5.18) favours 3-D scientific experiments whilst Alessia Navo (5.19) argues that science might be unpopular.

Overall, the panel favours a virtual museum presenting material on a range of disciplines the choice of which should be guided by themes likely to attract interest and to fully exploit the potential of multimedia exhibitions.

3.4 Relevant marketing channels

Sixty-two percent of panellists favour a multi-channel strategy including web advertising, Internet communities, specialist journals, universities and schools.

Eleven of the archaeologists (e.g. Massimo Vidale (5.9) favour the use of specialist research journals. Vicki Greenwood (5.37), Inger Seiferheld (5.44) and Bojidar Dimitrov (5.55) emphasise the importance of using web communities. Jim Dickson (5.35) stresses the use of teacher web networks.

MM Romanian archaeologist (5.6) and Angela Karsten (5.30) argue for strong positioning on search engines, however, whilst Martin Baumeister (5.24) questions the cost and effectiveness of web advertising, Mathias Will (5.28) argues for a focused approach on relevant websites. David Fryer (5.16) mentions that US schools and universities are important.

Finally, EN Roman entrepreneur TLC (5.18) and Alistair Shaw (5.41) emphasise using those channels relevant to target market segments. In summary, the panel favours a multi-channel marketing strategy, focused in terms of expenditure on target markets and exploiting fully inexpensive web positioning and Internet communities.

3.5 Virtual museum products

Half of the panellists (37 or 47%) mention the products from the SWOT (virtual visits, specialist information, books and novelties) and seventeen (20%) educational materials and/or specialist exhibitions (e.g. Filippo Delpino 5.15).

Giuseppe Caporaso (5.1) makes the important point that the product mix should meet the likely demands of potential customers e.g. specialist papers etc for researchers and museum shop materials for tourists. Leo Nascia (5.5) highlights the importance of digital products (CDs and DVDs) for digital purchasing channels. Santo Tiné (5.21) suggests low-resolution j-peg photographs. Kyriaki (5.58) stresses the importance of ecommerce links to museum shops. Several panellists commented that they had not read the SWOT.

Some of the archaeologists view specialist papers and access as (chargeable) products (e.g. Thörle 5.33) and others (e.g. Knaut 5.25) see such materials as non-market, freely available knowledge. Baumeister (5.24) makes the point that the latter perspective implies continued subsidy. Seventeen percent of panellists see virtual visits as a product (e.g. Krauss 5.29). Here there seems to be some confusion between the public site (see Kay 5.40) and special on-line exhibitions or educational materials (see Jim Dickson 5.35). As Burgauer (5.43) points out, if target sales are B2B then, they are (in Vicki Greenwood's [5.37] terms) high margin low volume not high volume low margin products.

There is an issue amongst panellists over charging for researcher-level access and materials and a further issue over whether chargeable products are museum shops on-line (B2C) or B2B channels selling educational materials (including special exhibitions and non-public viewing).

3.6 Market, business model and customers

There are obvious inter-connections in how panellists envision the market, business model and customers for the virtual museum.

Almost all of the respondents see the potential market as worldwide, constrained only by ICT reach and access and linguistics.

There is some confusion amongst some of the panellists over what constitutes a business model. Overall, 32 (39%) favour a freely access model funded by grants, sponsorship and advertising, with 31 (38%) favouring a model of institutional subscription coupled with individual pay-as-you-go and supported by sponsorship and advertising. Choice of model does not seem to relate to the professional background of panellists, but rather to national culture with half of the Italians, Greeks and Romanians and almost all of Germans favouring free access; whilst most of the British and Bulgarian respondents favour paid access.

Riccardo Mancini (5.7) makes the point that advertising and sponsorship make come from both the public and private sectors. Vicki Greenwood (5.37) points out that without a high hit and click-through rate, income from advertising is likely to be negligible: she also suggests that PayPal could be used for on-line sales.

Leo Nascia (5.5) points out the difficult of combining subscription and pay-as-you-go models. The clear differences expressed here can perhaps only be resolved as the project's business planning identifies clear cost projects and likely income streams.

