Information Literacy (IL), supervising and research

By Gunnstein Akselberg

1. Introduction

Today universities and colleges spend considerable sums on electronic resources that give access to knowledge in all fields of study. We now have boundless access to all the knowledge in the world via electronic resources, and the cost of the technical equipment, updates, maintenance and subscriptions needed to access these resources is steadily rising.

Access to international databases is necessary to carry out work on the international research front. The resources are there, but what we are lacking today is adequate skills in accessing, using and evaluating all this knowledge. We must therefore train users – i.e. researchers – to be better at finding and evaluating the knowledge that is available.

For this reason, we must invest more in IL training in the academy, from the beginner's level to the highest academic level, the PhD degree. At the basic level, most academic staff can contribute to IL training. At the PhD level, advanced use of knowledge and advanced training in IL are required. Academic institutions must therefore put more into IL training. By doing so, we will considerably increase research productivity and improve the quality of research.

This paper examines links between IL, research productivity, and research quality. IL has the potential to both increase productivity and raise the quality of academic research. At all levels of research and in all areas of IL, there must be close collaboration between faculties and libraries. It is important that research and the teaching of IL should be seen as the shared responsibility of faculties and libraries. All research training and teaching should be a common concern.

2. Focus on research supervision

Several conceptions and definitions of information literacy have become prevalent.

In the present article, which focuses on research and IL, I will base my account on the definition given in the Final Report of the American Library Association's Presidential Committee on Information Literacy which specifies that ' To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information' (1989). A researcher must therefore be able to recognise when information is needed and have the ability to locate, evaluate, and use effectively the needed information in all the different stages of the research process. The libraries and the faculties must join forces to pursue this goal.

My account focuses on the manner in which access to information literacy may improve the quality of the research process and the research results at the universities. I will link my discussion on access to information literacy to three main actors: academic libraries, faculties and researchers. I will, in particular, focus on the role of the academic libraries in the dissemination of information literacy as these libraries have always been some of the most important disseminators of information literacy and its usage, as will in all probability be the case in the future. My discussion is based on my own research experiences within the field of the Humanities as a linguist and as Dean of the Faculty of Humanities at the University of Bergen. I also draw on my experience with and knowledge of the Arts Library at the University of Bergen.

The main focus of this account will be the research process at the master's level, and especially at the doctoral level, at which the perspective on the education of researchers is central. I will view the relation between the research process and information literacy in the light of a book by Mari-Carme Torras and Tove Pemmer Sætre called *Information Literacy Education: A process approach. Professionalising the pedagogical role of academic libraries* (Torras/Sætre 2009). Their book is central in this context as it promotes the professionalisation of the pedagogical role of the academic libraries with regard to education and research. Their suggestions will, however, to a great extent challenge the current role of the academic libraries and their staffs. The libraries and the employees themselves must, among other things, establish new relations with the academic and faculty staff and the academic communities.

3. Three central actors

It would be natural to link the discussion on the research process with emphasis on information literacy to three central actors: academic libraries, faculties and researchers.

3.1 The academic libraries

The academic libraries play a central role with regard to information literacy as they administer a great wealth of knowledge (books, periodicals, newspapers, pictures, documents, manuscripts, audio records, videos, electronic databases etc.). They disseminate large quantities of knowledge in addition to helping users to navigate their way to the information needed among the sources they administer and have access to. The provision of help and services has always been one of the most important tasks of the academic libraries. The academic libraries help the researcher to navigate his or her way around the great wealth of knowledge in order to find the information required. The libraries have always been knowledge centres in which to search for and retrieve information, as is the case today.

Torras and Sætre (2009) argue for a change with regard to the role of the academic libraries. These libraries should not only be depositories of knowledge where one has access to knowledge and where researchers are given advice on how to find relevant pieces of information, but also places where students may apply knowledge and work on scientific texts. The libraries must become study centres, learning centres or learning arenas. This particular facility has been developed many places in that students and young researchers work at the libraries in the immediate vicinity of the sources. Torras and Sætre do not focus merely on turning physical depositories of knowledge into learning arenas. They also believe that the academic librarians should not only provide services, but also be in charge of pedagogical tasks related to information literacy education, i.e. the teaching of access to and use of information literacy. Torras and Sætre would also like the academic librarians to function as supervisors for students in the research process. A professionalisation of the staff will be the result of training employees to be in charge of new tasks related to education and research. The professionalisation of the academic librarians is the goal of the book written by Torras and Sætre. The academic libraries are autonomous academically and administratively.

3.2 The faculties

The responsibilities of the universities are threefold; research, education and dissemination. This is the academic side of the universities. The faculties represent the academic side through departments and their respective academic communities. Information Literacy is a prerequisite for good and efficient research. Consequently IL must be available to students and faculty researchers at the level of departments and academic communities. The faculties consist of an administrative and an academic side. The departments represent both sides. The administrative side should support academic

activities including the promotion of Information Literacy. Presently the faculties – represented by the departments and various academic communities – lack sufficient knowledge of and insight into Information Literacy. Knowledge of IL faculty-wise is fragmented and unholistic. Today the faculties of the University of Bergen cooperate increasingly with the libraries in connection with introductory meetings for new students related to IL. Apart from these meetings the cooperation on the dissemination of IL is rather random. It is therefore necessary to strengthen the cooperation between the faculties and the libraries in this regard. This must be incorporated into the formal curriculum – as recommended by Torras and Sætre – the question is how.

3.3 The researchers

Research is carried out at different academic levels at the faculties. Papers are written at the Bachelor level (the first cycle according to the Bologna process). However, most of the research takes place at the Master's and doctoral levels (the second and third cycles) in addition to research carried out by permanent academic staff. In this particular context, the second and third cycles are topical, and the focus is therefore on the connection between the education of researchers and access to knowledge related to Information Literacy.

4. Research and research processes

4.1. Information researching and writing processes

Torras and Sætre look upon the research process as an overarching process incorporating information searching and writing activities (63 pp). Information searching is a process that intertwines with their writing process. The writing process is seen as phases of work from the choice of topic to the submission of an academic text (Dysthe et al. 2000:39). Torras and Sætre base their account on a model of the postgraduate research process in humanities and social sciences proposed by Handal and Lauvås (2006) (Torras and Sætre 2009:63pp). The model illustrates six phases: choice of topic, defining research question, reading/data collection, draft writing, draft rewriting and editing and closure.

Choice of topic	Defining research question	Reading Data collection	Draft writing	Draft rewriting and editing	Closure

Figure 1. Phases in the postgraduate research process in the humanities and social sciences (Torras and Sætre 2009:63)

Torras and Skagen (2006) show how the six stages of the information searching process , described by Kuhltau (2004:44), relate to writing activities – and other activities like reflecting on research ethics, evaluation of sources and referencing in the totality of the research process, as do Torras and Sætre (2009:65).

Information search process (Kuhlthau, 2004)		Writing actions	Other actions or strategies
Stage 1	Task initiation	Brainstorming Mind mapping Writing 'for thinking'	Reflecting on research ethics
Stage 2	Topic selection		
Stage 3	Pre-focus exploration	Annotated bibliography First outlines Project statement	
Stage 4	Focus formulation	Listing and structuring keywords	
Stage 5	Information collection	Draft writing Writing 'for presentation'	Critical evaluation of sources Referencing
Stage 6	Search closure	Conclusion writing Final writing up	Ethical use of sources Presenting one's work

Figure 2. Information searching and writing as intertwining processes in the student's research process (Torras and Sætre 2009:65)

These two processes are central in the totality of the research process. In addition to the above-mentioned partial processes there is another process, a process I term the scientific process.

4.2. The research process: Different stages, different actions and different parallell processes

Another way to describe the research process – rather than to look upon it as information researching and a writing process – is to emphasise the scientific operations of the research process. In my opinion, the scientific process may be divided into nine central phases: 1) Choice of topic, 2) choice of scientific approach/model, 3) defining research question, 4) operationalisation, 5) choice of data, 6) collection of data/ building a corpus, 7) analysis of data, 8) collection

of analysis results, 9) presentation of research results, 10) dissemination of knowledge/insight. See the description of these phases below (4.3).

The stages	Actions and strategies
1. Choice of topic	Reflections on and evaluation of research tradition
2. Choice of scientific approach/model	Reflections on and evaluation of paradigms
3. Defining research questions/ generating hypothesis	Formulation of main hypothesis and sub-hypothesis
4. Operationalisation	How to obtain answers to research questions/hypothesis
5. Choice of data	How to consider data
6. Collection of data/building corpus	Interviews, questionnaire, recordings, observation, written sources, etc.
7. Analysis of data	Qualitative or quantitative, statistics or interpretation
8. Collection of analysis results	Patterns and tendencies
9. Presentation of research results	How to obtain knowledge and insight
10. Dissemination of knowledge and insight	Presentation in different texts and media

Figure 3. The ten central phases into wich the scientific process may be divided

We may thus propose three partial processes of which the totality of the research process is composed. The first process is the information searching process, the second is the writing process, and the third, which I will discuss in more detail below, is what I term the scientific process. All the different stages within each process depend upon each other and partially interact throughout the entire research process, as is the case with the three partial processes. Torras and Skagen (2007) have described the connection between the information

searching and the writing actions. My aim is to discuss the manner in which these three partial processes – the information searching, the writing process and the scientific process – interrelate.

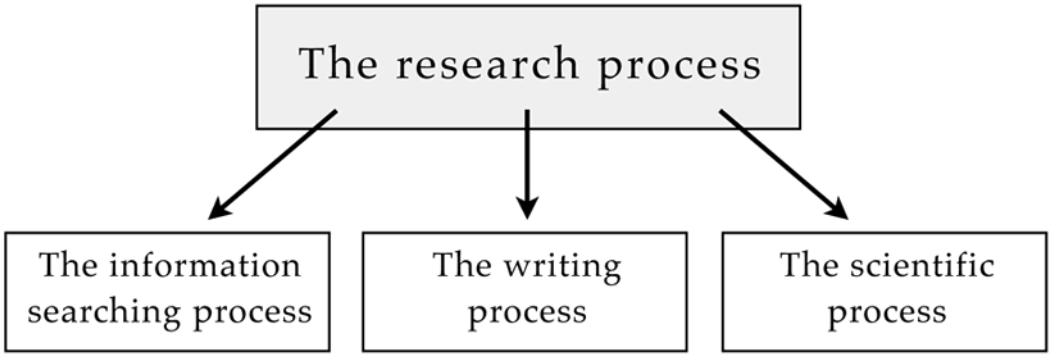

Figure 4. The three partial processes into which the totality of the research process is composed

4.3. The scientific process:

The presentation of this process will be illustrated by means of examples from the field of sociolinguistics.

1. Choice of topic

The choice of topic may be made based on personal interests, yet this choice is frequently based on international or national research traditions or the traditions of a particular field, the research environment or the research group to which one belongs.

2. Choice of scientific approach/model

In most fields and research communities certain approaches are prevalent. This is expressed explicitly or implicitly through a favoured paradigm or several prevalent paradigms in a particular community. These paradigms may be based on one or several scientific theories and the scientific practice which characterises the community to which one belongs. The paradigms are often expressed in specific models. It is often difficult to change the dominant paradigms of an institution or a field. Consequently, these paradigms are passed on to new students and researchers for generations.

3. Defining research question/generating a hypothesis

Research requires a clear hypothesis. It may be based on a main hypothesis. It may also be based on a main hypothesis and several sub-hypotheses or on one or several main hypotheses and many partial hypotheses. The research questions and the hypotheses are created on the basis of prevalent paradigms, models or theories in a particular academic community.

4. Operationalisation

A research question must be clear and explicit, and a hypothesis should predicate a case or a situation and should point to a direction. The way in which one attempts to obtain answers to a research question or test the hypotheses is called operationalisation. There are many demands related to what operationalisation should or ought to be, among other things the emphasis on validity (i.e. the fact that we are studying the phenomenon we are to study) and reliabilty (i.e. the fact that we can trust the information or the data we have access to).

5. Choice of data

After having decided how the research questions or the hypotheses are to be operationalised, one must choose which data to collect. This means defining what is to be considered data and what one should focus on, for instance with regard to informants (e.g. sex, age, education, profession, social group etc.), and whether these informants should be chosen based on random sampling, stratified sampling or whether the informants should be prototypical.

6. Collection of data/ building a corpus

The collection of data depends on the type of research question and the hypotheses proposed, in addition to the purpose of the investigation. Is one to use questionnaires with open or closed questions? , is one to use interviews? , is one to make recordings (audio or video)?, is one to employ observation (passive or participant)?, is one to use written sources or historical documents? These choices are connected to points 1–5.

7. Analysis of data

When data have been collected, the following analysis may either be qualitative or quantitative. Should one use statistical methods or should one resort to interpretation and hermeneutics?

8. Collection of analysis results

After having analysed research data, one is faced with several different analysis results. By establishing connections between these results one may discover certain patterns and tendencies that may throw light on the research questions.

9. Presentation of research results

After having analysed the data one must present these individually, in groups and in context. Which knowledge and insight have emerged from the research process, and which knowledge and insight have we gained access to?

10. Dissemination of knowledge and insight

The knowledge and insight brought by the research process are presented in dissertations, in articles, in popular science texts and in the media (newspapers, radio, television).

5. Supervision and supervision models

Torras and Sætre discuss the professionalisation of the academic librarians in terms of a pedagogical role and a supervisory role.

5.1. IL and education (pedagogical dissemination)

The pedagogical dissemination carried out by academic librarians should be process-oriented information literacy education in which the library practitioner is a professional and autonomous educator. This pedagogical professionalisation is based on the didactic relation model (33pp) proposed by Bjørndal and Lieberg (1978:135) in which the didactic categories are didactic conditions, learning goals, content, learning activities and assessment. This part of the professionalisation is very useful in connection with the dissemination of IL knowledge and by and large unproblematic with regard to the academic faculty staff. To let the academic librarians participate in supervision, would, however, lead to challenges in terms of academic insight, the sharing of supervision and the responsibilities related to supervision.

5.2. IL and research supervision

The academic libraries and the faculties must jointly disseminate IL in the research process at the doctoral level. It would be sensible to link this dissemination to the formal education of researchers and supervision in connection with the doctoral thesis. The challenge is to determine how the academic librarians and the academic faculty staff are to divide the tasks among themselves, how they are to join forces in the dissemination of IL and last but not least how they are to assist each other in the supervisory process.

