



**PROPOSAL FULL TITLE**

**European Network of Centres of Excellence  
for Research & Education in Digital Culture**

**Short Description of the  
Joint Programme of Activities**

**PROPOSAL ACRONYM**

E-Culture Net

**DATE OF PREPARATION**

23 April 2003

**TYPE OF INSTRUMENT**

Network of Excellence (NoE)



## KEY ROLES & MEMBERS

<b>WP 1</b>	<b>1: Build DEED</b>	
1.1	Security	Université Catholique de Louvain
1.2	Legal Arrangements	Universidad Politecnica di Valencia
1.3	Storage	UNESCO-EU DCMC
1.4	Multilingual Terminology	AMP Consortium
1.5	Semantic Mapping	SEMKOS Consortium
1.6	DACOs	Universität zu Köln
1.7	Interfaces	Intermedia, University of Oslo
1.8	Multimodal Interfaces	SIMILAR NoE
1.9	3-D Spatial Access	ORION
1.10	Spatio-Temporal Access (GIS)	Portsmouth Consortium
1.11	Virtual Environments, Agora	CINECA
1.12	Virtual Heritage Centres	CNR-ITABC
<b>WP 2</b>	<b>2: Fill DEED: Networks</b>	
2.1	Country Networks	Laval Mayenne Technopole
2.2	Share Research in DEED	Country Members
2.3	Harmonise Projects	MINERVA (+Country Members)
<b>WP 3</b>	<b>3: Update DEED: Research Matrices</b>	
3.1	Co-ordinate with Networks	ERPANET?
3.2	Knowledge Discovery	Fraunhofer Institute for Media Communication

### Joint Research Programme:

<b>WP 4</b>	<b>Content Pilots</b>	
4.1	Multidimensional Museums	Universidad Complutense
4.2	Historical European Cities	Università di Bologna
4.3	Cultural Tourism	Tourism-site.org
4.4	Text and Image Databases, Online Slides	UzK
4.5	Greek Culture	FHW
4.6	3-D and Archaeology	ORION
4.7	Virtual Environments, V. Heritage Centres	CINECA, CNR-ITABC
4.8	Cultural Diversity	Paris 8

### Activities to Spread Excellence:

<b>WP 5</b>	<b>A: E-Learning and E-Training</b>	
5.1	Hypermedia E-Learning	ANID
5.2	PRONOWnce user group	Fraunhofer IUK
5.3	French Examples	Sorbonne (Paris IV)
5.4	Greek Examples	Foundation of the Hellenic World
5.5	Restoration and Heritage	Malta Centre for Restoration
5.6	European Masters and Doctorates	Università di Bologna and Rome
<b>WP 6</b>	<b>B: Expansion</b>	
5.7	Expand to NAS	Univeristät Wien
<b>WP 7</b>	<b>C: International</b>	
5.8	International Dimensions	EVAN
<b>WP 8</b>	<b>D: Dissemination</b>	
5.9	Annual Conferences, Summer Courses	Co-ordinator
<b>WP 9</b>	<b>E: Management</b>	
6.1	Progress Reports	Co-ordinator



## FORMAL PROPOSAL DETAILS

### PROPOSAL FULL TITLE

European Network of Centres of Excellence  
for Research and Education in Digital Culture

### PROPOSAL ACRONYM

E-Culture Net

### STRATEGIC OBJECTIVE ADDRESSED

1. IST-2002-2.3.1.12 Technology-enhanced learning and access to cultural heritage

### SPREADING EXCELLENCE RE: OTHER RELEVANT OBJECTIVES<sup>1</sup>

2. IST-2002-2.3.1.7 Semantic-based knowledge systems
3. IST-2002-2.3.1.6 Multimodal interfaces

### PROPOSAL ABSTRACT

The long-term objective is to provide multi-lingual access to Europe's cultural and scientific heritage for all its citizens.

The immediate objectives are:

- 1) to integrate research communities and resources in digital culture for e-learning
- 2) to include resources that reflect national, regional and local diversity
- 3) to keep these up to date using new standards, solutions and trends in digital culture.

As a NoE, In Phase 1 E-Culture Net will:

- 1) build a tool to share research and critical methods and integrate these in e-learning;
- 2) add content through networks to include national, regional and local diversity;
- 3) update the tool working with other networks to create research matrices of the complete knowledge production life-cycle. In phase two, the building of the tool can evolve into an IP for a Distributed European Electronic Resource (DEER), the NoE will focus using the DEER to share research, critical methods and content, and integrate this in e-learning and e-training.

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<sup>1</sup> Please see B.2



## DEGREE OF INTEGRATION AND THE JOINT PROGRAMME OF ACTIVITIES

### Description of the Joint Programme of Activities

E-Culture Net comprises **three linked components** which are key to the development of European networking on digital cultural heritage.

#### COMPONENT 1

The first of these components refers to the **building an electronic information and communication system**. This system is called a **DEED**,<sup>1</sup> that is a Distributed European Electronic Dynamic resource. This will be a relational computer database, which presents the means to access an array of digitally stored and mediated resources which are distributed across Europe. This system will also contain a variety of media types, knowledge forms and high quality research concerning cultural heritage. As a communication system, the DEED will provide a recognisable and functional ‘interface’ between layers of information, databases, projects and research in digital cultural heritage. This interface will further provide a gateway to excellence on existing, new and emerging resources in this field. Here, focus will be given to developing a multimodal interface to highlight key developments in the area of cultural heritage and its digital forms and representations. In this sense as a dynamic environment, the DEED will make it possible to realise transitions between database and interface. The DEED will present clear, tangible ways of linking, sharing and commenting on digital resources relating to cultural heritage. The design and implementation of this information-communication system will be based on from cutting edge research among the project participants as well as from the market.