A similar referencing of business planning may be necessary to resolve the undoubted differences on target customers amongst the panellists. As Amanda Burgauer (5.43) implies, B2B and B2C market launch and penetration require widely different approaches. She and Inger Seiferheld (5.44) conclude that institutional customers are low-lying fruit: much easier to attract than B2C customers, unless the virtual museum does not develop new product and migrates museum shops to the web as Alistair Shaw (5.41) suggests.

3.7 Critical success factors (CSFs)

Whilst panellists place the critical success factors for a virtual museum in differing orders of preference, all agree that site usability; quality of content; quality of interactivity; multi-linguality and cost of access are important. Only 5 panellists (6%) mention one-stop access to many museums and exhibitions combining artefacts from several museums as CSFs.

Most of the Greek and Romanian panellists (e.g. Rezvan Feleag 5.70) (and some Italians e.g. ST Roman Web consultant 5.12 and Andrea Carosio 5.2), give priority to multi-linguality. Several panellists mention 3-D exhibitions. Perhaps this is an example of ST Roman Web consultant's (5.12) point that CSFs should be shaped to the aspirations of target customers. Usability, for example is especially important for B2C.

Sue Pinder (5.38), undoubtedly with institutional customers in mind, emphasises quality of learning materials. Alistair Shaw (5.41) focuses on the cost of quality in CSFs. By way of an example, both Amanda Burgauer (5.43) and Inger Seiferheld (5.44) suggest a 5-year lead-time to create a high quality virtual learning environment. In summary, each of the CSFs is deemed important by the panel, however, given the high cost of attaining some of these, their importance may be ranking – from a business planning perspective – in terms of specific target customer requirements and project cashflow.

3.8 Enhance or detract physical visitors

The panel is virtually unanimous is concluding the virtual museum is unlikely to detract from physical visitors to museums. Indeed, some 25% argue that the virtual museum may increase physical visits, though this may depend upon the location and travel logistics (see David Frayer 5.16) and catalogue quality.

Mike Harrison (5.36) suggest that the virtual museum may increase tourists but reduce specialists, though this perhaps depends upon the quality of content in the virtual museum and the cost of accessing it (as Rolf Krauss 5.29 points out). It seems fair to conclude that if the virtual museum impacts upon physical visitor numbers, then the effect is likely to be positive.

3.9 Weaknesses to overcome

Some 34% of panellists decline to comment under this heading. Of those who do, few comment on the business development aspects of the project. Many of the Romanians highlight resources e.g. Nicolae Ursulescu (5.68) and e.g. Alin Frânculeasa (5.71) and technical capacity e.g. Popescu Mircea (5.75).

More of the Italian panellists (e.g. Giuseppe Caporaso 5.1) mention low staff competences, with others highlighting technophobia (Grimaldi 5.17) and marketing Tartaglia (5.20).

Several of the German panellists mention lack of shared standards for presentation and terminology e.g. Mathias Will (5.28) and difference governances between museums e.g. Martin Baumeister (5.24). Angela Karsten (5.30) mentions poor IT management in museums.

The British panellists focus on the business competence of museums and the consortium, with Jim Dickson (5.35) commenting that the project appears, "Under-resourced, weakly managed, lack of direction, little knowledge of market and products. Most of the museums in the SWOT seem to need professional management." Vicki Greenwood (5.37) highlights the absence of a clear marketing mix and Roddy McKechnie (5.42) suggests that, "The project needs effective and focused management, the wholehearted championing by participating museums and adequate resourcing.

Overall, at this stage in the project development, panellists highlight resources, standards and management as weaknesses is not unexpected and should help focus the project team in its exploitation planning.

3.10 Opportunities to exploit

The main opportunity for the virtual museum arises from exploiting the quality of the museum collections, as many panellists point out. As Andrea Carosio (5.2) points out, this quality offers opportunities for international co-operation on exhibitions enjoying (as Galanakos Vasilios 5.61) suggests lower costs of exchanging (virtual) objects between museums. GL (5.4) emphasises the opportunity to build and share ICT capacity; Georgios Mostratos (5.60) opportunities for joint research projects and Chatzidakis Spyridon (5.65) the creation of shared marketing power.

In summary, the panellists identify a number of complementarities and opportunities that individual museum can exploit within a virtual museum, most prominent amongst which is the sharing of collection in new virtual and inter-linked exhibitions.