5.3. The academic librarian supervisor and the academic supervisor

Sætre and Torras (2009) emphasise the information searching process (64–67) and the writing process (67–68), and the way in which these two processes are closely connected. Writing activities must be central during the entire research process (Dysthe et al. 2000). Writing helps the student to formulate, register, develop and structure thoughts. Thus writing at the post-graduate research level must be process-oriented with emphasis on both writing for thinking and writing for presentation. Writing for presentation leads to more elaborated texts written for others. When writing such texts, the student needs more specific information, more specialised searches and must access more specialised databases. It is during the writing of such texts that the academic librarian is to facilitate the in-depth searching process. The library supervision is to contribute to the development of the student's ability to use information sources in his or her own writing (cf. McNeely and Wolverton) .

Toras and Sætre (2009:70) state that:

> The academic supervisor and the academic librarian may decide that the librarian will be entirely responsible for promoting certain skills such as selecting information, paraphrasing, referencing, while the academic supervisor will be entirely responsible for other skills such as developing and supporting arguments. They may further decide that they can both work jointly on promoting some other skills. For instance, in terms of using terminology correctly, the librarian can help the student identifying concepts in her research question and find background literature to define and relate them. The academic supervisor can discuss with the student whether her choice of terminology is adequate and consistent with the theoretical background the student has chosen.

Different supervison models and roles are proposed based on these ideas.

5.4. Supervision models

Torras and Sætre emphasise the fact that the librarian should be capable of playing a multiplicity of roles – each of which is characterised by different supervisory strategies. They present three supervisory models and strategies:

- *The academic librarian as counsellor* (72–76)

  The librarian should be process-oriented rather than source-oriented. A counsellor role will entail the identification of appropriate sources, dialogue with the student, customised counselling etc. In this manner the supervisor becomes a 'writing coach'. The task goes beyond the location of information to identifying problems.
- *The academic librarian as process-oriented supervisor* (76–81)

  Torras and Sætre's account based on Handal and Lauvås (Lidén 1998) – recommends that the academic librarian's supervision should be a process supervison mainly. The academic supervisor, on the other hand, should alternate between process and product supervision.
- *The academic librarian and supervision as a social practice* (81–85)

  This role is based on the view that supervision is a social process. The emphasis is on group supervision and dialogue. Through the creation of library workshops the student will experience the plurality of voices (cf. Dysthe et al. 2006).

5.5. Librarian supervision and the academic process

Torras and Sætre's suggestions regarding the dissemination of IL knowledge and insight through the inclusion of library staff in research are very interesting. The linking of IL dissemination and the research process are appropriate with regard to two of the processes included in the totality of the research process; the information searching process and the academic writing process, and may be taken care of through the three supervision models and

roles. The third process – the academic process – is, on the other hand, a challenge as it does not fit into the three supervision models proposed. The reason is that the supervisor in charge of this partial process must be an expert in a particular field. In order to see this process through in a fruitful and creative manner one must have in-depth knowledge of relevant theories and methods and great insight into parallell and related contemporary and past studies. One must also be capable of evaluating operationalisations with regard to validity and reliability within the field. An academic librarian would seldom be able to assume this role.

6. The importance of IL capital for future research

IL capital – a term based on Bourdieu's theories – has become increasingly popular and important with regard to future research (cf. Bourdieu 2010). It has an impact on both the quality of the research carried out and the pace according to which students complete their degrees. The large quantity of knowledge available today is so overwhelming that experts are needed in order to navigate around it and to evaluate its quality, relevance and usefulness. A professionalisation of the library staff with regard to pedagogical qualifications and insight into research would be a sound way to meet this need and would also be an important investment – personally and financially.

In this context it is important to divide the research process into three partial processes: the information searching process, the writing process and the academic process. The library staff may easily take part in the first two processes. The third, however, is a challenge. The faculties and libraries must join forces to meet this challenge.

It is vital that research students at the master's and doctoral level have access to relevant and extensive IL capital. In this manner the quality of the research will improve, more students will complete their degrees and more degrees will be completed on time. The faculties must solve these problems in close cooperation with the libraries by supporting a professionalisation of the library staff as far as pedagogical and research skills are concerned. This professionalisation should include the participation of the faculties and the academic communities.

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Creation of some sets of descriptors aimed at the analysis process of research papers in librarianship

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Abstract

The present paper is a part of the research work dedicated to the critical analysis of the research papers in the librarianship field in Romania in a period covering the last 20 years.

The descriptors established in this paper will be used in indexing the research papers in the librarianship field as well as in different analyses and evaluations.

The list of descriptors covers the topics of the librarianship field and, at the same time, it presents the main orientations of the research work in librarianship worldwide.

The present paper is a part of the research work dedicated to the critical analysis of the research papers in the librarianship field in Romania in a period covering the last 20 years.

The descriptors established in this paper will be used in the indexing of subjects of the research papers in the librarianship field as well as in different analyses and evaluations, regarding the following aspects:

a) topical distribution of research papers

b) evolution of the considered topics in time

c) comparison between the research work in the field of librarianship performed in Romanian and in other countries

The aim of the paper is the elaboration of a list of descriptors which, on one hand, should cover research papers in the librarianship field and, on the other hand, should bring out into relief the main directions in the librarianship research work worldwide.

Establishing the list of topical descriptors

A definition of librarianship as stated by ISO (International Organization for Standardization) and adopted in Romania as such in the Explanatory Dictionnary of librarianship and information science[1] says that „ Librarianship is the science concerned with the organization, management and legislation of libraries".

In his lecture on knowledge theory (1925-1926), Nae Ionescu made the following assertion regarding science: „ Each and every science makes reference to the whole reality; in other words, the activity field of all science or the field covered by the object of each and every science is reality as a whole. But, our mind can perceive different things about this reality. That is, our mind takes into consideration a quantum of perspectives and each of them represents for us the field of a

[1] Regneală, Mircea. ***Dicționar explicativ de biblioteconomie şi ştiința informării***. p. 76. Constanța, Ex Ponto, 2001.

science. Therefore, we can talk about the topics a science may deal with as related to reality, rather than the object of a science"[2]

What we have to do in the beginning, is to establish the list of topics which the science called librarianship- or as it has recently been named - *library and information science*- is concerned with.

The topics of a field can be general and particular. If general topics can be gathered under *the broader terms* of a scientific field then, it follows, that the particular ones can be gathered under *the narrow terms* .

As already known, the broader terms and the narrow terms are the main elements of the hierachical structure of a thesaurus.

Therefore, the selected terms have to observe the following criteria:

a) to cover the whole field of librarianship; it is only in this way that the resulting analysis can rate at what length the topics of the field are taken into account;
b) to seize the dynamic aspect of patterns in the last 20 years worldwide, as well as the most representative directions of the researsch work – seen as the frame for the professional studies for library specialists;
c) to give a panoramic view of the topics dealt with in order to evaluate the previous research work application.

The three criteria give us the idea that the topics have some degree of generality (item **a** and **b**), as well as of particularity(item **c**)
According to the analytical description model for the articles in the serials, as used by the National Library of Romania, we shall use also a minimal term thesaurus built on broader and narrow terms covering the librarianship field. This thesaurus will fulfill items **b** and **c.**
The same type of thesaurus was used for a set of analyses made by IFLA; these analyses foccused on the evaluation of the research work in librarianship in several countries.[3]
For item **c,** we shall use a controlled subjects list, gradually made, as we proceed to the describing of the research papers according to the model[4] and in conformity with the international standards for subject heading construction.
In order to establish the first two types of terms (broader and narrow), we shall analyse several examples of terms utilized in describing librarianship and science information papers :

A) ABSI / Abstracts in Bibliology and Information science[5]- published by the National Library of Romania employs the following list of terms:

0 – LIBRARIANSHIP. LIBRARIES
0.1- Librarianship
0.2- Writing. Printing.Book. History of the book
0.3- History of the libraries
0.4- Special collections
0.5- Library development
0.6- Terminology. Standardization
0.7- Archivistics
1. – LIBRARIES. MANAGEMENT. BOARD OF DIRECTORS
1.1- Library organization
1.2- Collection management
1.2.1- Books
1.2.2 – Serials
1.2.3 – Audiovisual
1.2.4 – Others

[2] Ionescu, Nae. ***Curs de teoria cunoaşterii (1925-1926)***. Bucureşti: Apologeticum, 2003

1.2.5 – Topics distribution
1.3 – Library constructions. Equipments
1.4 – Library management
1.5 - Library legislation
1.6 – Library financing
1.7 – Methodology
1.8 – Automation. Information technology

2 - LIBRARY SERVICES. LIBRARY
2.1 – Collection development
2.1.1- Acquisitions. Legal Deposit
2.2 – Collection organization.
2.1.2 – International book exchange and ILL
2.3 - Collection Processing
2.3.1 – Cataloguing. Catalogues management. Document Description.
2.3.2 – Classification and Indexing. Indexing and retrieval languages. Thesauri. Indexes. Abstracts
2.4 – Book storage. Preservation. Conservation. Restoration
2.5 – Public relations. (Bibliografic) references

3- READERS' SERVICES

4 – INFORMATION. DOCUMENTATION. INFORMATION PRODUCTS
4.1 – Bibliographies. National bibliographies
4.2 – Catalogues. Collective repertoires
4.3 – Other library publications

5 – STAFF. PROFESSIONAL TRAINING

6 – ORGANISMS. ORGANIZATIONS. ASSOCIATIONS
6.1 – Interlibrary collaboration

7 – ROMANIAN PRESENCE THROUGHOUT THE WORLD

B) The report made by Maxine K. Rochester and Pertti Vakkari and entitled ***International Library and Information Science Research: A Comparison of National Trends*** (published in IFLA- Professional Reports, No. 82) analyses the trends in librarianship and information science research work in several countries. The distribution of topics, approaches and methods used in 1965, 1975 and 1985 was compared by means of articles published in the core magazines from different countries, as sources.
This study led to a project on a comparative study concerning library and information science research in the Scandinavian countries (Denmark, Finland, Norway and Sweden).

A single classification scheme for all the topics in librarianship and information science research work was used :
LIS topic

- Professions
- Library history
- Publishing and book history
- Education in LIS
- Methodology
- Analysis of LIS

Research on L&I service activities

- Circulation or interlibrary loans
- Collections
- Information or reference service
- User education
- Buildings or facilities
- Administration of planning
- Automation (except when concerned with some particular activity)
- Other L&I service activities
- Several interconnected L&I activities

Research in IS&R

- Cataloguing
- Classification and indexing (process or languages)
- Information retrieval
- Bibliographic databases or bibliographies
- Non-bibliographic data bases (textual, numeric...)

Research on information seeking

- Information dissemination
- The use/users of information channels/sources
- The use of L&I services (no other channels considered)
- Information seeking behaviour (focus on persons)
- Information use (whether (and how) used)
- Information management

Research on scientific and professional communication

- Study on Scientific or professional publishing
- Citation patterns and structures
- Other aspects of communication

Other LIS Topic
Other study (other discipline)

C) We introduce a third variant namely that of *transforming the list of IFLA divisions into a braoder terms list and the list of IFLA sections and working groups into a narrow terms list.*
The present list of IFLA sections is:

Division of Library Types
Sections

- Academic and Research Libraries
- Art Libraries
- Government Libraries
- Health and Biosciences Libraries
- Law Libraries
- Libraries Serving Persons with Print Disabilities
- Library and Research Services for Parliaments
- Metropolitan Libraries
- National Libraries
- Public Libraries
- School Libraries and Resource Centres
- Science and Technology Libraries
- Social Science Libraries

Special Interest Groups (SIGs)

- Agricultural Libraries
- National Organisations and International Relations (NOIR)(National Libraries Section)

Division of Library Collections

Sections

- Acquisition and Collection Development
- Audiovisual and Multimedia
- Document Delivery and Resource Sharing
- Genealogy and Local History
- Geography and Map Libraries
- Government Information and Official Publications
- Newspapers
- Preservation and Conservation
- Rare Books and Manuscripts
- Serials and other Continuing Resources

Special Interest Groups (SIGs)

- Environmental Sustainability and Libraries (Preservation and Conservation Section)

Division of Library Services

Sections

- Bibliography
- Cataloguing
- Classification and Indexing
- Information Literacy
- Information Technology
- Knowledge Management
- Libraries for Children and Young Adults
- Library Services to Multicultural Populations
- Library Services to People with Special Needs
- Literacy and Reading
- Reference and Information Services

Special Interest Groups (SIGs)

- Indigenous Matters (Library Services to Multicultural Populations Section)
- Libraries and Web 2.0 (Information Technology Section)

Division of Support of the Profession

Sections

- Continuing Professional Development and Workplace Learning
- Education and Training
- Library Buildings and Equipment
- Library Theory and Research
- Management and Marketing
- Management of Library Associations
- Statistics and Evaluation

Special Interest Groups (SIGs)

- E-Learning (Education and Training Section)
- Library History (Library Theory and Research Section)
- New Professionals (Management of Library Associations Section)
- Women, Information and Libraries Discussion group (Management of Library Associations Section)

Division of Regions

Sections

- Africa
- Asia and Oceania
- Latin America and the Caribbean

Special interest Groups (SIGs)

- Access to Information Network – Africa (ATINA) (Africa Section)
- LIS Education in Developing Countries

D) Another example of a term list is the one used for the research work *Analytical, bibliometric and content analysis bibliography of the literature of librarianship work in the dedicated Romanian serials* done by the Cluj-Napoca University library. The analysis was performed by means of genre and analytical topical terms. However, the selected terms did not cover the entire librarianship field. The term list was a posteriori compiled, which means that the terms cannot cover the entire librarianship field but only a part of it, namely the one which developed in Romania between 1990 and 1997.

Besides that, we consider that the analysis has to evaluate also the fields (topics) not covered by the Romanian specialists. The fact that in some particular fields there is no research work done could by induced by different reasons which should be also taken into consideration.

Under these circumstances, we believe that the path followed by the research work performed by the experts' group in Cluj –Napoca, does not cover throughoutly the criteria proposed by us in the present work, therefore we will not use it for our purpose.

