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EPOCH

Excellence in Processing Open Cultural Heritage

Network of Excellence

Information Society Technologies

D4.4.1: Training Needs and Offerings Report

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Contents

Executive Summary

This report describes work in progress to scope the training offering relevant to developing skills in the use of Information and Communication Technologies (ICT) specifically in the support of tangible Cultural Heritage as exemplified in Monuments, Sites and Museums. Following an initial consideration of the environment in which such a study is being undertaken the report goes on to provide a review of current offerings as reported by EPOCH partners, gleaned from the Internet and discovered through other contacts and research. It is expected that the survey will be maintained using feedback mechanisms on the EPOCH web-site, along with monitoring of developments that come to light through the EPOCH educational program.

This report has been generated following analysis of the 1600 or so Higher Education Institutions (HEIs) in the area of Europe covered by the FP6 program. Future developments to this resource will include substantial effort in the area of recording the burgeoning shprt course CPD (continuing professional development) provision.

EPOCH seeks to promote cultural diversity and to this end is attempting to be inclusive in recognising the training provisions, irrespective of the language in which the course is delivered.

The “Needs” section of this report is linked to the activities of EPOCH in defining user needs and training requirements with the sector’s value chain. These activities fall under Workpackage 2 where major studies are currently being undertaken, with related workshops and seminars planned for December 2004. These actrivities will produce reports in the next few months and an amended version of this report will then be generated.

A. Training offerings - Introduction and Overview

This report is the first EPOCH survey of training needs and offerings in the field of ICT tools and applications (henceforth IH, Intelligent Heritage) for tangible cultural heritage. This survey addresses needs as defined by EPOCH's scope: museums with their objects and collections, historic monuments and sites, and historic landscapes. The report must be clearly considered as work-in-progress for four distinct reasons:

Firstly, the survey is being undertaken during a period of great change in European Higher Education systems. This report presents a snapshot of a system undergoing changes which started in Bologna (1999) and – through Prague and Berlin – culminates in next year's assessment in Bergen and finally reaching a definitive shape by 2010. In the meantime, the "old", pre-Bologna, system and the new one co-exist, which makes the framework confused. There is some agreement on the names of the two-tier degrees as "Bachelor" and "Master", but this is not universal. For instance in Italy they are still called by the old names and the name chosen for the new equivalent of the Master title may be misleading. In Italy a "Doctor" title does not necessarily equate to a PhD either.

The old degrees still survive in some places, making comparisons difficult. The case of Belgium is an exemplar. Here there are two "old" systems - the Walloon one which is similar to the old French one with a multiplication of acronyms for graduate and postgraduate levels, and the completely different Flemish one, which resembles the old Dutch one. The new two-tier system has been superimposed very recently on top of these, from September 2004, including a twin track process with "professional" (Hogeschule) and "academic" (University) careers.

To explain this confusion, this report includes, wherever necessary, an explanatory paragraph for each country.

The second reason is unrelated to the present transitional phase: education as a field changes continuously and even small changes in educational practice may radically change the provision of continuing professional development opportunities in such specialised and inter-disciplinary subjects as those relevant to EPOCH. This is particularly true for CPD training, which lies outside of traditional academic structures, and may be delivered, for instance, in outreach study opportunities, summer schools, seminars, short courses, commercial training etc.

There is a third very practical reason for considering this survey as continuing "work-in-progress". EPOCH is seeking to maintain and enhance cultural diversity and an it is important that the Network sets examples where possible to encourage this attitude of inclusiveness. When considering the European countries participating in FP6 (i.e. member states, candidate member states and associated countries) there are in "FP6-Europe" about 1600 Universities (see Table 1); if one limits to member states this figure only reduces to just under 1400. The number of documents to be checked easily exceeds 50.000 pages and in almost all cases original documentation should be checked, because the documentation written in English is very often too stilted to be useful. The original documents are written in some 30 different languages (including Catalan, Gallego, Euskara, etc.) many of which are little known or used outside their home country. Fortunately, EPOCH has a good – although not complete – geographic coverage and can count on local partners for support. We are aware that in some cases a deeper examination may give further insight, but in almost all such cases the extensive effort of translating some documents, for instance, is unlikely to produce significant

additional benefits. However whenever a document appeared relevant, all efforts were made to check its content, even if it was written in a less well known European language.

The fourth and final reason for the "work-in-progress" nature of this report is that the whole section of needs and offerings in the provision of continuing professional education (CPD) is related to on-going studies under EPOCH's workpackage 2 in the areas of User Needs (Activity 2.1) and encouragement of participation by SMEs (under Activity 2.8). These activities will be holding workshops as part of the VAST 2004 week of events in December 2004 at which findings on user requirements and on training needs to encourage and enable SME participation will be further developed. It is expected that this report will then be amended, particularly in the areas of User Needs and CPD offerings.

All in all, the present report appears to be a good overall picture of the present HE education and training framework in Europe as far as the relevant subjects are concerned, and conclusions may be drawn basing upon it. As a survey of educational opportunities it will be continuously updated and improved – in coverage and depth – and implemented as a database of relevant courses, extending coverage to vocational/professional training and lifelong education. This is known to be a substantial, but somewhat unstructured provision in the sector, for instance, ICT training for museum curators and other cultural heritage professionals.

Methodology

Documents have been collected concerning the higher education institutions (HEIs) of all member states. All HEIs were considered and, in almost all cases, original documentation was checked, without limiting the checking to summaries in English. Documents came mainly from the Internet but also from leaflets and other printed matter provided by partners. Personal knowledge was sometimes a cue to search for additional information. Additionally, partners were asked to fill in a form describing the training they provided, if any.

All courses (or, in some cases, parts of them) relating to Information Technology applications to Cultural Heritage have been recorded and, as far as possible, examined in detail. The areas covered by the survey cover, but are not limited to:

Humanities and Social Science side
- Archaeology,
- Cultural Heritage Management,
- Tourism and
- Museology;,

Technology
- Information Systems
- Computer Science and Relevant Engineering

Digital Media and Communications

The database created for this purpose will be improved following further review and commentary; in the light of the additional work undertaken in Workpackage 2; and potentially by asking the people involved for further details. It will then be made available on the EPOCH web site.

Table 1 below reports the number of HEIs in each country in "FP6-Europe" who were reviewed for potential inclusion in the survey. Not all of them has required detailed consideration, however, because in many cases it was apparent from the goal of the institution that it was unlikely to have relevance to Intelligent Heritage (e,g, a "Veterinary University").