3.11 Funding sources

Funding sources, as Kathleen Greenwood (5.39) indicates are likely to be not commercial, since as Inger Seiferheld (5.44) and Calitola (5.13) state, MU.S.EU.M.'s products are pre-competitive. Undoubtedly, Santo Tiné (5.21) is correct in suggesting that institutional sources of funding are most appropriate given the substantial amounts involved, even for a pilot.

Various panellists suggest various sources. Andrea Carosio (5.2) suggests approaching EU research and training programmes, cultural programmes and corporate or charitable sponsors. Both Matthias Knaut (5.25) and Delpino (5.15) point out that it may be possible to attract a high net worth individual sponsor. Rolf Krauss (5.29) suggests approaching web-based firms. Without a detailed and costed project it is difficult to mount a funding to an institution. Perhaps only when such an exercise is complete, will it be possible to draw up a shorter list of potential pilot funders.

3.12 Key partners

Panellists highlight a wide range of potential upstream (supply or outsourcing) and downstream (user and horizontal) partners for a virtual museum pilot.

Potential upstream partners include the suggestion by Amanda Burgauer (5.43) of an e-learning partner and Alessandro Grimaldi (5.17) of a computer graphics firm for outsourcing. Suciu Cosmin Loan (5.66) suggests that Perseus projects may share competences. Pauline Kay (5.40) argues that external competence partners could be important, since few UK museums have virtualisation competences in-house. Downstream partners suggested include Alessandro Vanzetti (5.23) suggesting tourist bodies and cultural associations, Mike Harrison (5.36) suggesting ISPs and specialist education networks and Christodoulou Kyriaki (5.58) who suggests municipalities.
Numerous panellists, including Giuseppe Caporaso (5.1), highlight the importance of university partners.

Francesco De Filippo (5.3) makes the important point that the main partners of the MU.S.EU.M. consortium are other museums and that cementing a long-term alliance between museum involves, as EN Roman entrepreneur TLC (5.18) points out, negotiating clear goals, structures and governances and sharing best practices (see PU prehistorian and archaeologist from Pisa University 5.22).

In summary, it will be important for a pilot that the MU.S.EU.M. partners formalise their network goals, structure and governances and identify particular target upstream and downstream partners.

3.13 Key complementarities and standards

Unsurprisingly, with some many panellists from a museum background some 76% stress the importance of amplifying complementarities and compliance with general standards, as Mathias Will (5.28) points out, museum should be should already be compliant.

Francesco De Filippo (5.3) emphasises CMA and ICOM standards and Calitola (5.13) that the consortium should codify emerging practice standards. Alessia Nava (5.19) stresses the importance of complying with generic ICT and education (e-learning pedagogic) standards.

Finally, Pauline Kay (5.40) urges the museum to focus on completing their cataloguing and public website as an exercise in standards usage. The panellists favour standards compliance and maximising complementarities, however, for some museum, identifying and internalising prevailing pedagogic and ICT standards involves new learning processes.

3.14 Strengthening the consortium

Some 50% of panellists make suggests strengthening the MU.S.EU.M. consortium. A minority consider strengthening to be a technical matter and suggest forming (David Frayer 5.16) a scientific committee, composed GL Romanian archaeologist (5.4) suggests by professional ICT staff; or what Delpino (5.15) terms a committee of ICT technicians and archaeologists.

A majority of panellists making suggestions to strengthen the consortium refer, like MM Romanian archaeologist (5.6) to a specialist implementation team or project management competences that are wider than simply technical or scientific expertise. EN Roman entrepreneur TLC (5.18) for example, urges the need for a "strong managerial approach," sentiments echoed by Jim Dickson (5.35). Vicki Greenwood (5.37) argues that, "The project needs a manager supported by professional marketing, web design and general business support." Francesco De Filippo (5.3) suggests that, "The project needs leading by a person with proven commercial project management experiences. S/he should enrol a network-provider, web designer and negotiate funding and resources from participating museums." As Maria G. Kodaki (5.57) argues, the existing consortium appears inadequate to complete a pilot and needs external support.