It follows then, that we will proceed to the analysis of the appropriateness of one of the three variants, as set above:

- It is to be noticed that, at a first glance, in the case of the first two examples (**A** and **B**), the narrow terms pointing out the recent concerns in the field as- Information literacy, knowledge management, E-Learning, Library services for multicultural groups, services for person with disabilities, reading, references and information services, libraries and web 2.0 – are missing;
- The describing system in example B is structured according to the applicability of a field and not to a scientific field considered in its integrity (as in examples **A** and **C**);
- As we have shown above, our choice for variant **C** has the following advantages: it corelates the selected terms with the most representative directions of the international research work in the field, and it enables the connection to the paradigm transformation undergone in the librarianship and information science field in the last years.

Consequently, we shall use as a term list the variant given in example **C**, while mentioning that we will not include either *Types of libraries* or *Regions* as they do not represent a particular field of science but only the place for the applicability of the librarianship process.

Therefore, the final list of broader and narrow terms of librarianship and information science field will have the following structure

Library Collections

- Acquisition and Collection Development
- Audiovisual and Multimedia
- Document Delivery and Resource Sharing
- Genealogy and Local History
- Geography and Map Libraries
- Government Information and Official Publications
- Newspapers
- Preservation and Conservation
- Rare Books and Manuscripts
- Serials and other Continuing Resources

Library Services

- Bibliography
- Cataloguing
- Classification and Indexing
- Information Literacy
- Information Technology
- Knowledge Management
- Libraries for Children and Young Adults
- Library Services to Multicultural Populations
- Library Services to People with Special Needs
- Literacy and Reading
- Reference and Information Services
- Libraries and Web 2.0

Support of the Profession

- Continuing Professional Development and Workplace Learning
- Education and Training
- Library Buildings and Equipment
- Library Theory and Research
- Management and Marketing
- Management of Library Associations
- Statistics and Evaluation
- E-Learning (Education and Training Section)
- Library History

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Is the library what its users want it to be? Performance measurement - a perspective of *Mihai Eminescu* Central University Library

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Abstract

The statistical data about the library activities has always provided important information to library managers. A good library management considers users' information needs and the provision of quality services as the main objective of the library activity. The performance indicators are calculated by collecting such quantitative and qualitative data and combinations thereof that evaluate the performance of an organization or of a function/service. In the recent years, the Central University Library from Iaşi undertook several approaches to assess its performance. In this paper we share our experiences in the process of evaluation using PIs. The introduction of the digital technologies in our library has necessitated the introduction of evaluation methods appropriate for this new approach.

Introduction

The objectives for development and collecting library statistics are monitoring operating results against standards and data of similar organizations, monitoring trends in time and the results of innovation, providing a base for planning, decision making, improving service quality, and feedback on the results, demonstrating the value of library services, including the potential value to users from future generations, informing the national/local decision authorities which have funding roles, publicizing the role of the libraries in the new informational world.

Steps which have been made in adopting performance indicators and library evaluating

Current standards for the collection of aggregate statistics in academic libraries are outlined by the International Standards Organization (ISO 11620 and ISO 2789) in Europe and the National Information Standards Organization (ANSI/NISO Z39.7) in the United States.

At the *2001 NISO Forum on Performance Measures and Statistics*, three management functions that are supported by library statistics and measures were identified: to assist in internal decision making (purchasing, staffing); to justify library budgets and activities; and, to identify broader trends in the use and value of information and libraries.

UNESCO collects international data for the purpose of broad national comparisons. UNESCO, which collects its library statistics based on standards outlined by the ISO, often has difficulty obtaining complete statistics.

The LibEcon project in Europe was an attempt to standardize the collection of library statistics at the international level and expand on the existing ISO standards to provide a more complete picture of library activities in participating European countries. The goal was to build on existing standards, ISO 2789 (International standard on library statistics) and ISO 11620 (Library Performance Indicators). LibEcon2000, which originally collected library statistics from various sectors for 30 European countries, was expanded in 2001 to include Australia; Canada; Korea; New Zealand; USA; Japan; Mexico; Turkey and Russia. The project was funded by DG13 of the European Commission within the Telematics Applications Programme and it examined the feasibility of

assembling such information via electronic means (web). This pilot project aims to gather consistent international information about the part played by libraries in developing information resources within Europe, and internationally, for the purposes of benchmarking and advocacy. LibEcon has expanded the UNESCO questionnaire, which is based on ISO standards, to include information about electronic resources as well as detailed information about library expenditures.

At the *4th Northumbria International Conference on Performance Measurement in Libraries & Information Services,* held in August 2001, the need to broaden the range of definitions in order to reflect recent technological developments and the increasing demand for new measures and statistical methods for libraries were highlighted.

A major challenge for research libraries in the new digital environment is the collection of statistics about electronic resources. In recent years, several organizations have begun to develop more accurate measures for electronic resources in libraries. The International Coalition of Library Consortia (ICOLC) published **Guidelines for Statistical Measures of Usage of Web-based Information Resources**. The 2001 revision intended to provide consortia administrators with the information needed to effectively carry out their responsibilities and to provide vendors a practical framework in which to deliver usage statistics in the current environment.

A more in-depth study was conducted by the ARL (Association of Research Libraries) as part of its New Measures Initiative. The aim of the **E-Metrics Project,** conducted in 2000-2001, was to provide research librarians with important techniques to count, describe, and report networked services and resources in their libraries. The study is characterized as *"a beginning approach, for describing and measuring some of the resources, uses, and expenditures for supporting networked services in a research library setting"*. The key goals of this project were to develop, test, and refine selected statistics and performance measures to describe electronic services and resources in ARL libraries; to engage in a collaborative effort with selected database vendors to establish an ongoing means to produce selected descriptive statistics on database use, users, and services; to develop a proposal for external funding to maintain the development and refinement of networked statistics and performance measures.

Another research endeavor into measuring electronic resources, conducted between 1998- 2000 by Centre for Research in Library and Information Management (CERLIM) at Manchester Metropolitan University & 6 other European partners, is the **EQUINOX** project. The major aim of EQUINOX (Library Performance Measurement and Quality Management System) was to further develop existing international agreements on performance measures for libraries (ISO 11620), by expanding these to include performance measures for the electronic library environment. After extensive consultation with the professional community, a number of performance indicators were produced[*].

[*] Percentage of the population reached by electronic library services; Number of sessions on each electronic library service per member of the target population; Number of remote sessions on electronic library services per member of the population to be served; Number of documents and entries (records) downloaded per session for each electronic library service; Cost per session for each electronic library service; Cost per document or entry (record) downloaded for each electronic library service; Percentage of information requests submitted electronically; Library computer workstation use rate; Number of library computer workstation hours available per member of the population to be served; Rejected sessions as a percentage of total attempted sessions; Percentage of total acquisitions expenditure spent on acquisition of electronic library resources; Number of attendances at formal electronic library service training sessions per member of the target population.

A new issue of concern for libraries was the development of standardized methodologies for the collection of statistics on the usage of individual electronic journals and databases. In order to tackle these issues, **Vendor-Based Usage Statistics Working Group** was formed (Publisher and Libraries Solutions Committee - PALS). Its aim was to develop a code of practice for vendor-based electronic journal and databases usage statistics. COUNTER Code of Practice (2005) on usage reports cites the following – *Journal report*: number of full-text article requests by month and journal; number of successful full-text requests in html and pdf formats; turnaways by month and journal; number of item requests by month, journal and page type; total searches by month and collection; - *Database report*: total searches, sessions and full-text requests by month and database; turnaways by month and database; referral by aggregator or gateway. The LibQUAL+ instrument was developed to assess service quality among research libraries and is patterned after the

SERVQUAL, a protocol developed for the for-profit sector in the 1980's. Through a web-based survey, LibQUAL+ (a collaborative effort between the ARL and researchers at Texas University) asks respondents to provide assessments of expectations of service on three scales: desired, perceived and minimum evaluations. For each question, gap scores are calculated between minimum and perceived expectations and desired and perceived expectations.
The development of new tools to facilitate analysis of statistical data may help to increase in its usability. Initiatives to facilitate cost-analysis are of current interest as pressure grows on libraries to justify expenditures.
One such tool, called the **Balanced Scorecard,** a German project, is an adaptation of management software to be used in academic libraries. The concept for the balanced scorecard, a performance management model to assess organizations, was introduced in an article in the *Harvard Business Review* by Kaplan and Norton (1992). The scorecard was designed for businesses but is today widely adapted for use by government and non-profit organizations. The tool, which was originally designed for use in the business arena, translates the planning perspective of an institution into a system of indicators for four main areas of library performance: finances, users, internal processes and improvement activities. One of the key functions of the Balanced Scorecard is to visualize cause and effect relationships between target values, evaluation data and actions taken. This evaluation technique establishes a *balance* between organization vision, performance indicators, goals and implementation actions versus financial perspective, internal process perspective, innovation and learning perspective and customer perspective that can be represented in a *scorecard* (Kaplan & Norton, 2004). The system integrates financial and non-financial data, input and output data, the external perspective (funding institutions, users) and the internal perspective (processes, staff), goals and measures taken, and causes and results.
An interesting study, though smaller in scale than the others, was conducted to compare the cost and performance of print and electronic journal titles at the University of California (UC Davis libraries). This valuation of **cost/performance of print vs. licensed electronic journal titles** was ongoing and provided measurements on the effects of some of these shifts in format on the use of materials throughout the collections.
A focused statement about the reasons for performance measurement and consequent application of performance indicators is given by ISO TC 46/SC 8 (2002). The performance indicators described in this Technical Report are used as tools to compare the effectiveness, efficiency and quality of the library's services and products to the library's mission and goals. They can be used for: comparing a single library's performance over years; support for management decisions; demonstrating the library's performance and its costs; comparing performance between libraries of similar structure; whether the library's performance or the use of its services has changed over years; how far performance or use in one library differs from that in other libraries.
The aim of the comparisons is that the libraries which want to enhance their quality will be able to contact other libraries to make use of their knowledge and experience. This method of quality enhancement is called the “best practice” method.
Digital libraries and the evaluative approach – the first concern of any evaluative approach was to get information from collected data to be used against a set of defined objectives[7] gathers as twofold:
1. Library-centered or system-centered, focusing on efficiency and effectiveness, was prevalent for a time;
2. User-centered, pointing at service quality and users’ needs, both cooperating in achieving quality.
In this context, were added the following:
1. Human-centered approach, studying behaviour, such as information seeking, browsing, searching or performance in completion of given tasks;
2. Usability-centered approach, assessing features by users, bridging between system and human-centered approaches.
Most notable is the integration of the two standards with the technical report 20983 by ISO TC46/SC8, which produced 15 new indicators[**], purposely identified for a digital environment. The

report recognizes its limitations by evaluating only "performance by quantitative statements about the supply, use, costs, or market penetration of electronic library services" (ISO TC 46/SC 8, 2002), while ISO 11620 is focused for the collection of qualitative data (on user satisfaction).

[*]*Percentage of population reached by electronic services; Percentage of expenditure on information provision spent on the electronic collection; Number of documents downloaded per session; Cost per database session; Cost per document downloaded; Percentage of rejected sessions; Percentage of remote OPAC sessions; Percentage of virtual visits to total visits; Percentage of information requests submitted electronically; Number of user attendances at electronic service training lessons per capita; Number of workstation hours available per capita; Population per public access workstation; Workstation use rate; Number of attendances at formal IT and related training lessons per staff member; Percentage of library staff providing and developing electronic services

It was considered useful and necessary to make a brief overview of these projects because their results were the background to the adoption of performance indicators for the electronic library included in the latest standards and norms adopted internationally. Moreover, some of these standards are not yet available in Romania.

The Romanian experience

■ The European program LIBECON was also conducted in some Romanian libraries and it was followed by the National Program "Romanian performances in public libraries – PROBIP 2000" (1998-2000) – coordinator Doina Popa.

The statistics on national level during 1990-2000 had been remade, making it possible to send the data to the European Commission and to include Romania in the European statistical records that facilitate a comparison between different countries and also suggest a unique way of collecting and processing data. The national program was finished by using a set of PIs and by developing standard forms appropriate for collecting them.

■ In 2003, the National Conference of the Romanian Library Association (RLA) introduced the Division on Statistics and Assessment. Its objectives were to collect, analyse, interprete, publish and use the statistics data from all types of libraries in the educational system; to establish a set of relevant performance indicators to the libraries in the general and the high education system; to facilitate the exchange of information and professional skills on national level, to organize meetings for the specialists from the academic and public Romanian libraries; to offer counselling in the usage of statistics and assessments for the management and promotion of the services offered to the users; to collaborate with national bodies and decision factors (Board of Library Statistics from the National Commission on Libraries - NCL, the Ministry of Education, Research, Youth and Sports, The National Statistics Institute).

Nowadays, the libraries fill in the Annual Statistical Report every year, which is adapted to all library types. Also, CULT1 forms developed by the National Institute of Statistics were updated according to the suggestions of the Sub-commission of Statistics of National Commission on Libraries (NCL).

■ "Quality and performances of online libraries assessment" (LibEval) is a research project conducted during 2007-2010 and coordinated by ICI Bucharest. The aim of the project is to solve problems regarding:

- the elaboration of the methodological frame necessary for the development of the evaluation process according to the international standards and the best practices used for the assessment of the on-line libraries;
- the elaboration of the methods and software tools needed to evaluate the on-line libraries, considering the process of providing services, the user interface and the information provided to the user;
- the assessment of the on-line libraries taking into consideration the characteristics and the users' activities/tasks, the typology of on-line libraries and the availability of the electronic services provided; thus, there is ensured a modern approach concentrated on the users; the correlation between the quality of library services, the performance and the strategy of the on-line libraries (integrate the quality assessment to the perfomance evaluation using the Balanced Scorecard methodology).The aim of all the projects performed, norms and standards is to provide library managers a greater understanding of academic library activities in order to make more informed decisions.

Statistics and PIs at BCU Iasi

BCU has accomplished and collected statistical data and starting from 2003, the performance indicators have been estimated (according to ISO 2789: 2003 and ISO 11620: 1998). Our library statistics have traditionally focused on inputs, holdings and expenditure, but recent developments have concentrated on outputs, use and availability, outcomes and impact.