	Member state	HEIs			HEIs		Other FP6 states	HEIs
1	Austria	39	14	Latvia	18	26	Iceland	8
2	Belgium	32	15	Lithuania	17	27	Norway	20
3	Cyprus	11	16	Luxembourg	2	28	Bulgaria	34
4	Czech Republic	22	17	Malta	1	29	Israel	15
5	Denmark	26	18	Netherlands	24	30	Romania	47
6	Estonia	14	19	Poland	109	31	Switzerland	26
7	Finland	23	20	Portugal	61	32	Turkey	75
8	France	246	21	Slovak Republic	16			
9	Germany	265	22	Slovenia	2		**Total other**	**225**
10	Greece	44	23	Spain	75			
11	Hungary	32	24	Sweden	37			
12	Ireland	19	25	United Kingdom	158			
13	Italy	81						
	Total member states				**1374**		**Total FP6**	**1599**

Table 1: Higher Educational Institutions by Country

Austria

The Austrian system is organized nowadays into the standard EU two-tier plus doctorate/post-graduate studies. Individual PG degree programmes are also available.

Since the introduction of the new curricula in the winter semester of 2002/2003 two different systems of degree programmes co-exist. In some disciplines the two-tier system comprising a diploma programme and a doctoral programme was maintained; in other fields the new three-tier system comprising a bachelor programme, a master programme and a doctoral programme was introduced.

Bachelor programmes are usually practice-orientated. They last for six semesters and successful completion leads to a bachelor's degree (Bakkalaureus/Bakkalaurea, short: Bakk.). This can be followed by a master programme with a more scientific approach, which comprises three or four semesters and leads to a master's degree (Magister/Magistra, short: Mag./Mag.a).

Diploma programmes comprise two or three stages of study, without an interim degree award, last for eight to ten semesters and lead to an Austrian master's degree (Mag./Mag.a).

After having been awarded the master's degree by either route, the individual can continue with a doctoral programme, which comprises four semesters and leads to an Austrian doctor's degree (Doktor or Doktorin, in short: Dr.).

There are also non-degree programmes. Participants in degree courses, students attending single lecture courses, applicants for the university entrance qualification examination and non-Austrian students may be admitted as non-degree programme students during the time they spend studying on their main programmes.

In addition students may choose to follow a standard study plan or propose their own Individual Plan. The individual degree programme (IDP), which used to be called "Studium Irregulare", offers the opportunity to compose a degree programme according to one's personal interests. The range of established degree programmes can be widened and the changing demands of the job market can be met.

Until recently it had only been possible to apply for individual diploma degree programmes, but since January 1st, 2004 individual bachelor and master programmes are also possible. Students who apply for an individual degree programme have to write a "profile of qualification". This profile contains descriptions of the qualifications that you want to acquire during the course of the degree programme and the potential use in your professional life. When approved, the IDP is binding as for any other study plan. In some cases, established IDP's are available, possibly outside the standard list of qualifications; it is likely that the choice of such established IDP's will be approved automatically. The "Studium Irregulare" offers a good opportunity for interdisciplinarity if such an interdisciplinary plan is approved by academic authorities.

Apart from these general considerations, there is no evidence of IH related disciplines taught in Austria.

It is likely that some computer literacy is required for some (but not all) courses in Archaeology, as shown for instance at the course in *Klassische Archäologie* at the Karl-Franzens-Universität Graz, envisaging a course on *Computeranwendung* (Computer Applications) with Lessons and practice. There is in general little or no trace of such subjects

in relation to cultural heritage management, which is often envisaged as a possible future job for archaeologists, art historians and the like, and has no dedicated studies.

Some courses taught in English are available at major universities.

Belgium and Luxembourg

The higher education system in Belgium is rather complicated, as already noted, because it differs between the Walloon and Flemish communities. These systems were similar to the old French one for Wallonia and to the Netherlands one for Flanders. In September 2004 conversion to the Bologna Bachelor/Master system was started. Since the transition has only just started currently old and new degree programmes co-exist.

The previous system in the Walloon community included a long list of degree types which can be very roughly simplified as candidature/licence or first and second cycle. The situation for post-graduate studies is also complex and will remain the same because the reform does not involve such studies. There is also a parallel system of professional degrees, granted by "High schools" (*Haute-Écoles* or *Hogeschool*en).

In the transition to the new European system, in some cases curricula have also been updated so that there is no direct equivalence between curricula corresponding to the old degrees and those for the new ones. In addition, most curricula have only just been planned because they refer to next year's courses and have yet to be confirmed, so some course planned for 2005/2006 and subsequent years might, in fact, not take place.

In conclusion, the impression from the outside is of considerable confusion: sometimes there are four or more different curricula for the same course, with additional variants related to professional education.

There are a few courses, especially at PG level, taught in English.

The table below summarizes courses relevant for IH. When variants were present, only the ones related to the new system have been reported.

In the two universities in Luxembourg there are no courses obviously related to the cultural heritage of monuments sites and museums

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University	City	URL	Degree	Subject/course title	Notes
KU Leuven	Leuven	http://www.kuleuven.ac.be	Bachelor in de Archeologie	• Informatiekunde • Geografische informatiesystemen I+II: vectortoepassingen en cartografie: theorie en practicum	Basic computer skills
			Master of Arts in eastern and Mediterranean Archaeology (in English)	Archaeological Applications of Geographic Information Systems (GIS)	
Universiteit Gent	Gent	http://vwww.ugent.be/	Bachelor in de Archeologie	Informatica toegepast op de archeologie	
Université de Liege	Liege	http://www.ulg.ac.be/	Bachelier en Histoire de l'Art et Archéologie, orientation musicologie	Informatique appliquée à l'archéologie et à l'histoire de l'art, y compris les exercices pratiques	planned
			Bachelier en Histoire de l'Art et Archéologie, orientation générale	Informatique appliquée à l'archéologie et à l'histoire de l'art, y compris les exercices pratiques	planned
			Master en Sciences et Technologies de l'information et de la Communication, à finalité spécialisée	• Informatique appliquée à l'archéologie et à l'histoire de l'art, y compris les exercices pratiques • Méthodes informatiques pour les sciences humaines • Pratique professionnelle du multimédia • Images numériques et bases de données graphique	Appears to deal mainly with libraries, but has an interesting scope
Facultés Universitaires Notre-Dame de la Paix	Namur	http://www.fundp.ac.be/	Diplôme d'études spécialisées en Etude et Gestion du Patrimoine Culturel (PG)	Relevés graphiques et CAD	

No professional course relevant for EPOCH topics was found, nor were any of the several engineering or computing science courses directly related.