#### COMPONENT 2

The second component of E-Culture Net concerns the **ways in which such a network infrastructure and platform will be realised at the level of linked, distributed content and critique**. Sets of connected, integrated projects will provide the nexus for the conceptual and practical building of this electronic information and communication system, the DEED. Work on filling the DEED will involve the active participation of project members and related institutions and projects in providing a variety of links to content for the database. E-Culture Net will therefore function as a meeting point concerning excellence in content-based research and collections on cultural heritage in digital form. The partners to the project will collaborate online and face-to-face. Their specialised inputs and related projects and interests will help in the filling of the DEED. The network will operate dynamically through integrated actions concerning the storage, retrieval and sharing of content specifically relating to digital cultural heritage.

#### COMPONENT 3

The third component refers to how **maintain and update the DEED** during the project period. A management structure and processes of ongoing upkeep will be established. At this level, the DEED will be an active resource for building secure, multilingual solutions for sharing research and content. In the long-term, it is envisaged that this project may lead to formation of a DEER (Distributed European Electronic Resource). This will involve the scaling up of a network built

on excellence and collaboration to a more thoroughly informed Integrated Project. The connections and relationships between these three phases and their convergence in the form of a projected Integrated Project are presented in Figure 1. As a Network of Excellence, the DEED will provide an informed, participatory mechanism for the professional construction of online digital cultural heritage resources. This will have the effect of linking key institutions, research partners and developers in the crucial conceptual and pragmatic building of knowledge about and on content in this field and ways to work together to place such knowledge on a wider European and international stage.

## **THE PROGRAMME OF ACTIVITIES AND INTEGRATION**

*How the joint programme of activities brings about the expected degree of integration.*

### **Basic Objective & Activity 1: Build DEED to share research**

The first basic activity integrates members of different technological research communities by giving them a common goal of creating a DEED. It combines a number of existing solutions into a single tool that will allow a larger group to share their research resources, methods and develop critical thought. By using a multilingual interface the DEED will make accessible materials from countries throughout Europe. The modules for this tool also serve to measure the degree of integration of resources: i.e. how many modules does the resource use? (cf. figure 20). The DEED serves as a common research infrastructure whereby a number of members can perform jointly executed work together, thus further strengthening the common activities of these communities.

### **Basic Objective & Activity 2: Fill DEED through networks to reflect diversity**

The second basic activity integrates three main constituencies, which have thus far often worked in isolation, namely, cultural organizations, research institutions and industry. Their use of the DEED, will allow integration of further research resources including examples at national, regional and local levels to reflect Europe's diversity. Degree of integration can be measured in terms of the quantity and quality of participants sharing research and resources in DEED.

Connected with this basic activity are eight joint research activities to integrate different research communities on a number of specific themes and which entails co-ordinated programming of partners' activities on topics. Some of these groups are working on STREPs and other projects to permit more detailed research than allowed for by the NoE funding. Their simultaneous participation in the NoE means that their research results will feed into the DEED and other activities of the E-Culture NoE.

### **Basic Objective & Activity 3: Update DEED through research matrices**

E-Culture Net will work with other specialized networks to create research matrices of the entire knowledge production life cycle in order that the DEED can be updated. In addition, members of the networks in each country will contribute to these matrices in order to track developments of the knowledge production life cycle. This activity assures that the solutions in activity 1 remain current and that the contents of activity 2 remain accessible.

## **LEVEL & COMPONENTS OF ACTIVITIES**

### **How this integrates the various components to a coherent network**

Essentially the NoE is about a new tool for sharing research, which provides a new research infrastructure for digital culture, namely, the DEED (Distributed European Electronic Dynamic) resource. The three basic integrating activities focus on three fundamental steps in reaching this goal: 1) build the tool; 2) add content and 3) update it. Together these basic activities lead to an evolving product that remains up to date and continues to make accessible new resources. If all the components of these activities had to be developed from scratch then E-Culture Net would need to become one or a series of Integrated Projects (IPs). Because it builds on existing solutions from a number of NoEs, Consortiums and projects, the E-Culture NoE is a coherent network. This is amplified through its various components.

Activity 1, the DEED (Distributed European Electronic Dynamic) resource entails in a first instance “development and utilisation of electronic information and communication means.” The joint work on collaborative environments and virtual heritage centres will contribute to the “development of virtual and interactive working methods.” The DEED will foster “development and use of joint research infrastructures. The DEED will also lead to “adaptation of the existing facilities with a view to a shared use,” specifically by providing members of the NoE secure, multilingual access to research resources/materials presently available only in the institutions, which carried out the research.

The first ten components will integrate different communities by working together on a common goal, the DEED, which can be used in a regular intranet and will be of use to the entire research community. The final two components will extend the DEED to broadband contexts. In a first instance, this will be used by a small group of core members in the NoE. The twelve basic elements/modules for the DEED also serve to measure the degree of integration. In future, scholars wishing to make their research available on the intranet can be asked how many of these elements they have are included thus far. They can also help to create time lines for making research compliant on all twelve items.

To ensure that these modules are integrated into a coherent whole there will be periodic meetings, which bring two or three of the working groups together in order to share research and methods (5.12). At the frontiers there is a need for a permanent updating of professional competences. Hence this work in progress of the teams can be combined with Marie Curie scholarships such that the equivalent of refresher courses for the experts and training of new experts goes hand in hand.

Activity 2, content for the DEED through the development of networks in each country, makes researchers at national, regional and local levels more aware of resources, solutions and standards at the European level, and will lead “to adaptation of the participants' research activities in order to strengthen their complementarity.” The Spanish E-Culture network offers an excellent case in point. A census of major research projects in the field has led to the evolution of transverse projects that integrate research within the country and beyond. It is also leading to a paradigmatical general model, which offers a framework for understanding individual projects and contributions.

Activity 3, keeping the DEED updated by building research matrices, will further support the above goal. Gathering solutions, standards, and projects with respect to basic processes/activities

in the complete knowledge production life from major specialised networks, and from members in individual countries will allow the NoE to keep informed of developments with respect to standards and solutions all over Europe, and thus to keep the DEED up to date. Making these visible through the knowledge discovery tools developed by Netzspannung will allow researchers better to perceive trends and thus “to promote innovation.”