In order to understand the evolution of the collected statistical data and the performance indicators calculated during 2003-2009, it is useful to make a review of the international standards used in these activities, emphasizing the differences between two consecutive editions:

- The standard **ISO 11620** "Performance indicators for libraries" was first published in 1998, when it dealt mainly with traditional library services. The second revised edition of 2008 with 45 indicators adds performance indicators for electronic library services and adopts the structure of the Balanced Scorecard. ISO 11620 intends to offer quality measures for all types of libraries, but cannot consider all specified conditions and activities (for example, national libraries did not find their tasks covered by that standard; PIs for national libraries are indicated in ISO/TR 28118:2009).
- The first edition of **ISO 2789** "International library statistics" was published in 1974; in its meeting in March 2009 in Berlin, the working group in charge of the standard decided to start a 5th revision (!). The discussion identified a number of topics for which reliable statistics should be found in the revision: preservation/conservation; digitization; library buildings; publications on open access servers; institutional archives; cultural activities outside the library; library research and development; participation in new forms of services (second life, blogs etc). The revision has started in October 2009.

When BCU Iasi decided to evaluate its electronic services, the goals were similar to the evaluation of traditional services. The *questions asked* were: *Does the library give access to the information resources users need? Do users get access directly and easily? Is the equipment for the use of electronic services sufficient and functioning? Do the services reach the population?*

In order to answer such questions, any library needs to collect data about: the size of their electronic collection (journals, databases), the use of their electronic services (electronic collection, OPAC, the library's website, document delivery services etc), the expenditure on electronic services (collection, equipment). ISO 2789: 2006 (available in Romania since 2009) defines statistics for all e-library services; data collection procedures are described for e-collection, e-document delivery, reference service and training lessons. The standard points out which data would be useful on a national scale for different types of libraries.

While most traditional statistics can be produced by the library itself, statistical data for e-services, especially for their use, need to be collected from different sources (vendors, suppliers, library consortia). To achieve correct statistics, must be defined the various forms of e-library services, of e-information resources and of use of e-services.

Lawton and Scholfield[6] identified the following key problems which have shaped the recent library strategies:

- Clients' expressed needs, from client feedback and surveys;
- The desire to deliver services at point and time of need;
- The need to provide the same level of service to remote students as to onsite users;
- Complexity and diversity of information systems;
- The necessity to extend services from limited funds and to maximise value using innovative technologies;
- Pressure on the library to stay ahead in a highly competitive informational environment.

The indicators are presented in the perspectives of the Balanced Scorecard method – four perspectives adapted to libraries; the classification we have chosen is according to [4]. On the right, we mention the source of that particular indicator. The PIs in blue are the ones calculated at BCU Iasi. Out of these, the ones referring to the electronic collections (*) and the required equipment will be further exemplified.

I. **Resource, infrastructure**

1. *Library as a place for learning and research* is defined by
   - a. Size of user area **(User area per capita)** ISO11620:2006
   - b. The availability of user workplaces **(Seats per capita)** ISO11620:2006
   - c. **Public access workstations per capita** (*) ISO11620:2006
   - d. **Workstation hours available per capita** (*) ISO11620:2006
   - **e. Opening hours (compared to demand)** ISO11620:2006
2. The quality of *collection* is measured by:
   - a. Acquisitions expenditure per capita **(Expenditure on information provision per capita)** [4]
   - b. **Availability of required titles** ISO11620:2006
   - c. **Percentage of required titles in the collection** ISO11620:2006
   - d. **Subject catalogue search success rate** ISO11620:2006
   - e. **Percentage of rejected sessions**(*) ISO11620:2006
   - f. **Ratio of request received on requests sent out in ILL** [4]
   - g. **Immediate availability** [4]

II. *Staff* resources:

- a. **Staff per capita** ISO11620:2006
- **b. User services staff as a percentage of total staff** ISO11620:2006

III. *Website* quality:

- a. **Direct access from the homepage** [4]

IV. Use – the following PIs demonstrate how the services are accepted

1. *General* indicators for user-oriented services
   - **a.** Market penetration (**Percent of target population reached**) ISO11620:2006
   - **b. Percentage of external users** ISO11620:2006
   - **c. User satisfaction** ISO11620:2006
   - **d. Library visits per capita** (*) ISO11620:2006
2. *Library as a place for learning and research*
   - **a. Seat occupancy rate** ISO11620:2006
   - **b. Workstation use rate** ISO11620:2006
3. *The attractiveness of the physical collection* is evaluated by
   - **a. Collection use (turnover)** ISO11620:2006
   - **b. Percentage of stock not use** ISO11620:2006
   - **c. Loans per capita** ISO11620:2006
   - **d. Percentage of loans to external users** ISO11620:2006
   - **e. In-library use per capita** ISO11620:2006

   The attractiveness of the electronic collection is evaluated by
   - **a. Number of content units downloaded per capita**(*) ISO11620:2006
   - **b. Percentage on information requests submitted electronically** ISO11620:2006
4. The adequacy of the library's *information services*:
   - **a. Attendances at training lessons per capita** ISO11620:2006
   - **b. Reference questions per capita** ISO11620:2006
5. The attractiveness of events – *Cultural activities*
   - **a. Attendances at events per capita** ISO11620:2006

V. Efficiency - These PIs measure cost-effectiveness and quality of processes

1. *General*
   - **e. Cost per user** ISO11620:2006
   - **f. Cost per library visit** ISO11620:2006
   - g. **Cost per use** [4]
   - **h. Ratio of acquisitions cost to staff costs** ISO11620:2006

2. *Collection costs*
    a. **Cost per document processed** ISO11620:1998
    b. **Cost per unit downloaded** (*) ISO11620:2006
    c. **Cost per database session** (*) ISO11620:2006
    d. **Cost per loan** ISO11620:2006
3. *Processes- speed*
    a. **Acquisition speed** ISO11620:2006
    a. **Media processing speed** ISO11620:2006
    b. **Employee productivity in media processing** ISO11620:2006
    c. **Lending speed** ISO11620:2006
    d. **ILL speed** ISO11620:2006
4. *Processes – reliability*
    a. **Reference fill rate (Correct answer fill rate)** ISO11620:2006
    b. **Shelving accuracy** ISO11620:2006

VI. Potentials and development

The potential for development is measured against

1. The library's input in *electronic services*

a. (*)Percentage of acquisitions expenditure spent on the electronic collection ISO11620:2006

b. Percentage of library staff provinding and developing electronic services ISO11620:2006

2. The library's success in gaining funding from its institution and external sources or by income Generation – *Budget*

a. **Percentage of library means received by special grants or income generation** **ISO**11620:2006

b. **Percentage of institutional means allocated to the library** ISO11620:2006

3. The most important indicator for potentials and development is the library's input into staff training – *Staff development*

a. Attendances at training lessons per staff member ISO11620:2006

Definition of data involved in e-library evaluation

Library collection – all documents provided by a library for its users

Electronic collection – all resources in electronic form in the library collection: databases, electronic serials, digital documents, and computer files.

Measures for the use of the e-collection have been defined as follows (ISO 2789):

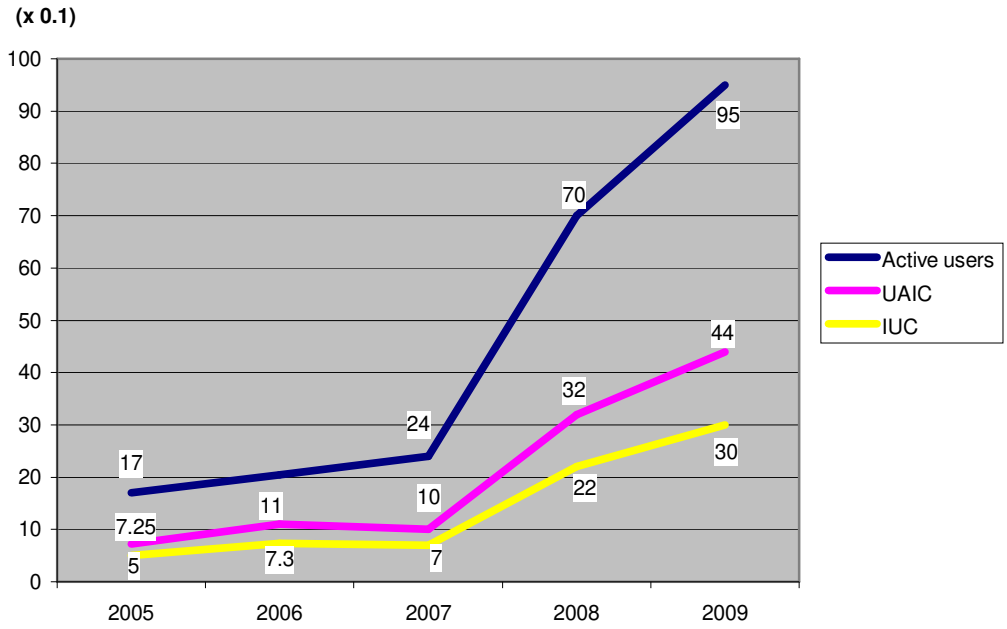
- Search – specific intellectual query
- Session – successful request of a database
- Rejected session (turnaway): unsuccessful request of a database by exceeding the simultaneous user limit
- Session time: the period of time between a log-in and an implicit or explicit log-off from a database
- Contents downloaded: a descriptive record being successfully requested from a database, electronic serial or digital document
- Record downloaded: a descriptive record being successfully requested from a database.

1. Public access workstations per capita establishes the number of workstations that are publicly available to users in the library. The **objective** of this PI is to assess the availability of workstation the library offers per 1000 members of the population to be served.

Method: I_{PAWC} = (A/B) x 1000, where A is the number of the public access workstations and B is the number of the population to be served.

For a correct evaluation of this indicator there is required a definition for the notion of "population to be served" in the case of BCU Iasi. The customers of BCU Iasi are *specific users*: students, university teaching staff, researchers, PhD and MSc students and *non-specific users*: high-school teaching staff, graduates, high-school students in the last grade, managers, specialists from different fields, other categories of readers (non) /residing in Iasi. Considering this structure, we consent that

"population to be served" = target population ≈ 60,000 (academic staff, researchers, students from other universities in Iasi), a value considered to remain ~ the same during the period under study.
For the evaluation of other indicators, it is more appropriate to consider that target population = academic staff & students from "Al.I.Cuza" University, assuming that the staff and the students from the other universities use the libraries from those particular universities as well. In this case, target population ≈ 41,000 (40214 students: 29201 BSc, 9627 MSc and 1386 PhD, and 845 – academic staff). In other cases, operating with the number of active users offers an evaluation from a different perspective.
The number of workstations owned by the library available to users has grown in a relatively constant pace, from 29 (2005) to 179 (2009).
Figure 1 presents the variation of this PI, considering the three variants for "population to be served".

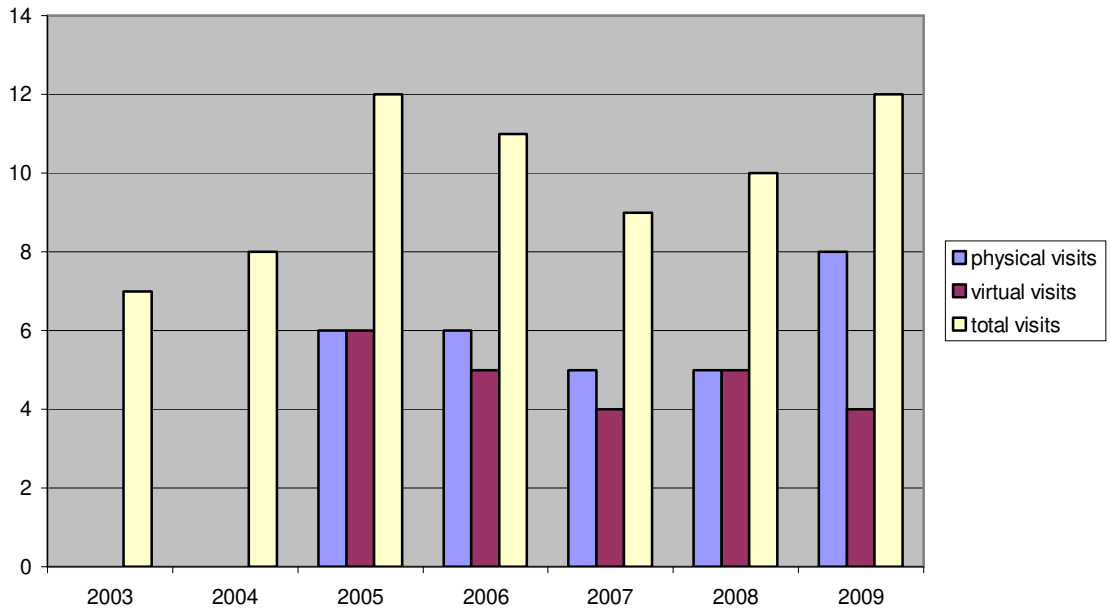


I_{PAWC} measures the provision of resources related to the population but its value is not very significant because the library makes available wireless internet access services; the users can also use the computers available in the university buildings.

2. Workstation hours available per capita

Its **objective** is to assess the availability of workstations by calculating the average number of hours a workstation could be available for a member of the population during a year.
Method: Establish the number of workstations in the library, the number of hours that the workstations are available to users and the number of population to be served. The number of hours is usually the same as the number of hours that the library is open.
I_{WHAPC} = [(A – B) x C] / D, where A is the total number of workstations, B is the number of workstations not in service, C is the number of hours the workstations are available to users during a year, D is the population to be served.
For 2009, the value of this PI is estimated according to the three possibilities for "population to be served" as follows:
→ I_{WHAPC1} = (179 computers x 220 working days x 11.5 hours/day) / 60,000 = 7.6 h/capita
→ I_{WHAPC2} = (179 x 220 x 11.5) / 41,000 = 11 h/capita
→ I_{WHAPC3} = (179 x 220 x 11.5) / 18,917 = 24 h/active user
A low result may not be so significant if workstations from which library services can be accessed are widely available to users elsewhere, or where libraries make available wireless internet access services.

