

## *IT profiles and curricula for digital libraries in Europe*

Anna Maria Tammaro  
University of Parma

Annamaria.tammaro@unipr.it

### **Abstract**

This paper examines the roles and competences of digital librarians and the trends of education for digital libraries in Europe. It puts two questions: What are the IT (Information Technology) profiles for digital librarians? How should they be educated? The analysis is based on the results of the European project *European Curriculum Reflections on Library and Information Science Education* and the proceedings of two Workshops on digital library education, held in Italy in 2005. Three approaches to education for the digital library have been described: 1) the emergence of the concept of “memory institutions”; 2) the library approach to information and knowledge management; 3) the IT isolation from LIS (Library and Information Science) schools. The roles of the digital librarian together with the structure of a course in digital librarianship, covering learning outcomes, competences and teaching methods is proposed, but further research is needed.

### **1. Introduction**

With the introduction of digital resources into libraries, recent years have witnessed an increasing need of positions with advanced skills in IT technologies. The labor market in Europe is now beginning to demand specialized skills, but there is a serious shortage of such skills, mainly due to the lack of formal (and informal) opportunities for education in Information Technology (IT) profiles suited to libraries. Library and Information Science (LIS) schools have a shared interest in the way in which to respond to a rapidly changing library environment for the impact of IT, and in particular their strategic planning about an uncertain future. The Bologna process (following the Bologna Declaration), an important factor stimulating innovation in course offerings, more transparency and employability, can be considered an external support for the design and implementation of education for digital librarians. In Europe at present the education for digital libraries seems almost entirely based on apprenticeship and on short continuing education courses, but a survey of curriculum offerings has not been carried out.

Weech (Weech 2005) gave an overall view the LIS digital librarianship education worldwide. In their 1999 analysis of LIS educational offerings worldwide (however, with the main emphasis on the USA) consisting of an analysis of the websites of LIS schools and a questionnaire survey, Spink and Cool (Spink and Cool 1999) concluded that most courses had no sound conceptual background. This was one of the reasons of narrow focus on technical aspects of building digital library systems. Later Tefko Saracevic and Marija Dalbello (Saracevic and Dalbello 2001) carried out a survey of digital library education in 2001. As a result researchers derived several broad models of digital library courses:

- 1) technology as a tool with an instrumental approach to ICT in the building of digital libraries and the focus on technological infrastructure and processes;
- 2) digital libraries as environments concerned with social and cultural environments digital libraries reside in;
- 3) the digital library as composed of objects with the main focus on the management of the life-cycle of documents and artefacts in the digital environment,
- and 4) a combined model that includes different perspectives on the subject.

Working on the results of previous research, a new inquiry was made by Anita Coleman (Coleman

2002), who indicates the danger of fragmentation of knowledge in education for digital libraries and emphasizes the need for an interdisciplinary approach to integrate digital library-related domains in computer sciences and LIS. In 2004, Yan Quan Liu (Liu 2004) carried out a survey to find out what was being taught regarding digital libraries by analysing course syllabi relating to education for digital libraries in North America, Europe and Asia. The survey results demonstrated a balance of theory and technology in teaching approaches, and the major differences in courses arose from whether the school took a 'hands-on' or 'hands-off' approach to digital library education. Some courses, labelled 'the Technocrats', involved the mechanics of computer architecture and programming to house the digital libraries of the future. Other courses, labelled 'Librarians as Guides' were teaching the technical side of digital libraries only in addition to the operational/user-oriented understanding of the potential of digital libraries, for example by incorporating aspects of digital librarianship with more traditional aspects such as library mission and collection policy.

At a research level, much has been written on the competences and skills of digital librarians<sup>1</sup>. Bawden (Bawden, Vilar, and Zabukovec 2004) affirms that competences are wide-ranging and include creating search strategies, evaluating websites, guiding and training users, integrating networked sources, analysing and interpreting information, creating metadata, imaging and digitizing, designing interfaces and portals, and project management. The author affirms that these competences can be acquired in traditional LIS courses. The main differences between digital libraries and 'traditional' or pre-digital libraries can be seen (Rowlands and Bawden 1999) as follows: (1) a change from ownership to access; (2) a change from known item access and physical browsing to search and navigation; (3) changing expectations of users.

The results of these studies, mostly realized in the United States, stimulate further research in Europe, in trying to reply to questions such as:

- What are the IT profiles needed in digital libraries?
- How to design a curriculum for a digital librarian?

The aim of this paper is to debate whether a "Learning Society" should invest more than previously to establish IT educational programs targeted at library professionals and what should be the content of such programs. The importance of supporting learning is a conceptual background which highlights the need both for external (i.e. adoption and exploitation of achievements and knowledge of other disciplines – computer science, archives, museums, multicultural studies etc.) and internal integration of knowledge within the LIS domain (i.e. digitization in the context of library social functions, user services, collection management practices etc.).

