 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

IST-2001-37491

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

Work Package 3 – Deliverable 8

Research Topics/Implications

Contact:

Kim H. Veltman

Maastricht McLuhan Institute

Universiteit Maastricht

Grote Gracht 82

6211 SZ Maastricht


The Netherlands

Phone: +31 43 3882699

Fax: +31 43 3252930


Mail to: k.veltman@mmi.unimaas.nl

Deliverable 8.doc	Fifth draft	13 June 2003	1/51
-------------------	-------------	--------------	------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

<i>Project Number</i>	IST-2001-37491
<i>Project Title</i>	European Network of Centres of Excellence for Research and Education in Digital Culture (E-Culture Net)
<i>Document Type</i>	PU – Public usage of the result
<i>Document Number</i>	D8
<i>Contractual date of delivery</i>	30-05-2003
<i>Actual date of delivery</i>	11-06-2003
<i>Title of Document</i>	Research Topics/Implications
<i>Contributing work package</i>	WP3
<i>Nature of Document</i>	Report
<i>Author(s)</i>	Kim Veltman in consultation with all members
<i>Abstract</i>	A survey of implications of new media on existing disciplines and new subjects.
<i>Keyword list</i>	New media, education, training, digital culture, cultural heritage,

Table of Contents	Pages
Title Page	1
Cover Page	2
Contents	3
Executive Summary	4
1. Introduction	5
2. General Collections	8
3. Anthropology	10
4. Archaeology	11
5. Architecture	12
6. Art	13
7. Art History	15
8. Conservation, Restoration	16
9. Culture	17
10. Cultural Studies	19
11. Design	20
12. Education, Learning	21
13. Ethnology	22
14. Geography	23
15. History	24
16. Law	25
17. Library Science	26
18. Linguistic	27
19. Museum Studies	28
20. Medicine	29
21. Media, New Media	30
22. Philosophy	31
23. Psychology	32
24. Religion, Theology	33
25. Sociology	34
26. Multilingual, Dynamic Knowledge	36
27. New Models of Culture	39
28. Conclusions	40
Appendix 1: Christian Lahanier (C2RMF)	46
Notes	48

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Executive Summary

This study examines implications of networked media for traditional academic subjects and disciplines. A survey of 23 disciplines is made. Two areas for long-term research are considered: Dynamic Knowledge and New Models of Culture. Whereas the initial research topics (deliverable 4) outlined strategies to arrive at a DEER, these topics explore what will become possible once the DEER exists.

Dynamic Knowledge

Over the past half century scholars (Innis, McLuhan, Giesecke) have noted that while print media brought many advantages it also limited presentation to a static, linear form of presentation. The new media introduce possibilities of whereby we can trace such static claims dynamically over time through databases. This applies to lists of paintings, manuscripts, editions, translations and equally to maps. The resulting dynamic knowledge can transform our approaches to knowledge. One of the deeper goals of the DEER would be to create environments for such dynamic knowledge.

New Models of Culture


Until recently cultures defined the world in terms of themselves, often ignoring the existence of other paradigms. This led both to inbred models tending towards isolationism or expansionist models tending towards cultural imperialism. In a networked world neither of these extremes poses a reasonable alternative. We need new models of culture that acknowledge the contributions of high culture (e.g. Europe, Asia, India) but approaches them in a framework where comparative study on an equal footing is possible. This framework needs also to acknowledge the contributions of nomadic and oral cultures, and give due recognition to the roles of present expression and future creativity. Such models are vital for Europe itself, which needs to redefine itself as it expands. At the same time Europe needs this larger framework in redefining its role with respect to other cultures if it is to reposition itself as a one of the major players on the world scene.

In addition five further implications are identified:

- 1) Massive new content
- 2) New methods of scholarship
- 3) Distributed multilingual vision that includes local, regional, national and international.
- 4) New fields of study
- 5) Changing boundaries of scholarship.

From this we conclude that effects of the new media on scholarship and knowledge organisation are more fundamental and that there many more avenues for study than has generally been recognised.

Deliverable 8.doc	Fifth draft	13 June 2003	4/51
-------------------	-------------	--------------	------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

1. Introduction


What implications do the new networked media have for traditional academic subjects and disciplines? First, at the simplest level, the Internet is making the traditional contents of these subjects more readily accessible. This means that some 650 million persons, or roughly 10% of the population potentially have access to these sources. The bad news is that they need to know the appropriate languages. The good news is that this is not just English, which has fallen to about 35% of the Internet and will continue to fall. Other great languages of the world are taking their proper place. A fundamental consequence of this first implication is that the sample on which our claims are based is enormously, nay incredibly expanded. Where the most learned persons of the early 17th century working in Wolfenbüttel or Rome, then the world's largest libraries had between 100,000 and 150,000 books at their disposal, their equivalents today have access to databanks of over 100,000,000 titles at their disposal. Even so content, verbal, visual, multi-medial, multi-modal is but one dimension of the implications, not least because quality ultimately remains more important than sheer quantity.

A second implication concerns method: the Internet is leading scholars all over the world to rethink the validity of their methods which were convincing when applied to a local or national sample but almost certainly require adjustment when viewed from a larger viewpoint. In Washington, the United States may appear to be the centre of the world. From another viewpoint the United States is a country with 4% of the world population that consumes 40% of the world's oil. The Internet is challenging our methods in all the traditional fields. One of the challenges lies in sharing critical thought in order to create serious new methods on which there can be a reasonable amount of agreement.

There was a time when it seemed as if the Internet would lead simply to a new version of the *Encyclopédie*, whereby all knowledge could be compiled together. In the meantime it has become clear that a new synthesis will be quite different in character. The *Encyclopédie* of Diderot and D'Alembert was the product of a centralised, absolutist regime, which believed somehow that there was a single answer and solution to all things knowable. The emerging synthesis is fundamentally different. It insists that local, regional and national voices must be represented in any picture, that the big picture cannot suppress or simply ignore these complexities and diversities. The new vision entails not only distributed computing but also distributed world-views ranging from those of a little village to the global ambitions of the G-8; distributed customs, expressions and even distributed versions of truth. This third implication may prove to be the most elusive of the effects of the new media.

In addition, there are further implications which are again more obvious. A fourth implication is that the new media are bringing new fields and auxiliary fields: where once we had anthropology, we now have visual anthropology and cyber-anthropology. Where

Deliverable 8.doc	Fifth draft	13 June 2003	5/51
-------------------	-------------	--------------	------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

once we had history and archaeology we now also have archaeo-astronomy, archaeo-metrics, and geo-spatial statistical analysis.

Such titles point in turn to a fifth implication of the new media. For the past decades there has been an increasing trend to speak of multi-disciplinary, pluri-disciplinary, inter-disciplinary and trans-disciplinary studies in order to signal a phenomenon that the traditional boundaries between/among fields was becoming every more difficult to maintain. Traditional specialists continue to resist such trends as if they represent an erosion of basic values. From the viewpoint of the new media we can see in retrospect that these new combinations, permutations and sometimes transformations of the familiar are direct consequences of expanding enormously the sample on which our claims and conclusions are based. Hence this fifth implication of changing boundaries is closely linked with the first implication of greatly increased access to content and to the size of the sample on which our judgements are based.


In the longer term we see two fundamental implications of the new media in the realms of knowledge and culture. A first entails a move towards dynamic knowledge. Whereas print media limited presentation in the form of static lists, the new media enable presentation of knowledge in the form of dynamic lists. A second entails a shift towards new models of culture. In the past each culture was free to act as if it existed in isolation. In a networked world the presence of other cultures needs to be acknowledged and integrated into a larger vision, which re-assesses rather than simply denies or overlooks the important contributions of others.

The essay that follows examines briefly some of these trends while making no efforts to be either comprehensive or exhaustive. In a world where there are over 7 million new pages a day, a sixth implication, which many might wish to choose as the first, is a recognition that there is too much to know. For all the rhetoric of larger machines and more software for automatic indexing as well as artificial and intelligent everything, we are falling behind in our ability to see the big picture, the large lines, as opposed to the day's stock prices and the latest "news."


When we do stand back as we do in the opening sections on general collections it is striking that the greatest number of hits by far on the Internet are in the fields of art history, design and history. The three greatest subjects of the Middle ages theology, law, and medicine combined do not equal the amount of any one of today's top subjects. Even media and new media combined do not equal today's top subjects.

A first simple conclusion needs to be that the buzzwords, which we hear are much like passing fashions, whether or not we accept *Wired's* distinctions between wired, tired and expired. In the world of apparel, fashions change, clothes remain. In the world of learning, fashions change, but the changes that count often take decades and even centuries. Braudel's *longue durée* is more fundamental than the passing fads. And when

Deliverable 8.doc	Fifth draft	13 June 2003	6/51
-------------------	-------------	--------------	------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

we look beyond the buzzwords of semantic web and services, we quickly recognize that none of us yet understands the really big picture. None of us alone can understand the very big picture. “Big science” may require teams of 10,000 scientists to repair a single Hubble telescope. Why should we assume that the picture that is needed for “big culture” should be much smaller? Networks are no longer an amusing accessory. They are our only hope of rising above the quandaries of small minds and small-minded departments in arriving at new global visions, which respect and foster the unity of diversities which is crucial to our future.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

2. General Collections

A number of Internet resources provide an overview of how the new media are affecting traditional disciplines and subjects. The most comprehensive of these is the WWW Virtual Library (<http://vlib.org/>) where the section on the Humanities with a subsection on culture is particularly of interest (<http://vlib.org/Humanities.html>). It is very significant that such Virtual Libraries are now appearing in different languages e.g.:

French	Histoire	http://www.revues.org/vlib/
German	Geschichte	http://www.phil.uni-erlangen.de/~p1ges/vl-dtld.html

For Internet related topics there is a web-site called Netzwissenschaft by Dr. Reinhold Grether that provides an excellent survey of major scholars in the field of new media (<http://www.netzwissenschaft.de>). Of special interest in this survey is a list of Internet Research Projects with a very useful survey of emerging trends (<http://www.netzwissenschaft.de/proj.htm>). At the national level, there is a new journal netzspannung.org, the magazine for media production and inter-media research which also has interesting semantic knowledge maps with respect to emerging subjects: (http://netzspannung.org/journal/issue0/index_en.html). For a survey list of electronic information see: http://library.usask.ca/~dworacze/SUB_INT.HTM.

To achieve some sense of the implications of new media on traditional and more recent disciplines, a small set of terms was entered in Google (www.google.com) on 28 May 2003. With respect to the three main subjects of the Middle Ages, namely, theology, law and medicine there were 2,440,000; 23,000,000 and 18,300,000 respectively. The three most popular contemporary disciplines are history, art history and art with 81,100,000; 85,000,000 and 94,400,000 hits respectively. In all four variations with related words were tried using the same basic set of terms, namely:

1. Term
2. "online" + term
3. Term + "resources"
4. Online + term + "course."

In general it was found that there were decreasing numbers of hits for 1, 2, 3 and 4 respectively. In ten cases (anthropology, archaeology, conservation, cultural studies, ethnology, geography, library science, linguistics, restoration, theology, sociology) the hits for 2 were less than the hits for three: i.e. the hits for online anthropology were less than hits for anthropology resources.

Deliverable 8.doc	Fifth draft	13 June 2003	8/51
-------------------	-------------	--------------	------


	Term	Online	Resources	Course
Anthropology	2,370,000	547,000	657,000	248,000
Archaeology	1,980,000	414,000	435,000	107,000
Architecture	1,850,000	492,000	467,000	278,000
Art	94,400,000	4,880,000	3,940,000	2,220,000
Art History	5,060,000	2,960,000	2,670,000	1,350,000
Conservation	9,560,000	1,330,000	2,240,000	370,000
Culture	26,400,000	3,310,000	3,040,000	1,530,000
Cultural Studies	2,850,000	1,260,000	1,810,000	650,000
Design	85,000,000	5,510,000	4,800,000	2,640,000
Education	3,340,000	3,460,000	3,460,000	2,360,000
Learning	36,400,000	3,930,000	2,890,000	2,380,000
Ethnology	149,000	25,400	41,700	7,220
Geography	5,450,000	1,340,000	1,510,000	427,000
History	81,100,000	5,170,000	4,720,000	2,610,000
Law	23,000,000	1,660,000	1,600,000	838,000
Library Science	3,120,000	2,300,000	2,370,000	1,110,000
Linguistics	2,010,000	415,000	488,000	159,000
Museum Studies	1,410,000	597,000	264,000	794,000
Medicine	18,300,000	2,540,000	2,500,000	983,000
Media	72,000,000	5,630,000	5,630,000	2,500,000
New Media	7,440,000	5,430,000	4,550,000	2,290,000
Philosophy	11,400,000	2,240,000	2,200,000	990,000
Psychology	8,480,000	1,680,000	1,650,000	730,000
Restoration	4,650,000	895,000	1,270,000	92,000
Religion	1,010,000	1,150,000	1,020,000	712,000
Theology	2,440,000	483,000	506,000	157,000
Sociology	3,180,000	750,000	946,000	353,000

Figure 1. List of hits obtained on 28 May 2003 in Google when one entered a term, then online + term, then term +resources and finally online +term+course: e.g. archaeology, online archaeology, archaeology resources and online archaeology course.