3. Library visits per capita is the total number of visits to the library per year, either physical or virtual, by members of the population to be served, divided by the number of persons in the population.
A *physical visit* – the act of a person's entering the library premises.
A *virtual visit* – a user's request on the library's website in order to use one of the services provided.
The indicator assesses the library's success in attracting users either to the library as place or to its web services and the adequacy of the library's traditional and new web-bases services to its population.
I_{LCV} = A/B, where A is the total number of physical plus virtual library visits in a full year, B is the number of persons in the population to be served.
Fig. 2 shows the variation of library visits (number of physical, virtual and total visits) per capita (60,000).



4. Percentage of rejected sessions of the total attempted sessions for each licenced database during a specified time period. The indicator assesses whether the number of licenses for a database is sufficient for user demand. Since especially the expensive databases have priced graduated according to the number of simultaneous users, the ratio of attempted sessions to rejected sessions helps to balance the user's demand for unlimited access to information and the restrictions of the library budget.
This PI could be compared to the number of copies available for print documents in high demand.
Method: Sessions by library staff and for user training should be included; sessions rejected because of incorrect passwords or user IDs are not included. For each e-resource the percentage of rejected sessions must be calculated and interpreted separately.
I_{RS} = (A/B) x 100, where A is the number of rejected sessions on a licenced database during a specified time period and B is the total number o sessions (rejected + successful) on the electronic database during the same time period.

Interpretation and factors affecting the indicator
A high figure is a clear indication that the present number of concurrent users allowed to access the database simultaneously is too low. Depending on the price and the level of gradation additional licenses should be bought.
The usage statistics received from our database suppliers included the number of rejected sessions in only two cases:

Database	Sessions	Turnaways	% rejected sessions
Academic One File	403	0	**0**
Palgrave Dictionary of Economics	35	9	25.7
Statesmans Yearbook Site	40	0	0
WHED Online	12	0	0
TOTAL Palgrave	87	9	**10.3**

I_{RS} = (9/87) x 100 = 10.3 ≈ 10%

The PI is an integer in the range 0 to 100. A high score indicates that the number of licenses is not adequate to users needs. In case of AOF, 0% rejected sessions means that there is a sufficient number of access licences for this database; in the second case, 10% from the total number of sessions were rejected sessions; this percentage would be significant if the library had purchased this database and there should be estimated a number of necessary licences (*Palgrave* was used in free trial).

5. Number of content units downloaded per capita

The **objective** of this PI is to assess whether users find items of interest in an electronic resource. The number of requests for content units indicates the relevance attributed to the e-collection by the users.

Definition: The number of content units downloaded in part or in whole from each e-resource, divided by the population to be served during a specified time period.

Method: I_{NCUDC} = A/B

A – number of content units downloaded from a specified e-resource during a specified time period;

B – population to be served; in some special cases, the library can use a particular target population (e.g. academic staff of a faculty, senior level students

I_{NCUDC} was calculated for 15 databases.

One of the difficult issues was to specify the "population to be served" in case of each database, considering their content. For instance, in the case of **AIP+APS, IOP** – "population to be served" is considered to include the academic staff from the Faculty of Physics and MSc and PhD students from the same faculty (230). We have applied the same principle for the **e-book** users estimated for **Elsevier** (the library bought e-books in fields of Chemistry, Mathematics, Physics and Astronomy) – academic staff + PhD&MSc students from the three faculties (675).

In the case of Springer Journals, which include reviews from very diverse fields, we considered that the target population includes all university teaching staff and the students from the 2nd and 3rd Bologna cycles, more precisely 11,600.

The tabel (fig.3) presents the two parameters (population to be served and number of downloaded units) which are the calculation criteria for this PI (its values are written in the last column of the table).

Figure 3

Nr.crt.	Database name	Population to be served	No. of units downloaded	PI value
1.	SPRINGER e-books (Mathematics, Physics, Statistics, Astronomy)	470	695	1 ~ 2
2.	ELSEVIER e-books (Mathematics, Physics, Chemistry, Astronomy)	675	2852	4
3.	Institute of Physics (IOP)	230	5213	23
4.	American Chemical Society (ACS)	220	4954	23
5.	SPRINGER Journals	11600	40643	3 ~ 4
6.	EMERALD	3650	1269	< 1
7.	SAGE	5740	1058	< 1
8.	NATURE (free trial)	1850	1041	< 1
9.	PROQUEST	9300	15862	2
10.	EBSCO	11600	4062	< 1
11.	Academic One File	11600	998	< 1

12.	American Institute of physics & American Physical Society (AIP+APS)	230	4199	18
13.	Wiley Blackwell (WB)	220	5157	23
14.	**ISI Thomson – Web of Science**	**1000**	**43843**	**44**
15.	PALGRAVE (free trial)	8380	157	< 1

This PI may be affected, in our case, by some factors: the level of users' skills (quality and efficiency of search strategies), the level of network access and the promotion of services.
The highest value for this PI was estimated for ISI Thomson – Web ok Science (44) followed at great difference by the single-disciplinary databases (IOP, ACS, WB - 23).

6. Cost per unit downloaded

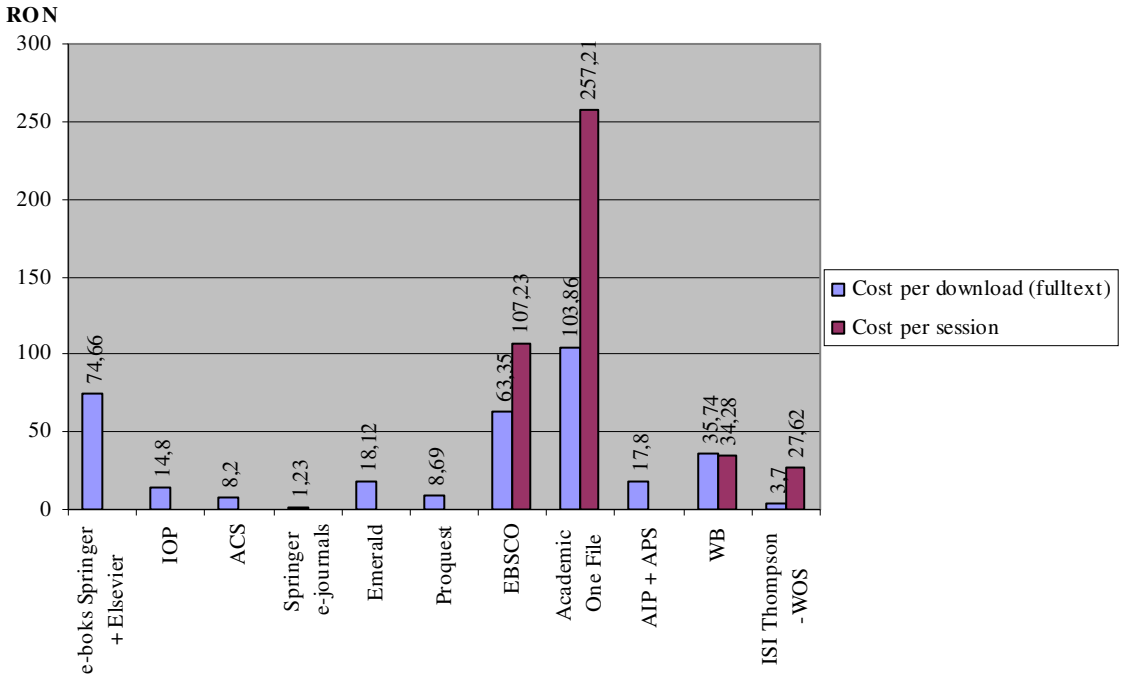
7. Cost per database session

Electronic usage could be counted as sessions (requests of e-materials) or downloads (successful requests of a content unit or descriptive record out of the e-collection – a database, electronic serial or digital document). A session on a database shows the user's interest in a topic, while the download of a content unit or descriptive record out of the database would show that users have found items they deem relevant. The relation of downloads to sessions is somewhat similar to that of loans to browsing. Downloads are therefore preferred as measures for the electronic use of the collection.

Performance indicator	**Cost per session**	**Cost per unit downloaded**
Objective	To assess the cost of a database related to the number of sessions	To assess the cost of an electronic resource related to the number of content units downloaded
Definition	The cost of each database divided by the number of sessions during a specified period	The cost of an electronic resource divided by the number of content units downloaded in part or in whole from that e-resource during a specified period
Method	$I_{CDS} = A/B$ A – the cost of each database for a specified period; B – the number of sessions on each database during the same period	$I_{CCUD} = A/B$ A – the cost of electronic resource for a specified period; B – the number of content units downloaded from each e-resource during the same period
Interpretation and factors affecting the indicator	Low costs per session would generally be considered as showing high cost-effectiveness of that resource***. The PI can be influenced by: ease of access to e-collection, the level of user skills, fees for library use. The attractivity of e-collection can be increased by promoting the e-collection via the library website, by adapting the collection policy to the needs of the population etc.	The PI assesses the cost-efficiency of the e-collection*** on a title basis so that the library can decide at regular intervals if it is still willing it accept the cost per use or if it decides to cancel a resource. The number of downloads is also an indication of the relevance attributed to the e-resource by the users. The indicator can be affected by the users' browser cache configurations and use of proxy servers. The real number of downloads could be higher than the numbers shown by server statistics.

*** Before cancelling a database or e-journal with high cost per session/per downloads, the library should assess whether the resource is very important for a comparatively small user group.
These indicators can be used for justifying the library's expenditure and for budget appliances.

Figure 4 – Cost (RON) per unit downloaded and cost per session for 11 databases.

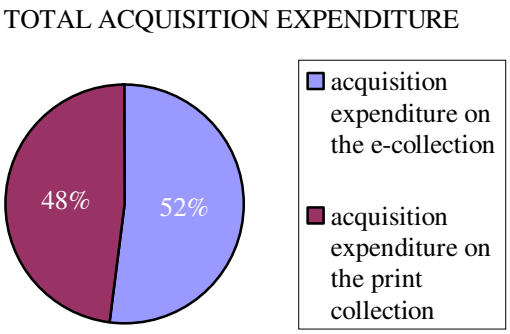


Using the statistics from our suppliers, we could also estimate the following items:
►for SPRINGER and ELSEVIER e-books: the average purchase price for one e-book ≈ 164 RON;
►for PROQUEST there were reported 189750 searches, the average price per search being 0.72 RON;
►for EBSCO: 23.37 RON / one search
►for AOF: 58.33 RON / one search
►for WB: 121.75 RON / one search
The subscription from Wiley-Blackwell included only part of the journals, so that the statistics indicated a number of 2858 accesses denied, which lead to the conclusion that there were also accessed the journals which did not have access licences.
►for ISI Thomson – Web of Knowledge there was calculated 188 RON / login (successful logon) for WOS.

8. Percentage of acquisitions expenditure spent on the electronic collection

The **objective** of this PI is to indicate the priority the library gives to building an electronic collection.
Definition: The percentage of the library's total expenditure on information provision spent on the electronic collections during a period (usually one year).
Method: Expenditure on electronic collection should include acquisition, subscription, licensing costs for databases, electronic journals and digital documents, including pay-per-view costs as well as pro-rata payments for consortium agreements or packages. It should not include expenditure on infrastructure, such as hardware, software or networking, and on digitization of documents; e-documents delivery costs are also excluded.
Percentage of total acquisitions expenditure spent on acquisition of electronic library services is:
$I_{PEIPSEC} = (A/B) \times 100$
where: A - acquisition expenditure on the electronic collection
B - total acquisition expenditure
$I_{PEIPSEC} = (837408 / 1608870) \times 100 = 52\%$

Figure 5 :



If the library joins in consortia, only the library's own share in the contractual expenses should be counted. Where electronic versions are acquired in a package with print versions, only the surplus payment for e-version should be counted.

Interpretation and factors affecting the indicator:

A higher score will normally considered as better, as it indicates high investment into e-collection. The indicator is influenced by the library's collection policies, the range of e-publications available in the library's collection subjects, specialized needs of the population to be served, external means for consortia.

If the value of this PI seems too low, library could use the following methods to decide whether to invest more into e-resources: evaluate usage statistics for both print and e-collections; evaluate ILL or document supply requests in order to adapt the acquisition policy to user needs; perform a user survey for assessing the market penetration of e-services and the satisfaction with e-resources. Experience shows that acquisition costs for electronic instead of print media will not be lower, and that possible savings in shelving and space will be made up by high IT equipment costs. But as e-resources are more frequently used than traditional ones, higher usage can reduce the cost per use and thus improve the efficiency of the services.

The value we obtained for 2009 is the highest we have ever had and it is close to the percentages estimated in the case other European countries[4] (Swedish research libraries - 58.4% (2005), Netherlands university libraries – 50.64% (2004), Finnish university libraries – 51.4% (2005)).

Conclusions

Despite the lack of experience of Romanian libraries for evaluating e-library services, BCU Iasi is managing to obtain some useful quantitative and qualitative data, particularly in the area of electronic resource provision, which give evidence that its strategies are working effectively. The abundance of literature on evaluating electronic library services supports the view that librarians are decided to provide the value of the services they offer, in spite of the difficulties of measurement[7]. They are doing this through successful promotion and publicity efforts which draw attention to the continuous service improvements.

Besides the difficulties in collecting the data needed to calculate PIs specific to electronic resources, there should also be solved current problems regarding the accessibility of these collections (subscribed for a restricted period of time) after the subscription availability, considering that in case the subscription is for the print version, this remains in the library collections.

The ultimate goal in using the calculated PIs is their utility in the library assessment processes realized by the policy makers.

The Section of Statistics of the RLA is considering the selection of a set of PIs specific to the electronic library and the creation of a statistical form to include all data needed to calculate them.

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Assessment of users' information needs and impact on library services

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Abstract

Investigation of the readers' information needs has always been in the attention of library management, with a view to implementing the policy of development and diversification of services offered to the public.

Traditional approaches (based on questionnaire surveys, statistics, analysis of documents) and careful behavioural studies of Romanian library readers have been present since the interwar period, when libraries were considered to be integral parts of education and literacy programs. The technological changes that took place during recent decades and the diversification of information sources have determined the Romanian libraries to continue the application of specific investigation methods in order to identify new information needs.

The results of sociological investigations carried out in libraries have a major impact on the information services and also on the training programs of librarians and library users, effectively contributing to the development of their information literacy.