Activity 1 brings together technologists in different communities to create the DEED, a common tool for those active in digital culture. A series of jointly executed research projects including broadband experiments will add existing content to the DEED. These same groups are defining STREPs and other projects to provide new content for the DEED. These activities and projects will integrate a number of research communities. Activity 2 extends these links between communities and ensures that the DEED’s content becomes representative of the entire European Union. Activity 3 ensures that the process is updated and thus remains relevant. The three basic activities thus produce a coherent network by creating a tool, filling it with content and keeping it updated.

Through its activities to spread excellence, the NoE will further contribute to a coherent network by integrating these basic activities with developments in e-learning and e-training. Through activities 5.7-8 the NoE will foster “short-, medium- and long-term exchanges of personnel, the opening of positions to researchers from other members of the network, or their training.” Through activities 5.8-11 the NoE will ensure integration of communities/resources internationally. This will make others more aware of Europe and make Europeans more aware of the role European culture elsewhere.

## **B.4.1 INTEGRATING ACTIVITIES**

*How the integration effort of the network is comprised of a number of different activities (major elements or blocks of work). Describe each of these activities, identify who will be involved in carrying out the different integrating activities.*

As noted above the NoE has three basic activities or blocks of work: to build, fill and update the DEED.

**Basic Integrating Activity 1: Build DEED.** This has twelve elements.

### **1.1 Security**

**Team of Benoit Macq, Université Catholique de Louvain (UCL)**

A secure intranet is a first prerequisite for major institutions to share their databases with the equivalent of a club of trusted members. The team of Professor Benoit Macq, Université Catholique de Louvain (UCL) has produced a series of open-source tools for security including ASPIS (An Authentication and Protection Innovative Software System for DVDROM and Internet).<sup>2</sup> Meanwhile, Oxford, (within the RTS and with JISC funding) has begun an investigation into authentication and personalization systems appropriate to a distributed complex environment. This project, called DCOCE, is just starting. A small group from UCL in conjunction with Oxford will deploy these existing/emerging solutions with respect to the E-Culture Net intranet and apply them to resources as a first module for the DEED.

The above represents an interim solution to a large range of issues. We are aware that the SEMKOS Consortium in their bid for an IP have a more complex approach to security issues in the bibliographical and cultural domains. Our intention would be to draw on their solutions as they become available. Indeed since security is also one of the large objectives of the Commission, there should soon be other solutions that become available.

### **1.2. Legal Agreements**

**Team of Nuria Lloret Romero, Universidad Politecnica de Valencia**

A working group at the University of Valencia, “E-Contents, cultural contents and legal aspects in the Information Society,” which has worked with the EU on legal issues in culture, will be responsible for monitoring developments in IPR and DRM systems needed for users of the network and assess studies such as that of the University of Bristol’s Centre of IT and Law,<sup>3</sup> the Sorbonne’s work,<sup>4</sup> LITRU<sup>5</sup> and track the EU’s new legal site.<sup>6</sup> They will compose basic letters of agreement reflecting laws of different countries whereby each member of the network using the distributed resources agrees to use this only for research purposes. This group will also provide advice on legal issues pertaining to the E-Culture NoE as a whole.

### **1.3. Storage**

**UNESCO**

As a separate project, UNESCO, in conjunction with E-Culture Net and a series of leading museums (e.g. Louvre, National Gallery, London and the Uffizi) are developing an EU-UNESCO Digital Centre of Memory of Culture (DCMC, Appendix 5). This project will develop

digital centres, or mirrored repositories, which are the equivalents of backups at the level of major institutions and national collections. They will also explore how the DCMC can be linked with the principle of digital legal deposits emerging in the context of European national libraries (cf. Koninklijke Bibliotheek, the Hague). It is foreseen that the DCMC will one day become an important component of a future version of the DEED (cf. figure 13). A small working group will explore how the results of this UNESCO project can be applied to the NoE's storage needs. This group will define basic rules for storage and backups for all contributors to the DEED.

#### **1.4. Multilingual Mapping of Terminology**

**Team of Pierre Rouillard, Maison de l'Archéologie et de l'Ethnologie (MAE) – René Ginouvès, Nanterre (Maison des Sciences de l'Homme): Host of Accès Multilingue au Patrimoine Consortium**

Without practical solutions to the problem of multilingualism there won't be any low-barrier access to the cultural diversity expressed in heritage databases in Europe.

The project AMP (Accès Multilingue et Patrimoine) was created in 2001 by a request from the Director of the Department for Humanities and Social Sciences in the Centre National de la Recherche Scientifique (CNRS), and later financed by the French Ministry of Research. The AMP Newsletter is published in French and English: it can be accessed on the French Ministry of Culture and Communication website<sup>7</sup> AMP has been exploring methods of mapping the terms of different database vocabularies. It aims to facilitate access to these complicated multilingual constructs, through interfaces based on the widely known and well-understood methodology of dictionaries.

AMP plans to make controlled vocabularies from a wide range of subjects machine-readable, bringing them into the public arena. Instead of another effort to make cultural heritage databases use one standardised language, AMP will offer a method of connecting them. This will allow queries to be translated from one frame of reference to another, and from one language to others. This technique will facilitate the networking of the players and users, and encourage interaction between them. To achieve this, AMP proposes a joint programme of activities in which the crucial integrating activities and an ambitious programme for the training of experts are closely linked to jointly executed research into the more technical and language-oriented aspects.

As a first concrete step, AMP would begin with carefully chosen samples from several databases, ranging from iconographical terms for art history image data bases (Iconclass – Royal Netherlands Academy of Arts and Sciences (KNAW)<sup>8</sup> to more specialised archaeological and ethnological library databases (Frantiq – Brigitte Lequeux<sup>9</sup> and Réseau Ethnologie – Isabelle Donze – Laboratoire d'ethnologie et de sociologie comparative)<sup>10</sup> and to multilingual and multiscrypt historical geography in the MOM (Darmezine, Dalix, Saba-Drappeau, Belhaj). The owners of each vocabulary will develop a means of exporting their material, ideally as XML. This will then be converted to a more standardised representation. Next the team will produce a generic framework to maintain and disseminate these vocabularies, and software to convert them to this framework. These projects have been described in AMP Newsletter Nr.2.<sup>11</sup>

ISO has issued a standard: ISO/IEC 13250:2000 Topic Maps, which defines a generalized method of encoding concepts („topics“) and the relationships between concepts. An XML

representation of this standard has been developed.<sup>12</sup> This is actively supported by the TopicMaps.Org consortium.<sup>13</sup> It is the view of AMP that Topic Maps offer a standards-based framework, which is sufficiently powerful to address the issues of relationships between concepts in different languages and frames of reference.