It should be noted that in Flanders two out of three bachelor degrees have some computing taught. Only one in the Walloon system does, but these are perhaps the most important.

In contrast, most computer science courses include data management and GIS, with the exception of the Liege course which has an interesting approach, focused more on libraries than heritage.

Cyprus

The University of Cyprus is very active in Computer Graphics applications to IH and is participating in several European projects on the subject. So, in contrast to elsewhere in Europe, one can expect to find relevant training issues more in the Computer Science Department here than in the Humanities.

No course explicitly relating to IH is however present. A good deal of the documentation and training material (and perhaps also some teaching) is available in English.

Czech Republic and Slovakia

Academic studies in the Czech republic correspond to the standard two-tier European model. Relevant subjects for IH are not very evident with the notable exception of Masaryk University in Brno where both the degrees in Archaeology and Museology show IT-related courses. The curricula in Archaeology include a course on *Computer Technology*, with a first, basic level and a second level on field documentation and databases. Museology has an introductory *Basics in Computers* followed by two courses on *Geographical Information System in archaeology*, at a rather good technical detail, and a course entitled *Computers in Museum Practice*, dealing with computer 2D and 3D graphic software and its applications. Two more courses, *Museum documentation* and *Practice in museum documentation* include computer uses for this goal. This shows that the IT training for museum professionals, in particular, is uncommonly well addressed and notably detailed.

Additionally, the Faculty of Arts, where the Department of Archaeology and Museology belongs, provides a general purpose basic course named *Výpočetní technika* on computer literacy use, open to students on all the degree programmes.

Another significant note about MU is the presence in the Faculty of Informatics of a programme called *Informatika a druhý obor* (Informatics with another discipline). This is a degree where students may combine informatics with another discipline such as biology, medicine or others.

A similar level of computer involvement is not present in other academic institutions, where the traditional separation between technology and humanities seems more persistent.

Information in English is generally available (fairly good, again, at Brno) and some courses are taught in English.

The situation in Slovakia is not dissimilar from the average Czech one, but with less information and teaching apparently available in English.

Denmark

The University system in Denmark is already based on the Bachelor/Master system, with small variants. The Bachelor's degree in Humanities generally consists of two components: a two-year Basic Course ("*grundfaglig del*") in the subject to which the student has been admitted, combined with a one-year elective study programme ("*tilvalg*"). There are two types of elective programme: a subject-related programme which consists of modules taken from the appropriate main subjects, e.g. Danish, History, English, or Spanish, or an interdisciplinary arts programme consisting of cross-disciplinary modules such as Theories of Humanistic Research or a specific field of cultural research. Students who have studied both Basic Courses and an elective programme in subjects taught at secondary schools are - after the completion of the Candidatus degree - qualified to teach at Danish sixth-form colleges ("*gymnasier*"). The master degree may consist of Master's level Candidatus degree "*cand. mag.*" – (BA + 2 additional years). The final two years consist of a number of individually selected disciplines and the *cand.mag.* degree is concluded with a dissertation of 50-100 pages. An extended master's level degree ("*Magisterkonferens*") – (BA + 3 additional years) involves three years of research-based studies in the Major Subject after the completion of a BA. Not all subject areas offer students the opportunity to study for this degree.

Holders of a Danish *Candidatus Magister* degree, or a degree assessed as comparable, are eligible for admission as PhD students subject to approval of their project. The PhD requires 3 years and a thesis based on extensive original research.

The opportunities for mixing different subjects offer interesting possibilities. For instance at the Aarhus Universitet, a BA student at the Faculty of Humanities may put together with traditional training a course on multimedia from IMV, the *Institut for Informations- og Medievidenskab*, and the course on *Informatik for Kulturhistorikere* (Informatics for Culture Historians). However courses related to IT – let alone IH – are practically absent at Faculties of Humanities. A few research teams on IT related themes, at Aarhus and at the Syddansk Universitet (University of Southern Denmark at Odense), may perhaps offer postgraduate opportunities.

In Denmark foreign students are welcome, with courses taught in English available.

Finland and the Baltic Republics

The Finnish system is almost completely converted to the BA/MA system. Although some courses are offered in English, teaching and documentation is generally in Finnish. There appear to be very few courses – and no full degree programmes – relevant to IH. One of the rare exceptions is the course on Digital Archaeology held at the University of Turku in the framework of the degree in Archaeology. Another potential exception is the University of Arts at Helsinki and its Media Lab, targetted at interdisciplinarity but actually not including any education specifically aimed at IH.

In the Baltic Republics no directly relevant course provision was found.

France

France has also started the process of reforming its system to the two-tier Bologna model (although they relate the changes to an earlier Sorbonne meeting). In France the system is known as “LMD” from the initials of the degrees “Licence” (equivalent to a Bachelor) and Master, plus the Doctoral degree.

The transition is not proving easy and some “old” intermediate titles are being maintained such as the DEUG and the “Maitrise”. Also a re-definition of courses has taken place, with new names for some of them. The process, as noted by a Conference of French Universities in 2003, is still on-going. When several specialisms are present within a degree course, they are called “Mention”.

For the purposes of this report it is sufficient to refer to the new degree names which are now compulsory.

The current situation for IT education related to IH is not particularly advanced, because IT training is present in only a small fraction of heritage-related courses: if one counts the universities where even this is not included, the overall fraction further reduces. Only a few courses offer specialisd IT education and in many not even a minimal level of computer literacy seems to be guaranteed, which misses the opportunity offered by the recent changes.