These topics are addressed to in this paper with examples from the "Lucian Blaga" Central University Library, Cluj-Napoca.

Key words: assessment of users' information needs, questionnaires surveys, library services, information literacy, "Lucian Blaga" Central University Library in Cluj-Napoca

1. Romanian libraries during the interwar period

After the year 1918, the administration of the new Romanian State wanted to culturally build the Romanian Nation through cultural means of state politics. The liberal state came to the solution of *educational politics* and of *culture politics*.

Historian V. Pârvan, in the review *Arhiva pentru ştiinţă şi reformă socială,* 1919 [*Archive for science and social reform*], underlined in his article, *Ideile fundamentale ale culturii sociale contemporane* [*Fundamental ideas of contemporary social culture*], the fact that the meaning of *social culture* refers to "education of the masses and socialization of personalities"[1], in other words, a process with a double-effort approach, bringing together the elites and the masses.

The landmarks for Romania between the two World Wars, a period of time that brought about some major changes in the library field, indicate that this period of time:

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[1] V. Pârvan. Ideile fundamentale ale culturii sociale contemporane. *Arhiva pentru ştiinţă şi reformă socială* (ASRS), I, 1919, 1, p.19.

- has determined further investigations in the book history domain,
- has boosted research in the bibliological field,
- has brought about some of the first monographic approaches of some libraries,
- has put forward the role that libraries have in cultural and national education,
- has developed a new cultural politics etc.

In portraying cultural life between the two World Wars, we cannot overlook the development that publishing houses, foundations and cultural associations have known[2]:

- The most important publishing houses were: "*Editura Fundațiilor Regale*", "*Cartea Românească*", "*Casa Şcoalelor*", "*Scrisul Românesc"* [*Royal Foundations Publishing House, Romanian Book, School house, Romanian writing*]

- Scientific research institutes - *Institutul de studii sud-est europene*, *Institutul Social Român* [*Institute for South-Eastern European Studies, Romanian Social Institute*] ; the *Romanian Academy* also had a fruitful activity, by organising conferences and scientific exhibitions, being the highest cultural forum in the country.

Romanian cultural politics between the two World Wars focused on three primary issues: 1. the problem of dissemination of culture among masses; 2. the problem of practical learning system; 3. the actual creational problem.

The Romanian Social Institute has published an entire set of conferences held between 1927-1928[3] by personalities of that time on theory and politics of culture; also, a serious educational study of cultural politics[4] in contemporary Romania was edited by professor Ştefan Bârsănescu, in Iaşi, 1937. Through this study, professor Bârsănescu became the founder of *educational politics* as a research field.

During the interwar period, the most efficient method of investigating needs within libraries was the *questionnaire*, as mentioned in the history of libraries in Romania. The questionnaire was used in investigations conducted primarily by the Romanian Social Institute, where, as its president, the renowned sociologist, Dimitrie Gusti, considered that libraries were an integrating part of his dissemination of culture programme[5].

In 1920, the first questionnaire that had national scale applicability and made reference to books, reading and library was created by the *Casa Şcoalelor*, with the occasion of a campaign that was encouraging teachers and priests to elaborate monographs on their villages. Within the questionnaire, there were questions referring to the village library, whether the local people able to read were visiting the library and how many, if newspapers were available in the village, where did local people gather information about "...what was going on in the world" etc. Information regarding groups of readers, categorised by sex and nationality, or questions about the existence of "a pencil, a paper, a book?" in the homes of the villagers were also asked. The results of the above mentioned investigation, initiated at the end of the First World War, have brought up a surprising situation – of a rural population that was isolated from the rest of the world, whose possibilities in getting informed were limited to regular publications and books that rarely became available in villages. It was only in 1928 when, with the spreading of the *radio*, the sources of information expanded.

In 1939, the review *Căminul cultural*[6] [*Cultural home*] emphasized the following fact: "*Through a questionnaire, we do not wish to know what there should be at a library, but what there truly is"*.

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[2] G. Georgiu, *Istoria culturii române moderne*, ediția a 2-a, Bucureşti, Editura Comunicare.ro, 2002, p. 254.
[3] *Politica culturii: 30 de prelegeri publice şi comunicări organizate de Institutul Social Român,* Editura I.S.R., Bucureşti, 1930.
[4] Şt. Bârsănescu, *Politica culturii în România contemporană: studiu de pedagogie*, Iaşi, Tipografia concesionară Al.Terek, 1937.
[5] *Politica culturii*, *op. cit*., p. 533.
[6] *Căminul cultural*, V, nr.10-12, oct.-dec., 1939, p. 899.

Generally speaking, the research programme of D. Gusti's *Sociological School* focused on the following aspects related to librarian activity:

- the interest for libraries as educational institutions;
- an analysis of socio-cultural context of the reading phenomenon between the two World Wars;
- gathering of documentary materials useful for the evaluation of the state of the libraries in the period between the two World Wars.

From a sociological point of view, investigations within libraries may enhance the research methods that can be used in libraries – statistical investigation, direct observation, document study, gathering additional information etc. In this context, we can make reference to the data collected[7] by *Ioan Muşlea*, one of the first Romanian directors of the University Library in Cluj (during the years 1935-1947, 1940-1944), regarding the activity of Romanian libraries in Transylvania before 1918. The purspose of Muşlea's questionnaire was to identify the number and current state of the existing Romanian libraries in Transylvania, after the Great Union, but also to classify them on specific criteria (libraries belonging to religious cults, educational institutions, professional reunions, various cultural personalities etc.). A catalogue[8] of the existing Romanian libraries in Transylvanian cities was created based on the results of the questionnaire.

The Central University Library (C.U.L.) in Cluj is an emblematic institution that has represented and sustained the academic and cultural life of the town for more than 130 years. The historical path of the library was closely linked to that of the University of Cluj. The stages of its development were marked by the political, economical and cultural history. In other words, throughout its existance, B.C.U. Cluj has performed complex activities in order to integrate in the structure of the University, by matching book funds to readers' requests, to educational curricula, faculty profiles, but also scientific research programmes of the teaching staff. In accomplishing these goals, a series of sociological investigations were applied on library readers.

2. Investigation of users' needs of information in C.U.L. Cluj

Investigation of the readers' information needs has always been in the attention of library management, with a view to improve the policy of development and diversification of services offered to the public.

In C.U.L. Cluj several methods have been applied to identify library personnel and users' requirements. Out of these methods we mention here only the sociological investigations conducted in the past 10 years, focusing on the issue of user training and offered library services.

No. Crt.	Type and name of the investigation	Period of investigation
1.	A comparative study between traditional catalogue, on-line catalogue, CD-ROM and Internet[9]	1998 - 2001
2.	A sociological investigation on the users' knowledge and evaluation of the library services [10]	1999-2000

[7] I. Muşlea, *Contribuţii la cunoaşterea bibliotecilor româneşti ale oraşelor din Transilvania (până la Marea Unire)*, Cluj, Tipografia "Cartea Românească", 1935, p. 22.

[8] *Ibidem*, p. 26.

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3.	Poll performed by C.U.L. on students' access to publications[11]	2001
4.	A study[12] on open-shelf rooms use (the Social sciences room „Lucian Blaga", and the Sciences room „Bolyai János") within the central building of C.U.L. "Lucian Blaga" of Cluj	2001
5.	A poll[13] that took place within the regular publications room in the central building of C.U.L.	2001
6.	A study[14] on publication serving from the deposit to lecture rooms I-III	2002
7.	A study[15] on Multimedia room use	2002
8.	Attitudes towards users' formation courses[16]	2004 - 2005
9.	A sociological investigation[17] regarding readers' interest concerning a User's training course	2007
10.	A sociological investigation[18] with regard to methods of informing oneself from the central premises of the "Lucian Blaga" C.U.L.	2007
11.	The Library – a place for communication: polling users' opinion with referrence to services offered by the Loan Departament[19]	2008
12.	Polling opinions of users in lecture rooms I-III using questionnaire-based means [20]	2010

Some of the research reports of the opinion polls and investigations that took place within the library have been carried out by the institution's sociologist (Valeria Salanki), or by one[*] of the authors of the present article, others by B.A.s and M.A.s of the History and Philosophy Faculty - Library and Information Science at "Babeş-Bolyai" University, some of which were already a part of the library staff that have continued their studies or students that have been hired after graduating their studies in the field.

Moreover, each applied questionnaire contained questions that made reference to users training courses/programmes, regarding their utility and impact on library services, but also there were questions on users' practical ways of identifying the most usefull sources of information, depending on the subject of interest.

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[16]V. Salanki, *Atitudini privind cursurile de formare a utilizatorilor: Anul universitar 2004-2005*, Cluj-Napoca, [Biblioteca Centrală Universitară "Lucian Blaga"], 2005, 25 p.

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[19]C. Gherman-Căpuşan, *Biblioteca – spaţiu al comunicării: sondarea opiniilor utilizatorilor privind serviciile oferite de Secţia Împrumut la Domiciliu,* (forthcoming paper).

[20]N. Bria-Bolojan, *Sondarea opiniilor utilizatorilor din salile de lectura I – III pe baza de chestionar* (forthcoming paper).

[*]Olimpia CURTA, PhD, deputy director, "Lucian Blaga" Central University Library of Cluj-Napoca.

3. The impact of the sociological investigations results on services offered by C.U.L. Cluj

The information boom has caused major changes in the area of information services, but has also influenced the user as an active person in an everchanging society.

In this sense, the user has transformed into a person that has the need to access up-to-date, verified information and, if possible, delivered at home, as fast and efficient as possible, when in the past, he was not under time pressure and visiting the library in order to consult traditional catalogues. Apart from the mentioned user characteristics, libraries are confronted with an increased frequency of requests.

These factors determine a continuous change in the services and products that are offered. Therefore, aside from libraries, archives and specialized libraries, centres or documentation services, data banks, databases, media libraries, orientation and guidance services and others have made their appearance.

The library automation has brought about major fluctuations in the number of information and documentation services offered, as well as their quality.

In most of the questionnaires applied in the library, users were asked to make observations on the information services offered to them and also make suggestions for improvement of these services. Some users showed satisfaction with services and others reported high satisfaction; even so, many of them made pertinent observations and suggestions related to services provided by the library.

Generally speaking, by analysing dissatisfactions, observations and suggestions recorded through polls and sociological investigations, the library management has articulated a series of strategic points in order to solve user requests and problems in the shortest possible amount of time.

Out of the problems that were identified during the 10 years of surveys carried out in different reading rooms of the central library premises, but also of its branch libraries, we mention the following:

- insufficient computers/terminals in the catalogue room for consulting the on-line catalogue,
- small amount of time provided for user Internet access,
- necessity for updating compulsory and optional bibliographies,
- large amount of time elapsed until the serving of user requested publications,
- reduced number of publications per title, and, as a result, there is often no possibility to consult requested publications (especially during examination period),
- slow up-to-date acquisition and processing of books.

Suggestions recorded from users:

- the organisation of courses in which computer use and modern informational means be improved,
- the possibility of advanced booking (a few days) for Internet access,
- if needed, offering assistance with the search and retrieval of information activity,
- a greater diversity of CD-ROMs, as well as purchasing CD-ROMs in fields of specialty that have complete summary and text available,
- the introduction of all data from the traditional catalogue to the on-line catalogue,
- preservation by means of digitisation of patrimonial-worth documents and making them available to users in their electronic format etc.

Based on the analysis that top managers made using the results of the studies carried out within the library, efforts were made in order to solve user signalled problems, or to develop and diversify the following services and specific products:

Services	Products
On request, ***complex bibliographies***, from traditional and modern sources (1996)	OPAC search ***scheme*** (1996)
Users education (1999)	***New records*** in OPAC by retroconversion process (1996)
Virtual references (2002)	***Internal bibliographical databases on Internet*** (2000)
On-line ***acquisition proposals*** (2003)	New reading rooms by merging some of the personnel offices or by changing the destination of other spaces: *Exhibition room ->* ***Multimedia Room*** (2000)
I.L.L. and ***Document Delivery*** (2004)	***Bibliorev Review*** in electronic format, accessible from the library homepage (2001)
Access to OPAC by ***computers with touch screen*** in the library hall (2005)	***Maps***, ***presentation and promotion flyers*** for lecture rooms, branches of the library, services (2002, 2006, 2009)
Acces to **RO**manian **Li**brary **Ne**twork **S**cience & **T**echnology – ***ROLiNeST*** (2005)	***Internal bibliographical databases on CDs*** (2004)
Book scanning by ***people with visual disabilities*** using computers with scanner (2006)	***Novelty list*** – updated on the Internet on a regular basis (2002)
On-line renewals (2007), ***hold requests*** on loaned publications (2008), ***photo requests*** (2009)	***Homepages*** of the library branches with specific bibliographies (2006)
Book copying by users using ***copy-machines*** operating with access card (2007)	***Philobiblon Review*** in print format (1995) and in electronic format by Ebsco database (2007)
Internet access with ***personal laptops*** (2008)	***Informative Bulletin*** in printed and electronic formats (2008)
On request, ***document scanning*** (2008)	*Sciences Room* -> ***PhDs' room*** (*Marino and Rațiu–Tilea* collections) (2008)
Access to ***Digital Library*** with electronic editions of the publications from patrimonial and periodical funds (2008)	***Orientation guide*** available in electronic format from library homepage (2009)
Access to ***old catalogues*** via Internet (2008)	***Electronic text collections*** from specified publications within compulsory bibliographies of U.B.B. courses syllabus (2010)

4. Users education

The development and dissemination of computer technology, along with the improvements of information retrieval systems have led to a dramatic increase in the number and variety of bibliographic databases. From the point of view of the bibliographic databases producers, the user is the person who interrogates the database; he/she may be an ordinary person or a specialist who actually works in an institution of information and documentation.

From a library's perspective, the user is a person who requires a service for a document consultation or requests a bibliographic research. One can distinguish three main categories of library users:

- those who are not yet engaged in an active life (pupils and students);
- those who are engaged in an active life, whose information needs are related to their profession;
- ordinary citizens, who need information of general interest, usually related to their social life.

In practice, no matter to which category a user belongs to, his training and experience should be considered along with the purpose for his information and documentation request.