This paper analyses the results of the European project *European Curriculum Reflections on Library and Information Science Education*, coordinated by the Royal School of Library and Information Science. This project, in the framework of the advancement of the Bologna process (the reform of higher education in Europe after the 1999 Bologna Declaration), has produced a report on LIS curriculum after the Bologna Declaration. The report is the preliminary conclusion of the discussion initiated at the EUCLID Conferences in Thessaloniki and Potsdam<sup>2</sup>.

The need to identify and define the IT profiles and skills needed in libraries and information centers, and to propose a set of educational actions that could result in making those skills available in the short to medium term, was the aim of two Workshops held in Italy in 2005<sup>3</sup>. The proceedings

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<sup>1</sup> Ref. to: Sreenivasulu 2000; Chandler 2001; Prytherch 2001; Chowdhury and Chowdhury 2003

<sup>2</sup> EUCLID (European Association for Library & Information Education and Research) is an independent European non-governmental and non-profit organisation existing for the purpose of promoting European co-operation within library and information education and research.

<sup>3</sup> The Workshops were held in Florence in March 2005 and in Parma in October 2005. The first Workshop "Digital Library Education" was a joint project of the University of Parma International Master in Information Studies with the

of the two Workshops have been used here to define trends in education for digital libraries in Europe.

### **1.1 European background for digital library education**

Internationalization is becoming a key issue for Library and Information Science (LIS) education in Europe. The Bologna process framework, which guides the reform of higher education, means government support for combining the best educational experiences and expertise of European LIS schools and also for starting international joint courses. However, the apparently disparate nature of LIS educational programs in Europe constitutes a barrier to increased co-operation in the field. The European project *European Curriculum Reflections on Library and Information Science Education*, sponsored by the European Union, has been the first attempt to aggregate the result of discussions covering a very broad spectrum of views, perspectives and backgrounds from many different European LIS educational environments. In particular, information for digital library education has been found in the following report chapters: Digitization of cultural heritage, Information seeking and Information retrieval, Information/Knowledge Management.

Manžuch, Vatanen and Aparac-Jelusic ((Manžuch, Vatanen, and Aparac-Jelusic 2005) have identified two approaches in digitization in Europe:

- 1) a library-oriented approach, that focuses on the evolution of the system of knowledge, about concepts, processes, procedures, and tools related to the creation and maintenance of digital libraries;
- 2) a cultural heritage-oriented approach that provides an “umbrella” approach to fields that were earlier developing independently, i.e. library and information science, archival science and museology.

A third approach which can be identified is that taken by technologists, in which the subject Digital Library has been included in many computer science curricula. According to Weech (Weech 2005), the content of digital librarianship education in Europe is more technical than in North America.

Two different trends for digital library education can be recognised in Europe: the isolation of IT from Library fields and the convergence of libraries, archives and museums.

The problem of IT in profiles and curricula is common to the broader humanistic area and the discussion is not limited to librarians but could also include the specific needs of other communities (there is an ongoing discussion on Humanities and Computer). It is clearly an important 'European theme', though there are no uniquely 'European values' associated with it. Variations in practice, resources and perception in different parts of Europe may well influence curriculum content and development (Bawden 2005). Much of the research and education for digital libraries has up until now been done by computer scientists and research projects, such as DELOS (Casarosa 2005), with no relation to LIS schools. Isolation of ICT-related disciplines from such themes, such as the main library functions and roles in society, library services and operational processes etc. has resulted in internal fragmentation of automation topics within the LIS domain and

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University of Northumbria in Newcastle and the Scuola Normale Superiore of Pisa, the Oslo University College, Saxion University in Deventer and Tallinn Pedagogical University. The program has had the participation of Terry Weech from the University of Illinois (available at: <http://www.unipr.it/arpa/benicult/biblio/master/240305.htm>). The second Workshop “IT profiles and curricula for libraries” was organised by the International Master in Information Studies together with ELAG (European Library Automation Group) and DELOS, European project for research in the digital library (available at: <http://www.unipr.it/arpa/benicult/biblio/master/131005.htm>).

lack of communication with computer scientists. Both at a research and practical level the consequences are a concentration on narrow purely technological issues in LIS curriculum and the production of applications or services that don't meet the real needs of society (e.g. digitized collections on the Web, accessible to all but at the same time not usable because of inconsistency with the needs or the level of users' skills; sophisticated cultural heritage applications that don't consider the social, economic, cultural factors of real-life situations etc.). Surely, IT profiles are at different levels of technical and management qualifications and they require an in-depth rethinking of the role and competences of the digital librarian role. The participants at the Workshops in Italy have identified the profiles of System Librarian, Library Manager and Digital Librarian (Spinello 2005). However, it is necessary to envision the digital library not only in terms of a technological infrastructure but also as a set of services (e.g. educational, services for communities of interest, support for scholarly activities etc.) that build on certain managerial decisions and economic models and are intended for specific user communities (e.g. occupation-, age-, culture-related communities etc.) and offered in specific institutional settings (e.g. museums, archives, libraries and their networks) (Manžuch, Vatanen, and Aparac-Jelusic 2005).