With respect to online courses in these disciplines/subjects there is an enormous range from ethnology (7,220) to five between 2 and 2.5 million, namely, new media (2,290,000), art (2,220,000), education (2,360,000), learning (2,380,000) and media (2,500,000); as well as two above 2.5 million, namely, history (2,610,000) and design (2,640,000) respectively. In simple terms this means that the top five disciplines entail over 12 million hits with respect to online courses.

In light of this the need to develop clear criteria for quality and excellence emerges as a first important implication.

Examples of new institutions which are emerging are the French Cyber-Institut (<http://www.cyber-institut.org/>) and the Oxford Internet Institute which is particularly concerned with policy (<http://www.oii.ox.ac.uk/about.shtml>).

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

3. Anthropology	Term 2,370,000	Online 547,000	Resources 657,000	Course 248,000
------------------------	-------------------	-------------------	----------------------	-------------------

The WWW Virtual Library for Anthropology (<http://vlib.anthrotech.com/>) lists sites for anthropology as a whole (477) as well as applied (51), biophysical (35), cultural (331) and linguistic anthropology (63). In addition under specialised fields (http://vlib.anthrotech.com/Specialized_Fields/) it includes a further 15 headings (figure 2). A slightly different list is found at: <http://www.indiana.edu/~wanthro/theory.htm>.


Agricultural Anthropology (36)	Ethnomusicology (23)	Paleontology (35)
Business Anthropology (13)	Forensic Anthropology (10)	Primatology (15)
Cyber Anthropology (50)	Gerontology (3)	Psychological Anthropology (10)
Development Anthropology (37)	Medical Anthropology (68)	Public Anthropology (5)
Environmental Anthropology (27)	Paleoethnobotany (4)	Visual Anthropology (30)

Figure 2. Specialised fields of anthropology according to WWW Virtual Library

Of particular interest for our purposes is that at least two of these namely, cyber anthropology and visual anthropology can be seen as directly affected if not caused by developments in new media. The first of these includes the Atlas of Cyberspace (<http://vlib.anthrotech.com/bin/jump.cgi?ID=4>), which offers an excellent introduction to the wide range of new visualisation methods that are emerging, partly also through new fields such as information visualization, knowledge visualization and scientific visualisation which have 206,000; 415,000 and 416,000 hits respectively.

The field of visual anthropology emerged seriously in the 1980s when anthropologists began taking video materials seriously as part of their scientific field trips. The enormous rise of digital video, digital cameras, and more recently phone cameras open many new possibilities of collecting evidence which need to be integrated into the formal thinking and approaches of the discipline.

In the past, the boundaries between anthropology, archaeology, ethnology, ethnography, history and palaeontology seemed clear. Today, increasingly these fields are inter-linked as, for instance, in the case of palaeo-ethno-botany. One of the challenges lies in creating dynamic classification systems whereby we can visualise more effectively how the boundaries between and among these fields shift, blur and sometimes become invisible.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
4. Archaeology	1,980,000	414,000	435,000	107,000

Archaeology has been one of the traditional disciplines that has been most active in the taking up the new media. A book by Reilly and Rahtz (1992) provided an important survey of new techniques, which were already in place then.¹ As Reilly noted archaeology is the only field which has traditionally destroyed its own evidence during the process of an excavation. The past decades have seen dramatic new combinations of surveying techniques, photographic methods and visualisation techniques to capture some or potentially even all of the excavation process.

These processes on the ground are leading to new combinations with aerial photography, satellite images, and GIS to produce new combinations of detailed and global views of the same sites.


Meanwhile radical developments in (laser) scanning techniques mean that three-dimensional objects can now be captured in great detail and using stereo-lithography one can even reproduce surrogates which can then be used for simulations of restorations. Some of the earliest work in this area was done using the National Research Council of Canada's 3-D laser scanner at the Canadian Museum of Civilisation. This scanner has since been licensed to Arius 3-D and more recently Kestrel 3-D and is being used by the National Museums of Scotland and the ORION network. In China this is leading to new kinds of reconstructions called virtual recovery.¹

The Archaeology on the Net site (<http://www.serve.com/archaeology/>) gives a useful introduction to the range of areas now covered. Of particular interest is a new field of archaeological computing, which includes reconstructions of Roman sites such as Xanthen and cathedrals, e.g. Amiens (<http://www.serve.com/archaeology/comp.html>). While extremely useful this site makes no reference to Maurizio Forte's basic survey of archaeological reconstructions.² There have in fact been many hundreds of these reconstructions of which the most significant include those of Rome and Pompeii. A number of these are now becoming accessible via the Virtual Heritage Net,² which also has an Italian subsection.³

Major developments in the last decade entail a growing link between such reconstructions and television (via blue rooms). An early example was BBC working with IBM (1995).⁴ This theme is being developed especially through a collaboration between RAI and CINECA.⁵ Next steps will entail linking such virtual studio techniques via the GEANT network to produce virtual reality demonstrations of archaeological sites and reconstructions in the classroom. Of great importance in all this has been the rapid decrease in hardware costs and the rise of open software standards. For instance, thanks to Open GL there is now a desktop virtual reality version of Pompeii. The evolution of the Open GIS,⁶ Open SG⁷ and more recently the Web 3D Consortium⁸ will have a great impact on archaeology and many other fields.

¹ Paul Reilly and Sebastian Rahtz, *Archaeology and the Information Age*, London: Routledge, 1992.

² Maurizio Forte, *Virtual Archaeology: Re-Creating Ancient Worlds*, New York: Harry Abrams, 1997.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

5. Architecture	Term 1,850,000	Online 492,000	Resources 467,000	Course 278,000
------------------------	-------------------	-------------------	----------------------	-------------------

The field of architecture is profoundly affected by the new technologies.⁹ Companies such as AutoCAD, Graphisoft¹⁰ and Bentley Systems have worked towards the idea of Industry Foundation Classes,¹¹ which is part of a much larger movement towards International Intelligent Manufacturing Systems (IMS).¹²

Software such as CATIA¹³, Alias/Wavefront¹⁴ and Bentley Systems have transformed the field of Computer Aided Design (CAD). For instance, Bentley Systems has reconstructed the entire “old “city of Philadelphia in VRML¹⁵


For the most part architects are using the new technologies to reconstruct old sites. One of the most dramatic was the use of 3-D software to reconstruct every stone in the bombed Frauen Kirche in Dresden and then use the 3D virtual reality model as a basis for reconstructing the physical building. Most architects of course use the software to create entirely new buildings. An interesting site by Andrzej Zazicki called Digital Architecture (<http://www.gis.net/~zarzycki/>) introduces a further possibility: that one uses reconstructions of existing architectural masterpieces as a starting point for new possibilities. This is a domain that invites much more attention especially as more and more architectural sites come on line.

Already in the early 1990’s Art+Com in its Terravision project demonstrated the potentials of combining satellite imagery, aerial photography, architectural views and CAD. A US project of the same name hosted by SRI with major military support, and more recently the SANTI (Sistema Avanzado de Navegación sobre Terrenos Interactivo)¹⁶ project have taken this idea much further. Even so a systematic linking of satellite images via UMTS, GPS (cf. Galileo), GIS, CAD and digital photography and reconstructions has yet to occur. The NUME project (discussed below under history) adds a further historical dimension. Meanwhile, related traditional fields such as photogrammetry, which were important both for conservation and town planning with respect to architecture are increasingly being replaced by digital photogrammetry at the commercial level.¹⁷

As in law, there remains a trend towards ever-larger architectural firms, which tend to take on ever larger multi-million dollar projects. Even so as cities and towns become ever more conscious of their historical heritage there is an increasing challenge to train architects who are also aware of the needs of conservation and restoration such that they can build in keeping with the atmosphere and environment surrounding or perhaps even involving their project.

In general it should be noted that in fields involving 3D graphics (especially archaeology and architecture) the high level techniques available are used mainly in industry. Specialised colleges and training courses teach their use. Meanwhile, on account of their high price this software is typically not available in academic circles, which are often 10-20 years behind. One solution would be to organise group licences for members of centres of excellence such as E-Culture Net or produce independent European solutions (cf. Galileo, EPISTAGE¹⁸, and SCIGAL).¹⁹

Deliverable 8.doc	Fifth draft	13 June 2003	12/51
-------------------	-------------	--------------	-------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Art	Term 94,400,000	Online 4,880,000	Resources 3,940,000	Course 2,220,000
------------	--------------------	---------------------	------------------------	---------------------

An introductory survey of the enormous resources available on art is found at the art gallery section of the WWW virtual library.²⁰ Many more are found on ICOM's museum site. With respect to recent pieces of 3-D artists it is striking that although traditional categories are still used (e.g. Sci-fi, Fantasy, Realism, Nature, Abstract),²¹ it is frequently difficult to determine to which category their art belongs. It is instructive that e-Bay refers to modern art as 1900-1949 and contemporary art as 1950 to the present. Somewhat more comprehensive is the list of art movements in the Artcyclopaedia.²² One of the best surveys of concrete examples is the excellent *Encyclopédie des nouveaux medias* by Christine van Assche (<http://www.newmedia-arts.org/sommaire/francais/sommaire.htm>). There is also a Museum of web art.²³ A quick search with Google using some of the main new media categories reveals a surprising number of hits (figure 3).


Stereographic art	3,440 ²⁴
Holographic art	68,200 ²⁵
Fluxus	123,000 ²⁶
Dada	227,000 ²⁷
VR art	336,000 ²⁸
Webcam art	417,000 ²⁹
Born digital art	495,000 ³⁰
Stereo art	830,000 ³¹
Laser art	1,330,000 ³²
Happening art	1,390,000 ³³
Digital Film art	1,490,000 ³⁴
3d Art	1,970,000 ³⁵
Digital video art	2,120,000 ³⁶
Digital art	3,510,000 ³⁷
Performance art	3,890,000 ³⁸
Internet art	4,160,000 ³⁹
Web art	4,840,000 ⁴⁰
Video art	4,970,000 ⁴¹
Animation	7,350,000 ⁴²

Figure 3. Some basic categories of modern art along media lines and their respective hits in Google.

One of the important implications of such lists is that we are still lacking in a serious understanding of the categories of art brought about by new media in the last century, let alone an appreciation of their contents and significance. Once again academic fields are for the most part far behind contemporary developments.

As Kim Halsokov (Interactive Institute) notes:

At one of the frontiers of multimedia applications computers are used as part of experimental theatre, puppet theatre, musical performances, museums,

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----


entertainment, and learning. In some of these domains, people interact with the computers using a mouse, keyboard and 17-inch monitor, but present-day interfaces take a variety of forms, including motion-capture technology, displays of up to several meters in height and width, 3D stereo displays.

The study of the performing arts is becoming an interdisciplinary field bringing people from the study of the fine arts together with people with a technical background, including computer science. Since the technology is changing at high speed it is important for the research community that development and experimentation with high-end technologies is an integrated part of the research in digital culture. One of the new and interesting challenges is that of ‘interactivity’ which needs to be addressed in ways different from what is know in the field of Human Computer Interaction, which predominantly has been focusing on computer technology for the workplace.

Previously scenography for the performing arts was made in wood, cardboard and other kinds of physical materials whereas stage lighting during the recent decades increasingly has been used for creating the setting and the atmosphere of a performance. The using of interactive digital scenography is still in its infancy. Among the research questions we find: 1) How is digital technology used to fascinate and surprise the audience? 2) Which kinds of illusion are possible? 3) How does the digital world relate to the physical world?