This process will lead to enhanced understanding of the relationships between concepts in structured vocabularies. We intend to feed this knowledge back to the bodies responsible for the development of structured vocabulary standards.

Once the vocabularies have been converted from the format provided to standardised XML, a study will compare the relative merits of using e.g. a Topic Map engine vs. an XML database for the purpose of making them available on the Web. The chosen technology will then be used to develop a Web application to provide the required access to these resources. This application, and the vocabulary data, will be then be placed on a stable site as a module of the DEED.

Meanwhile, Oxford (RTS) is developing a new, linguistic analysis tool, capable of handling any XML conformant corpus in any language. How this can be added to the DEED will be explored. This group may be aided by members of the CHIME (Computing and Humanities in Multilingual Europe) EoI,<sup>34 14</sup> which specializes in questions of automatic translation.

#### **1.5. Semantic Mapping** **Traugott Koch, Lund University, SEMKOS**

The SEMKOS (Semantic Web meets Knowledge Organization for Large-Scale Information Integration)<sup>15</sup> group has been leading developments in integrating semantic web and knowledge organisation activities. A group of researchers will address semantic mapping problems in the cultural domain. SEMKOS is also applying for an IP in this area. Their precise role in the DEED will be defined more precisely once it is clear whether their bid for an IP is successful. E-Culture net might, for instance, provide one of the test beds for their work.

#### **1.6. Digital Autonomous Cultural Objects (DACOs)** **Team of Manfred Thaller, Universität zu Köln, cf. PROMETHEUS**

In its phase as a thematic network, E-Culture Net has demonstrated the potentials of Distributed Autonomous Cultural Objects (DACOs). In contrast to typical Internet approaches, which provide access to collections and resources, the DACO approach provides access at a higher level of granularity with respect to individual images and pages of heterogeneous, distributed collections. A small working group under the direction of Professor Thaller will extend this approach to the DEED and resources of members of the NoE. These extensions will be threefold:

- a) On the one hand the DACOs will be closely related to the concepts of the OAI (Open Archive Initiative), communicating with a superset of the OAI protocol, which in turn means that all DACO communication becomes fully acceptable for OAI harvesters, while at the same time allowing a much closer integration of the created resources in terms of granularity.
- b) A network of pilot implications for the DACO protocol for the major DBMSs (Data Base

Management Systems) used in the cultural heritage area will be provided.

(c) The DACO communication, which is currently being refined in terms of the Semantic Web via DF (Resource Description Format), will be extended to allow for integration of and brokerage between different ontologies, using OWL (Web Ontology Language) for that purpose.

### **1.7. Interfaces**

**Andrew Morrison, InterMedia, University of Oslo and Interactive Institute**

The Media Lab (Helsinki) in conjunction with the Interactive Institute in Sweden and other partners in Scandinavia designed the initial interfaces for E-Culture net. In the thematic network phase this group identified three phases: interaction design, system components and usability parameters. In the NoE this group will develop this approach and be responsible for creating coherent interfaces for early versions of the DEED.

### **1.8. Multimodal Interfaces**

**Benôit Michel, UCL, SIMILAR NoE<sup>16</sup>**

The proposed SIMILAR NoE will unite over 30 laboratories to develop a number of multimodal interfaces including speech, and various innovations with respect to human Computer Interface (HCI) dimensions. A small group will work with the E-Culture NoE to test and adapt these innovations to the needs of users as another module of the DEED.

### **1.9. Spatial Access (3-D Reconstructions and Reproductions)**

**David Clarke, National Museums of Scotland, ORION**

In the context of the ORION thematic network, the National Museums of Scotland are, inter alia, using the National Research Council of Canada's laser camera technology capable of remarkable photos and 3-D reproductions using stereo-lithography. A small group will make 3-D access into a further module of the DEER and will explore how spatial access can be integrated into the E-Culture framework as a whole. They will focus on three research questions:

- 1) Advanced, Accessible (N.B. for the disabled) 3D Archaeology web-site
- 2) development with consideration to multilingual, multicultural aspects
- 3) Large (and small) 3D Interactive Displays for Archaeology Exhibitions touring Europe and internationally (related to work in 1).
- 4) 3D digitization cost trend analysis studies (N.B. This latter issue is a stated EC priority) with obvious use in cost-benefit work etc.

The approach has been designed to be complementary with the specific STRP proposal being developed by the ORION Consortium on 'End to End 3D from Excavation to Museum Public Display and Education' and other initiatives. As in other cases discussed elsewhere, the plan is again that specialized research from this STRP will filter down into the NoE which serves effectively as a user group for the results. There will be close cooperation with the work in the following topic.

### **1.10. Spatio-Temporal Access (HIS/GIS)**

**Humphrey Southall, University of Portsmouth**

Treating spatio-temporal access to cultural resources involves three main components:

(a) Resource discovery by location and date: Existing metadata for on-line cultural content generally includes dates but the only locational data are place-names. Some place-names can sensibly be translated into points on the ground ("Monaco"?) but others cannot ("Germany"). Names change over time ("London" and "Londinium", "Breslau" and "Wroclaw"). Toponymic databases and on-line gazetteers are therefore central to enabling spatio-temporal searching, but they must be linked to GIS frameworks recording geographical entities as polygons. We can demonstrate spatial discovery of resources whose metadata contains only place-names, but it is better if the metadata contains coordinates or direct references to polygons. We have a demonstration gazetteer, whose core is neither a GIS nor a thesaurus but an ontology, on-line at: [www.gbhgis.org/demo\\_gaz.htm](http://www.gbhgis.org/demo_gaz.htm).