We can affirm that the convergence of Archives, Libraries and Museums (ALM) is the approach which characterises the evolution of digital libraries in Europe. Digitization became a pre-requisite for closer co-operation among museums, archives and libraries, which are increasingly being treated collectively as memory and cultural institutions, thus highlighting their common functions and roles. From the user point of view, collaboration between memory institutions brings multiple benefits because it provides a holistic view of human knowledge preserved in libraries, museums and archives. However, from the theoretical point of view, the convergence of memory institutions is problematic since for historical reasons, these cultural institutions have developed different disciplines. There is the need to find a common theoretical framework, to focus on similarities between different disciplines. Manžuch, Vatanen, and Aparac-Jelusic (Manžuch, Vatanen, and Aparac-Jelusic 2005) considering the complex and multilateral nature of studies in cultural heritage, use the term of "communication of memory" for the ALM approach as a conceptual background to contextualize the development of digitization courses and integrate them into the general body of LIS knowledge:

"The communicational aspect refers to the ways memory is shared between human beings in time and space by employing 1) codes to express it (e.g. language), 2) media to transfer meanings (e.g. books, compact disks etc.) and 3) channels which are used to spread meanings (e.g. telephone, computer networks etc.). Communicational and social aspects of memory are interrelated: on one hand, the social role of memory to serve the interests of the present resulted in political, economical, cultural impacts on its communication and on the other hand codes, media and channels used to transfer meanings of memory shape its perception".

The ALM conceptual framework is based on the traditional role of cultural and literary mediation of professionals but is also directed towards interdisciplinarity and to an extension of roles such as facilitator, educator and other socially active roles in Learning Society.

A more library-oriented approach to technological issues includes mainly aspects of information/knowledge creation, acquisition, organization, storage (technology), seeking, accessing, dissemination, use, sharing, and learning in a complete cycle. (Widén-Wulff 2005). Information Management education in LIS is a field that has undergone rapid development owing to its connection to technological aspects and the emerging and growing interest in intellectual and human capital in organizations. The traditional role of information specialists and information managers as administration of information resources and technology, knowledge organization, and collection management, can all be referred to as information management skills. However, the Knowledge Management initiative has drawn attention to skills of such importance as

communicative, pedagogical or facilitation skills. In doing so, of course, it has simply taken over other initiatives that have been pursued in organizations, from ‘organization development’, to the ‘learning organization’. In this approach technology is seen as socially embedded (Audunson 2005) and the digital library can be an informal classroom for e-learning, focusing on literacy and communication.

## **2. What is a digital librarian?**

What is a digital librarian? There are contrasting opinions on this question as there is no agreement on the definition of Digital Library (DL). A widespread point of view, that has been repeatedly presented by computer scientists, advocates that DL should enable any citizen to access all human knowledge anytime and anywhere, in a friendly, multi-modal, efficient, and effective way, by overcoming barriers of distance, language, and culture, and by using multiple Internet-connected devices. With the advances in automatic classification, automatic indexing, automatic metadata extraction, and the availability of services such as support of annotations, personalization, multilinguality - just to name a few - that future seems to be rapidly approaching. At such a stage we could find it difficult to justify the need for libraries and librarians, since “all” information is available on line, and “all” the services are provided by clever software tools. Disintermediation, that is based on the easy access to digital resources without an intermediary, is threatening the library professionals who need to focus on re-engineering their role. Another definition is that of the Digital Library Federation (2003) which defines digital libraries as follows:

“Digital libraries are organisations that provide resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities”.

The participants of the Workshops in Italy discussed both DL visions: the first, information technology based, leads to a disintermediated approach to information access and a librarian is no longer needed; the second, library-based, urges an innovation of the traditional background for the digital librarian. According to participants’ opinions, the competences, skills and roles of the digital librarian vary, and were recognised as dependent on the specific type of the library or information center in which the digital librarian works. The results of the discussions were that the use of IT extends the core roles of the librarian, or helps him/her to carry out these roles better. Defining the role of the digital librarian, the Workshops participants defined it as:

- a bridge between digital resources and users (the traditional role of literature mediator, also remotely);
- an agent of innovation, of citizenship, of information literacy etc. (the concept for the digital librarian as a facilitator of learning, a mentor, as a friend of the user, as a personal trainer who guides the user);
- communication skills are important for the social role of the librarian which is still prominent, and even more so in a digital environment (the concept of a social role, for active citizenship and social inclusion in the Learning Society, also the collaboration needed with stakeholders);
- pedagogical skills are enforced in a digital environment (the role of educator, teaching digital librarian) – the concept of the digital library as a virtual classroom.