In the past there were clear distinctions between the serious and playful. Art and culture were serious and so was education. By contrast entertainment was playful and frivolous. Terms such as edu-tainment began to “undermine” the serious-playful distinction. Today the playful video-game version of the Matrix appears a week before the “serious” film version, costs \$ 42 million to produce and is expected to make much more.

In the past there were specific places where we went to be entertained such as the theatre or the cinema. Today we have theme parks, which combine all the modes known to us and there is a trend whereby their influence is everywhere. Within a decade we might conceivably be able to have wall size screens at home. How will this affect our traditions of community action/experience? The rhetoric of the day is towards increasingly interactive and collaborative environments. Yet some of the most serious work of the past has arisen from quiet, wilful isolation and reflection. Will the new collaborative trends suppress individual study or can they successfully complement what we know to be proven paths to insight? In any case it is clear that as we move increasingly from tiny hand held screens to enormous wall sized and even building sized screens the question of interfaces, of displays appropriate for the need and purpose of the moment are destined to become of ever more central importance.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----


Art History	Term 5,060,000	Online 2,960,000	Resources 2,670,000	Course 1,350,000
--------------------	-------------------	---------------------	------------------------	---------------------

In 1995 there were serious fears shared by the European Commission that individual corporations such as Microsoft (through their Corbis subsidiary) would try to gain possession of all rights to images. The past seven years have brought enormous developments to allay these fears on at four major fronts:

- 1) The widespread commitment of the great museums to make freely available serious images from their complete collections. Here museums such as the Uffizi (Florence), the Metropolitan (New York) and the National Gallery (London) have been pioneers. The Louvre, although a little slower will bring its complete collection of images online in 2003.
- 2) Google's Image function gives one instant access to a dazzling collection of millions of images even though there are still minor teething problems. For instance, Leonardo da Vinci brings 8,500 hits while da Vinci brings 18,500 hits.
- 3) The commitment of collectors such as the Catholic Church to make freely available high quality images of major collections (cf. www.christusrex.org).
- 4) The commitment of innovative art historians to make the Internet into a serious tool for teaching. Here one of the great pioneers was Michael Greenhalgh who has created the Art Serve Database which on 25 March 2003 added a further 5 gigabytes of information (<http://rubens.anu.edu.au/>). Another impressive example of what a single professor can now offer online is provided by Christopher L.C. E. Whitcombe (<http://witcombe.sbc.edu/ARTHLinks.html>) whose work covers the entire history of art and for the Renaissance alone offers an enormous variety.⁴³

The past years have seen further important developments. Manfred Thaller (Cologne) through the Prometheus project (<http://prometheus.hki.uni-koeln.de/Prometheus1/>) has introduced the idea of numerous institutions and professors sharing their slide collections to create new virtual slide lectures. Meanwhile, the Louvre's C2RMF is equally committed to putting online for research purposes, its high level images ranging from a 30 MB to 30GB per image. They are interested in the Prometheus solution and are considering a project which would link the concept of Distributed Autonomous Cultural Objects (DACOs) with Prometheus. This could open up a new chapter in the teaching of art history, not least because it would also bring to light the results of research in conservation (see below). One of the important areas of debate in art history, conservation and culture involves questions of rights to cite images for scholarly and creative purposes. We have argued elsewhere that this could be an important source for future creativity.⁴⁴

Deliverable 8.doc	Fifth draft	13 June 2003	15/51
-------------------	-------------	--------------	-------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
Conservation	9,560,000	1,330,000	2,240,000	370,000
Restoration	4,650,000	895,000	1,270,000	92,000

Traditionally conservation and restoration have been done mainly in specialised labs and occasionally in universities, which usually have some access to nearby museums and collections. These fields have been greatly affected by constant improvements first in surface photography and these past decades by improvements in photography beneath the surface (x-ray, ultraviolet,⁴⁵ multi-spectral⁴⁶ and infrared reflectography).⁴⁷ These studies will potentially change our assumptions about art history. For instance, we typically attribute to Renaissance painters a great deal of individual creativity particularly in the North. Recent studies of at the Louvre's C2RMF show that Northern Renaissance masters typically did a rough draft of the painting adding letters to indicate precisely what colour their disciples should paint the various fields. Access to the images resulting from these images will modify if not transform future histories of Northern renaissance art. Similarly, infrared reflectography confirms the presence of elephants in the layers underlying the Adoration of the Magi (Uffizi) by Leonardo da Vinci.


A generation ago leading art historians relied exclusively on black-white photographs of paintings on the grounds that colour calibration was impossible. Recent projects such as Crisatel which now entail images of 30 Gigabytes have completely transformed our sense of the colour spectrum through a new Macbeth colour chart. This means that professors and students alike can expect an entirely new approach to art history once these images are made available on-line. Until the advent of GEANT this was not feasible. Today it is.

Once one has high level digital photographs of every detail of the surface of paintings or frescoes which are to be restored then one can simulate the effects of adding a given colour or other interventions before carrying these out in practice. The restoration of the fresco cycle of the *Legend of the True Cross* by Piero della Francesca in Arezzo was one of the first places where this was carried out on a large scale. In future the enormous documentation of such restorations will become increasingly important for scholarship.

Thanks to the innovative work of the Canadian Conservation Institute, a network on conservation information was begun in 1994 in conjunction with the Getty Conservation Institute. This has since led to the Conservation Information Network.⁴⁸ In Europe, the C2RMF is making its information available to other labs in a high-speed network beginning in 2004. The FOM in Amsterdam has created a virtual laboratory for conservation studies. A next challenge will be to make these detailed findings of the conservation and restoration world available to art historians in order to bridge the gap between historians, connoisseurs and restorers (the battle between the Longhiani and the Venturiani in Italy).

It is generally recognised that networks are needed for preservation, conservation and restoration. The potentials of such networks to provide new impetus to the study of art history and other fields of culture needs to be more generally complemented. Further developments are listed in a report by Christian Lahanier (C2RMF, Appendix 1).

Deliverable 8.doc	Fifth draft	13 June 2003	16/51
-------------------	-------------	--------------	-------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Culture	Term 26,400,000	Online 3,310,000	Resources 3,040,000	Course 1,530,000
----------------	--------------------	---------------------	------------------------	---------------------

At the global level there have been two efforts to provide a survey of culture. One is the World Bank's Development Gateway⁴⁹ and the other is UNESCO which, through a single portal, now offers:

Access, among others, to the full texts of official UNESCO documents (about 20,000), the photobank (10,000 images), the worldwide translations database (1,3 million bibliographic records), thesauri, some links directories for specific themes (worldwide portals for libraries, archives, poetry, oceanography, etc.).⁵⁰

One of the important developments of the last decades has been the rise of national networks. Here the Canadian Heritage Information Network (CHIN, 1972-) was an important pioneer. There is now a Russian Cultural Heritage Network, a Chinese Cultural Heritage Network, an Asian Network of Excellence in Digital Silk Roads. Many European countries have their own national networks and thematic networks such as E-Culture net have begun to increase co-operation among these. Local and Regional sites are also appearing, not infrequently with an emphasis on tourism. Ruffolo (European Parliament) has explored the political dimensions of this approach.

Needed is a new co-ordination of local, regional and national and making these materials more accessible for education and e-learning. One of the enormous challenges here lies in redefining the contributions of European art and culture within a larger framework that acknowledges and gives due recognition to the other great religions and cultures of the world.

Given proper frameworks for copyright and legal agreements these materials could also be used for new e-creativity with respect to design, digital television and digital film.

The University of Washington has an institute of Cyberculture Studies.⁵¹ While there are many new sites to tell us about born digital art, web art, internet art and various forms of electronic art, as we noted above with respect to art, there is no clear framework for classing, ordering let alone judging the quality and value of these new forms. Similarly with respect to electronic-culture, cyber-culture, and other variants. Much research is needed in order that we can distinguish between flashy examples and serious new contributions. In older fields there may be fights about the boundaries of a corpus but there is at least a general acceptance of the core-corpus. With respect to the new media, we still have difficulty in separating the new technologies from the new content which results and is meant to express creativity.


There are many definitions of culture. Some thinkers, such as John Bodley, link culture closely with anthropology.⁵² While seemingly comprehensive this overlooks several important dimensions of culture. A first is a fundamental distinction between nomadic

Topical:	Culture consists of everything on a list of topics, or categories, such as social organization, religion, or economy
Historical:	Culture is social heritage, or tradition, that is passed on to future generations
Behavioral:	Culture is shared, learned human behavior, a way of life
Normative:	Culture is ideals, values, or rules for living
Functional:	Culture is the way humans solve problems of adapting to the environment or living together
Mental:	Culture is a complex of ideas, or learned habits, that inhibit impulses and distinguish people from animals
Structural:	Culture consists of patterned and interrelated ideas, symbols, or behaviors
Symbolic:	Culture is based on arbitrarily assigned meanings that are shared by a society

Figure 4. Different definitions of culture according to John Bodley.⁵³

and settled cultures. A second entails the ways in which cultural expressions especially in high cultures are fundamentally interrelated. For instance, Christianity has a sacred text, the *Bible*, which inspires a series of different physical buildings (e.g. Romanesque, Gothic, Baroque churches and monasteries); religious objects (altars, chalices); texts (religious commentaries); images (paintings, frescoes, drawings, engravings) and many forms of intangible culture (music, dance, processions, festivals). Similarly, Islam has a sacred text, the *Koran*, which inspires physical buildings (mosques) as well as texts, images (largely ornamental) and many forms of intangible culture. Indeed the same basic principle applies to the other great “religious” traditions such as Judaism (*Talmud*), Hinduism (*Vedas*), and Buddhism (Buddhist texts e.g. the *Tripattika*). In the past there have been periods in history where some of these, especially Christianity and Islam made a claim to be the only faith and subsequently the only viable culture. Some of these cultures generated elaborate and extraordinary building programmes on the assumption that other cultures were not present: e.g. Anghor Wat, the royal cities of Nepal, or the temples of Lhasa.

Needed is a new model, which allows us to compare these achievements while leaving to one side assumptions that one is necessarily superior to another or with an exclusive claim on truth. Needed is a model which acknowledges also the validity of other cultures which do not have this universal dimension and yet have many important qualities. Needed is a model, which recognizes the value of new cultural features that lead to new creativity.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Cultural Studies	Term 2,850,000	Online 1,260,000	Resources 1,810,000	Course 650,000
-------------------------	-------------------	---------------------	------------------------	-------------------


The Pratt Institute has a useful survey of cultural studies Sociology, and Critical Theory Resources⁵⁴ which includes references to websites on a number of individual thinkers such as Deleuze, and Foucault. The BUBL internet resources link has a very useful survey of sites.⁵⁵ Cultural studies resources at University of Iowa⁵⁶ and the cultural studies central⁵⁷ at Toronto are useful but one needs only to look at Karlsruhe's site on philology and cultural studies⁵⁸ or at a British site⁵⁹ to be reminded how different approaches can be in other countries. The British site defines cultural studies as blending methods and issues from:

economics, politics, media and communication studies, sociology, literature, education, the law, science and technology studies, anthropology, and history, with a particular focus on gender, race, class, and sexuality in everyday life. It represents, in broad terms, the commingling of textual and social theory, under the sign of a commitment to progressive social change.

In some contexts, this subject is part of a larger field of Communication cultural and media studies⁶⁰ In others, there is a focus specifically on gender mainstreaming.⁶¹

Enthusiasts point to the ways in which cultural studies provide new kinds of interdisciplinary approaches. Sceptics note that the emphasis on methods and issues is too often at the expense of careful study of the sources underlying these methods. Indeed the call for a return to sources (*ad fontes*), which inspired Renaissance humanism and was revived in the 19th century, is too often questioned or even mocked in this approach. And while the enthusiasts claim that they are providing a contextualisation of knowledge this is more frequently in the direction of political, sociological and psychological contexts.

It is instructive that the terms cultural studies or cultural sciences, *cultuurwetenschappen*, and *Kulturwissenschaften* although seemingly direct translations mean very different things. One of the great challenges lies in acknowledging the value of these new approaches while at the same time recognising that their new emphasis on certain dimensions, does not necessarily render invalid other more traditional approaches to learning. Needed is a larger framework that recognizes the contributions of all these approaches while at the same time being aware of their potential shortcomings. As is so often the case we need to recognise that evolution is often embracing not replacing.