Given that the project's initial ambition is to launch a demonstrative pilot, rather than a sustainable long-term venture, other panellists highlight the importance of *learning by doing* (Gundula Lidke 5.26); recruiting additional players especially from northern Europe (SD expert of rock art and museology 5.56) or large international museums with experience in virtualising (Stefan Thörle 5.33). During piloting, Martin Baumeister (5.24) argues the group should celebrate incompleteness as building foundations for future of virtual museum. PU prehistorian and archaeologist from Pisa (5.22) urges the consortium to use the piloting stage to negotiate networks goals, structure and governances for a longer-term virtual museum venture. Alessandro Vanzetti (5.10) argues that an appropriate management model for the pilot may be lead museum partner, with a project team of (say) three managers.

In summary, most of the panellists believe the project management competences of the consortium need strengthening to successfully deliver a pilot virtual museum.

3.15 Improving competences and capacity building

As the D 4.1 SWOT analysis makes clear, to successfully deliver a pilot the MU.S.EU.M. consortium requires improved competences (especially e-learning) and (especially ICT) capacity. This conclusion is reinforced by comments from the numerous panellists (e.g. Alessia Nava 5.19) especially Bulgarian and Romanian panellists, see Prof. Vassil Nikolov (5.54) and Prof. Bojidar Dimitrov (5.55).

Numerous panellists argue for the primacy of competence building over capacity building. As Mike Harrison (5.36) says, "computers come easier than people." A point echoed by AN senior software developer from Rome (5.8) and Massimo Vidale (5.9). Sue Pinder (5.38) arguing that serious investment in training is needed even before piloting can commence, argues that, "Competences are much more difficult to build than capacity (which can be bought in), don't buy lots of IT equipment until you can benefit from it." Two other UK panellists reinforce this point of the primacy of competences over ICT capacity. Amanda Burgauer (5.43) suggests spending nothing until the consortium get clear advice from an e-learning partner and Inger Seiferheld (5.44) advises getting the product right prior to building ICT capacity.

Competence building is a major theme through the SWOT analysis and the Delphic Panel comments. Coppa (5.14) sums this up, urging the consortium to focus on "training, training, training." As Giuseppe Caporaso (5.1) points out such a strategy will involve many museums transcending their traditional approaches to competence building. One example of this given by ST Roman Web consultant (5.12) is to outsource training. Other panellists emphasise competence building in marketing and PR (see Dr. Heimo Dolenz 5.34) and project management team-building from a business perspective (see Christodoulou Kyriaki 5.58).

Capacity-building remains a challenge for the consortium and especially in Bulgaria and Romania. Angela Karsten (5.30) advocated systematic future-proofed forward planning of capacity building. Leo Nascia (5.5) and Riccardo Mancini (5.7) echo her shared planning approach. Haipl Reinhold (5.59) highlights the importance of capacity building including relational databases and 3-D and Dr. Heimo Dolenz (5.34) suggests that students might use the project for dissertation work.

In summary, the Panel suggestion is that competence building takes priority over capacity building and feature management skills in addition to virtualisation skills. Capacity-building should be jointly planned with procurement occurring only when the consortium has a clear implementation strategy and has selected implementation partners.

3.16 Judging success

Giuseppe Caporaso (5.1) summarises the view of many panellists on success criteria, “An excellent performance virtual museum is not so easy to be built. MU.S.EU.M. consortium needs to develop friendly, precise and easy tools to navigate, to provide connectedness and various points of access, to apply a custom designed computer software, to employ power tools to search for information, to establish an organizational and technological support for updates, to use a high performance server, to set a secure access.”

Other panellists suggest hits of more than 20 minutes (Christine Reich 5.27); quality of research output (Francesco De Filippo 5.3); positive user feedback (Delpino 5.15); financial sustainability (EN Roman entrepreneur TLC 5.18 and Jim Dickson 5.35) and interoperability between museums (Alessia Nava 5.19).

Caporaso’s suggestion is a useful first draft of success criteria for the pilot. It is important that in formalising network structure, goals and governances that the success criteria are explicitly embedded in agreements.

4 CONCLUSIONS

- Overall, 93% of the Panel conclude that there is a gap in the market that a virtual museum can fill some panellists question the size and viability of filling the gap.

- A majority of panellists see IPR as important, and make a variety of suggests as to the appropriate legal and non-legal forms of obtaining protection.

- The panel favours a virtual museum presenting material on a range of disciplines the choice of which should be guided by themes likely to attract interest and to fully exploit the potential of multimedia exhibitions.