The facilitator and the educator roles of the digital librarian have been especially stressed. The museums, archives and libraries (ALM) sector is of fundamental importance in helping people to study and to learn, and increasingly, the ALM sector is becoming more active in the promotion of, and assistance with learning, rather than being a somewhat more passive resource for the already educated to use. Museums, archives and libraries have always had a role in mediating between their

content and their users, and communicating their content, but the tone of communication, and the manner of mediation are now changing into an educator role. The fundamental aims and objectives of social inclusion, lifelong learning and access, sit perfectly within ALM sector (Parker 2003).

The traditional role of the librarian as publications intermediary has been extended by the opportunities of IT, to achieve roles such as: Cultural /Literary mediation, Facilitating Learning/ Information Literacy, Social role/policy. For the realization of these roles, the metacategories included in the work of the digital librarian are as follows (Illustrated in Fig. 1):

User and Communities: core competencies were identified in applying research methods for user studies. User needs and user-centered design are topics that combine knowledge from different fields: Library and Information Science (LIS), Marketing, human-computer interaction. This theme covers two main dimensions: 1) the knowledge of determining target groups of users and their needs in order to develop appropriate services, and 2) the knowledge how to make these services usable and accessible in a technological environment, relying on the diverse factors of context of use (e.g. user features and abilities, aims and tasks, equipment, working conditions etc.)(Manžuch, Vatanen, and Aparac-Jelusic 2005). Defining user needs and the development of usable and accessible services in the digital environment is related to different stages of the digitization cycle, ranging from planning, development, quality control and assurance, access. Most prevalent are studies of performance assessing, effectiveness and/or efficiency that usually help in deciding about design or operations of the digital library. Also widely conducted are studies of users' behavior such as information seeking, browsing, searching as well as assessment of different features (e.g. use of portals).

Multicultural context: Modern societies, shaped by the consequences of globalization, are increasingly becoming multicultural. Digitization of cultural heritage in particular refers to the dynamic and evolving interdisciplinary epistemology of knowledge, that encompasses philosophical, social, cultural, economic and managerial aspects and consequences of management of cultural heritage in the technological environment (Manžuch, Vatanen, and Aparac-Jelusic 2005). European integration is based on the vital function of memory, which allows diverse communities to define their uniqueness and boundaries in the mosaic of other communities, understanding the multicultural context (Manžuch, Vatanen, and Aparac-Jelusic 2005). It also includes legal and economic issues in scenarios such as cultural tourism and economics of culture (Melorio 2005). Economics of cultural heritage comprise both the value of the culture, the aspect of delivery income and dissemination of cultural heritage, and the aspect of processing cultural heritage in an economic manner.

Management and collaboration: Management of projects, programs, resources and people are an important task of the digital librarian. Strategic planning of the digital library involves producing necessary decisions in order to develop sustainable projects that meet user demands. In comparison to other subjects, strategic planning of digitization initiatives is the most dispersed and implicit domain based on knowledge and skills aggregated from other disciplines. An institution, undertaking a digitization project, should be ready to evaluate all positive and negative factors surrounding the initiative. Sustainability is ensured by thorough assessment of several aspects: relevance of the initiative to the mission of the institution, its position in the set of existent services, capabilities for long-term financial support, and a long-term programme for maintenance of digitized sources (Manžuch, Vatanen, and Aparac-Jelusic 2005). Ashcroft (Ashcroft 2005) affirmed that collaboration skills are highly important for digital libraries. This may have commenced with the process of consortia purchase for e-journals, but now continues with the purchase of e-books and other e-resources. Whilst consortia purchase increases purchasing power, it also facilitates expertise sharing, both with regard to other libraries and their staff within the consortium, and also