 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
Design	85,000,000	5,510,000	4,800,000	2,640,000

A generation ago design was still largely a question of individuals using single programmes in creating new buildings, or machines. One of the enormous breakthroughs has been the emergence of collaborative, networked design whereby hundreds or in the case of the Eurofighter, thousands of individuals work together using one software (e.g. Catia) in creating a new airplane. This is also happening with respect to building complexes and architecture in general, thanks to innovative methods being introduced by places such as the Bauhaus, and the Swiss Federal Polytechnic (ETH).

The development of software for these new design projects has been largely at the international level in conjunction with efforts such as Industry Foundation Classes (IFCs) and International Manufacturing Systems (IMS). The thrust of this software has been to be provide us with technical solutions for “intelligent” doors and windows which are equally applicable all over the world. Meanwhile, there are increasingly collections of images with respect to individual doors and windows in historical architecture. One of the challenges of the next generation lies in establishing new links between the universal solutions of these new software packages and the individual solutions of historical examples, which can serve to provide continuing incentives for novel solutions in future design.

Culture, as scholars such as Gombrich have emphasised, entails a corpus of objects and expressions which are cumulative because they are continually annotated, commented and discussed which makes them richer over time. A challenge lies in making this cumulative corpus available for new design without it posing merely a terrible burden on creativity.


 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
Education	3,200,000	3,420,000	3,000,000	2,430,000
E-Learning	1,080,000	744,000	521,000	302,000
Learning	36,400,000	3,930,000	2,890,000	2,380,000

While e-Learning is early one of the buzzwords of the cyber-world it is striking that Google lists at least three times as many hits for the more old fashioned term education, from the Latin, to lead out from (*e-ducere*). With respect to online courses there are at least eight times as many listings in connection with education than in connection with e-learning. By contrast, learning has much higher numbers.

Comparison with the most popular disciplines such as Art History, History and Design confirm that there is an enormous discrepancy of c. 1-80 between the hits for e-learning and these subjects. The simple message is that there is much more academic content on the web generally than content used for e-learning and education specifically.

One of the major challenges lies in making the enormous amounts of content which are digitally available, digitally accessible for learning.


 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
Ethnology	149,000	25,400	41,700	7,220
Ethnography	255,000	52,300	78,900	16,600

The ICOM site lists only eight museums under the category of ethnology/civilizations.⁶² By contrast the University and Regional Library in Düsseldorf has over 100 sites on European ethnology alone.⁶³ A number of sites simply consider ethnology and ethnography as branches of anthropology. For instance, the Library of Congress links Ethnology with Ethnography⁶⁴ and this is in turn with Anthropology, Ethnomusicology, Folklore, and Folklife.

In Germany, ethnology is translated as social and cultural anthropology but continues to be linked with Folklife (Völkerkunde), Folklore and Folk Tales. As a result fields such as Sagas⁶⁵ and fairy tales⁶⁶ are closely linked to this discipline. In Canada, ethnology entails study of native peoples who are sometimes called aboriginal people in other cultures. Whereas the 19th century, especially after the introduction of Darwin's thesis and social Darwinism, showed an enormous interest in "primitive" man, the 20th century increasingly made the word primitive a politically incorrect term, not least because of racist associations which arose via the third Reich. In France, by contrast ethnology is linked to anthropology and is seen as part of the sciences of man.

One of the challenges for fields such as ethnology and ethnography is that they do not remain limited by earlier connotations and that they develop new ways of integrating work from other countries where more positive associations dominate. At the same time it is important that these negative strands of the past and methodological dead ends are not merely hidden or forgotten.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Geography	Term 5,450,000	Online 1,340,000	Resources 1,510,000	Course 427,000
------------------	-------------------	---------------------	------------------------	-------------------

The WWW web virtual library has a section on geography⁶⁷ and there are over a million sites with geography resources.⁶⁸


Already in Antiquity, Ptolemy who was one of the great geographers was also one of the great astronomers. In the past generations these fields have become much more closely entwined as satellite photography of the earth has come to play an ever closer role in our understanding of terrestrial geography.⁶⁹

As mentioned elsewhere the rise of GIS, GPS, UMTS and the advent of the Galileo system with proposed projects such as EPISTAGE, is destined to increase greatly this interaction between space, remote sensing, geography and cartography. The coupling of satellites with mobile systems means that these resources can soon become accessible everywhere.

The development of Scaleable Vector Graphics (SVG) by the W3 consortium is introducing a new systematic approach to 2-D graphics. The Web 3-D Consortium is developing a similar systematic approach to 3-D graphics. The W3 Consortium is discussing a new integration of 2- and 3-D spatial treatments which could potentially lead to fundamental changes in the way we deal with space and with geographical data.

In the past maps have been static. They have changed over time. Poland in 1000AD was a small European country: in 1470 it was the largest country in Europe. Maps are also political. German and Russian maps of Poland are different than Poland's maps of its own country. Needed is a new kind of dynamic geography and cartography that integrates these dimensions.

Indeed, just as scholars have gradually recognised that all major subjects have an historical component, there is an increasing awareness that geography is a field that relates to every subject. Almost every material subject has temporal-spatial dimensions. One of the challenges lies in including these dimensions seamlessly. These are aspects of dynamic knowledge, which we see as one of the main implications of the new media.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
History	81,100,000	5,170,000	4,720,000	2,610,000


The WWW Virtual library has a particularly rich heading under history.⁷⁰ Much of this focuses on historical sources. Greater access to a range of sources is also leading to new methods in history.

One is a new combination of history and geography through the use of historical maps as in the Great Britain GIS (Geographical Information Systems) project.⁷¹ The Nuovo Museo Elettronico (NUME) project at Bologna is taking these trends to a new level by combining historical documents such as tax records, city maps, and aerial photographs to produce a systematic view of how an inner city changes over a millennium from the year 1000 to the present.⁷² This is but one example of a larger trend that is evident also in the Commission Internationale pour l'Histoire des Villes, the Centre for Metropolitan History and the French Society for Urban History.⁷³ Related to this also are new links between demographics and history.⁷⁴ In the Netherlands there is a project to study the veracity of historical maps and to link this with the history of cities (Maastricht, Groningen).

Indeed the Virtual Library has a special section in methodologies which also refers to a number of new fields which have arisen through the new media such as archaeo-astronomy, archaeo-metrics, geo-spatial statistical analysis, forensics, palaeo-geodesy, palaeo-climatology, remote sensing, dating, economic analysis and source analysis.⁷⁵

With respect to auxiliary sciences there are also new branches, which arise directly from the new media such as Digital Edition and Historical Computing.⁷⁶

One of the important developments supporting these shifts has been the rise of networks which are concerned with methods, new research and teaching as well as with content. The most advanced of these is the NEHRN (Northern European Historical Research Network),⁷⁷ which has produced its first DCEs (Doctor Communitatis Europaeae). More specialised networks based on subjects such as the Mining History Network⁷⁸ or based on geographical areas such as Agricola, the Finnish History Network.⁷⁹ While experts are typically aware of the methodological changes taking place in their own specialty, an understanding of how these developments are transforming the study of history as a whole is one of the major challenges ahead. We need to increase awareness of the details of these specialised networks through the creation of a network of networks which can in turn become a basis for the long term Distributed European Electronic Resource (DEER).

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Law	Term 23,000,000	Online 1,660,000	Resources 1,600,000	Course 838,000
------------	--------------------	---------------------	------------------------	-------------------

The European Commission has produced a standard site for practicing lawyers: Eurolink for lawyers.⁸⁰ The MSH hosts an important European Network on Law and Society,⁸¹ which has links to other major networks such as:

GEDIM (Globalisation Économique et Droits du Mercosur)⁸²

Law and science⁸³


Network Law and Society in the Arab World⁸⁴

Reseau pour la recherche Justice⁸⁵

and links to hundreds of other European sites.

Of the three great subjects of the mediaeval university (other than religion and medicine) law may be the most comprehensively represented on the Internet. Ironically, of these three subjects it may also be the discipline facing the most fundamental challenges from two major fronts. For most of the past millennium there was a trend to define law on regional or national lines in accordance with major orientations such as Roman, French or Anglo-Saxon law. The rise of the European Union especially as it moves towards the East poses new questions: To what extent does country law continue to hold? To what extent does the Union impose its own law?

On the international scene these problems are much greater. The Berkman Center for Internet and Society at the Harvard Law School is one major place for study of these questions.⁸⁶ Some major countries lay great emphasis on the word governance, by which they imply an ability to impose their notion thereof on their own citizens while they are abroad. Such countries sometimes cite the Internet as an example of something that is global in reach yet bound only by the laws of one country. Such countries do not subscribe to an emerging international law court. Such enormous challenges make it clear that a Grotius of the cyber-age is already needed if not overdue.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
Library Science	3,120,000	2,300,000	2,370,000	1,110,000

The enormous resources made available through the International Federation of Library Associations (IFLA) clearly cannot be summarized in a page. It is striking, however, that the number of hits for one of the most organised discipline is in the order of 3 million which is relatively small when compared with history or design both over 80 million.

Trends towards electronic library cards and systems have continued steadily since the 1970s, as have trends to share electronic cataloguing. Organisations such as OCLC⁸⁷ have sought to impose their standardised approach on other libraries through their cataloguing rules, Dublin Core categories, and their Dewey Classification System. One drawback of this approach to standardisation is that variant names, different classification systems are frequently suppressed in the interests of a single McClassification.

Meanwhile, in Australia, scholars such as Liddy Neville have shown how the basic links of the Dublin Core approach can also be used to link indigenous knowledge of aboriginals with other cultures that have technical, scientific descriptions of colours etc.⁸⁸ This basic insight that the creation of standardised approaches need not remove and might indeed help to foster national, regional and local complexities, is something that is emerging on a number of fronts: e.g. cultural politics (Ruffolo), art history and archives (Thaller and the concept of DACOs discussed earlier).

Within the library world this trend towards multiple access to the same materials was explored in the Nordic Metadata projects,⁸⁹ developed in Renardus (Academic Subject Gateway Service in Europe),⁹⁰ which is being taken further by the SEMKOS group.⁹¹

One of the pioneers in more complex access methods has been the University Library at Göttingen, which has put online its old classification system (which Leibniz called an eighth wonder of the world)⁹² and has been working in access to knowledge using multiple classification systems.⁹³

A generation ago these questions of multiple access played a major role in the Gesellschaft für Klassifikation. More recently they have moved to the International Society of Knowledge Organisation. Although librarians are well represented in these organisations, the ideas of these organisations, and the theme of knowledge organisation as a subject are still too little considered the domain of the librarian, and indeed other domains of scholarship.

The challenge is how to make the systematic tools of classification systems, thesauri, dictionaries, encyclopaedias, catalogues and bibliographies which now form physical reference rooms into the basis for virtual reference rooms.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----


Linguistics	Term 2,010,000	Online 415,000	Resources 488,000	Course 159,000
--------------------	-------------------	-------------------	----------------------	-------------------

A site at Stanford University provides a useful Linguistics, Natural Language, and Computational Linguistics Meta-index (<http://www-nlp.stanford.edu/links/linguistics.html>) which offers a good survey of English language linguistic work but effectively ignores work in other languages.

The European Commission has a Thematic network Project on Languages <http://www.lang.ltsn.ac.uk/tnp.aspx> and a more important ELSNET European Network of Excellence in Human Language Technologies <http://www.elsnet.org/>. It is instructive that the WWW history site has a special section dealing specifically with languages.

A number of significant regional and national networks are emerging. In Scandinavia there is a Nordic Computational linguistics network⁹⁴ and a Nordic Neuro-Linguistic Network.⁹⁵ In the UK, there is the Humbul Humanities Hub with a section on linguistics.⁹⁶ A German, site Porta Lingua WWW Portal for Language and Communication Sciences (<http://www.portalingua.uni-essen.de/>) gives an instructive survey, especially of German work in the following fields: grammar, communication. Corpus linguistics, morphology, phonetics, writing, semantics, and history of language. In Germany scholars such as Michael Giesecke⁹⁷ are doing important work linking perception and communication in a linguistic context,⁹⁸ and in the process including subjects such as psychology, history, sociology, anthropology and philosophy.