University	City	URL	Degree	Subject/course title	Degree type
Université de Provence	Aix en Provence Marseille	http://www.up.univ-mrs.fr/	Conservation et restauration du patrimoine bâti	Informatique	Licence Professionnelle
Université de Provence	Aix en Provence Marseille	http://www.up.univ-mrs.fr/	Géomatique et aménagement durable	GIS	Licence Professionnelle
Université Michel de Montaigne Bordeaux 3	Bordeaux	http://acosiig.u-bordeaux.fr/	Archéologie : Mention Documentation	Informatique	Licence
Université Michel de Montaigne Bordeaux 3	Bordeaux	http://acosiig.u-bordeaux.fr/	Sciences de l'Antiquité et Archéologie	Méthodes d'investigation par l'informatique.	Master (ex DEA)
Université Paul Valery	Montpellier	http://www.univ-montp3.fr	Patrimoine	Méthodes et traitement des données en patrimoine	
				Techniques et outils appliqués au patrimoine	
			Archéologie	Méthodes et techniques d'analyses et de traitement des données	
Université de Metz	Nancy	http://www.sha.univ-metz.fr/	Assistants de gestion et de développement culturels	Informatique	Licence
Université de Metz	Nancy	http://www.sha.univ-metz.fr/	Conception et mise en oeuvre de projets culturels	Production de multi-media culturales	Master (ex Maîtrise)
Université d'Angers	Nantes	http://www.univ-angers.fr/	Sciences humaines et sociales (mention Histoire)	Informatique	Licence
Université de Nice	Nice	http://portail.unice.fr/	Médiation et ingénierie culturelle : arts vivants et muséologie	Multimédia appliqué à la communication culturelle	Master
Université de Nice	Nice	http://portail.unice.fr/	Sciences des mondes préhistoriques, antiques et médiévaux	GIS et techniques traitement des données	Master
Université François Rabelais	Tours	http://www.univ-tours.fr	Histoire et Archéologie	Informatique orientée a l' archéologie	Licence

Germany

The German system is two-tier and has the following titles: Bakkalaureus (B) (Bachelor) after 3 years, with a Diplom (D) (Diploma) after 4 to 5 years, qualifying to enter a profession; and Magister Artium (M.A.) and Magister Scientarum (M.Sc.) after 4 to 5 years, including at least two subjects; usually one main subject ("Hauptstudie", major) and two minor ("Nebenstudie") subjects.

Studies seem to maintain a strong disciplinary focus, but perhaps some interdisciplinarity can be achieved by combining major and minor subjects. Since this is subject to academic approval, it is unclear whether such an option is actually viable, used by students and approved by competent authorities.

A more detailed investigation is currently being undertaken in order to determine from direct questioning of academic staff the degree to which there is acceptance of such an option among students and professors, or if there are different local approaches to achieve interdisciplinarity. The investigation will also determine whether, in the end, interdiscplinarity is valued by students and staff. There are 265 high education institutions in Germany and even if most of them do not appear concerned with IH there remains a very large number to be checked.

Strict disciplinarity is also reinforced by the structure in Faculties and Institutes, the latter often focusing on very narrow subjects.

In some cases, students are directed to choose particular minors topics to majors, such as Latin and Greek Philology for Archaeology. Often practical activities are emphasised (excavation, practice in museums etc.) but no mention is made of computer laboratory practice.

In contrast in some isolated cases, there does appear to be some attention to computer issues. For instance, in the Martin-Luther-Universität at Halle-Wittenberg there is a course (available also on-line) with tutorials on basic computer notions, accompanied by workshops, which is part of the Prehistory curriculum. This is the exception rather than the rule, as is the mention of "*moderner Forschungsrichtungen***"** ("modern research directions") quoted by the University of Saarland in the description of their Classical Archaeology studies**.** Computer training appears to be more determined by a personal interest of the staff and their commitment to innovation than a strategic choice by academic authorities.

Greece

The Greek situation is very dynamic. Although the information available is uneven, the emerging framework shows that new technologies are decidedly entering the world of cultural heritage. In most universities where heritage is taught, courses on the use of IT are present at all levels, from undergraduate to doctoral studies. In many cases these are the result of interdepartmental collaboration. However it is often not easy to access course programs and syllabuses, so it seems more useful to give examples of good practices here rather than attempt a tabulation .

At the University of Piraeus, the department of Informatics manages an undergraduate curriculum on Learning Oriented Informatics including a course on Digital Culture Technology.

At the University of Athens, PhD themes include applications of computer science, and postgraduate courses (here called seminars) deal also with computer themes.

At the University of Crete, collaboration with the Institute of Mediterranean studies has led to joint educational postgraduate programs in Computer and Archaeology, dealing with different issues such as remote sensing, satellite imagery etc., combined with didactics from the research activity of the two institutions.

The University of the Aegean reaches tops this ranking, having a full Department of Cultural Technology and Communication. Undergraduate studies in the Department of Cultural Technology and Communication last for eight semesters. During the first four semesters, the Core Courses cover the scientific field of Cultural Studies, with a special emphasis on Culture, Multiculturalism, Communication and Cultural Promotion and Administration. The courses on basic principles of Informatics and Multimedia also begin in the 1st semester, combined with computer laboratory applications, and also last for four semesters. In the 5th semester the students select and attend one of the four (4) offered Study Divisions:

1. Museology
2. Digital Audiovisual Arts
3. Cultural Representation and New Technologies
4. Educational Technology and Intercultural Communication

The content of each division covers the epistemological issues of the division field, in combination with specialized training in the use of multimedia applications. The duration (for each division) is four semesters. In parallel with the Divisions, students have to attend one of the three Informatics Cycles described below. Each of them is composed of two courses. They are common for any Division. Students can also take an Optional Cycle. Part of the training process of the Divisions is the conduct of Summer Practical Training during the third and the fourth year of studies and also the composition of a degree dissertation. Both educational activities contribute to the acquisition of specialized knowledge and experience. The Informatics Cycles cover the following fields:

- Website Creation
  - Hypermedia Technology
  - Worldwide Web Technologies
- Hypermedia Application Development / CD-Rom
  - Analysis and Development of Standalone Multimedia Applications
  - Programming: Script Languages
- 3D Modelling Animation
  - Computer 3D Graphics
  - Virtual Reality

The list of courses includes, among others, such subjects as “Creating Virtual Museums: Methods and Practices”, “Digital archives for the creation of databases of texts and vocabularies” and more.

The M.Sc. in Cultural Informatics includes similar courses at a deeper level: “Virtual Exhibitions”, Digitization of Collections”, etc. The Department manages also doctoral studies on IH related subjects, planned on an individual basis. Teaching is in Greek but English speaking students are accepted as well.

Hungary

In Hungary there is apparently no teaching of subjects relevant to IH. This result is confirmed by our local contacts (some computer applications are incorporated in other courses). This seems a surprising conclusion however and direct additional investigation with local sources will be undertaken to provide more information.

Ireland

In Irish Universities very few IH courses have been identified with the two exceptions described in the following table.

University	City	URL	Degree	Course name
Galway-Mayo Institute of Technology	Castlebar, and Galway, co. Mayo	http://www.gmit.ie/	National Diploma in Humanities in Heritage Studies	Computer Applications and Research Methods
				Information Technology (3 courses)
			Bachelor of Arts in Humanities in Heritage Studies	Information Management
				Information Management and Multimedia
National University of Ireland at Galway	Galway, co. Mayo	http://www.nuigalway.ie/	M:A: in Archaeology	Information Technology for Archaeologists
				Digital Landscapes (GIS applications)

The National Diploma referred to in the above table is an intermediate qualification that can be "topped-up" to a Bachelor's with an additional year.