The creation of online catalogs within an information institution and the access of bibliographic database through interfaces that allow multiple search criteria ensure a certain independence of users, in the information retrieval process. However, the role of the specialist does not decrease, since the provided databases have different classification criteria and different search interfaces. Adding to all, the huge volume of information from more or less authoritative sources, require tracking, verification and their selection of a competent person.

In addition to assistance, the librarian, the nowadays information specialist, plays an important role in training users to meet their needs of information and documentation. This fact was taken into consideration by the staff and management of C.U.L. Cluj, especially since 1996 when the library was offering users access to their online catalog and the Academic Dialogue, the first subscribed database. Therefore, from that year on various forms of user guidance and training were held, particularly focused on the new information sources.

Soon after, we faced the problem of evaluating the library users' opinion on the need to organize training courses. In the questionnaire distributed during 1998-2001 the question 7 was: *Do you consider appropriate to introduce courses of information access with the new technologies in the library?* To this question the answers were positive in a 96% proportion in the year 1998, decreased to 93% in 1999, and for the last two years decreased to 90%, while remaining high, considering the years when these new media were introduced in the libraries.

The high percentage from 1998, has determined us to organize free training courses for library users starting with the following year. These courses are held systematically throughout the academic year, each semester, being organized into three modules[21].

Registration can be done directly in the library or electronically by e-mail: formare@bcucluj.ro, the user can choose one or more modules, and the operating hours (morning or afternoon).

The thematic of the courses point to user familiarization with:

- system of organization and the operation of the library
- library's provided services
- types of documents and the ways to locate them
- retrieving information from electronic resources
- academic research.

Grouping these topics into modules did not vary much from one year to another, until 2005 when the purpose of these courses was reconsidered along with the types of users to whom they are addressed. It was noted that the students in the first years of college are committed to printed sources, especially those recommended as mandatory bibliographies of the courses they are attending. Final year students, doctoral students and researchers began to realize the value of electronic resources, especially bibliographic databases containing abstracts and full texts. Thus, the training program was modified, being focused on 2 modules:

[21]O. Curta, *Metode de informare documentară tradiţionale şi moderne*…, Cluj-Napoca, Argonaut, 2008, p. 126.

Module I - Orientation and general information (addressed mainly to students from the first two years of college) with the following specific activities:

- spatial orientation in the C.U.L. central building (reading rooms);
- searching for information of interest in the traditional library catalogs (Hall of Catalogues)
- providing information on periodical publications;
- information searching in the periodical catalogs (Periodicals Department);
- simple and advanced searches in ALEPH online catalog;
- retrieving publications from rooms with free access to shelves.

Module II - specialized information (addressed mainly to final year student, Master and PhD students and researchers), with specific activities organized in two locations:

- the Office of Documentation:
  - presenting and exploring the internal databases (ProCite), preparation of specialized bibliographies;
  - support in using the bibliographic and reference tools;
- the Multimedia Room:
  - specialized information search in the subscribed databases (ProQuest, SpringerLink, Jstor, ONU, etc.);
  - search within the subscribed electronic journals.

The new organization form allows the users attending the first module to get acquainted with the library functions, become familiar with the sources of information, emphasizing the concept of continuous education need in the information society. The second module allows a better understanding of the documentation methods and the deepening of electronic information sources and their evaluation. Within this second module, certain aspects are also described: how to select the search results, their possibilities for organization and how to take advantage of them, in order to create new information or new knowledge.

Besides the direct benefits expressed above, users who participate in these courses can be actively involved in the institution's life by expressing opinions on the library. The library's advantage comes from the possibility to directly collect these opinions, even discussing them, opinions that have, as first target, the public service development, but also by establishing much closer relations between librarian-counselors and the readers.

Another benefit not to be neglected, is the increase of pedagogical experience of those who teach such courses. We mention that, within our library, some of the employees participating in user education are lecturers or associated lecturers at the Librarianship and Information Science School from Cluj, operating since 1995.

It is to note that the libraries' users, particularly of the academic ones, depend on the speed of information retrieval and their power to select and evaluate in order to obtain useful and quality information. This involves continuous education of both library staff[22] and users, and also development and diversification of library services that are imposed by the current tendencies.

[22]For training needs of C.U.L. Cluj staff see the work: I. Kiraly, A. Szekely. Studiul privind starea profesiei la bibliotecarii cu studii superioare din BCU "L. Blaga". *Hermeneutica Bibliotecaria – Antologie Philobiblon,* Cluj-Napoca, Presa Universitară Clujeană, 1998, p. 54-82; and for the actual ways of librarians training in computer literacy see: O. Curta. Laboratorul de Informatică şi profesioniştii săi. *Hermeneutica Bibliotecaria – Antologie Philobiblon*, Cluj-Napoca, Presa Universitară Clujeană, 2009, p. 66-84.

5. Conclusions

The user is a key-element to all information systems whose business has no other justification than to allow transfer of information between two or more interlocutors, who are remote or not, in time and space. In general, a user is a client of information services, but also a producer of information.

User's role in relation to an institution can be set at different levels. The user may be responsible for the resources maintenance and development and also for the policy of the information institution, either directly having decision functions or indirectly as a board member of responsible bodies, or through client relationships as well as a taxpayer. The user brings his contribution in the development of the documentation methods, provided he is familiar with the sources of information; he may report and assess the new documents releases and thus provide support for the selection and purchase process. The types of users that an information institution serves will determine the acquisition policy, the offered services and how they can be accessed, and also some requirements of the personnel with whom they come into direct contact.

Periodical investigation of users' information needs, by category or interest groups, allows the endorsement of a fair policy for public services development and diversification. This will be directly influenced by the technological developments, the diversification of information sources, but also by the users' behaviour and social needs. The quality of the offered services will be monitored periodically by analyzing the indicators and statistics provided by advanced applications that modern libraries are (can be) equipped with.

Among the provided services, a central position will be held by the continuous education of users: to learn how to use the library and information sources in general, how to assess these sources, how to organize the results, how to cite correctly and how to use the results for the development of new information or new knowledge. Emphasis will be set on the "learn how to learn" concept, which leads to the development of skills that are strictly necessary for the survival in this century.

The emergence of Web 2.0 involves new changes in the development strategy for public services, a wider opening of direct participation of users through pilot projects created with library professionals. In order to meet the new changes, the library staff should be offered the chance to familiarize themselves with the tools created by Web 2.0. Also, users' information literacy must be a permanent objective to all information institutions that do not wish to diminish their role of the central pillar of storage and dissemination of cultural values in the new society.

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Quality evaluation of library websites

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Abstract

The emergence of information on the World Wide Web is a recent development. Public library authorities are giving increasing prominence to provision of information online through websites.

The paper aims are to establish a kite marking of Romanian library's WebPages and to determine the standards used to assess the quality of this websites. This will be done with an instrument that has been developed for evaluating the quality of websites, WEB QEM method. The research is based upon approaches to evaluation that have been documented in the published literature, interviews of people responsible for websites, and providing a number of criteria that can be used to assess the quality of library WebPages.

The library website should always be the main starting-point for searches and the one virtual "entrance" to the library. The paper presents the main criteria for quality of a library website that can be summarized as follows: adequate language (to the population), clear structure, options for different user groups, and all information up-to-date, short, concise information. The website, especially the homepage, should guide by the shortest possible way to the most-used information. Results show that significant work still needs to be undertaken in order to make these sites examples of "best practice" library services, there is still much work to be done, but the study identifies key areas of concern which would lead to the situation improving significantly.

1. Introduction

The growth of the WWW and the increased use of computers is a key issue for the information society. The amount of information on the Web is constantly growing and the information will not be reliable and of the high quality that people require. Therefore, the quality of websites have now become fundamentally important. However, this is not an easy task, "there is no single catalogue and the documents are not organized in the way we find them in a library", (Chowdhury, 2001).

The definition of web quality is difficult to define. Aladwani and Palvia (2002) have recognized this when they describe web quality as, "a vastly undefined concept. Existing scientific research discusses the meaning of some aspects of web quality in a descriptive manner without delineating its major dimensions or providing tested scales to measure it". Quality has also been defined "in relation to information available via the Internet, quality is often used to refer to sources which contain original content or sources which are accurate and reliable", (Library Association Record, 2000:14).

In most developed countries, physical libraries are dependent on computer networks to provide access to local information resources. There is an issue which is most important of all, namely that young information seekers prefer to use other Internet resources such as search engines. Therefore researchers have used both qualitative and quantitative-led studies to measure user levels of satisfaction with library services and library managers are enthusiastic to know what

differences their library services make to learning, teaching and research (LTR). Till present, there have been numerous attempts to assess the quality of library web sites internationally, but few for Romania.

Statistics shows the state of libraries in Romania. During the last year, public procurement book have increased by several percent, but the number of public libraries has decreased. Romania is not yet a coherent program to stimulate reading and does not have a strategy in the field. Another curious problem is the lack of private libraries in Romania. After the property, 96.5% of all libraries are units of state.

More and more libraries have websites that are trying to address not only active users, but also potential users and non-users, who are rather attracted to satisfy their own needs for information through a simple search performed with one of the search engines offered on the Internet. The website can be a marketing tool very useful, with which I can directly address users can assemble easily with a lot of data about who they are, they are expectations. Based on the data thus obtained, they can improve the services offered so as to adapt better information needs of different user categories.

Our research is concerned with the key issue of quality. The concept of quality is multi-faced. The perception of the quality changes from different user perspectives: the final user is interested in external quality related to the usability and functionality of the site, while the developer is more interested to the internal quality related to backward and forward compatibility, openness to evolution, maintainability, portability, interoperability, etc. So, quality evaluation approaches suffer from several limitations.

Issues regarding websites quality and selection criteria were identified from carrying out an initial literature search. The research methods have taken a combined approach that has included both quantitative and qualitative research methods. The issues and criteria identified from the initial literature review and web-based research have been used to formulate a number of themes and research questions, designed to find out more about the selection of quality websites.

2. Research Methodology

The literature published a number of criteria to determine a quality website. Quality on the web in terms of design and content is difficult to define and a number of different guidelines have been put forward as to what makes a good quality website.

A number of authors have put forward recommendations about how to create a quality website; these include Rosenfeld and Morville, (1998), Head, (2000), Krug, (2000), Nielsen, (2000), Nielsen (2002), and Williams and Tollett, (2000).

The publications outlined above have lead to better websites being designed, created, produced and put up onto the web in the first place. These guidelines could also be used to assess whether a web site already in existence fulfils the criteria set out for being a good quality website.

Most noticeably the guidelines of Cooke (2001) sets out a series of website evaluation checklists with the following criteria headings:

- Identifying the purpose of a source
- Assessing coverage
- Assessing authority and reputation
- Assessing accuracy
- Assessing the currency and maintenance of a source
- Considering the accessibility of a source
- Evaluating the presentation and arrangements of information
- Assessing how easy a source is to use
- Making a comparison with other sources

- Assessing the overall quality of a source

The research has evaluated the effectiveness and quality of Romanian library websites in providing equitable and appropriate access to information. The study consisted in the analysis of a questionnaire completed by representatives of 20 county libraries which have developed their own website and provides information not only for active users, but also for potential users and non-users, and promote their services using Internet. In Romania, we can say that using the website as marketing tool is just at an early stage for most county libraries. From the 42 county libraries (including "Mihail Sadoveanu" Library in Bucharest, which fulfills the function for Ilfov county), only 26 were present with their websites, meaning a rate of approximately 62%. Although more than half have their own web page, the percentage seems small if we keep in mind that the computerization was one of the major objectives regarding public libraries for the last few years.

The current trend indicates that public libraries are becoming more open to the idea of meeting with users through the Internet, it is therefore possible that most of them will develop their own site or improve the existing one, transforming it from a source of information to an interactive tool to attract users to the library, to promote their products and services and to provide dedicated services.

The research we have conducted was performed in two steps.

In the first step, the main issue that the research focused upon was to select the number of representative library web portals. Each URLs was processed by first automatically retrieving a number of pages, starting from this home URL and progressively following hyperlinks to a pre-programmed depth (within each domain/site). The results were consolidated for each site and stored into a spreadsheet for detailed analysis. At this stage a number of sites were removed from further consideration, where sufficient data was not obtained for reliable investigation. This could arise for a variety of reasons:

- a site may have been relocated to a different domain;
- it might be temporarily out of service;
- it might rely on non-HTML navigation;
- it might require registration/login;
- it might be intrinsically a very small site.

An evaluation was performed on each of these sites to find areas of good practice using the following criteria, adapted from the manual “Quality criteria for a public-user-friendly and secure website” (Wind, Martin, and Uwe Schläger, 2002) developed at University of Bremen:

- Is easy to find the URL’s site?
- There are differences in the site view using different browsers?
- Are the contents accessible without installing specific viewing software (plug-ins)?
- If frames were used, are frame titles meaningful?
- Is the text a good default size, and can the text be resized in the browser?
- Can the web page be resized to 800x600 without any horizontal scrolling?
- Do the colors reflect personal settings?
- Are there any distracting or moving images?
- Does functionality still work when JavaScript is disabled?
- Is there an accessibility statement?
- Does a site map exist and is it useful?
- Has skip navigation been provided?
- Is the navigation clear and consistent?
- Is a FAQ list provided?
- Have page names been given appropriate names?
- The loading time is too long?
- There is a multilingual facility?

The list of sites was ranked according to the number of passes and fails.

In the next step, the first 20 ranked library websites were evaluated using the WEBQEM method. WEBQEM (Web Quality Evaluation Method) is a method based on the evaluation and quantitative comparison of the quality of websites, developed by a group of Argentinean researchers. The method is based on international quality standards.
In this evaluation were considered the following quality characteristic requirements: usability, functionality, site reliability and efficiency. With the aim to assess the level of accomplishment of these characteristics, a quality requirement tree for urban web sites was adapted based on quality method for academic Web sites developed by Olsina (Olsina et al., 1999).