In France, the Maison des Sciences de l'Homme (which as we shall see is playing an important integrating role) sponsors TEXTO: Equipe sémantique des textes et Institut national de la langue française⁹⁹ as well as the Equipe Sémiotique cognitive et nouveaux médias¹⁰⁰ which also sponsors the Semionet.¹⁰¹ A challenge lies in adapting this French model as a basis for Europe's knowledge landscapes: namely, how we can we create new links among disciplines without either reducing them to boring generalities or falling into the pitfalls of overspecialised approaches? One middle way between this Scylla and Charybdis of scholarship lies in the creation of new multilingual mapping tools, that maintain the complexities of original sources while creating bridges to related materials, an approach which is championed by the AMP group.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
Museum Studies	1,410,000	597,000	264,000	794,000

Museum studies which, thirty years ago, was little more than conservation and restoration plus informal ideas about collections management and exhibitions, is evolving into a serious discipline. The Smithsonian, the Museums Institut in Berlin and universities such as Delaware, Leicester, Queens (Kingston) and Toronto have strong programmes. There is a professional website: Mouseia¹⁰² and a Museum Studies reference desk.¹⁰³ The WWW virtual library has a section on museum contacts with further references.¹⁰⁴ Conservation¹⁰⁵ and Restoration, which were frequently treated as part of museum studies, are now recognized as independent fields. Indeed in France this has been the case for nearly a century.

Unlike conservation and restoration, which are concerned primarily with the survival of an object, museum studies are also concerned with the display and exhibition of objects. In the past it was assumed that this entailed only the physical object. In the past decade there is increasing attention to the possible role of new media in this context. Virtual models of a physical object might be used to reveal parts of the physical object, which cannot be seen in a regular display, such as the underside or bottom of a cup or vase. Some schools want to add these ancillary views next to the original. Others prefer to have them on handheld computers or PDAs in order to keep distinct the real and virtual spaces.

In any case, there is a rapid growth in both 3D volumetric capture of images (e.g. laser cameras such as that sold by Kestrel 3D) and 3D volumetric displays.¹⁰⁶ In the past, three dimensional physical reconstructions of famous sites such as the Acropolis (e.g. the Royal Ontario Museum) or historical views of cities (e.g. Bayerisches National Museum) were a familiar sight in museums. How will their virtual equivalents be integrated into the museum environment? Will we have IMAX theatres or their equivalents to immerse us into such spaces?

In recent years there have been various specialised exhibitions which have linked the knowledge gained during restoration of a painting with the painting itself: e.g. the National Gallery of London's Paintings in Focus series re: works such as Holbein's *Ambassadors*. Even so, when we walk through major galleries most of us have no information about the history of restorations a painting has undergone. Making visible the invisible dimensions of paintings will become one of the challenges for museum studies in the coming generations, such that we can see not only the painting as it now looks but also its earlier versions. Here part of the challenge lies in making accessible the earlier places where a painting was placed: not just its position on the wall of museum x but also the homes and/or churches in which it resided previously. This will entail much more than a provenance index as envisaged at the Getty. It will require that each painting acquires its own personal history of locations in which it found itself. As such museum studies will increasingly move out of a study of where objects are now to a deeper of study of how objects arrived at their present position and how their present position can best reveal the object's history.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----


	Term	Online	Resources	Course
Medicine	18,300,000	2,540,000	2,500,000	983,000

Our concern is not to summarize all the developments of medicine of the past decades in a page. Rather some major lines that affect the humanities deserve particular note. With respect to classification, e.g. Medical Subject Headings (MESH), the rise of electronic databases has seen a much more systematic approach to subsumptive relations especially qua.whole/part. A similar trend can be perceived in the realm of manufacturing where the production of an airplane or a car is becoming ever more closely linked with its various parts. One challenge for the next generations will be to apply this subsumptive approach to all fields of endeavour and knowledge and thereby achieve a much more systematic approach to knowledge.

Projects such as the Visible Human have taken us significant steps further whereby basic information about a part can be linked with its technical descriptions and with corresponding images. Projects linked with the Visible Human have introduced collaborative display technologies such as the virtual workbench whereby one can work together at a distance on a three-dimensional skeleton and literally pick a bone from another site. Such collaborative techniques which have been developed for medicine hold many interesting and important implications for the realms of culture and art.

At the most obvious level this could entail the use of virtual mummies to compare the techniques with which they have been made. More challenging would be to include such virtual workbench methods into a virtual environment of an ancient room such that one could have the historical atmosphere while re-enacting the earlier methods.

As noted above, one of the unexpected applications of the Dublin Core has been to link aboriginal natives descriptions of colours to modern definitions with respect to chemistry. Fields such as ethno-botany, ethno-biology and ethno-medicine¹⁰⁷ have made us aware that earlier peoples had a wide range of informal medical solutions which were often extremely effective. This has led to increasing interest in traditional knowledge, ayurvedic and other traditions. A future challenge will lie in linking such knowledge with our modern names for the same processes, thus providing yet another process of bridging earlier categories with contemporary ones. Mapping, as we shall argue later, is becoming one of the major new trends in knowledge development.


 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
Media	72,000,000	5,630,000	5,630,000	2,500,000
New Media	7,440,000	5,430,000	4,550,000	2,290,000

Some new media resources such as Netzwissenschaft and Netzspannung were mentioned at the outset in the general section. In addition to the work by bodies such as the ITU, EBU etc, there is an important European Audiovisual Observatory (EAVO <http://www.obs.coe.int/>) and Webinfocom, a Portal for the Information and Communication Technologies ¹⁰⁸

Although it has become almost a cliché to speak on all fronts of the new technologies about the central importance of users and usability, the reality remains that those concerned with technological developments still pay little more than lip-service to the real needs of users. We still tend to study content, context and communication as three areas rather than as three inter-related dimensions of development. How do we create knowledge production life cycles not just for a single medium but across all the media? What are the consequences of such more comprehensive life-cycles? These are questions that face us as we attempt to understand the impact of the new media. As these media become invisible through the nano-technology revolution how will we find criteria to study effects which are caused at levels invisible to the human eye?

Scholars such as McLuhan have told us that the medium is the message: that every new technology affects knowledge in that it both extends and limits our capacity to communicate. Much more study is needed concerning the implications of the new media to determine whether the trends here identified will indeed prove to be seminal in the decades to come. What should be clear is that we know far less about these processes than is sometimes assumed.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----


	Term	Online	Resources	Course
Philosophy	11,400,000	2,240,000	2,200,000	990,000

There is a World Philosophy Network,¹⁰⁹ which provides less than the name suggests. By contrast, a guide to Philosophy on the Internet <http://www.earlham.edu/~peters/philinks.htm> provides unusually rich links and is of further interest because it offers an overview about projects in particular countries. There is an Internet Encyclopaedia of philosophy,¹¹⁰ a site on Philosophy in Cyberspace,¹¹¹ and a more commercial epistemelinks.com.¹¹²

An Austrian site has a long list of philosophical initiatives, which are specifically being carried out on the Internet.¹¹³ This is important because it points to philosophical activities, which are happening directly with the Internet and might be caused by the Internet. This is clearly an area that represents a growth industry. Yet to what extent can these virtual methods grow without raising questions about our ongoing treatment of reality?

The past decades have seen interest in some aspects of philosophy from unexpected quarters. Those in artificial intelligence and especially those in natural language have become increasingly concerned with formal logic structures, which has led to new meanings for traditional notions of ontology¹¹⁴ and description logics¹¹⁵ in arriving at knowledge base projects¹¹⁶ and moving towards a semantic web.¹¹⁷ At the same time there is serious evidence that the semantic web as now defined is focussed on services and specifically on transactions, on the meanings needed by machines to deal with our money rather than the meanings of humans needed to reflect upon life.

Philosophy must be more than a treatment of the needs of mechanical and electronic robots and avatars. How can we develop a network of communication that also ensures the continued complexities and subtleties of historical meanings, of present concerns and future visions? Those who are techno-determinists would have us believe that we have no choice concerning future scenarios. What then is philosophy? Is it to become only a list of scenarios, which favour the interests of mechanical and technical developments or is it to ensure the richer understanding of humans?

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----


Psychology	Term 8,480,000	Online 1,680,000	Resources 1,650,0-00	Course 730,000
-------------------	-------------------	---------------------	-------------------------	-------------------

In addition to the above general terms, Google list at least six major networks in the field:

Psychology	Network ¹¹⁸
Community Psychology	Network ¹¹⁹
Global School Psychology	Network ¹²⁰
Health Psychology	Network ¹²¹
Radical Psychology	Network ¹²²
Social Psychology	Network ¹²³

Psych Ref¹²⁴ offers a good overview of sites. Athabaska University has a very helpful list of Psychology Resources.¹²⁵ There are sites on Psychology Resources¹²⁶ and also specialised sites: e.g. on School Psychology Resources.¹²⁷

In Europe, there is a European Political Psychology Network (EPOPS).¹²⁸ Of special significance is work within the department of Psychology at Rome on Social Representations and Communication,¹²⁹ which has led to a network of institutions producing a European Doctorate in the field and links with a network Marie Curie training sites. This group, led by Professor Anna Maria Silvana de Rosa offers an important model for developing new educational and training structures in Europe. We are fortunate that Professor De Rosa has agreed to work with e-Culture Net to this end. Needed is a new approach that integrates social, and psychological dimensions with more obvious medical concerns.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

	Term	Online	Resources	Course
Religion	1,010,000	1,150,000	1,020,000	712,000
Theology	2,440,000	483,000	506,000	157,000

One of the more interesting developments of the past decade has been the rise of internet committees among the major orders of the Catholic Church such as the Benedictine Internet Commission¹³⁰ and an Internet Committee for the Order of Preachers (Dominicans).¹³¹ While the Jesuits do not have a public site regarding their Internet policy there is a Jesuit Internet Resources¹³² page, a Jesuit Communication Centre,¹³³ a Jesuit Communication Project,¹³⁴ a Jesuit Refugee Org.¹³⁵ and a Computing Ethics and Security Awareness Committee.¹³⁶ This phenomenon is evident in all the great religions of the world: e.g. the Hindu Universe¹³⁷, Buddhist Information and Education Network;¹³⁸ the Global Jewish Information Network¹³⁹; Jewish Network¹⁴⁰; Islamic Network¹⁴¹ These developments¹⁴² are of interest here because they are contributing to access to a great number of traditional religious sources.


In the Middle Ages it was monks who were one of the chief contributors to old and new learning by their work as scribes in scriptoria. A search with Google confirms that modern equivalents are emerging:

Electronic scriptorium	7,910 ¹⁴³
Electronic monastery	38,200
Electronic monasteries	16,500

In at least one case a traditional Monastery of the Holy Cross¹⁴⁴ has joined forces with a start-up company, Electronic Scriptorium¹⁴⁵ in Leesburgh, Virginia in order to produce electronic equivalents of scribal and related materials.

While these developments are of interest mainly with respect to future energies for making sources and commenting thereon, it bears noting that the Catholic Church is officially making images of many of its artistic and architectural treasures freely accessible through sites such as www.christusrex.org. Volunteers at www.eulogos.org have made over 2000 texts, *opera omnia* and holy books in 36 languages freely available from Christian and other religions.

Leaving aside the sites of radical factions, many new age sites and alternative religions which are also available online there can be no doubt that these materials offer new sources for future study and insight.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Sociology	Term 3,180,000	Online 750,000	Resources 946,000	Course 353,000
------------------	-------------------	-------------------	----------------------	-------------------

As in other fields there are umbrella sites which provide a survey of recent developments, such as: Sociology Internet Resources (<http://vax.wcsu.edu/socialsci/socres.html>) or Sociosite (<http://www2.fmg.uva.nl/sociosite/>). The International Sociological Association offers an important portal.¹⁴⁶


A Social Sciences Net¹⁴⁷ headed by the [Fondation Maison des Sciences de l'Homme, Paris \(MSH\)](#) has the following members:

- [Wissenschaftszentrum Berlin für Sozialforschung GmbH \(Social Science Research Centre, Berlin\)](#)
- [Maison des Sciences de l'Homme Ange Guepin](#)
- [Netherlands Institute for Advanced Study in Wassenaar \(NIAS\)](#)
- [The Swedish Collegium for Advanced Study in the Social Sciences \(SCASSS\)](#)
- [Institute of Philosophy and Sociology \(IFiS\)](#)
- [Fundatia Noua Europa – New Europe College \(NEC\)](#)
- [Collegium Budapest \(CB\)](#)

The MSH also sponsors a Centre de sociologie européenne¹⁴⁸ and a (BESS) Bibliographie Environnement/Sciences Sociales¹⁴⁹. At one of its branches, the Centre René Ginouvès (Nanterre) it brings together archaeology, ethnology, comparative sociology, ethno-musicology and iconography (figure 5). In contrast to the United States, where courses in the Humanities attempt to provide a generic understanding of such fields the MSH approach maintains the complex traditions of scholarship while fostering a pluri-disciplinary approach. In contrast also to the UK which through the JISC and more specifically Humbul covers such topics while maintaining traditional specialisms, the French approach is leading to more interplay among fields.