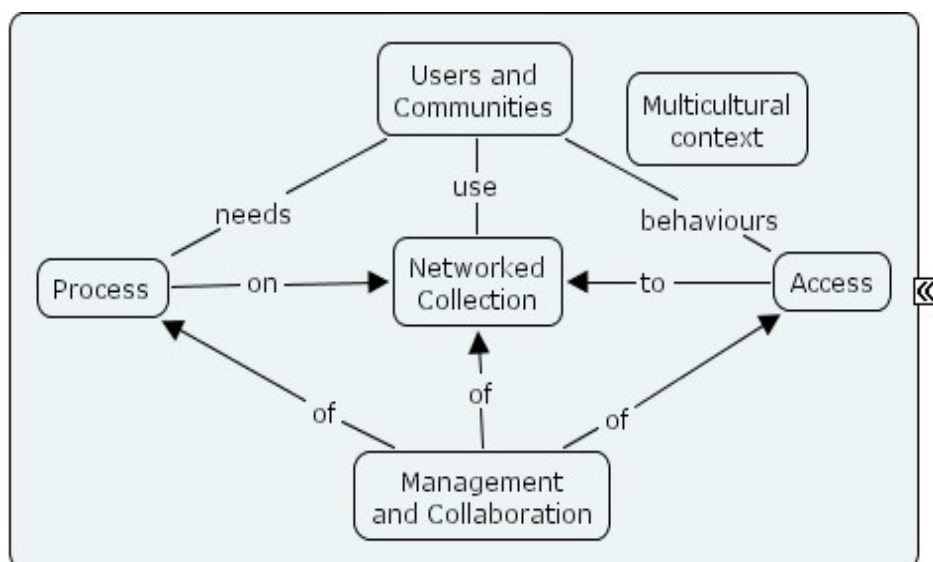
in areas such as the marketing expertise of suppliers. The requirement of good collaboration skills increases with the number of different parties – the variety of different organisations and people with whom to work and in light of the many different aspects to such purchase (Ashcroft and McIvor 2001). This indicates the importance of collaboration between library staff and academics also, for interaction between library staff, teachers and students in developing learning objects and contents for e-learning from the library collections (Budin and Budin 2005). Negotiation skills, marketing, customer satisfaction, fund-raising and e-commerce are also important for digital libraries (Melorio 2005).

Networked collection: The networked collection concentrates on digital documents of enduring value (artifactual features, historic importance, intellectual content), fulfills the needs of preservation, and conservation or 'rescue digitization' (the term used when digitizing rare documents that are suffering from continued use), increases demand for accessing the collection. The digital library might provide significant support for research and instruction, elementary school education, lifelong learning, leisure, promotion, cultural tourism, improvement of access to or preservation of cultural heritage, as well as reinforcing a shared national consciousness and informed citizenship be linked to economic growth and job creation (Manžuch, Vatanen, and Aparac-Jelusic 2005). Thus, the selection process will depend upon the main purpose of such projects, availability of cultural heritage items, financial support, staff etc. There is a shift from holding to access and this move urges an increasing demand for a collection policy and criteria that are applied to help in building a sustainable digital collection, improve access to it, make key contents more widely available. The concept of information, documents, and collections should be combined with a knowledge of mark-up languages and Unicode.

Process: Whilst it is clear that technology skills are needed for digital libraries, the traditional core skills are also required (Ashcroft 2005), such as analysing, evaluating and cataloguing information, enquiry work, user education, training and facilitating and customer service. Not one is redundant – although they may need to be applied with a different focus. Cataloguing and classification skills have much relevance to the Web. Diversity of the resources, problem of describing textually non-textual entities, subjectivist valuation of cultural heritage, multiplicity of interpretations, paradigmatic changes in related disciplines, cultural diversity and broad scale of user needs are only a few of the issues hindering the development of efficient schemes. In addition a more thorough knowledge of the major schemes and their working principles is required to allow a person to adapt and accommodate existing metadata schemes to use, and to possess the basic expertise to construct new schemes (Manžuch, Vatanen, and Aparac-Jelusic 2005).

In spite of the generally non-technical focus of LIS studies, an information specialist needs a thorough understanding of the available technologies and their implications on the management and the sustainability of information assets (Manžuch, Vatanen, and Aparac-Jelusic 2005). A technological background refers to the specific techniques, which are used to convert original materials to digital form (i.e. digitization), the techniques of converting digital materials from one format to another, plus storage and preservation issues. Technical aspects involve adequate means to ensure the integrity and reliability of such conversion and to store digital material in a sustainable manner with adequate emphasis on both technical and organizational aspects. At present the central problem of storage from a technical point of view is the lack of reliable data on the physical tenability of diverse digital storage media and the need of preservation. The task of the digital librarian is to be sure not only to react to a sudden new demand, but to also consider medium and long term planning (Felfoldi 2005). Quality control and assurance of digitization of cultural heritage is seen as a process of checking and rechecking of the quality, legibility and accuracy of the content, user access methods, technology used, delivery media, and new formats for preservation of digital cultural heritage (Lunghi 2005).

Access: Access to and safeguarding of the digital library increasingly depends on information and communication technologies. Information organization, system architecture and delivery perspective of digital assets resides in the crossroads of broader discussions on the LIS perspective of information dissemination and related disciplines of communication and publishing. Knowledge of programming fundamentals, and relevant technology for websites, data bases, content publishing, and related net technologies and protocols etc., are needed for the digital librarian (Felfoldi 2005). From the cultural heritage digitization viewpoint the notion of delivery concerns technical and policy issues relating to the effective and efficient dissemination of digital information in context. Management of cultural heritage resources, developing services to different communities is influenced by technological environments and tools, which outgrew the mere function of communication channels and devices and came to occupy a social and cultural space. The major task of modern library and information specialists is to explore and adopt in a creative way opportunities that are offered by information and communication technologies to create services that meet user demands (Manžuch, Vatanen, and Aparac-Jelusic 2005).