(b) Integration of spatio-temporal data held on different servers: Most digital cultural content is held in database and other content management systems without spatial functionality; and GIS software tends to lack other capabilities needed by the cultural sector. We therefore need to integrate content held in different servers with different capabilities, based on standards developed by the Open GIS Consortium. The initial GBHGIS web site, going live next month, already combines content generated by a series of distinct servers, including an OGC Web Map Server, into particular web pages: [www.VisionOfBritain.org.uk](http://www.VisionOfBritain.org.uk).

(c) Spatio-temporal visualisation: Locating cultural content by geography and bringing it together is not enough; the user must be able to see the content in a spatio-temporal framework on screen. We have already built a demonstration system for the British Library which locates cultural content on a zoomable map of the world. Users can select content by locality and period, and then access the material. A slightly cut-down version of this system, excluding for example sound recordings, is publicly on-line at: <http://www.ccg.leeds.ac.uk/geotools/blpilot/MapKiosk.html>.

Accompanying this activity there will probably be an STRP. In a second phase it is foreseen that this work will be integrated with the work on historical cities (cf. jointly executed work below, p.67).

#### **1.11. Intelligent Virtual Environments** **Team of Antonella Guidazzoli, CINECA**

For the E-Culture Net TN, CINECA in conjunction with the Supercomputing centre at the Universidad Computense da Madrid has produced a broadband demonstration involving a digital version of the Fresco Map of Bologna in the Papal Apartments of the Vatican.

CINECA in conjunction with RAI has developed virtual environments, which allow one to go from a representation of an archaeological ruin, to a reconstruction of the site, which can then be linked with a television set. A small group will explore how this can be added as a feature of a broadband DEED and explore how this approach can be adapted for e-learning in classrooms with full broadband connections.

The artnouveau thematic network will contribute to this group latest developments in mixed reality and Human Computer Interfaces (HCI). At least one representative from Art nouveau will

also be a member of the interface group (1.7) to assure that there is further integration between the solutions for regular and broadband internet.

It is likely that, along with other major players such as the artnouveau thematic network (led by Fraunhofer and including the FHW (Foundation of the Hellenic World)), Laval (MUVII etc.) and the VICE (Virtual Collaborative Environments) Consortium<sup>17</sup>; CINECA will develop STREPs, which address specialized research problems, that go beyond the scope of research possible within the NoE per se. Here one of the starting points will be the work of the FHW.

FHW is active with CREATE (Constructivist Mixed Reality for Design, Education, and Cultural Heritage) that aims at developing a mixed reality framework to enable highly interactive real-time construction and manipulation of realistic, virtual worlds based on real sources. This framework will be tested and applied to cultural heritage content in an educational context, as well as to the design and review of architectural/urban planning settings. The CREATE project will:

- develop careful design methodologies to determine user requirements, based on a human-centred, "constructivist" approach to working and learning, with special attention paid to evaluation of the resulting mixed reality experience
- adapt, develop, and combine novel visualisation, display and audio technologies based on the requirements thus defined, to enable realism with interactivity, specifically for immersive VR platforms (single/multiple-screen stereoscopic displays)
- construct prototypes for two specific applications, cultural heritage and architecture/urban planning, that incorporate more natural and usable interface approaches and permit assessment of both the methodology and technology employed (March 2002-February 2005).

#### **1.12. Virtual Heritage Centres** **Maurizio Forte, CNR-ITABC**

The Institute for Technologies Applied to Cultural Heritage of the Italian Research Council (CNR-ITABC), has outlined a plan for a small network of Virtual Heritage Centres,<sup>18</sup> that will effectively integrate the above activities in a new kind of high-speed context. This work will build on the virtual environments work led by CINECA and constitute another module of the broadband DEED.

### **Basic Integrating Activity 2: Fill DEED through networks to reflect diversity**

This has three activities plus a number of jointly executed research activities (cf. 4.1-9).

#### **2.1. Develop networks in each country**

As a thematic network, E-Culture Net, appointed a series of volunteers who made preliminary surveys with respect to development of networks in each country. Some of these volunteers have found replacements, others have agreed to stay on. In most cases these individuals are already active in linking European activities with those at a national level in their respective countries. Some countries such as Spain and Portugal have already created their own websites for E-Culture Net. A team of 15 individuals, one per member state will continue this process (cf. 2.1 above). Initially, they will further enlist cultural organisations, research institutions, industries in

their countries as members of E-Culture Net. This approach allows the network to gain a critical mass through a distributed structure while maintaining a small central secretariat.

For the thematic network phase of E-Culture Net, the Foundation of the Hellenic World (FHW) surveyed potential candidates for a Greek and a Mediterranean Website. They are now working on MEDINA-MEDiterranean by INternet Access. The main objective of the project is to design and pilot the development of a "federation" of integrated Websites concerning culture and tourism in a number of countries of the Mediterranean Area. The federation will consist of a number of "national" Websites, obtained by reorganising and adapting existing material, and a "MEDINA Portal", integrating and rearranging selected information from the national Websites. The national Websites and the Portal will be oriented towards both end-users, directly organising their tourism, and professional operators looking for specific information. The national Websites will organise information according to local points of view, interests and focuses. All the national Websites, however, will share a common methodological approach, a common design (in terms of structure and content topics) and compatible implementation. The MEDINA Portal will provide a Mediterranean point of view, allowing the user to plan a global tourist activity across several Mediterranean countries. State-of-the-art technological methodologies, partly originated from previously funded European projects, multichannel access (ranging from standard Internet connections, to broadband, WAP, UMTS, etc.), intensive training and an effective dissemination of the results will allow, in the future, a further development of the project to all Mediterranean Countries.

Organisations from the following countries participate to this project: Italy, Algeria, Austria, Belgium, Cyprus, France, Greece, Lebanon, Malta, Morocco, Palestinian Authority, Syria, Tunisia. The project has started in July 2002 and will last for 40 months.