Laboratoires	Archéologies et Sciences de l'Antiquité
	Archéologie des Amériques
	Ethnologie et Sociologie Comparative
	LIMC (Lexicon Iconographicum Mythologiae Classicae)
	Préhistoire et Technologie
	Textes, Images et Monuments
Les Enseignements	Cultures de l'Antiquité Classique
	Ethnologie, ethnomusicologie et préhistoire
	Environnement et Archéologie

Figure 5. Activities within the Centre René Ginouvès (MSH, Nanterre).

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Indeed the Maison des sciences de l'Homme (MSH) hosts many organisations (http://www.msh-paris.fr/les_sites/liste_complete.htm) with numerous resources¹⁵⁰ and a very wide range of research.¹⁵¹ As such this offers a model for future research at the European level. Needed somehow is an integration of specialist knowledge combined such that it points beyond the narrow boundaries of these specialities to a big picture.

A challenge lies in extending the essence of this French approach to the rest of Europe without compromising the richness of other national traditions. Here it is clearly not a question of simply imposing French scholarship, which would amount to a new kind of cultural and epistemological imperialism. The deeper insight of the French lies in not pretending to have a single answer but rather in finding ways of mapping between different answers. This mapping is essentially multilingual. This points to a) a new kind of dynamic knowledge, and b) to a re-assessment of all our cultural models, which we perceive as the two fundamental implications of the new media.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

26. Multilingual, Dynamic Knowledge


A number of scholars (Innis, McLuhan, Goody, Giesecke) have drawn attention to how traditional printed books impose a static dimension on knowledge. Books have the advantage that they “fix” in the sense of render firm a list, which brings with it the disadvantage that the list cannot be changed without a new edition or at least a new issue of the book. As a result, every new claim requires a new book or new publication. To take a concrete example: In the seventeenth century there were lists of Rembrandt’s paintings. Every new list required a new static publication. Every time a scholar had a new theory about more or less paintings required a new static publication. The scholarly world developed various tools in the form of addenda, corrigenda, reply, review but the printed document remained static.

Using the new digital media the knowledge of all those disparate claims concerning Rembrandt’s paintings can more fruitfully be seen as a database problem. Reduced to basics the essential problem is simple. There is a database for Rembrandt’s paintings. Scholar A includes x number of paintings in this list. Scholar B includes $x + n$ in this list. Scholar C includes $x - n$ in this list. Using a time function the list thus becomes dynamic. We can trace how the paintings by Rembrandt and attributed to Rembrandt grows and diminishes over time (e.g. after the Rembrandt Commission scraps a number of contentious examples). Such a dynamic list needs to be linked to the static claims of the past in order that we can understand the basis for the changing claims. The great advantage of such a dynamic list is that it allows us to understand development of claims and knowledge over time without plunging us into a simplistic relativism.

That which applies to lists of paintings by a painter applies equally to lists of sculptures by a sculptor, lists of buildings by an architect, lists of manuscripts and books by an author. Instead of static lists which entail only the claim of one individual at one place at a given time, dynamic lists of knowledge allow us to survey the history of claims as they change over time and space. Such dynamic lists are closely linked to the concept of dynamic geography discussed earlier.

Linking these dynamic lists both to the static claims and the physical objects/monuments/sites on which they are based allows us to create new kinds of maps, which show the validity of the claims. In static book publications, footnotes and references were used as controls of scholarly seriousness. In dynamic knowledge presentations, the equivalent of footnotes may well become direct links with the original object. Hence mention of Rembrandt’s *Night Watch* is one level. Inclusion of a link to an image thereof is one step better. Inclusion of a direct link to the original image of the *Night Watch* is again one step better.

Deliverable 8.doc	Fifth draft	13 June 2003	36/51
-------------------	-------------	--------------	-------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

The quest for dynamic knowledge has much more fundamental consequences for scholarship and knowledge organisation than may at first appear to be the case. As long as we are committed to static lists then the static list of the moment makes a claim to being the authoritative version. For instance, in art history the quest for a *catalogue raisonnée* was inevitably an attempt to create a single list that would replace all others. With a dynamic list the *catalogue raisonnée* loses its absolute pretensions: it becomes the latest in a long series of claims over time.


At the level of personal names, this implies that one may well, for the sake of convenience, choose one official way of writing a name: e.g. John Pecham rather than Peckham, Peccam or Petsan. This is the well-known concept of the authority file. But whereas static lists attempted to minimise variants through see also references, dynamic lists require that one collects all the possible variants as different ways of arriving at the current standard. That which applies to personal names applies equally to place names. In a dynamic system, variant names become alternative ways of reaching the same knowledge. They are aids in the process of mapping, bridging, creating walkthroughs.

That which applies to names applies equally to concepts in classification systems and thesauri. A static list typically allows a single hierarchy, a single set of relations. Dynamic knowledge potentially requires including different classifications. In the mediaeval period theology, medicine and law were the chief disciplines of scholarship. Today they remain important but as we have noted in the preceding pages numerous other disciplines have emerged. Dynamic lists of disciplines will help us to visualise how the relations among disciplines change over time, how some become absorbed (e.g. how ethnology is tending to become part of social and cultural anthropology) while other disciplines emerge. They will also reveal how the boundaries of these disciplines vary over space, geographically (nationally, regionally and locally).

That which applies to changing links between terms applies also to their definitions (dictionaries) and explanations (encyclopaedias). Dynamic knowledge requires databases of shifting positions of disciplines such as philosophy, law, anthropology or culture. In addition, these terms need to be linked with their changing definitions and explanations over time. This brings us back to links with sources on which claims and knowledge are based.

On the surface this is precisely the quest of the humanists over half a millennium ago with one fundamental difference. The humanists' desire for sources (*ad fontes*) was a general approach. The new electronic media open a possibility where a direct link to original sources becomes an essential criterion for the seriousness of a claim: a distinguishing characteristic of what it means to be scholarly. Most persons simply make

Deliverable 8.doc	Fifth draft	13 June 2003	37/51
-------------------	-------------	--------------	-------


 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

unsubstantiated claims. Scholars create links to the literary sources on which their claims are based and link back to the original objects, which these sources discuss.

Implicit in this approach is a new commitment to multilingualism. We have already noted that terms such as ethnology or culture have different connotations or even very different meanings in various languages. Dynamic knowledge thus requires that we map and bridge between these different languages thus acknowledging that a topic such as fairy tales which we might find under literature in one language, might appear as part of *Völkerkunde* in German.

In the United States there are some who would have us believe that if something has not been translated into English it effectively does not exist. By contrast, the “European” approach considered here insists that as long as materials are only in one language they cannot reflect the complexities of different cultures. This approach does not make light of the obvious needs and challenges of translation among languages. At the same time it insists that a future answer cannot lie in a reduction to a single language. Future answers lie in a multilingual approach, which respect and keep intact local, regional and national diversities including a temporal dimension.

In short, some aspects of the American approach towards a melting pot may consider linguistic and cultural diversity as a nuisance, which needs to be replaced or eliminated. By contrast, dynamic knowledge assumes cultural, temporal (historical) and spatial (geographical) dimensions of knowledge. Implicit in this is a long-term re-organisation of knowledge that maintains and fosters linguistic and cultural diversity as a fundamental dimension of both past heritage and future creativity.¹⁵²


 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

27. New Models of Culture

Many models of culture exist (cf. figure 3 above). We have noted that the so-called high-cultures (e.g. China, India, Europe) entail a complex set of expressions, which link tangible and intangible expressions in the context of a single text or corpus of religious works. In these cultures the extent of proliferation of expressions in different media, a divergent process that is almost the exact opposite of convergence, becomes one of the criteria for cultural depth and richness. Earlier cultural histories traditionally began from the standpoint of a single one of these religions. The past decades have seen increasing awareness of comparative religion. Needed are new approaches in comparative cultures, which acknowledge the contributions of these great religions and focus on the cultural expressions, which make them comparable rather than their different dogmas, which make comparison difficult if not impossible.

As Jack Goody has noted in Africa and elsewhere followers of Islam are typically known as people of the Book. A future history of world cultures will need to distinguish clearly between a number of great religions, which involve a book or sacred texts and others which maintain their beliefs in oral traditions. A further distinction will need to be made between sedentary and nomadic oral traditions. Using such distinctions a re-assessment of cultures becomes possible, which is neither Euro-Centric nor Asian-Centric, which acknowledges an enormous range of expressions from those of aboriginals (in Australia, or their equivalents in Canada, South America or Africa) to nomadic tribes, to sedentary civilisations without falling into the pitfalls of racism of the 19th and 20th centuries.

In short the most fundamental implication of a networked world is that Europe can no longer define itself strictly in terms of itself. It must look to the other great cultures of the world and acknowledge their contributions before it can hope to re-assess the value of its own contributions. In a networked world all cultures are related. In the 17th century, John Donne told us that “No man is an island.” Today we recognize that no culture is an island although there are many island cultures.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

28. Conclusions


In the introduction we pointed to five general implications of the new media in a networked environment:

- 1) the contents of traditional subjects are more readily accessible and thereby the sample on which judgements and conclusions are based is greatly increased,
- 2) this new access to a greater diversity of content challenges us to rethink and reformulate our methods concerning traditional and emerging disciplines.
- 3) in contrast to earlier encyclopaedic tendencies, an emerging vision of a new synthesis entails not only distributed computing but also distributed world-views ranging from those of a little village, through regional, national ones to global ambitions of the G-8.
- 4) the new media are also bringing a number of new disciplines, fields and auxiliary fields, that need to be better understood.
- 5) simultaneously the new media are blurring clear distinctions between traditional fields and forcing us to think in multi-, pluri, inter-, and trans-disciplinary ways.

In the main body of this study we surveyed briefly the consequences of these changes with respect to 23 traditional disciplines. We discovered that on the Internet today, the most important disciplines of the mediaeval period (theology, law and medicine) are relatively insignificant compared to subjects such as history, art and design. In the case of law and medicine, it may be of course that considerable amounts of content are hidden from view in the deep web of commercial databases.

We claimed also that there are two major implications emerging from these trends. One entails the need for multi-lingual, dynamic knowledge. Whereas the printed medium of books led to a static presentation of knowledge, the new digital media allow, we would be tempted to say require, a dynamic approach to knowledge whereby spatial-temporal and cultural dimensions of knowledge can become visual and visualised. In all this there is a choice. If one aims towards a melting pot such diversities of language and culture will invariably be seen as inconveniences, nuisances and threats to communication. If one aims at a model that accepts a unity of diversities (as Ruffolo has attempted to characterize the European goal), then in these diversities lie the secrets to our past riches, our present subtlety and our future creativity. In this context, new levels of access to cultural heritage as foreseen by groups such as AMP are much more than yet another project description. They outline a strategy that is fundamental for the future of Europe in its deeper sense, a collection of cultures that is at once open to all the world, and yet has its own world view that defines itself rather than being limited to others' definitions.

Deliverable 8.doc	Fifth draft	13 June 2003	40/51
-------------------	-------------	--------------	-------


 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Looking back over these developments we can also recognize other trends. In the past, education was something one did and then left behind. Today, life long learning is more than a buzzword. Those who are truly devoted to learning risk spending their whole lives preparing with little time for practicing their skills. Those who think they have left school for good may find themselves without the necessary skills to continue a decade later. As e-learning becomes something for all ages, questions of accessibility broaden from those with inherited challenges to those facing all persons as they age: less vision, less hearing, less mobility. The EU has already made many important steps in the direction of new training possibilities, not least through their Marie Curie Training Networks.¹⁵³ Needed still is a much greater coupling between e-learning networks, cultural networks and such specialised training networks.