- The panel favours a multi-channel marketing strategy, focused in terms of expenditure on target markets and exploiting fully inexpensive web positioning and Internet communities.

- There is an issue amongst panellists over charging for researcher-level access and materials and a further issue over whether chargeable products are museum shops on-line (B2C) or B2B channels selling educational materials (including special exhibitions and non-public viewing).

- Almost all of the respondents see the potential market as worldwide, constrained only by ICT reach and access and linguistics and target customers as B2B education and research institutions, perhaps accompanied by some offers to B2C researchers and tourists. This choice of customers will be reflected in product design, marketing mix and exploitation planning.

- The panel concludes that if the virtual museum impacts upon physical visitor numbers, then the effect is likely to be positive.

- Panellists highlight resources, standards and management as weaknesses is not unexpected and should help focus the project team in its exploitation planning.

- The panellists identify a number of complementarities and opportunities that individual museum can exploit within a virtual museum, most prominent amongst which is the sharing of collection in new virtual and inter-linked exhibitions.

- Without a detailed and costed project it is difficult to mount a funding to an institution. Perhaps only when such an exercise is complete, will it be possible to draw up a shorter list of potential pilot funders.

- Panellists suggest that it will be important for a pilot that the MU.S.EU.M. partners formalise their network goals, structure and governances and identify particular target upstream and downstream partners.

- Most of the panellists believe the project management competences of the consortium need strengthening to successfully deliver a pilot virtual museum.

- The Panel suggestion is that competence building takes priority over capacity building and feature management skills in addition to virtualisation skills. Capacity-building should be jointly planned with procurement occurring only when the consortium has a clear implementation strategy and has selected implementation partners.

- In formalising network structure, goals and governances success criteria should be explicitly embedded in agreements.

The transition towards a virtual museum

The virtual museum is more than merely the digital representation of artefacts and museum-shop. It includes the possibility of specially designed e-learning materials and a variety of Internet-based communities associated with the virtual museum. Virtual museums are learning environments structured around the needs of learners and researchers and thereby combining advanced imaging and knowledge from an array of physical museums. These are likely to include digital images of paintings, drawings, diagrams, photos, videos, archaeological sites and architectonic environments, presented in unique and customisable exhibitions.

Technologies, such as DVD and digital sound formats, support Internet-based virtual museum platforms. Such platforms are characterised by ubiquitous connectivity, continuous information flows and for Internet platforms real-time remote updating and information exchanges via email and forums. These platforms only improve access if supporting technology configurations are usable by visitors, content layers are appealing to a variety of visitors (e.g. researchers, learners and tourists) and access accommodates visitors with special needs. Multimedia presentations and choice of access arrangement devices (e.g. supporting voice, text or mouse activation) mean that virtual museum exhibitions can be far more accessible to people with special needs than physical exhibitions.

This report shows that progress technical matters is critical if a pan-European museum of archaeology is to be built. It also illustrates, that such technological diffusion will be inadequate for success unless it is accompanied by organisational and business innovations, in particular building a wider network or supportive technical and business partners, offering both business expertise and capital and training functions.

MU.S.EU.M. D 4, Characteristics, extent, profile of European museums' websites and case studies on best practices, records the achievements of ten virtual museum best practices and some two-hundred museum websites. The challenge of a pan-European virtual museum of archaeology is learning important lessons from this state-of-the-art. However, it remains the case that the challenges facing the pan-European virtual museum are fundamentally different in terms of network-building than those of creating a virtual presence for a single museum organisation.