*Fig. 1 Meta-categories in digital librarian tasks*

There is a need for the digital librarian to become more competitive with other professionals and to modernise services: this has an impact on staff development at all levels. The digital librarian should have also other personal and professional competences such as:

Communication skills are vital (Ashcroft 2005). Online communication is essential and, while demanding a different approach, has to be effective with a range of people who have different levels of IT skills. Communication skills are needed for every aspect of digital libraries and, in connection with the increasing range of players involved, spill over into collaboration and negotiation skills.

Learning skills (Dixon Digital library education: Reflection. 2005). The digital librarian must be committed to continuous learning and lifelong improving of skills in all areas of digital applications, services etc. He/she must be willing to learn, willing to meet the need of users who have high expectations and are used to high quality.

Making judgements (Dixon It competences and curricular issues: A university perspective 2005). The digital librarian should employ all aspects of reflective expertise in appropriate ways, with a



developed awareness of inter-relationships and a highly developed awareness of values and value-systems in order to be able to work effectively in areas of value-conflict.

The need to respond effectively to European demands for increasing investment in lifelong learning and associated programmes has implications for the development of all staff, but particularly those working in ancillary roles, who may have the potential to return to learning. There is a need to learn how to work in partnership with other organizations, to secure funding, to avoid duplication and to strengthen the response to the challenges of change. Parker (2003) has listed the skills that were clearly identified as being necessary to all ALM domains and they were:

Communication, ICT, Management, Teaching, Learner Support, Exhibition, Presentation, Fund-raising, Finance, Advocacy, Research, Public Relations, Marketing, Time Management, Evaluation, Project Organization, People Management and establishing links and partnerships with other organizations.

A inquiry into an education and training strategy for the ALM sector was commissioned by Resource in UK: *Towards a Strategy for Workforce Development* (Usherwood 2002). The three domains were at different stages of development. Librarians in the UK had rapidly developed their ICT skills due to investment in training by the central Government. The curriculum for librarians in the UK covers basic management skills but this is not so for archivists or curators. There are a small number of archivists in comparison with the other two professions, and this has an effect on the opportunities they have for staff development. Curatorial staff are much more aware of the learning role that museums have and have developed the role of educator to a greater degree than the other two domains. Libraries and archives, to some degree, have been more passive and less proactive in formalizing and making their educational role explicit. These research findings identified skills gaps and shortages in a number of areas including ICT, new ways of working, customer care, commercial skills, 'new agenda' skills for learning and inclusion, communication and interpersonal skills, team work, leadership and management. A number of barriers to developing the existing workforce were identified, and these include time, money, lack of information and guidance and lack of reward. However, the most significant barrier to workforce development which the sector needs to face is organizational culture. The major education and training issue that has emerged from the inquiry is that of leadership skills, as all three domains have an ageing professional staff and middle management staff who can lack management skills. (Usherwood, 2002).

During the final session of the Workshop *IT profiles and curricular* for libraries, a matrix has been developed, trying to put together roles and competences of the digital librarian. The matrix (see Tab. 1) has on the x-axis 3 core roles of the digital librarian and vertically – some of the most important competences of the digital librarian. The idea is to go further into the matter and to put a grade (1-6 scale) of each competence for each role in order to define the importance of the competence for the role.

Tab . 1 Matrix of IT curricular for digital libraries

	Roles	Cultural mediation	/Literary	Facilitating Information	Learning Literacy	Social role/ Policy
<b>Competences</b>						
<b>Information technology (IT)</b> Inf. Architecture Information retrieval Web-publishing Digital document, XML Database theory Networking Human computer interaction Evaluation of information systems Technical troubleshooting skills etc.						
<b>Knowledge/Information Organization</b> Indexing Thesaurus Information Retrieval Collection development Evaluation of Information Resources						
<b>Multicultural understanding</b> Research methods Library management Human resources management Users and uses of digital libraries Cultural heritage and digitalization Library in a multicultural information society Collaboration and consortia Mediation of culture in a European context						
<b>Epistemology</b> Knowledge concept Constructivist and positivist approach Library and society in a historical perspective						
<b>Knowledge Management</b> Learning processes Internet communities Communities of Practice						
<b>Promoting social processes</b> Information Society. Barriers to the free access to information Reference work User education Information literacy Customer services and marketing						
<b>Web-based Literary Mediation</b> Electronic publishing Scholarly communication Copyright Economics						

### 3. How to design a curriculum for the digital librarian?

In order to cope with the challenges from new technology and compete with other professions, LIS education will have to change. While many library schools in Europe offer courses or modules designed to prepare professionals for work in a digital library program, few, if any, do so in a systematic and comprehensive manner. The proposal of a theoretical and practical framework for digital librarian education was the general aim of the two Workshops promoted by a consortia of European LIS schools and research institutes in 2005 in Florence and Parma.