The survey of Manfred Thaller concerning tendencies to share knowledge in German bodies such as the Deutsche Forschungs-Gemeinschaft (DFG) points to a new commitment to sharing research, which has arisen through taxpayers' money. While the approach is very different and the funding models more different still a similar trend can be discerned in the efforts of the Joint Information Systems Committee (JISC) to create first a Distributed National Educational Resource (DNER) and more recently an Information Environment.

The trend in the context of the Maison des Sciences de L'Homme (MSH) is a similar one. Here another trend is evident also: namely, one which continues to respect the existence of the traditional disciplines while at the same time combining them in new ways institutionally (cf. figure 5) and pooling their findings in a networked environment. In so doing, the old boundaries are both respected while their limitations are simultaneously overcome.

In the Anglo-Saxon tradition there is a dual tendency towards great specialisation and creating the gentleman who is an all-round man. The American tradition has created superlative versions of these two trends, on the one hand towards over-specialisation (cf. the Fach Idiot of the German tradition) and on the other hand towards a study of the humanities in such general terms that none of the expertise of the specialists is maintained. By contrast, the trend of the French MSH, (evident also in some universities of the United Kingdom, e.g. Oxford with their Text Archive), points to an interesting European alternative that maintains the specialist knowledge of individual experts but situates them in a larger context that opens back to a universal vision. While this is not a necessary consequence of the networks we think this should necessarily be a consequence that is worth fostering because it combines the richness of past diversity and combines it with the integration possible through new networks.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Security
Legal Arrangements
Storage
Multilingual Terminology
Semantic Mapping
DACOs
Interfaces
Multimodal Interfaces
3-D Spatial Access
Spatio-Temporal Access (GIS)
Virtual Environments, Agora
Virtual Heritage Centres


Figure 6. Twelve fundamental problems to serve as initial modules for a future solution.

It is perhaps no co-incidence that the MSH has also become the institutional home of *Accès Multilingue au Patrimoine (AMP)* which sets out from the premise that one cannot meaningfully create a single dictionary or encyclopaedia that suits all, but can create bridges between the myriad ways of naming which have been so vital ever since the first chapters of the Old Testament. This polyvalent approach to multilingual challenges must become part of any future solution.

Standing back we can identify at least twelve ingredients that are needed for cultural networks (figure 6). A first is security. Without this major content holders will not be willing to share their high level content. A second entails legal arrangements. Without a clear set of rules for sharing across borders, languages and media serious content holders will not share their high level content. A third entails storage: how do we create reliable, distributed storage systems that will protect the enormous investments being made in this domain and that will ultimately protect important dimensions of mankind’s collective memory? These first three ingredients can be seen as a priori necessities, which are needed before sharing can begin.

A fourth ingredient is multilingual terminology, which has already been mentioned in connection with AMP. It is related to 5) the need for semantic mapping in the manner of SEMKOS and 6) the need for Digital Autonomous Cultural Objects (DACOs) which enable access to original sources without altering their original substance. These three ingredients (4-6) can be seen as the core elements for networked sharing of cultural content.

As we have noted networked sharing introduces new possibilities of sharing on an enormous range of devices from hand held phones to wall sized and even building sized environments. Hence, the challenge of 7) interfaces is clearly a fundamental ingredient. In the past these interfaces were almost exclusively visual. In future they will include all

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

the senses. Hence, related questions of 8) multimodal interfaces will become another basic ingredient.

In a number of fields including archaeology, art history, and conservation we noted that new methods of 3-D spatial capture, representation and reproduction (e.g. stereo-lithography) are fundamental to recent developments in these fields. Clearly, 9) 3-D spatial access is another basic ingredient. Related to this new mastery of 3 dimensional objects is a new mastery of how these objects are situated in both space and time. Hence, 10) spatio-temporal access is another basic ingredient. Together these 10 ingredients form the components for sharing using everyday networks.

Meanwhile many of the new digital products have acquired proportions far exceeding the capacities of a regular Internet connection. Broadband networks, which once seemed a luxury needed only for big science are needed equally for culture. This poses obvious challenges with respect to infrastructure and grids, which are already being addressed by the Commission through GEANT, Serenate, infrastructure and grids sections.

Specifically important for the cultural field is the challenge of 11) virtual environments which can also serve as virtual agoras for collaborative sharing, whereby archaeological and other reconstructions can be developed, transported to television, film and ultimately also the classroom via new versions of blue rooms and virtual studios. Finally there is the challenge of creating new 12) virtual heritage centres, which bring together such reconstructions with historical documents and other sources, this providing a new kind of contextualization of the museum process.

These twelve ingredients do not solve all the problems of digital culture. They do, however, offer a realistic roadmap of how one can use a limited number of modules to begin with a concrete solution. One of the great advantages of beginning with such basic ingredients, is that there are already groups, and sometimes major consortia which are addressing these questions. The challenge therefore is to build on what already exists. In this context the *raison d'être* of a Network of Centres of Excellence (NoE) is much more than simply connecting a few like-minded souls. The essential purpose of the network is to foster more co-operation among groups of professionals who were formerly unaware that they were working towards something much larger than their own particular field.

The challenges of such a distributed set of resources and environments are far too complex to be covered at this stage by even a large Integrated Project (IP).

In the context of an NoE, the twelve modules can enable these hitherto scattered communities ranging from archaeology, history and conservation to language and linguistics and computer science, to begin building in a bottom-up, empirical way a prototype for a Distributed European Electronic Dynamic (DEED) resource. While

Deliverable 8.doc	Fifth draft	13 June 2003	43/51
-------------------	-------------	--------------	-------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

building a working prototype they will also in the process define user and usability needs for a future system.


In theory, the IPS which are now being evaluated (PRESTO, BRICKS, SEMKOS, E-MUSE) all offer top down answers to the challenges outlined in this paper. In two years time as their first products become visible, it would be advisable to have the equivalent of a concertation meetings whereby their efforts are more closely aligned with those of the emerging prototype. It might be even more useful if such concertation meeting could be built into the process such that we are not faced with *fait accomplis* at a certain juncture. Ideally a combination of the existing IPs in the second half of FP6 can address the challenges of a prototype at a higher level. The network can also work with these groups in identifying emerging standards to ensure that the prototype remains up to date. By the time of FP7 these preparations should be sufficiently advanced in order to merit a new level and scale of integrated project, which will be required to address the full-scale problem of multilingual access to culture for all citizens. At this stage the prototype DEED can move in the direction of the DEER as described in deliverable 11.

While creating a prototype of a tool for sharing and keeping it up to date may be important initial purposes of the NoE, the more important role of the network must be in sharing content and critical thought in order to develop new methods. As we have noted the new media are doing much more than simply bringing existing content on-line: they are challenging the boundaries between traditional fields; they are changing the methods whereby we acquire, display and communicate knowledge; they are transforming the nature of knowledge itself.

Deliverable 1 outlined a realistic vision of how to address these challenges. Deliverables 2 and 3 outlined how this vision can be expanded to the NAS, Mediterranean and beyond. Deliverable 4 focussed on four themes that can serve as a roadmap for research in the near future. Deliverables 5 and 9 outlined requirements and topics for European Masters and Doctorates whereby this vision becomes grounded in everyday teaching and research. Deliverables 6 and 10 identified and defined 23 concrete broadband pilots that can be used to integrate content for an evolving DEED. It also provided a first demonstration of such broadband sharing including use of subsets for those with lesser capacity qua Internet connectivity. Deliverable 11 outlined a framework how the DEED can evolve into a DEER, including some initial considerations concerning interfaces. This deliverable (8) provided a survey of emerging trends and showed how these various activities can lead to a coherent operationalisation (in the jargon of Brussels): in simple terms how theory can be translated into practice which fosters the ongoing development of theory.

Thus the most important implications of networked knowledge may be the need for a new kind of network of networks whereby the individual efforts of specialists are combined in

Deliverable 8.doc	Fifth draft	13 June 2003	44/51
-------------------	-------------	--------------	-------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

defining the requirements and building the prototype of tools for sharing whereby they can continue the age-old processes of learning at a new level, using the new media not just for access to greater quantities of knowledge but especially to revise and refine their criteria for quality of knowledge in the context of a digital world.

Sharing knowledge through networks will do much more than simply increase access to further details. They offer ways of arriving at new methods, new insights and ultimately to a wider world-view that includes rather than excludes or suppresses the views of those who come from cultures different from our own. In a bygone age the other was inevitably the barbarian, the unwanted, the enemy. In future, we must discover in the other, new dimensions of ourselves. Else outside the tiny bed where we were born we are doomed to being strangers everywhere. The key to the future lies in understanding and tolerance of what we did not recognize we were, are and can become.

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

Appendix . 1 Report by Christian Lahanier (C2RMF)

New fields in computer management and digitisation of museum collections related to the conservation field.

1.- Internal program

The C2RMF engages a new program, in 2003, related to its production of data. Instead of being concerned with the acquisition of the ancient documents made till 1931 like photo-archives and reports, we are involved this year in the computerisation of the new production of materials. We will include as well this year the analytical results such as elemental analysis, isotopic analysis, structural analysis etc.

The EROS database has been updated with a dynamic viewer to consult panoramic images made on 3D objects. A 3D viewer developed by the Ecole Nationale Supérieure des Telecommunications in the frame of the SCULPTEUR project will be included with EROS.

We will implement a dynamic management of the multilingual authority lists, which will simplify their updating.

The main server will contain two more servers for Raid disks management and calculation of multi-spectral images, feature vectors for indexing images and the reconstruction of 3D images.

The server will be connected in September to RENATER, the Academic high speed network in France. The network will permit scientific laboratories to access the technical data and to proceed to new developments on line.

2.- External program

2.1- Research engine

The next evolution in our research and development program will be indexing oriented, multilingual approach, new engine for data retrieval where no indexing has been done such as free text, using a grammatical approach and a contextual model 5 of the PERTIM engine).


Elaboration of feature vectors to characterise the image content, a new image indexing system for similarity retrieval.

2.2- Image Indexing

To build a semantic clustering of the images, a model of classification using the knowledge of experts will be set up. Analysis of the indices affected to the feature vectors related to colour, shape and segmentation of the images will permit us to understand the semantic content of the images.

2.3- Web crawler to recover information

Deliverable 8.doc	Fifth draft	13 June 2003	46/51
-------------------	-------------	--------------	-------

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

To enrich the database with external data accessible on the Web, a Web crawler will be developed with specific functions.

2.4- Ontology classification for multi-access

To be able to research in different cultural database related to libraries, archives and museums, a new ontology has been elaborated by the CIDOC group. A Conceptual Reference Model allows a classification of all the information using a common structure of concepts. The EROS database will be accessible through such dynamic 3D graphs to access to the data. Semantic layers will classify the conservation metadata with multilingual instances.

2.5- Digitisation program

Two kinds of digitisation programs will be conducted in the frame of two European projects:

2.5.1- The multi-spectral digitisation of paintings

In the frame of the CRISATEL project a multi-spectral camera has been made. A colour chart containing three parts made with pure pigments one without varnish, a second one with mat varnish, a third one with glossy varnish allows us to calibrate the lighting system. A specific lighting system has been set up using a double light lamps with linear beam moving and synchronised with the displacement of the CCD array of the camera.

2.5.2- The 3D capture of paintings

The C2RMF is engaged in collaboration with the CRNC to build a new laser camera to get with accuracy the relief of paintings. This experimentation will be used to register the state of conservation of paintings and to study the crack network and the signature of artists.

2.5.2- The 3D capture of objects.

Two kinds of equipment are used:

- The Minolta camera using a laser beam for fast capture in low resolution and with a medium quality of texture. The reconstruction is made later using for example the Rapidform software.
- A turntable with a high definition digital camera and a colour chart for colour correction. A software designed by ENST maps the 36 digital images to rebuild its mesh structure mixing the texture of the different views.

2.6- Conservation-restoration multilingual vocabulary for indexing.

Nevertheless, the indexing of components will be done by documentalists for a fast access to documents when contents are difficult to understand such as history of art.