5 APPENDIX: DATA FROM DELPHIC PANEL

Response number	Panel participant	Expertise	City and organisation
5.1	Giuseppe Caporaso	Cultural journalist	Rome, Sat 2000
5.2	Andrea Carosio	Culture expert	Rome, Regione Piemonte
5.3	Francesco De Filippo	Cultural journalist	Rome, Ansa
5.4	GL	Archaeologist	Romania
5.5	Leo Nascia	ICT expert	Rome, researcher in TLC at ISTAT
5.6	MM	Archaeologist	Romania
5.7	Riccardo Mancini	Digital publisher	Rome, Avverbi edizioni
5.8	AN	Senior software developer	Rome
5.9	Massimo Vidale	Archaeologist	Rome, Istituto Centrale per il Restauro iCR – Ministero per i Beni e le Attività Culturali
5.10	Alessandro Vanzetti	Protohistoric Archaeologist; Course Tenure in Museums	Rome, University of Rome 1 La Sapienza
5.11	Antonella Traverso	Archaeologist	Rome, DARFICLET University of Genoa
5.12	ST Roman Web consultant	Web professional	Rome, private consultant
5.13	Elena Calitola	TLC expert	Rome, Italmedia
5.14	Coppa	Professor of Anthropology	Università di Roma, La Sapienza
5.15	Delpino	Archaeologist	Rome: Consiglio Nazionale delle Ricerche
5.16	Frayer	Paleoanthropology	Rome: University of Kansas
5.17	Grimaldi	Computer expert	Percorsi Grafici snc
5.18	EN	Entrepreneur TLC	Rome
5.19	Nava	Physical Anthropology	Rome: freelance
5.20	Tartaglia	Physical Anthropology	Rome: Consultant
5.21	Tiné	Prehistoric Archaeologist	Rome: University of Genoa
5.22	PU	Prehistory and archaeology	Pisa University
5.23	Vanzetti	Proto-historic Archaeologist	University of Rome 1 La Sapienza
5.24	Martin	Prehistoric	Berlin, Germanisches

	Baumeister	Archaeology	Nationalmuseum Nürnberg; Universität Würzburg
5.25	Prof. Dr. Matthias Knaut	Expertise Archaeologist	Berlin, Fachhochschule für Technik und Wirtschaft Berlin – University of Applied Sciences – Study Programme Conservation-Restoration, Field Archaeology
5.26	Gundula Lidke	Prehistory (Neolithic)	Berlin, Museum für Vor- und Frühgeschichte Berlin (MVF) Prehistory (Neolithic)
5.27	Dr. Christine Reich	Bronze Age; Prussia	Museum für Vor- und Frühgeschichte, Staatliche Museen zu Berlin – Preußischer Kulturbesitz
5.28	Dr. Mathias Will	Frühes Mittelalter	Berlin, Archäologische Staatssammlung – Museum für Vor- und Frühgeschichte
5.29	Dr. Rolf Krauss	Egyptology	Berlin, Staatliche Museen zu Berlin, MVF
5.30	Angela Karsten	Conservation Science	Berlin, Newport Museum and Art Gallery; Newport Medieval Ship Project
5.31	Wagner	Archaeological objects of region of Berlin	Landesdenkmalamt Berlin
5.32	Tobias Springer	Prehistory	Berlin, Germanisches Nationalmuseum, Nürnberg
5.33	Dr. Stefan Thörle	Merovingian period archeologist	Berlin, Landesamt für Denkmalpflege Hessen
5.34	Dr. Heimo Dolenz	Archeologist	Berlin, Archäologischer Park Magdalensberg/Landesmuseum Kärnten
5.35	Jim Dickson	e-service innovation	EIL: West Lothian Council
5.36	Mike Harrison	Staff recruitment	EIL: Consultant
5.37	Vicki Greenwood	International service marketing	EIL: Consultant
5.38	Sue Pinder	e-learning environments and innovation	EIL: West Lothian College
5.39	Kathleen Greenwood	Financing e-service businesses	EIL: WL Ventures Co Ltd.
5.40	Pauline Kay	Fine arts museum exhibitions design consultant	EIL: Consultant
5.41	Alistair Shaw	e-service business planning	EIL: WL Business Centre