As shown by the table, courses take into account basic IT needs and are not widespread. However, the overall number of courses in Archaeology is relatively small, so the ones with some IT training represent a high percentage (almost 40%). It is interesting to note that they are concentrated in Galway, although in different institutions.

Italy

In Italy the “Bologna process” started in 2001, accompanied by discussions and the opposition of the most traditional part of the academic community. The passage from a system with a 4 or 5-years degree to the two-tier system was also the opportunity to introduce some modernization in the field of cultural heritage studies, but the degree of modernization depended on the willingness of the academy. In some cases – rather few – the change was substantial. In others, there was no change and the subjects already taught were simply split into two sets, the first three years and the additional two years. This gave rise to the name by which the two-tier system is usually known, i.e. “3+2”. Computer teaching was absent before the reformation and in these cases it remained absent, limiting to the basic “computer literacy” that was envisaged by the law for all careers and not specific to those related with heritage.

Some confusion derives from the fact that the first level – the one called everywhere in Europe as Bachelor – in Italy maintained the name that the 4/5 had previously, i.e “Laurea”, while the second level – what other Europeans call Master – here become “Laurea specialistica” i.e. a specialized degree. The Master title and master courses had already been introduced for post-graduate occasional courses. Since a graduate was entitled to have the Doctor title without having a PhD (a degree non existent in Italy until the ‘90s) the question has arisen about who is entitled to use this title. This has been taken to court and at present it appears that a second-level degree is necessary, not necessarily a PhD. This makes the Italian degree system confused when compared to other European ones.

To describe the results of our survey and make them comparable with the rest of Europe, it has been necessary to establish equivalences, defined in this way: “Laurea” = BA, “Laurea specialistica” = MA, so-called second level “Master” for which a second level degree is required = PG, and first-level “Master” for which only a first-level degree is sufficient, also PG.

Such abbreviations are used in the following table. Most of the PG training is difficult to track because a number of initiatives have only started on paper, since they have not reached the minimum number of enrolments to make them financially viable (PG training is market-based). This becomes known only in the first part of the calendar year – the second academic semester. For this reason reporting on them here would possibly have misrepresented the true situation, and they will be surveyed when whether they take place or are cancelled can be assessed. This is not the case for Doctoral degrees, but in this case no specific programme on the relevant topics was found.

As already mentioned, the presence of “computer literacy” has not been reported because this is a legal requirement that in practice may mean anything – on average being interpreted as an ECDL level, for which training is available independently from curricula. It can be seen that there has been no uniformity on whether to put computer training into the first or second level, as shown by the table. This is possibly a hint of the different roles attributed to computer training.

As far as names are concerned, the first level is often called “Beni culturali (Archeologia)” i.e. Cultural Heritage (Archaeology). Similar denominations – sometimes much longer – have been normalized in this way. In other cases it is simply called “Archeologia” (Archaeology) possibly with specifications, e.g. “Near East and Asian Archaeology”, which are irrelevant for our analysis. These names have therefore been normalized to “Archeologia”. The difference has been maintained among the two BA denominations since they belong to different groupings at a national level.

The second level is usually called “Archeologia”, possibly with specifications as above which have been omitted for the same reasons. A few exceptions to this scheme exist and have been maintained in the table with their original names.

University	City	URL	Degree course	Subject/cuorse name	
Università della Basilicata	Matera	http://www.unibas.it/	Beni Culturali	Laboratorio di informatica	BA
				Trattamento informatico dei dati storici e storico-culturali	BA
			Nuove Tecnologie per la Storia e i Beni Culturali	Fondamenti di informatica	BA
				Progettazione web	
Università di Napoli 2	S.M. Capua Vetere	http://www.unina2.it/	Archeologia	Archivistica: archiviazione e diffusione multimediale del dato archeologico	MA
Università di Bari	Bari	http;//www.uniba.it/	Archeologia	Laboratorio di Informatica	MA/BA
				Laboratorio di Informatica applicata ai beni culturali	MA
Università di Bologna	Ravenna	http://www.unibo.it/	Beni culturali (archeologia)	Avviamento all'uso di supporti informatici per il trattamento delle immagini e/o di dati linguistici	BA/MA
				Elaborazione delle immagini	
				Fotogrammetria	
				Informatica applicata agli archivi	
				Informatica generale	
				Informatica umanistica	
				Metodi informatici della ricerca archeologica	
				Tecniche per le basi dati bibliografiche e documentali	
				Telerilevamento	
Università di Cagliari	Cagliari	http://www.unica.it/	Beni culturali (archeologia)	Laboratorio di informatica	BA
Università "G. d'Annunzio"	Chieti-Pescara	http://www.unich.it/	Archeologia	Informatica	MA
Università di Firenze	Firenze	http://www.unifi.it/	Beni culturali (archeologia)	Metodi informatici della ricerca archeologica	BA
			Archeologia	Metodi informatici della ricerca archeologica	MA
Università di Genova	Genova	http://www.unige.it/	Beni culturali (archeologia)	Fondamenti di Informatica	BA
				Informatica applicata all'archeologia	BA
			Archeologia	Elaborazione digitale di immagini storico-artistiche	MA
Università di Macerata	Macerata	http://www.unimc.it/	Beni culturali (archeologia)	Informatica generale	BA
Università di Napoli "L'Orientale"	Napoli	http.//www.unior.it/	Beni culturali (archeologia)	Metodi informatici della ricerca archeologica	BA

Malta

At the University of Malta, the degrees in Archaeology include a course on GIS applications. There is also a notable course on Conservation Documentation managed by MCR, the Malta Centre for Restoration, incorporating The Institute for Conservation and Restoration Studies. The latter deals with topics such as: “Heritage and cultural informatics: ICT in libraries, archives and museums”, “Photogrammetry”, “Laser scanning”, **“**Data bases and GIS integrated heritage management” “Information organisation and retrieval”, “Creation and management of digital collections & networks” etc. Such a course is unique in its field in Europe.

The Netherlands

The overall situation in the Netherlands is similar to the Flemish community in Belgium, although the changes here started earlier (2002) and the situation is a bit clearer. Also in the Netherlands there is a distinction between professional titles (*hbo*), delivered by *Hogeschoolen* and university (*wo*) titles, delivered by universities. However, no hbo-title seems potentially relevant for our topics.