Within the context of the E-Culture NoE, the FHW will combine the standardization processes in the two projects, MEDINA and DEED, in order to have optimal results concerning these issues. E-Culture Net's Mediterranean network has been formed mainly by organizations that participate in the MEDINA project.

## **2.2 Share research to reflect national, regional local diversity**

A second role of these E-Culture networks at the level of individual countries will be to provide members with the DEED in order that they can add resources from national, regional and local levels to reflect Europe's unity of diversities.

## **2.3 Co-ordinate with national policies (MINERVA)**

Another role of networks at the country level is to work in conjunction with national governments to harmonise ongoing projects with policy goals (cf. MINERVA). Here the precise role of the E-Culture NoE awaits further definition of the role of MINERVA within FP6.

### **Basic Integrating Activity 3: Update DEED through research matrices**

This activity in turn has three components.

### **3.1. Co-operation with other specialised networks**

Component one entails co-operation between E-Culture Net and a) member networks such as ERPANET, ENCORE, SCRAN and b) specialised networks such as ERCIM and DELOS in order to refine the research matrices and gather information with respect to solutions, standards and trends.

### **3.2 Collect info re: standards, solutions, for research matrices to update DEED.**

Another role of networks at the country level is to collect information from cultural organisations, research institutions and industry in each country concerning evolving solutions, standards, and trends for research matrices of the knowledge production life cycle to update the DEED.

### **3.3 Adapt Netzspannung's (Fraunhofer) Knowledge Discovery tool**

Netzspannung has developed tools for the CAT (Communication, Art & Technology network) for semantic views and knowledge discovery specifically with respect to projects concerning electronic arts. In component three, a small group of researchers from Netzspannung will adapt this project and extend it reflect the entire knowledge production life cycle.



## THE IMPORTANCE OF CONTRIBUTIONS TO THE INTEGRATION PROCESS, INCLUDING QUALITATIVE & QUANTITATIVE PERFORMANCE INDICATORS

*Show the importance and contribution of each to the integration process, in particular in relation with the qualitative and quantitative performance indicators that are proposed.*

### Basic Activity 1: DEED (Distributed Electronic Electronic Dynamic) Resource

#### 1.1. Security

Security is fundamentally important for the DEED in order to convince major cultural institutions that they can share their resources safely without danger of contravening copyright. The security module contributes to the integration process by providing a context for safe sharing.

*\* The effectiveness of the security module can be tested by asking candidates to identify: What security aspects are not covered by the module? What provisions have been made for adding of new security aspects? A second periodic test should be whether there is hacker penetration?*

#### 1.2. Legal Agreements

Legal arrangements are a second important module of the DEED to ensure that a framework for trust exists in writing. It will contribute to integration by spelling out concerns in black and white. Here E-Culture Net can give guidance in development of European Directives on copyright, digital goods and digital legal deposits.

Related to this is a small subproject on Digital Object Identifiers (DOI) connected with Intellectual property rights. The partner in question, the Polytechnic University of Valencia is also working on the DEED module 2 (legal agreements) and will compare the DOI approach to the European DACO approach.

*\* The effectiveness of the module can be tested by asking: Do the agreements cover the legal diversity of all the EU member states? The ultimate test of this module will be its contribution to European legislation and jurisdiction.*

#### 1.3. Storage

Systematic storage and backups are of vital importance in order to ensure the preservation of the DEED especially in emergency situations, whether natural or man-made. This module contributes to integration by ensuring that the day-to-day efforts of the NoE have permanence.

*\* The effectiveness of the module can be tested by asking: Do UNESCO's storage methods adequately reflect the needs of all the NoE's members? Traditional measurements of fault rate and down time will be applied as quantitative measures.*

#### 1.4. Multilingual Mapping of Terminology

Multilingual mapping is of basic importance to ensure that adding resources becomes more than a simple dumping process. This module contributes to integration by providing a single framework for access to the DEED, which is at the same time multilingual to permit access from

members in different countries. The addition of members from the CHIME Consortium includes the dimension of natural language and automatic translation.

*\* The effectiveness of the proposed methodology can be measured by determining the range of crucial parameters: mapping existing formats (e.g. thesaurus, classification, dictionary etc.), languages (e.g. French, English, old and new Greek, Arab, etc.) and topics, which are relevant to many applications and user groups (e.g. iconography, geography). Another important measure will be the facility to create efficient exchange formats between collaborating institutions/researchers. The actual building of multilingually mapped vocabularies is not part of this workpackage.*

### **1.5. Semantic Mapping**

Semantic mapping is an important module of the DEED to ensure that one is sharing meanings rather than simple homonyms. This contributes to integration by ensuring that members have access to resources in other languages in which they may not be fluent.

*\* The effectiveness of the module can be tested by asking: Does the semantic mapping entails only standard meanings? How does the system deal with regional and local meanings and how does the system deal with historical changes in meaning?*

### **1.6. Distributed Autonomous Cultural Objects (DACOs)**

Most solutions for sharing resources on the Internet give access to collections or at best single resources. To share resources fully we need access to individual pages and single images. DACOs provide this through a higher level of granularity in searching without requiring a rewriting of metadata as in schemes such as the Dublin Core. DACOs give access to detailed items of culture while permitting the maintenance of local, regional and national diversity. DACOs are therefore an essential component of the DEED.

*\* The effectiveness of DACOs can be measured by simply asking how many cultural objects are accessible via DACO?; How easily can new resources be made accessible? Can this be done by non-specialists? Are there limits of scale in the application of DACOs? How do DACOs deal with multilingual challenges?*

### **1.7. Interfaces**

Interfaces are recognized as an important aspect of Human Computer Interaction (HCI). The contribution of this module is to take into account the central importance of users in all technological experiences, including psychological factors.

*\* The effectiveness can be tested by asking whether there are explicit guidelines for construction of interfaces for the DEED. Are the interfaces designed to accommodate persons with disabilities? Can the interfaces be personalised?*

### **1.8. Multimodal Interfaces**

In addition to being one of the EC's priorities, multimodal interfaces are important because they offer multiple means of access to complex information. The contribution of this module is that one can introduce new kinds of navigation through information and knowledge, some items being guided by gesture while others through voice commands.