5.42	Roddy McKechnie	Product Development Manager	EIL: BAE Systems
5.43	Amanda Burgauer	Business internet sites	EIL: Sharebase
5.44	Inger Seiferheld	Virtual learning environments	EIL: University of Edinburgh
5.45	Elka Anastasova	Archaeologist	Sofia, Institut of Archaeology with Museum
5.46	Gavrail Lazov	Archaeologist	Sofia, National Museum of History
5.47	Janeta Mihaylova	Economist	Sofia, National Museum of History
5.48	Lilyana Georgieva	Archaeologist	Sofia, National Museum of History
5.49	Martin Hristov	Archaeologist	Sofia, National Museum of History
5.50	Stoyan Stoyanov	Administrative Director	Sofia, National Museum of History
5.51	Tsvetana Kyoseva	Historian	Sofia, National Museum of History
5.52	Veselina Ivanova	Archaeologist	Sofia, National Museum of History
5.53	Martin Hristov	Archaeologist	Sofia, National Museum of History
5.54	Prof. Vassil Nikolov	Archaeologist	Sofia, Arhaeological Institute with Museum
5.55	Prof. Bojidar Dimitrov	Archaeologist	Sofia, National Museum of History
5.56	SD expert of rock art and museology	Expert of rock art and museology	Athens: Rock art centre of Macedonia
5.57	Maria G. Kodaki	Conservator	Athens, National Archaeological Museum
5.58	Christodoulou Kyriaki	History of Art-Museology	Athens, Municipality of Komotini
5.59	Prof. Dr. phil. Haipl Reinhold	Senior software developer	Athens, BASF IT Services
5.60	Georgios Mostratos	Classical Archaeologist	Athens, National Archaeological Museum
5.61	Galanakos Vasilios	National Archaeological Museum	Athens, National Archaeological Museum
5.62	Panagiota Dalakoura	Archaeologist-Museologist	Athens, National Archaeological Museum
5.63	Panagiota Tsakanikou	Prehistoric Archaeologist	Athens, National Archaeological Museum
5.64	Katharaki Sophia	Student in cultural technology and	Athens, University of Aegean

		communication	
5.65	Chatzidakis Spyridon	Conservator	Athens, National Archaeological Museum
5.66	Suciu Cosmin Loan	IT	Bucharest: University *Lucian Blaga* Sibiu, Romania.
5.67	Dan Octavian Paul	Conservator-restorer (museology)	Bucharest, Brukenthal Museum Sibiu
5.68	Prof. univ. dr. Nicolae Ursulescu	Archaeology	Bucharest, Facultatea de Istorie, Universitatea "Al. I. Cuza" Iasi
5.69	Daniela Andreescu	History teacher	Bucharest, No 206 School
5.70	Rezvan Feleag	Student of pre-history	Bucharest University
5.71	Alin Frânculeasa	Archeologist	Bucharest, Muzeul Județean de Istorie
5.72	Dorel Bondoc	Archaeologist	Bucharest, Muzeul Olteniei Craiova
5.73	Eugen Pavele	Archeologist	Bucharest, Muzeul Județean de Istorie Arheologie Prahova
5.74	Andra Tomescu	Student archaeologist	University of Architecture, Bucharest, D. Cantermir University
5.75	Popescu Mircea	Economist	Bucharest
5.76	Radu Ciobanu	Archeologist	Alba Iulia, National Union Museum – Alba Iulia
5.77	Rustoiu Gabriel	Archeologist	Alba Iulia, Department for Culture, Cults and National Cultural Heritage
5.78	Ion Itean	Archeologist	Alba Iulia, Phd Student
5.79	Dr Vasile Moga	Archeologist	National Union Museum, Alba Iulia
5.80	Drîmb Rean Matei	Archeologist	National Union Museum, Alba Iulia; România
5.81	Jlie Moise	History - Ethnology	Alba Iulia: “Lucian Blaga” University, Sibiu
5.82	Gligor Adrian	Archeologist	Alba Iulia, PhD student
5.83	Erzsébet Hanny	Museologist	Budapest History Museum
5.84	Zsolt Tóth	Programmer, businessman	Budapest History Museum
5.85	Szilvia Závodi	Museologist	Budapest, Military History Institute and Museum
5.86	Krisztina Hancz	Biologist, environmentalist	Budapest History Museum
5.87	Korom Anita	Archaeologist	Budapest History

			Museum
5.88	Angelika Pásztor	Librarian	Budapest, Tárki Rt.
5.89	Róbert Patay	Archaeologist	Budapest, Management of the Museums of Pest county
5.90	Ferenc Gyulai	Archaeobotanist	University of Agricultural Sciences, Gödöll
5.91	Bori Németh	Egyptologist, specialist of English literature	Budapest History Museum
5.92	Balázs Németh	Masseur, specialist of English studies	Budapest National Museum
5.93	Hannes Herdits	Archaeology	Burgenländische Landesmuseen, Museumgasse 1-5, A-7000 Eisenstadt
5.94	Dr. Daniela Kern	Archaeologist	Private, projects with AoS, RF
5.95	Andrea Kourgli	Librarian	Natural History Museum Vienna
5.96	Peter C. Ramsl	Archaeologist	Natural History Museum Vienna
5.97	Dr Timothy Taylor	Reader in Archaeology	Dept. Archaeological Sciences, University of Bradford

Table 1: Delphic panel participants

6 MUSEUM: Delphic panel questionnaire

Question 1: Overall, does the idea of a virtual museum fill a need – is there a gap in the market? (please comment in the box below)

Question 2: How important is it that museum's protect their IPR. What do you think are the most appropriate protection instruments?