In Dutch universities, there appears to be neither a degree nor a course dealing with subjects related to IH. It is likely that some computing is taught within other archaeology or heritage courses: Sometimes there is a hint in the course title as in *Physical anthropology and computer applications* taught in the degree of Bachelor in Archaeology and Prehistory at the Universiteit van Amsterdam. In other cases it is more hidden and cannot be revealed by a survey.

There is lots of provision for foreign students including teaching in English.

Poland

In Poland the survey has not uncovered any evidence of teaching courses related to IT applications to cultural heritage.

Portugal

Higher Education in Portugal includes education in universities ("*Universidade*") and polytechnics ("*Instituto Politécnico*"). There are public and private universities, approximately 50%-50% of the total, with polytechnics totalling half the number of universities. The sector also includes military and administration universities and a large number of higher schools, named "*Escuela Superior*" which deliver degrees in specific subjects, for instance for para-medicals.

Both universities and polytechnics can grant the degree of "*bacharel*" and "*licenciado*", although bacharel courses are infrequent in universities. Some disciplines only exist in universities and others only in polytechnics, but most are shared by both.

Polytechnic teaching aims more at vocational subjects and most of their degrees are organised in two-steps, i.e. in the first cycle the degree of *bacharel* is granted, which may be complemented by a second cycle with the title of *licenciado*. Such courses are named *bachalerato/licenciatura*.

The *licenciatura* corresponds to a longer academic training, of at least 4 years, while *bachalerato* has a maximum duration of 3 years.

A further degree, named "*mestrado*", requires a starting basis of the licenciatura. It takes 1 or 2 additional years and is concluded by a dissertation.

Doctoral studies ("*doutoramento*"), contrary to the situation in most other countries, do not include formal courses or lessons. They consist of research activity and are concluded by the dissertation of a research level paper.

There exist, moreover, post-graduate courses, called *"pós-graduações*", targeted at those with *bachareis* or *licenciados*, for further specialization on a specific subject (some are indeed named as "specialization courses") but they do not confer any academic title. Strictly speaking, also *mestrado* and *doutoramento* are post-graduate courses, but they give the academic titles of *Mestre* and *Doutor*.

Finally, there are some open courses not included in any academic degree.

All courses, at any level, are given in Portuguese. Foreign students are implicitly required to learn the national language. There appear to be a number of foreign students, mainly from programs such as Socrates or similar, and occasionally universities have advertising in English addressing perspective students from abroad.

From the survey it appears that one degree is available in the fields related to Intelligent Heritage. It is the *mestrado* in Archaeology by the University of Minho, which has a curriculum in Information systems and Archaeology.

There are, moreover, some courses relating to Library Informatics which is acknowledged as an independent field of study. In the EPOCH field, there is a small number of individual courses, named as "Computer archaeology" or similar, which generally includes basic information about data management, use of CAD and GIS. In a very few cases, also presentation of heritage data by means of computers is concerned as well, sometimes limiting to web pages, otherwise dealing possibly also with VR and computer graphics.

From a more detailed examination of programs it results that individual courses pertinent to IH are those listed in the following table.

University	City		URL	Degree or post-graduate course	Course	Type	Note
Universidade Lusófona	Lisboa	Private	http://www.ulusofona.pt/	Mestrado em Conservação, Restauro e Revivificação de Monumentos e Sítios	Fotogrametria e Multimédia	Mestrado	
				Pós Graduação em Gestão Cultural	Sistemas Informáticos para Gestão de Projectos	PG	
Universidade do Porto	Porto	Public	http://www.letras.up.pt/dctp	Mestrado em Arqueologia		Mestrado	There is no specific relevant course but the attitude of the managing department DCTP is interdisciplinary
Universidade do Minho	Braga and Guimarães	Public	http://www.uminho.pt/	Licenciatura Historia, variante Arqueologia	Introdução à Informática Arqueologia e Informática	Licenciatura	
				Mestrado Arqueologia Sistemas de Informação e Arqueologia		Mestrado	
Universidade Indipendente	Lisboa	Private	http://www.uni.pt/	Curso de Pós-Graduação em Património Cultural: Valorização e Gestão	Património e Novas Tecnologias	PG	
Universidade Fernando Pessoa	Porto	Private	http://www.ufp.pt/	Arqueologia - Pós-Graduação	Novas tecnologias de representação gráfica	PG	
Instituto Politécnico do Porto	Porto	Polytechnic	http://www.ipp.pt/	Gestão do Património (B+L)	Introdução a Informática Oficina de Tecnologia e Informação	Bachalerato + LIcenciatura	
Instituto Politécnico de Tomar	Tomar	Polytechnic	http://www.ipt.pt/	Mestrado em Arqueologia Pré-Histórica e Arte Rupestre	GIS	Mestrado	This course is currently changing its programs
				Gestão do Território e do Património Cultural (B+L)	GIS	Bachalerato + LIcenciatura	This course is currently changing its programs

From the above table it appears that courses on subjects related to IH are present in 7 higher education institutions out of some 40. The following table summarizes the ratio to relevant degrees, grouped as Archaeology, Heritage Management and Museology.

Subject	Licenciatura or B+L	Mestrado	Doutoramento	Pós-Graduação	Total	%
Archaeology	6	6	4	2	18	
with IH courses	1	3			3	16,7
Heritage Management	9	11	1	5	26	
with IH courses	2		1	2	4	15,3
Museology		5		8	13	
with IH courses					0	0

In conclusion, it appears that only a small percentage of students in relevant subjects receives training in informatics. When such training is available, it mainly involves information management (databases, GIS etc.) and sometimes “new technologies”.

Slovenia

At the University of Ljubljana is the survey found no evidence of IT specific courses. However, in 2003 some seminars had been organized on such issues as GIS applications and 3D reconstruction, with local and visiting lecturers, so some training activity at postgraduate level does exist.

Spain

University studies are divided in two cycles to reach a degree, with a third post-graduate degree. The first cycle is called “Primer ciclo” and leads to a diploma (“Diplomado”) and lasts 2 or 3 years. The second cycle is called “Segundo ciclo” and leads to a degree (“Licenciado”). It lasts 2 or 3 years, usually 3 for those in which the diploma is 2 years only. There are additionally courses by “Centros privados de enseñanza superior” i.e. not deemed as universities (differing from “Centros universitarios privados”, i.e. private universities granting recognised titles) and professional development courses. A degree may be a “Título oficial”, i.e. recognised in all Spain, or “Título proprio”, i.e. not recognised by the State.