*\* Effectiveness can be measured by asking: How many senses are covered? To what degree do the interfaces offer faster accessibility to ensorially challenged persons: e.g. the blind, the deaf?*

### **1.9. Spatial Access (3D)**

A traditional photograph shows only one view of a vase, statue or other cultural object. Spatial access is an important module in the case of all cultural objects, which are three-dimensional, because it allows one to see the same object from all viewpoints. This is vitally important in order to study the complete object. A further contribution of this approach is that objects are not only represented in three dimensions but can also be reproduced in three dimensions (e.g. using stereo-lithography). This permits production of virtual surrogates, which can be used to test whether intervention on an unique cultural object is advisable. Integrative approaches (see 4.3) are already being initiated e.g. the ECN Object – Room - Building – etc hierarchy with clear interaction with other topics e.g. Cultural Tourism & e-learning.

*The effectiveness of the component can be tested by asking: How easily can cultural objects be rendered in 3D and at what costs? What interoperability is there between the considered by ORION methods and other solutions (e.g. the SCULPTEUR project, Web 3-D consortium, Adobe Atmosphere and 3D Consortium<sup>19</sup>)? Which alternative products offer best quality and are most cost-efficient?*

### **1.10. Spatio-Temporal Access**

Spatio-temporal access is vitally important in the case of historical materials where the boundaries of countries on maps change over time. The contribution of this module is to permit access to historical resources. A further contribution is that it permits new ways of searching for objects using Geographical Information Systems (GIS).

*\* The effectiveness of this component can be measured by asking: Does the GIS approach deal with multilingual place names? Does the approach include historical changes in place names multilingually? To what degree does the resource add to the experience of cultural tourism? What degree of coverage is achieved?*

### **1.11. Virtual Environments for Broadband Access**

When bandwidth is not a constraint, virtual environments are an important component of the DEED because they permit complete immersion into a reconstruction or other three-dimensional space. This module enables lifelike versions of historical sites for e-learning.

*\* The effectiveness can be measured by asking: Can the virtual environment be shared on-line? How many are being shared? What amount of preparations are needed to share these environments? How readily can these virtual environments be shared via television? Can these virtual environments be used in classrooms? If so what are the necessary technical parameters? What change is there in the quality of learning?*

### **1.12. Virtual Heritage Centres for Broadband Access**

Virtual Heritage Centres are another important component of a broadband version of the DEED because they permit multi-sensory, multi-lingual access to digital cultural heritage. Their contribution lies in providing a single context that integrates a number of different techniques to display, analyse and study cultural materials for e-learning.

*\* Questions concerning effectiveness include: How many networked virtual heritage centres are there? How many of these are operated within the NoE? Are there provisions for groups outside the NoE to use these VHCs? What is the minimum bandwidth for virtual heritage centres?*

The real importance of the DEED lies in integrating technologies which now exist in isolation to permit researchers to share their resources, research methods and critical thought in new ways.

Activity 2: Fill DEED through networks in each country

### **2.1. Develop networks in each country for sharing internationally**

The goal to build DEED (activity 1) becomes important once there is a framework to make DEED available to a much larger group of researchers. If administered centrally such a framework poses great difficulties to the efficiency of the NoE. Creating a (branch of the) network in each country overcomes this challenge and also avoids problems of subsidiarity.

*\* The effectiveness of these networks at the country level can be measured by asking: Is there a website for the country in question? How comprehensive is the website? Do these websites foster co- co-operation beyond the boundaries of their country of origin? How many resources are being shared both ways? Are there conferences at the country level which foster co-operation at the European level? What part of the resources of a country are difitally accessible via DEED?*

### **2.2. Share research to reflect national, regional, and local diversity**

The introduction of networks at the country level is also important for strengthening and integrating co-operation between cultural organisations, research institutions, and industry. This can be achieved by their sharing research using the DEED and will ensure, in turn, that the DEED reflects Europe's diversity at national, regional, and local levels.

*\* The effectiveness of this component can be measured by asking: How many resources are on the DEED from country x? How many of the DEED modules are being used? What links are there between alternative interpretations of the same facts, events at different levels? How many of the members of the E-Culture NoE participate in activities of the national network?*

### **2.3. Co-ordinate with national policies (MINERVA)**

The development of networks at the level of individual countries is further important because it creates links among the key cultural players, which can help in co-ordination between European and national policies as foreseen by MINERVA.

*\* The effectiveness of this component can be measured by asking: How many of the MINERVA policies are evidenced in projects of the NoE? Is this number increasing?*

Objective 2, with its three components, provides an administrative framework for expanding greatly the use of the DEED and the diversity of its contents. Rather than being a limited tool that affects a small network of a dozen or so institutions, this approach allows it to include hundreds of institutions and as such gain a critical mass whereby it becomes seriously representative of Europe's complex cultural landscape. Through the notion of subnetworks, this model further allows integration of players from Mediterranean countries, Newly accessed States (NAS) and Russia in a way that fosters their uniqueness and diversity.

<b>Basic Category</b>	<b>Network</b>
Technologies and Infrastructure	ERCIM,CWI
Content Creators	artnouveau, INCCA Consortium
Content Holders	DELOS ,MUSICNET
Content Brokers	ENCORE, ERPANET
Context Creators	DELOS,TERMNET
Content and Context Communication	SCRAN
Applications	C2RMF,PULMAN
Implications	NEHRN

*Figure 12: Survey of basic categories of the micro-level research matrix and corresponding networks to track developments*

### **BASIC OBJECTIVE 3: UPDATE DEED THROUGH RESEARCH MATRICES**

#### **3.1. Co-operation with other Networks**

This component is vital to ensure that the solutions for security, storage etc offered by the DEED remain up to date. E-Culture Net already includes among its members a number of networks including, ERPANET, ENCORE, SCRAN, NEHRN and artnouveau. In addition, the EU has already created a number of specialised networks (e.g. ERCIM, DELOS, MUSICNET) that serve as a technology watch for individual developments (cf. Figure 12). The research matrices take this process of integration one step further by combining their expertise to provide a tracking of the entire knowledge production life cycle. Such co-operation among the existing networks in the direction of a network of networks will enable the NoE to the survey developments and keep the DEED up to date. In future such research matrices can become one of the components of a later version of the DEED (cf. Figure 13).