The goal of the Workshop *Digital Library Education* was to help to formulate the essential elements of a digital library curriculum or training program, focusing upon theoretical knowledge and practical skills. The speakers covered the topic from a variety of perspectives<sup>4</sup>.

The goal of the Workshop *IT profiles and curricula in libraries*, jointly organised with DELOS and ELAG, was to focus on IT skills and to gather data on the skills and knowledge needed to work in digital libraries and to determine what librarians need to know about technology in order to work effectively with IT professionals<sup>5</sup>.

The major result of the two Workshops was the discussion on how the digital librarian can be educated, concerning which comments and suggestions were collected from the audience and presented here classified in themes. The final session of the second Workshop was able to outline a matrix (see Tab. 1) of roles and competences of the digital librarian and draw some conclusions, for further research.

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<sup>4</sup> The Workshop was introduced by the key note speech of *Terry Weech*, who gave an overview of research and teaching of digital library worldwide. *Aban and Gerhart Budin* concentrate on e-learning, another field created by web technology. Their topic is the role of librarians in providing e-learning environments for students and teachers. In their presentation, digital libraries are enabling tools for e-learning and knowledge management. The problem is that neither librarians nor libraries are prepared for their new roles. They present examples from continuous education in their home country Austria, and list the content of these courses. *Aira Lepik* and *Ton de Bruyn's* presentations concern other local perspectives on LIS education. *Aira Lepik* gives an overview of the NORSLIS (Nordic Research School in Library and Information Science) project, a collaboration among the Nordic and Baltic countries in offering Ph.D. education. NORSLIS started up in 2004, and will go on until 2008. NORSLIS is a very good example of internationalization in European education, and projects like this will be of great help in developing digital librarianship education and research customised for Europe. *Ton de Bruyn* presents reforms in higher education in another European country—the Netherlands. The reform is a model of competence learning, reducing complexity in earlier pedagogical models. *Pat Dixon* said that the Web and digital libraries provide librarians great opportunities to use their skills in new environments. LIS has a strong tradition in knowledge organization which is necessary for the creation of valid and usable digital services. This means, as underlined by *Linda Ashcroft* on the second day of the workshop, that core skills in cataloguing and classification must not be ignored. These are unique competencies that are an important means in professional competition. However, to be able to examine the possibilities in the digital environment and create new services, LIS education must also provide sufficient skills on how such technology works. Current examples are XML and different standards and protocols needed to create interoperable services. This will give librarians the skills to work in digital libraries, but also enable librarians to find new work tasks outside libraries.

<sup>5</sup> The Workshop was articulated into two parts. The first part presented an overview of the present status in educational issues on IT technologies for libraries and recent trends in research for the digital library. Following *Anna Maria Tammaro's* introduction (University of Parma), *Vittore Casarosa* (DELOS) spoke about Digital Library Technologies, stressing the weak communication between technicians and professionals. Later *Paula Gossens* (ELAG) delineated the history of ELAG, giving evidence of the importance and richness of its past 25 years Conferences archives. *Maristella Agosti* (University of Padua and DELOS) illustrated the DELOS educational activities and also the University of Padova Libraries training programme for the shortening of professional skills. *Ragnar Audunson*, EUCLID President, concluded the first session, with a definition of new and traditional roles of libraries and the technological impact. The second part presented experiences and case studies on skills and competencies in the digital environment, presented by *Pat Dixon* (University of Northumbria), *Krasi Anguelova* (University of Sofia) and *Keith Nairn* (Master's student of the University of Northumbria) and *Annalisa Spinello* (Master's student of the University of Parma).

### 3.1 Course level and delivery

Education for digital librarians should be at all levels (basic, specialistic and continuing education) and includes all modes of delivery. Focus on information in a hybrid library goes from holding to access, there are still many barriers to using information, people not technology representing the most important issue: this complexity urges offering specialistic courses at Master level for digital libraries (Dixon It competences and curricular issues: A university perspective 2005). The target of digital library courses includes both students and qualified librarians in employment. Regarding staff already employed, there is a gap between what librarians are and what they need to be. Participants stressed the need of further education and part-time courses (Agosti 2005), also on a distance learning basis. It is vital to adapt the content, the level and the goals of further education for librarians to their respective age, cultural and social position, cultural as well as educational background. In order to ensure utmost motivation and further implementation (Budin and Budin 2005) recognition and credits accumulation are also important ((Melorio 2005).