Question 3: MUSEUM'S pilot will feature prehistoric artefacts. In terms of market size which other disciplines do you think will be most successful for virtual museums e.g. history, sciences, arts, particular themes or local history?

Question 4: Which marketing channels do you think will attract users to virtual museums e.g. web-advertising, Internet communities, specialist journals/magazines, universities, schools?

Question 5: The virtual museum's products may include virtual visits, specialist information and/or book or novelty sales. Which products do you think might be most successful? Do the artefacts mentioned in the SWOT appear you to as the basis of a successful product range?

Question 6: What in your view is the market for a virtual museum – within countries, across Europe or worldwide?

Question 7: Which business model do you think most appropriate to a virtual museum e.g. subscription, pay-as-you-go, merchandising, sponsorship or advertising (or others)?

Question 8: Who might be the customers of a virtual museum: is it

individual tourists, individual specialists, Internet communities, educational institutions, archaeological institutions, tourists and/or policy-makers?

Question 9: Which of the following are the critical success factors for a virtual museum: site usability, quality of content, quality of interactivity, multi-linguality, cost of access, one-stop access to many museums, exhibitions combining artefacts from several museums?

Question 10: In your view is a virtual museum likely to enhance or detract from numbers of physical visitors to our participant museums?

Question 11: From reading the SWOT, what are the key weaknesses that a museum in particular or this group of museums in general must overcome? Do you have any suggestions of how these weakness might be overcome?

Question 12: From reading the SWOT, what are the key opportunities that a museum in particular or this group of museums in general can exploit? Do you have any suggestions of how these opportunities can be exploited?

Question 13: It is clear that few of these museums have large resources available to invest in creating a virtual museum. Do you have suggestions on sources of funding or investors?

QUESTION 14: FROM READING THE SWOT, WHO MIGHT BE KEY PARTNERS FOR THE MUSEUMS TO ENROL IN ORDER TO CREATE A VIRTUAL MUSEUM?

Question 15: What do you think are the key complementarities or standards that the museums need to align with in order to create a virtual museum (e.g. education, ICT or other standards)?

Question 16: Overall, in your view, does the MUSEUM consortium have the ability to create a pilot virtual museum? If not, how can any deficiencies be overcome?

QUESTION 17: THE SWOT ANALYSIS HIGHLIGHTS TRAINING AND COMPETENCES AS A KEY AREA NEEDING STRENGTHENING? DO YOU AGREE WITH THIS CONCLUSION AND WHAT STEPS MIGHT THE MUSEUMS TAKE TO STRENGTHEN THEIR COMPETENCES?

QUESTION 18: SOME MUSEUMS ARE IN THE PROCESS OF BUILDING THE INFORMATION AND COMMUNICATIONS TECHNOLOGY CAPACITY NECESSARY TO SUPPORT A VIRTUAL MUSEUM. WHAT SUGGESTIONS WOULD YOU MAKE TO INDIVIDUAL OR THIS GROUP OF MUSEUMS TO BUILD CAPACITY?

Question 19: How should the success of a virtual museum be judged e.g. hits; hits lasting (say) more than 20-minutes; depth of site interrogation; user feedback; amount of subscriptions, payments or sponsorship; number of downloads or expansion of content?

QUESTION 20: WHAT SUGGESTIONS DO YOU HAVE FOR AN APPROPRIATE ORGANISATIONAL STRUCTURE LINKING THESE MUSEUMS INTO A VIRTUAL MUSEUM?

We are sincerely grateful for you participation in our Delphic panel. If you would like to receive a copy of our completed report, please place an 'X' in the box below.

Yes, please send me a copy of your completed report (mark 'X')