*\* The effectiveness of this component can be measured by asking: What quantitative evidence is there of more co-operation between networks? How comprehensive is the information in the research matrices? How well is it being updated?*

#### **3.3. Adapt Netzspannung's (Fraunhofer) CAT**

This component is important because it provides new ways of seeing, studying and analysing information collected by the research matrices by providing new knowledge discovery tools in the form of semantic connections, kohonen maps etc.

*\* The effectiveness of this component can be measured by asking: Does the adapted project display the research matrices completely and in new ways; How many persons are using the new system; What documented evidence is there that this is an improvement?*

### **FUTURE STEPS**

As we have noted, a prime objective of the E-Culture NoE is to share research methods and resources. This requires creating a common research infrastructure in the form of a DEED (Distributed European Electronic Dynamic) resource, which can be seen as a series of pilots. These pilots will integrate the research community in digital culture and further the vision of a European Research Area (ERA). The DEED pilots will also bring to light a number of user and usability needs that serve as preliminary work for full-scale DEED in the future.

As the research community in digital culture comes into focus it will increasingly make sense to separate the strict network characteristics of the NoE, and to develop the DEED as an Integrated Project (IP).

As a thematic network, E-Culture Net has identified a long-term framework for a DEED or a DEER (Distributed European Electronic Resource), with at least eight components (figure 13). As we have noted, a separate UNESCO-EU project (DCMC) is working on large scale backups and storage at the European level, which will be used for the NoE's DEED. This corresponds to component 1 of the future DEED.



**Figure 13:** Eight components for a future Distributed European Electronic Dynamic Resource and leading to a more comprehensive DEER (Distributed European Electronic dynamic Resource). (Diagram Alexander G. Bielowski adapted from Suzanne Keene, UCL)

Objective 1 of the NoE will provide aspects of components 3 and 4 of the future DEED. Objective two widens the application of component 3 to include national, regional and local content. Objective three of the NoE will eventually become component 2 of the DEED. The NoE's activities to spread excellence address component 6 of the future DEED.

Using a DEED as a modular first step towards a future comprehensive DEED, has the enormous advantage of gaining experience while integrating different communities relating to digital culture, rather than attempting a grand solution without a proper basis. Connecting the ideas from the outset has the advantage of providing these same communities with a sense of direction that is vital if the vision of an E-Europe where culture is multilingually available to all citizens is to become a reality.

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<sup>1</sup> Initially the example of the JISC's Distributed National Electronic Resource (DNER) inspired the idea of a Distributed European Electronic Resource (DEER). While preliminary study by Suzanne Keene (UCL) confirmed that the DEER was a practical goal, it also suggested that it would require a number of years to achieve. A first response was to distinguish between a short term Distributed Electronic Research Resource (DERR) and a long term DEER. In March 2003, one of the members, Frederic Andres, aptly noted that the DEER had a very static connotation, which was at variance with the dynamic approach that was foreseen through components such as collaborative environments and virtual agoras. As a result the DEER was renamed the DEED (Distributed European Electronic Dynamic) Resource.

<sup>2</sup> <http://www.iti.gr/db.php/en/projects/ASPIS.html>

<sup>3</sup> [http://www.jisc.ac.uk/uploaded\\_documents/archiving\\_legal.pdf](http://www.jisc.ac.uk/uploaded_documents/archiving_legal.pdf)

<sup>4</sup> <http://w3.univ-paris1.fr/pages/liste.cfm?RUBRIQUE=4061&lg=1>

cf. [http://droit-internet-2000.univ-paris1.fr/di2000\\_01.htm](http://droit-internet-2000.univ-paris1.fr/di2000_01.htm)

<sup>5</sup> Law and Information Technology Research Unit.

See: <http://www.um.edu.mt/pressreleases/2000/litru.html>

<sup>6</sup> [http://europa.eu.int/comm/justice\\_home/ejn/](http://europa.eu.int/comm/justice_home/ejn/)

<sup>7</sup> [[http://www.culture.gouv.fr/culture/mrt/numerisation/fr/f\\_01.htm](http://www.culture.gouv.fr/culture/mrt/numerisation/fr/f_01.htm)].

<sup>8</sup> [<http://www.iconclass.nl/>]

<sup>9</sup> [<http://frantiq.mom.fr/FRANTIQ/index.html>]

<sup>10</sup> [<http://web.mae.u-paris10.fr/recherche/beinforma.htm>]

<sup>11</sup> [[http://www.culture.gouv.fr/culture/mrt/numerisation/fr/f\\_01.htm](http://www.culture.gouv.fr/culture/mrt/numerisation/fr/f_01.htm)].

<sup>12</sup> [<http://www.topicmaps.org/xtm/index.html>].

<sup>13</sup> [<http://www.topicmaps.org>].

<sup>14</sup> [http://eoi.cordis.lu/dsp\\_details.cfm?ID=33577](http://eoi.cordis.lu/dsp_details.cfm?ID=33577)

<sup>15</sup> <http://www.lub.lu.se/SEMKOS/>

<sup>16</sup> [www.tele.ucl.ac.be/SIMILAR](http://www.tele.ucl.ac.be/SIMILAR)

<sup>17</sup> [http://consortium.cordis.lu/dsp\\_details.cfm?ID=32604](http://consortium.cordis.lu/dsp_details.cfm?ID=32604)

<sup>18</sup> <http://www.mmi.unimaas.nl/eculturenet/Internal/contributions/1/WP1CNRITABC.pdf>

user name: eculturenet

password kickoff2

<sup>19</sup> <http://zdnet.com.com/2100-1104-990866.html>