Deliverable 8.doc	Fifth draft	13 June 2003	47/51
-------------------	-------------	--------------	-------



Notes

¹ <http://klingon.cs.iupui.edu/~jzheng/bingmayong/e-index.html>

² <http://www.virtualheritage.net/>

³ http://www.mediadigitali.polimi.it/VH_network/

⁴ <http://www.agocg.ac.uk/gv/issue46/ibm.htm>

⁵ <http://www.archaeologie-wien.at/caa2003/papers/47.htm>

⁶ <http://www.opengis.org/>

⁷ http://www.opensg.org/OpenSGPLUS/symposium/Papers2002/Reiners_Basics.pdf

⁸ <http://www.web3d.org/>

⁹ Here a search through the WWW Virtual Library is not very helpful since a majority of the links are no longer extant. <http://www.clr.utoronto.ca/VIRTUALLIB/arch.html> especially with respect to courses.

¹⁰ <http://www.architosh.com/news/2003-05/2003c1-05112-ifc-graphisf.phtm>

¹¹ http://eetd.lbl.gov/btp/iai/copyright_ifc2x.html

¹² <http://ksi.cpsc.ucalgary.ca/IMS/IMS.html>

¹³ http://www.3ds.com/en/brands/ipf.asp?object_name=CATIA_Form_Q3_2002

¹⁴ <http://www.aliaswavefront.com/en/news/home.shtml>

¹⁵ <http://www.bentley.com/modelcity/>

¹⁶ http://videolab.udc.es/trabajos/trab_santi.htm

¹⁷ <http://phot.epfl.ch/workshop/wks99/toc.htm>

¹⁸ http://eoi.cordis.lu/dsp_details.cfm?ID=37100

¹⁹ http://eoi.cordis.lu/dsp_details.cfm?ID=36245

²⁰ <http://vlmp.museophile.com/galleries.html>

²¹ <http://raph.com/3dartists/artgallery/ag-co.html>

²² <http://www.artcyclopedia.com/>

²³ <http://www.mowa.org/enter.html>

²⁴ <http://www.google.nl/search?hl=nl&ie=UTF-8&oe=UTF-8&q=stereographic+art&btnG=Google+zoeken&lr=>

²⁵ <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=holographic+art&spell=1>

²⁶ <http://www.google.com/search?q=fluxus&hl=en&lr=&ie=UTF-8&oe=UTF-8&start=10&sa=N>

²⁷ <http://www.google.com/search?hl=en&ie=UTF-8&oe=UTF-8&q=dada>

²⁸ <http://www.google.nl/search?q=vr+art&ie=UTF-8&oe=UTF-8&hl=nl&lr=>

²⁹ <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=webcam+art&btnG=Google+Search>

³⁰ <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=born+digital+art>

³¹ <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=stereo+art&btnG=Google+Search>

³² <http://www.google.nl/search?hl=nl&ie=UTF-8&oe=UTF-8&q=laser+art&btnG=Google+zoeken&lr=>

³³ <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=happening+art>

³⁴ <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=digital+film+art&btnG=Google+Search>

³⁵ <http://www.google.nl/search?hl=nl&ie=UTF-8&oe=UTF-8&q=3d+art&lr=>

³⁶ <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=digital+video+art&btnG=Google+Search>

³⁷ <http://vlmp.museophile.com/galleries.html>


³⁸ <http://www.google.com/search?hl=en&ie=UTF-8&oe=UTF-8&q=performance+art>

³⁹ <http://www.google.nl/search?hl=nl&ie=UTF-8&oe=UTF-8&q=internet+art&lr=>

⁴⁰ <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=web+art>

⁴¹ <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=video+art&btnG=Google+Search>

⁴² <http://www.google.nl/search?hl=nl&ie=UTF-8&oe=UTF-8&q=animation&lr=>

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

⁴³ <http://witcombe.sbc.edu/ARTHLinks2.html#Italy15>

⁴⁴ “Historical Heritage and Future Creativity,” *First International Workshop on ICTs, Arts and Cultural Heritage with Special Emphasis on Applications, Local Development and Local Learning*, 5 May 2003, San Sebastian, 2003 (in press).

⁴⁵ See: <http://www.csd.tamu.edu/~arpita/Digital%20Atheneum%20Project.ppt>

⁴⁶ See: <http://www.byu.edu/news/releases/archive01/Apr/scrolls.htm>

⁴⁷ See: http://www.ino.it/~luca/rifle/riflesempio_en.html

⁴⁸ <http://www.bcin.ca/>

⁴⁹ <http://www.developmentgateway.org/>

⁵⁰ <http://www.unesco.org/unesdi/>

⁵¹ <http://www.com.washington.edu/rccs/intro.asp>

⁵² Ibid., See: <http://vlib.anthrotech.com/bin/jump.cgi?ID=919>;

cf. <http://imej.wfu.edu/articles/1999/1/02/demo/gallery/bytprof.html>

⁵³ John H. Bodley, “An Anthropological Perspective”

From *Cultural Anthropology: Tribes, States, and the Global System*, 1994.

<http://vlib.anthrotech.com/bin/jump.cgi?ID=919>

⁵⁴ http://www.geocities.com/Athens/7364/CS_pages_phII.html

⁵⁵ <http://bubl.ac.uk/link/c/culturalstudies.htm>

⁵⁶ <http://www.uiowa.edu/~commstud/resources/culturalStudies.html>

⁵⁷ <http://www.culturalstudies.net/>

⁵⁸ <http://www.uni-karlsruhe.de/Outerspace/VirtualLibrary/40.en.html>

⁵⁹ http://www.polity.co.uk/media/media_resctr.asp

⁶⁰ <http://www.cultsock.ndirect.co.uk/MUHome/cshtml/>

⁶¹ <http://www.medien->

[bildung.net/gender_mainstreaming/gender_mainstreaming_uebersicht_db.php/spezialthemen/](http://www.medien-bildung.net/gender_mainstreaming/gender_mainstreaming_uebersicht_db.php/spezialthemen/)

⁶² <http://vimp.museophile.com/international.html>

⁶³ <http://www.uni-duesseldorf.de/ulb/vol.html>

⁶⁴ <http://lcweb.loc.gov/folklife/other.html>

⁶⁵ <http://www.sagen.at/>

⁶⁶ <http://www.gwdg.de/~enzmaer/>

⁶⁷ <http://geography.pinetree.org/>

⁶⁸ E.g. <http://www.educationindex.com/geography/>

⁶⁹ http://earth.esa.int/ew/planning/pl_kazakhstan_may03.htm

⁷⁰ <http://www.ku.edu/history/VL/>

⁷¹ <http://www.geog.port.ac.uk/gbhgis/>

⁷² <http://www.storiaeinformatica.it/nume/italiano/ntitolo.html>

⁷³ <http://www.sfh.u-msh-paris.fr/home.htm>

⁷⁴ <http://www-hpss.geog.cam.ac.uk/>

⁷⁵ <http://www.ukans.edu/history/VL/methods/methodologies.html>

⁷⁶ <http://www.vl-ghw.uni-muenchen.de/hwEnglish.html>

⁷⁷ <http://nehrn.hum.sdu.dk/>

⁷⁸ <http://www.ex.ac.uk/~RBurt/MinHistNet/>

⁷⁹ <http://www.utu.fi/agricola/e/>

⁸⁰ <http://www.eurolink-law.com/swfindex.htm>


⁸¹ <http://www.reds.msh-paris.fr/francais/accueil.htm>

⁸² <http://www.unesco.org/most/globalisation/accueil.htm>

⁸³ <http://www.reds.msh-paris.fr/heberges/droitetsciences/index.htm>



- 84 <http://www.reds.msh-paris.fr/heberges/monde-arabe/index.htm>
85 <http://www.reds.msh-paris.fr/heberges/web2rj/index.htm>
86 <http://cyber.law.harvard.edu/>
87 <http://www.oclc.org/home/>
88 <http://www.archimuse.com/mw2003/papers/nevile/nevile.html>
89 <http://www.lib.helsinki.fi/meta/>
90 <http://renardus.sub.uni-goettingen.de/renap/racr.html>
91 <http://www.lub.lu.se/SEMKOS/>
92 <http://goopc4.sub.uni-goettingen.de:8080/BANDRKSYST>
93 <http://www.public.iastate.edu/~CYBERSTACKS/CTW.htm>
94 <http://www.nodali.sics.se/>
95 <http://cc.joensuu.fi/linguistics/nnn.html>
96 <http://www.humbul.ac.uk/output/subout.php?subj=linguistics>
97 <http://www.uni-erfurt.de/kommunikationswissenschaft/>
98 <http://www.uni-erfurt.de/kommunikationswissenschaft/>
99 <http://www.msh-paris.fr/texto/>
100 <http://semioweb.msh-paris.fr/escom/#>
101 <http://e-msha.msh-paris.fr/e-escom/Portal/>
102 <http://www.utoronto.ca/mouseia/>
103 <http://www.academicinfo.net/museumref.html>
104 <http://vlmp.museophile.com/contacts.html>
105 Cf. Conservation science network UK.
<http://www.chemsoc.org/networks/csn/index.htm>
106 <http://www.dgp.toronto.edu/%7Egfp/papers/VUI-IEEE-Computer.pdf>
107 <http://www.univie.ac.at/ethnomedicine/>
108 http://www.webinfocom.msh-paris.fr/infocom_et/medias/radio/index.htm
109 <http://www.worldphilosophy.net/>
110 <http://www.utm.edu/research/iep/>
111 <http://www-personal.monash.edu.au/~dey/phil/index.htm>
112 <http://www.epistemelinks.com/index.aspx>
113 (<http://buecherei.philo.at/initiat.htm#Philosophische%20Projekte%20im%20Internet>
114 <http://www.formalontology.it/>. Cf. <http://ksl-web.stanford.edu/kst/ontology-sources.html>
115 <http://dl.kr.org/>; <http://www.ida.liu.se/labs/iislab/people/patla/DL/>
116 <http://www.cs.utexas.edu/users/mfkb/related.html>
117 <http://www.ida.liu.se/labs/iislab/people/patla/DL/>
118 <http://www.psychology-network.com/>
119 <http://www.cmmtypsych.net/>
120 <http://www.dac.neu.edu/cp/consult/>
121 <http://www.healthpsychology.net/pages/290031/index.htm>
122 <http://www.radpsynet.org/>
123 <http://www.socialpsychology.org/>
124 <http://web.lemoyne.edu/~hevern/psychref1-1.html>
125 <http://psych.athabascau.ca/html/aupr/psycres.shtml>
126 <http://www.educationindex.com/psych/>
127 http://www.bcpl.net/~sandyste/school_psych.html
128 <http://www.epops.msh-paris.fr/>
129 <http://www.euophd.psi.uniroma1.it:8080/main/main.htm>
130 <http://www.osb.org/bic/cf>. <http://employees.csbsju.edu/roliver/scrip/forum.html>
131 <http://www.op.org/curia/bologna98/23i.internet.html>

 e-culture net	IST-2001-37491	WP3	D8
--	----------------	-----	----

- 132 <http://www.jesuitvocation.com/marnyk/internet.html>
- 133 <http://www.jesuit.ie/irl/jcc.htm>
- 134 <http://interact.uoregon.edu/MediaLit/JCP/>
- 135 <http://www.jesref.org/>
- 136 <http://www.luc.edu/infotech/cease/>
- 137 <http://www.hindunet.org/>
- 138 <http://www.buddhanet.net/>
- 139 <http://www.jewishnet.net/>
- 140 <http://shamash.org/>
- 141 <http://www.islaam.net/home/>
- 142 Cf. sisters in cyberspace: <http://www.geocities.com/Wellesley/1114/swrite.html>
- 143 <http://www.google.com/search?hl=en&lr=&ie=UTF-8&oe=UTF-8&q=electronic+scriptorium>
- 144 <http://www.wired.com/wired/archive/4.08/es.cybermonks.html>
- 145 http://www.electroniccriptorium.com/Company_Profile.html
- 146 <http://www.ucm.es/info/isa/>
- 147 <http://www.ssn.msh-paris.fr/>
- 148 <http://www.cse.msh-paris.fr/>
- 149 <http://www1.msh-paris.fr/bess/>
- 150 <http://www.msh-reseau.prd.fr/RessourcesDoc/>
- 151 http://www.msh-paris.fr/la_recherche/prog_sci/ps_index.htm
- 152 Cf, footnote 44 above.
- 153 http://fp6.cordis.lu/fp6/call_details.cfm?CALL_ID=23#