In parallel to these awards there are diplomas of “Technician” and “Superior Technician” which are part of the Vocational Training system (“Ciclos formativos”) which is also part of the university system.

University regulations are issued by the State, but in some parts of the country local autonomy allows different regulations.

Both graduate (“Grado”) and postgraduate (“Postgrado”) third cycle studies are being reformed. For postgraduate studies the project includes two titles, Máster and Doctor. The content of such studies is defined by universities and the doctoral career includes the discussion of a thesis. Presently, there are post-graduate degrees with various names (“Especialista Universitario”, “Máster”, “Doctor”) and rather different structures.

There is only one postgraduate course (a “Máster”) in subjects pertinent to Intelligent Heritage, titled “New Technologies applied to Cultural Heritage” at the University Rey Juan Carlos in Madrid. This course is, however, only planned (no start date as yet available) and more information about its content will be available in the future.

The few other courses dealing with related subjects deal mostly if not exclusively with the management of archaeological information and documentation. A postgraduate course on “Treatment and analysis of archaeological material” incorporates an individual course on “Storage and conservation of archaeological documentation” that mainly deals with stratigraphic documentation.

The panorama improves if postgraduate and professional development courses are considered. The Universities of Valladolid hosts a master in museology and the University of Granada hosts a master in management of cultural heritage both having courses on IT applications to communication.

It seems that Library Informatics is more popular and there are several courses dealing with this discipline.

Finally, practically all courses are taught in Spanish.

The table below details the available courses with some reference to IT.

University	City	URL	Degree course	Subject/course title	Type
Universitat Rovira I Virgili	Tarragona	http://www.urv.es/	Graduado Superior en Arqueología (Graduat Superior en Arqueologia)	Informàtica i Estadística Aplicades a l'Arqueologia	Propio
Universidade de Santiago de Compostela	Santiago de Compostela	http://xescampus.usc.es/	Licenciado en Historia	Fundamentos de la Informática	Oficial
Universidad de Alicate - Universitat d'Alacant	Alicante	http://cv1.cpd.ua.es	Licenciatura en Historia	Sistemas de información en Arqueología	Oficial
Universitat Autònoma de Barcelona	Barcelona	http://www.blues.uab.es/	Doctorado en arqueología prehistórica	"acceso a las nuevas disciplinas científicas"	Dpctorate
Universidade de Santiago de Compostela	Santiago de Compostela	http://xescampus.usc.es/	Tratamento e Análise de Materiais Arqueolóxicos (PG)	Rexistro e Conservación da Documentación Arqueolóxica	
Unversidad SEK	Segovia	http://www.usek.es/sek/index.html	Graduado Superior en Ciencias del Patrimonio	Sistemas Multimedia	Propio
				Sistemas de Registro y Catalogación	
			Doctorado en Cultura y Comunicación en la Sociedad de la Información	Sistemas de información y documentación digitales	Doctorate
				Industrias culturales en la era digital	
Universidad de Córdoba Universidad de Málaga	Córdoba / Málaga	http://www.uco.es/ http://www.uma.es/	Doctorado en Recuperación y gestión del patrimonio arqueológico de la Prehistoria: Métodos y técnicas aplicados	Analisis territorial en prehistoria: los S.I.G.S.	Doctorate
				Introduccion a los Sistemas de Informacion Geografica	
				Gestion patrimonial: necesidad y funcion de bases de datos	
Universidad Rey Juan Carlos	Madrid	http://www.urjc.es/	Master en Nuevas Tecnologías Aplicadas al Patrimonio Histórico	(course planned)	Master
Universitat Politècnica de València	Valencia	http://www.upv.es/	Título Especialista Profesional Conservación y Restauración de Bienes Culturales	Sistemas de registro digital	PG
Universidad de Valladolid	Valladolid	http://www.uva.es/	Máster Universitario en Museología	Los museos y las tecnologías de la información y de la comunicación	Master
Universidad de Granada	Granada	http://continua.ugr.es/	Máster Universitario en Gestión Cultural	Tecnologías de la Información aplicadas a la Gestión Cultural.	Master

Sweden

Sweden has a national degree system, not fully EU compliant, although there is much discussion about moving towards a more standardised European system. Higher education in Sweden is provided in the form of courses. These may be linked to constitute degree programmes with varying levels of individual choice. Students are also able to more freely combine courses into a degree.

Sweden has a system of credits (poäng), where one week of successful full-time study equals 1 credit. One academic year usually yields 40 credits. One Swedish credit equals 1.5 ECTS (European) credits.

Degrees are divided into general and professional degrees. There are about 50 professional degrees in the fields of engineering, health care, agriculture, education, and fine arts etc.

The general degrees in Sweden are:

- *Högskoleexamen* (University Diploma) requiring usually two years of study
- *Kandidatexamen* (Bachelor) requiring at least three years of study and including a thesis..
- *Magisterexamen* (Master) There are two types of Master degrees

  A *magisterexamen med ämnesbredd* (a broad degree), obtained by a student who already holds a partial degree, after completing further course requirements, to be determined more precisely by the concerned higher education institution. The student shall have completed an independent project (degree project) within the framework of course requirements.

  A *magisterexamen med ämnesdjup* (a depth degree), i.e. Master of a subject, obtained after completing the course additional course requirements, with advanced studies and after completing an independent project (degree project) related to the main subject studied.

Both a Swedish Bachelors and Masters degree can make a student eligible for postgraduate/research study which usually last a minimum of 4 years.

Since most of the Masters and all the postgraduate studies are based on a dissertation, the flexibility of the Swedish system allows the student to combine different subjects and create interdisciplinary curricula. This is explicitly recommended, for instance, in some multimedia courses. However, some interesting courses are one on *Humanistisk informatik* at Uppsala Universitet and another at Göteborg on Archaeological Computing.

Availability of courses in English is good.

UK

The UK degree system is substantially the basis for the Bologna system. It has some differences, though, such as Foundation Degrees or the Honours degrees, with the possibility of having Joint Honours combining two disciplines.. The academic institutions have in most cases already established such joint degrees, but it is perhaps possible to create new ones simply by an agreement at university level. This is one of the advantages of the flexibility of the UK system.