### 3.2 Additional or integrated LIS courses

An additional offer of courses for digital library seems to be the favourite choice. Adaptation to the digital information environment demands considerable re-education and learning for the digital librarian with new combinations of experiences and skills (Anguelova 2005). Graduates of today's schools find employment in the insurance industry, the film industry, the software development business, and other businesses created or transformed by the revolution in information technology. Considering this diversification in the professional prospects of graduates, and challenged by the growth of information science in other schools of the university, library schools should re-define their roles and curricula. The integration into academic LIS curricula could be also realized but the curricula must be flexible enough to support many different career tracks, and libraries are but one such track (Audunson, Nordlie, and Spangen 2003).

Tor Dahl (Dahl 2005) stated that professional work and control over work tasks are the focus points in Andrew Abbott's theory of the system of professions (Abbott 1988). Abbott calls the link between a profession and its work tasks *jurisdiction*. Professions are defined by their work tasks and the system of professions changes by interprofessional competition for jurisdiction over work tasks. New technology is the most important disturbance to the system, and can open new task areas and destroy others. Some professions may even become extinct as an effect of technological development. Librarians' work has through history been challenged by technological development many times before—especially by the introduction of computers. According to Abbott, librarianship has always been able to adjust to changes, and in effect librarians have gained from modern technology. Some work tasks in their jurisdiction have become more or less extinct (like maintaining card catalogues), but librarians have become the experts on using the new tools being developed (librarians are the experts on database search and retrieval). Librarians and computer professionals are involved in developing digital libraries, as they are in many of the work tasks defined or constructed in general by new digitization and networking technology. Some would say they are collaborating. Using Abbott's model of professional development, we could say they are competing for jurisdiction over the new work tasks.

According to Terry Weech (Weech 2005), computer science took the initiative in digital libraries education in the 1980s. LIS education has been a follower, not a leader in the field. Digital libraries courses and programs were introduced in the late 1990s and LIS education is now trying to define the core skills necessary to work in digital library environments and to collaborate effectively with IT professionals. An important conclusion that is prompted by most surveys is that digital library education suffers from the lack of a holistic approach to the digital library as a phenomenon that integrates social, cultural, economical, political and technological perspectives. It seems that a multi-lateral vision of the digital library, covering such components as technological infrastructure,

collections, communities of users, services, institutions, is the most suitable solution to the problem of integration of digital library knowledge into general LIS agenda (Weech 2005).

### 3.3 Balancing theory and practice

The issue of theory vs practice and of academics prospective vs vocational education was one of the main focus of the discussion. Regarding the orientation of the LIS programmes – professional / academic / research – the Bologna Declaration mentions that higher education courses shall be relevant to the European labour market as an appropriate level of qualification. The labour market orientation urges including in the educational system and also in didactic methodology experiential components, such as internship, and facilitating placement. The need of developing meaningful internships and other practical experiences for educating digital librarians was stressed, thus offering students an introduction into real life situations.

However the issue of theory versus practice is not limited to the internship period and placement. A different orientation of the curriculum on competences and learning outcomes is needed. In curriculum development and delivery the focus on competences and learning outcomes –generic, academic and professional– is going to have a relevant role in the Bologna process (Tammaro 2005). Competences are important at the undergraduate level and also for Master's degrees, when they are professionally oriented. The Dublin descriptors (together with the European Qualification framework in development) could guide teachers and students in improving learning quality. The word '**competence**' is used in the Dublin descriptors in its broadest sense, allowing for graduation of abilities or skills:

- Domain specific competences: they include general knowledge and abilities related to the domain;
- Special competences, including the core knowledge, principles and methodologies related to the sector;
- Transversal competences which include an academic orientation for professional skills such as Communication, Learning skills, Making Judgements.

Ton de Bruyn (Bruyn 2005) explained the differences of concepts as general competences (as applied in the Dublin descriptors) and specific competences, describing the Dutch experience of LIS courses re-engineering.

### Conclusion

For the purpose of this paper, the current education trends for the digital library have been reviewed, limiting the analysis to the results of the European project *European curriculum reflections on library and information science education* and the proceedings of two Workshops held in 2005.

The suggested educational model is based on a multi-layered concept of communication of memory that reflects the complex nature of cultural heritage phenomenon and foresees the synergies between LIS, archival science, museology and computer science. Another educational model, more library-based, has the Knowledge Management approach as its conceptual framework and is integrated into the existing LIS courses. The structure of a course in digital library, covering learning outcomes and competences, teaching methods is proposed, but further research is needed.

In conclusion, the educational models for the digital library in Europe are affected by the main trends in relevant research for digital libraries, which are moving from the stage of isolation of IT from LIS schools to the transition from a purely technological approach to the appreciation of social and human aspects in studies of cultural heritage.