Apart from this, it seems that there are two threads in UK concerning cultural heritage. One includes in training some kind of computer course, which may vary from a generic “Computer applications” to a more detailed list of different topics. The other is rooted in a traditional vision of the discipline and allows no space for innovation and technology. In general, visualization issues are not much present, with the exceptions quoted in the table below. Cultural Heritage courses are notable for their managerial/technological approach. Notable examples are the Glasgow archaeology courses, where it is prescribed for admission that students prove their literacy in computing.

There is then the York course focusing exclusively on computer systems in archaeology which is an exemplary case of interdisciplinarity, managed by an Archaeology department.

Another very good training offer is the set of courses provided by University College London.

Even in UK no specific course was found which addressed cultural issues from inside technologies.

It must be added, finally, that MA’s can be research degrees with individual planning of the content. A very detailed analysis would be necessary to categorise the content of such programmes.

The table below summarizes the results of the survey. Dubious cases, where it was unclear from the title and/or description if the module referred to IH applications or not, have not been inserted.

The degrees have been simplified in BA = 1st level and MA = 2nd level without the distinction B.A /B.Sc. and M.A./M.Sc. which is irrelevant for our purposes.

University	City	URL	Degree course	Subject/ course name	Type
Bournemouth University	Bournemouth	http://www.bournemouth.ac.uk/	Archaeological Resource Management	Theory and Practice in Archaeological Data Collection	MA
				Spatial Information Data Collection, Management and Analysis	
			Archaeological Science	Quantitative & Spatial Analysis	MA
University of Brighton	Brighton	http://www.brighton.ac.uk	Conservation of Industrial Heritage	Conservation of Industrial Heritage	M
			Histories and Cultures	Collections and the Making of Histories Navigating the Past (including Film and Video Archive and VR)	M
				Cultural Heritage & Sustainable Tourism	
University College London	London	http://www.ucl.ac.uk/	Archaeology	Archaeological data management	BA
			Archaeology	Archaeological Computing and Statistics	MA
			Archaeology of London	Geographic Information Systems in Archaeology	MA
			Cultural heritage	Databases in Archaeology	MA
				Digitisation and Museums	
			Museum Studies	Digitisation and Museums	MA
			GIS and Spatial Analysis in Archaeology	Geographic Information Systems in Archaeology	MA
				Model Building in Archaeology	
				Databases in Archaeology	
				Digital Mapping for Archaeologists	
			Managing Archaeological Sites	Digitisation and Museums	
				Geographic Information Systems in Archaeology	
University College Worcester	Worcester	http://www.worc.ac.uk/	Landscape archaeology	Geographic Information Systems	BA
			Archaeology and heritage studies	Reconstructing th past	BA
				Multimedia in context	
Durham University	Durham	http://www.dur.ac.uk/	Archaeology	Computer techniques in archaeology	BA
Liverpool University	Liverpool	http://www.liv.ac.uk/	Archaeology	Computer applications	BA
			Geography and Archaeology	GIS for archaeologists	BA
Glasgow University	Glasgow	http://www.gla.ac.uk/	Archaeological Methodology and Practice	Computer-based Data Management in Archaeology	MA/BA
				Computer-based Graphical Analysis in Archaeology	
University of Reading	Reading	http://www.rdg,ac,uk	Archaeology	IT & Quantitative Archaeology	BA
University of Wales at Lampeter	Lampeter	http://www.lamp.ac.uk	Cultural Heritage Management	Heritage Technologies (Database and multimedia)	MA

			Cultural Landscape Management	Practice of Landscape Archaeology (GIS)	
University of York	York	http://www.york.ac.uk/	Archaeology	Computer applications in Archeaology	BA
			(any MA in Archaeology)	Computer applications in Archeaology	MA
			Archaeological Information Systems	Data Storage and Information Retrieval	MA
				Data Analysis: CAD, GIS and Graphics	

B. Training needs

From the situation sketched above it is apparent that a significant number of the next generation of culture professionals will not have any computer skills taught in their courses at University. The lack of these skills is something the sector is facing now but derives from the past. If things do not change in academe this will be a perpetual struggle. Possibly, some improvement will come from the effects of a generalized computer literacy, Internet use, etc.

It is indeed from very basic computer levels that there are the major gaps in culture professionals' training. In a survey carried on at an EPOCH event with museum curators, practically all of them put basic computer applications at the first place as training priority for training, considering basic literacy as granted by the general advancement of computer use, especially among young people. They all stressed the importance of teaching these tools in an application context, i.e. with reference to problems they meet in their activity and not in general.

From this perspective, indications such as the simple mention of generic "computer literacy" in Italian curricula is welcome.

Another concern comes from the absence of IH heritage training in technological studies. This is something that needs further consideration and will be addressed by a specific survey aimed at technologists.

Examining briefly the different situations by country, national education systems – as far as the object of the present survey is concerned – can be classified (excluding those countries where heritage is not taught), as sociologists do, using the following bird metaphor.

1. **Hawks**. These are countries where several education institutions are far-sighted and are flying high and quickly changing the educational landscape, with little apparent effort. This seems to be the case of Greece and UK.
2. **Pelicans**. Countries where the academic institutions are apparently clumsy, as far as heritage training is concerned, but with resources in their beak and ready to fly. These seems to be where the heritage education systems of Germany, Austria, Denmark, Sweden and Finland are. All of these are countries where the university system makes provision for a quick shift, as already noted.
3. **Ducks**. They are swimming in a small pond, possibly making more noise than needed. It is necessary that they start thinking about their future as soon as possible. We would place here the heritage training systems of Italy, France, Spain, Belgium, the Netherlands, Ireland and Portugal. Some of these may turn out to be wild ducks and start a long flight, because there is in each of them at least one centre of excellent training that can take the leadership, as is the case of Belgium and Portugal. Others may turn out to be fat geese and unable to take-off.
4. **Sparrows**. Small countries with few and small universities. Cyprus and Malta higher education systems belong here. In their cases a small injection of energy can give great results. They are attentive and continuously look around them, ready to catch opportunities when they arrive. Perhaps Slovenia should also be classified here.
5. **Penguins**. The systems in this category are definitely unable to fly. Possibly they can find their own way of moving as penguins do by swimming, but at present their mobility is scarce and risks high, in a competitive situation. We would put in this group the heritage training systems of the Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia and Hungary. It is hoped that this a temporary classification and that they will move to better flocks.

The above sociologic-style description envisages a two-speed Europe and poses the challenge of reducing distances without slowing the flight of hawks. So such a description is not just amusing (or possible not even amusing), but it sets priorities for intervention, confirming the role of EPOCH in this regard and validating the actions undertaken in EPOCH's first training and bursary plan in the summer of 2004.