1. **Usability (0.3)**
   - 1.1. Global site understandability (0.35)
     - 1.1.1. Global organization scheme (0.5)
       - 1.1.1.1. Site map (0.3)
       - 1.1.1.2. Table of content (0.4)
       - 1.1.1.3. Alphabetical index (0.3)
     - 1.1.2. Quality of labeling system (0.3)
       - 1.1.2.1. Text labels (0.8)
       - 1.1.2.2. Picture labels (0.2)
     - 1.1.3. Plans of offices (0.2)
   - 1.2. On line feedback and help (0.3)
     - 1.2.1. Quality of help features (0.25)
       - 1.2.1.1. Explanatory help (0.6)
       - 1.2.1.2. Search help (0.4)
     - 1.2.2. Web-site Last Update indicator (0.1)
       - 1.2.2.1. Global (0.8)
       - 1.2.2.2. Scoped (per sub-site or page) (0.2)
     - 1.2.3. FAQ feature (0.25)
     - 1.2.4. Addresses directory (0.2)
       - 1.2.4.1. E-mail list (0.5)
       - 1.2.4.2. Phone-fax list (0.25)
       - 1.2.4.3. Post mail list (0.25)
     - 1.2.5. On-line feedback (0.2)
       - 1.2.5.1. Questionnaire feature (0.5)
       - 1.2.5.2. Comments (0.5)
   - 1.3. Interface and aesthetic features (0.25)
     - 1.3.1. Cohesiveness by grouping main control objects (0.2)
     - 1.3.2. Presentation permanence and stability of main controls (0.3)
     - 1.3.3. Style issues (0.5)
       - 1.3.3.1. Link color style uniformity (0.4)
       - 1.3.3.2. Global style uniformity (0.4)
       - 1.3.3.3. Global style guide (0.2)
   - 1.4. Miscellaneous features (0.1)
     - 1.4.1. Foreign language support (0.9)
     - 1.4.2. What's new feature (0.1)

2. **Functionality (0.3)**
   - 2.1. Searching and retrieving issues (0.2)
     - 2.1.1. Web site search mechanism (0.7)
       - 2.1.1.1. Scoped search (0.8)
         - 2.1.1.1.1. Civil servants search (0.25)
         - 2.1.1.1.2. Office search (0.25)
         - 2.1.1.1.3. Document form search (0.25)
         - 2.1.1.1.4. Legislation search (0.25)
       - 2.1.1.2. Global search (0.2)
     - 2.1.2. Retrieve mechanisms (0.3)
       - 2.1.2.1. Level of retrieving customization (0.5)
       - 2.1.2.2. Level of retrieving feedback (0.5)
   - 2.2. Navigation and browsing issues (0.2)
     - 2.2.1. Navigability (0.4)
       - 2.2.1.1. Orientation (0.7)
         - 2.2.1.1.1. Indicator of path (0.5)
         - 2.2.1.1.2. Label of current position (0.5)
       - 2.2.1.2. Average of links per page (0.3)
     - 2.2.2. Navigation and browsing issues (0.6)
       - 2.2.2.1. Presentation permanence and stability of contextual controls (0.4)
         - 2.2.2.1.1. Contextual controls permanence (0.5)
         - 2.2.2.1.2. Contextual controls stability (0.5)
       - 2.2.2.2. Level of scrolling (0.2)
         - 2.2.2.2.1. Vertical scrolling (0.7)
         - 2.2.2.2.2. Horizontal scrolling (0.3)
       - 2.2.2.3. Navigation prediction (0.4)
         - 2.2.2.3.1. Link title (0.5)
         - 2.2.2.3.2. Quality of link phrase (0.5)
     - 2.2.3. Citizen oriented related features (0.6)
       - 2.2.3.1. Content relevancy (0.5)
         - 2.2.3.1.1. Information about the locations of offices (0.1)
         - 2.2.3.1.2. Contact information (0.1)
         - 2.2.3.1.3. City code and regulation (0.1)
         - 2.2.3.1.4. Mission statement (0.1)
         - 2.2.3.1.5. Access to publications (document, reports) (0.2)
         - 2.2.3.1.6. GIS capabilities (0.1)
         - 2.2.3.1.7. Downloadable documents (0.1)
         - 2.2.3.1.8. Searchable database (0.1)
         - 2.2.3.1.9. Minutes of public (0.1)
       - 2.2.3.2. Services (0.5)
         - 2.2.3.2.1. Informative services (0.2)
           - 2.2.3.2.1.1. List of public services (0.25)
           - 2.2.3.2.1.2. Guide for administrative procedures (0.25)
           - 2.2.3.2.1.3. List with public databases (0.25)
           - 2.2.3.2.1.4. Newsletters (0.25)
         - 2.2.3.2.2. Interactive services available (0.3)
           - 2.2.3.2.2.1. On-line contacts with public servants (0.4)
           - 2.2.3.2.2.2. On-line discussion forums (0.3)
           - 2.2.3.2.2.3. On-line complaints (0.3)
         - 2.2.3.2.3. Transactional services (0.5)
           - 2.2.3.2.3.1. On line payment of public utility bills, taxes, etc (0.3)
           - 2.2.3.2.3.2. E-procurement (0.2)
           - 2.2.3.2.3.3. Apply for licenses (0.2)
           - 2.2.3.2.3.4. Property assessments (0.1)
           - 2.2.3.2.3.5. On-line survey/polls (0.1)
           - 2.2.3.2.3.6. On-line tracking system (0.1)

3. **Site reliability (0.25)**
   - 3.1. Link errors (0.6)
     - 3.1.1. Broken links (0.4)
     - 3.1.2. Invalid links (0.4)
     - 3.1.3. Unimplemented links (0.2)
   - 3.2. Miscellaneous errors and drawbacks (0.4)
     - 3.2.1. Deficiencies or absent features due to different browsers (0.25)
     - 3.2.2. Deficiencies or unexpected results (0.25)
     - 3.2.3. Dead-end web nodes (0.25)
     - 3.2.4. Destination nodes under construction (0.25)

4. **Efficiency (0.15)**
   - 4.1. Information accessibility (0.6)
     - 4.1.1. Support for text-only version (0.5)
     - 4.1.2. Readability by deactivating browser image feature (0.5)
   - 4.2. Windows accessibility (0.4)
     - 4.2.1. Number of panes regarding frames (0.4)
     - 4.2.2. Non frame version (0.6)

A quality characteristic is decomposed in multiple levels of sub-characteristics, and in turn, a sub-characteristic is refined in a set of measurable attributes. Quality evaluation aggregates the measured attribute values. The proposed quality tree is presented in figure 1.

For each quantifiable attribute was established an evaluation criteria - X_i. The result is a rating, which can be interpreted as the degree of satisfied requirement. For each variable X_i, has been established an acceptable range of values and has been defined a function, called the elementary criterion. This function is a mapping of the variable value into a numerical domain, called the elementary quality preference. The elementary quality preference EQ_i can be interpreted as the percentage of requirement satisfied by the value of X_i. In this sense, $EQ_i = 0\%$ denotes a totally unsatisfactory situation and $EQ_i=100\%$ represents a fully satisfactory situation.

Each criterion was weighted and the aggregation of elementary preferences completed the global quality preference*:* The global quality preference represents the global degree of satisfaction of all involved requirements.

Both quantitative and qualitative data has been collected by sending out an email-based questionnaire. A case study interview with a Library Authority has been carried out in order to collect further relevant qualitative data.

The responses from the questionnaires and case study interview have been presented and summarized by using descriptive statistics. The statistics have been analyzed and discussed in the light of the literature to present the current selection criteria used by Public Library Authorities to select quality websites.

3. Interpretation of results

For this research we chose to send questionnaires via e-mail as this method presents several very important benefits: low cost, speed (in a few hours we managed to send over 20 emails), range (we managed to get in contact with county libraries all over the country), response rate (the questionnaires sent by e-mail may be better received by respondents, those who check their messages are ready to interact). Of the 23 libraries contacted, 20 of them completed the questionnaires and returned them to the e-mail address specified, so the response rate was very high (87).

From the responses received, we have concluded that the first site of a county library in Romania appeared in 1996 (the website of Cluj County Library). Gradually the number of web pages began to grow, so that in 2000 were 6 library websites. The year 2005 is the year with the most spectacular growth, 9 websites. All county libraries websites have proved over time to be dynamic marketing tools that have adapted to changes in the domain and user demand. Many of them have now new versions of the first website, such as the county libraries from Arges, Dolj, Iasi, Mures and Timisoara.

The answers reveal that there are four major trends in terms of delegating responsibility for achieving and maintaining a library web page: a) the page is completed and updated by the library employees, especially those working in the IT department (62 %), b) the library use a specialized company of web design to achieve and maintain the site and pay a fee for services (11 %), c) library is working with outside firms or individuals to design the site, but the update is taken care by inside personnel, this way is more economical and d) a person who does not work in the library has the responsibility of creating the site, see the libraries web pages from Salaj, Suceava or Vrancea.

None of the libraries did not attempt to highlight the costs involved by the website. In most cases the costs for achieving and maintaining the pages we goes to 0, because the sites are posted on free servers and the updates are done by the library employees. Some respondents

mentioned among these costs the pay for employees who work for the site maintenance, the costs represented by the consumption of electricity and the purchase and maintenance of the equipment. All the county libraries cover these costs from their own budgets, funds from public institutions to which they are subjected, the county councils.

The answers we have received demonstrates a concern of most county libraries for market segmentation. Approximately 55% of surveyed, representing 11 county libraries addresses through the site to all categories of users. County libraries do not think of their websites as marketing tools by which they can address to certain segments of defined users. Starting from a minimum segmentation we could determine more clearly what each wants and we could improve the image created on the Internet and the services it offers. Through traffic monitoring service site can get information about countries where Romanian library web page is accessed, which demonstrates that not only community members can be users. For these virtual users should be developed specific services available online, to satisfy their information needs, increase the reputation among the institution and to provide visibility to a much more widespread, not just locally. These users may be attracted by services such as references by e-mail (available in several international languages, not only in English), consultation of databases and online periodicals, links to other sites, the consultation of books in digital format, translation or tutorials.

Monitoring site traffic (visits) is an effective tool for assessing the impact that the site has among users and of its effectiveness as a marketing tool. Based on data obtained from monitoring we can determine how often the site was visited daily, weekly, monthly or annually, which pages were accessed more often, how many visitors have returned to the referrer or how they got to the library site, the country of origin of site visitors, etc..

Monitoring traffic on the website is done in several ways: - 6 of the library websites (Arges, Brasov, Dolj, Maramures, Neamt, Valcea) are recorded on ***trafic.ro***, an analysis service websites in terms of number of visitors comprising two sections / services: ***Ranking*** - which lists websites according to the number of visitors and ***Tracking*** - Traffic analysis (on hours, days, weeks and months), the profile of visitors (countries, operating systems, browsers, display) and promote those sites (analysis referrer) - 9 library websites (Cluj, Dambovita, Galati, Harghita, Mures, Salaj, Satu Mare, Suceava, Vrancea) use other free traffic monitoring (Webalizer, Free Hit Counter, StatCounter) - 5 county libraries (Constanta, Iasi, Sibiu, Timisoara, Vaslui) not use such services to monitor traffic and the number users accessing the site daily is only indicative.

On county libraries websites are promoted especially: existing services, information about events, cultural events organized by the library, general information about access, collections or local interest, useful links, databases, online catalogue, list of new acquisitions. In addition to these services promoted by most libraries, some library websites added interlibrary loan via the Web, online catalogue that contain data from the catalogues of other libraries in the county. The possibility to view data sheet reader, loan history, sending e-mail information about a book, However, the websites of county libraries are still informative for a particular focus on the presentation of traditional services, the collections and less an interactive, dynamic, user oriented seen as a potential "customer". Therefore, the presence of services available exclusively online is very low.

While over 40 per cent of people aged 16 years and over currently could access to the Internet from any location, Internet access is lower for some groups, particularly older people, who comprise a large proportion of the library users.

The most important issue when designing a library's website is to consider the special needs, competences and behavior of the individual library's population. This may differ widely between types of libraries. What users generally want when accessing a website is either to find a specific information (the opening times of the library, the way to get a user card) or to

perform a specific activity (a catalogue search, a renewal). Users do not spend much time looking on a page. Normal users spend only about 35 seconds looking at the homepage, expert users about 25 seconds.7 During this time, they should be able to recognize how they can get to the information they are seeking. Users generally scan the page instead of reading consecutively. Website design must take this into consideration.

Most responses (55%) indicate as the most widely used service provided by the websites the online catalogue, Web resources, database and Info-Guide. On the website of the library in Cluj, the most frequently used services are those that provide access to Web resources. A special case it is the library page Dambovita county, where the most commonly used service is the communication of normative acts.

The responses reveal that, in general, county libraries update their sites only when there is new information. There are libraries that have a constant concern to keep awake the interest of users by updating very often, even daily or weekly. Libraries in Constanta, Galati, Iasi and Mures daily update information presented on this site, those in Brasov, Dolj and Neamt weekly and Arges county library site is updated monthly, in Vrancea, updating is done quarterly, and in Salaj update is made annually.

In order to reach their full potential, websites must constantly develope and promote communication with library users, especially when information and communication technologies is very dynamic. 90% of county libraries in Romania say they have developed the medium and long term plans for developing the web page. Only two libraries (Neamt County Library and Library of Valcea county) did not regard such plans.

The analysis and comparison of the final results lead ud to the following conclusion:
Concerning usability:

- All the sites have a table of contents;
- None of the web sites has a search help or explanatory help;
- The addresses directory is complete in 80% of cases;
- The questionnaire feature is presented in 5% of cases;
- The FAQ component is presented only in 24% of cases;
- The style issues are uniform in 90% of websites;

Concerning functionality

- Mechanisms for scoped search are available in 28% of cases, while for general search are available in 46% of cases;
- 72% of web sites obtained high scores at navigation and browsing issues;
- The vast majority of sites provide their department's telephone number (86 %) and mailing address (80 %).

Concerning reliability

- The most of sites (84%) have received high scores in the evaluation of the reliability;
- In 7% cases we found link errors and in 15% deficiencies like “destination nodes under construction”.

Concerning efficiency

- The support for text-only version is present only in 24% of cases;
- Many sites (88%) continue to omit alternative text for images. Where provided, it was often found to be inappropriate or ineffective;
- Where frames were used, they often (64%) appeared without titles or equivalent alternatives.

It is recommend that the library websites function as an “electronic signpost” and have:

- a guide to the availability of sources and services of learning resource, library and information providers;
- a way to inform people of their rights to access to these sources and services;

- a channel through which users could be directed to the appropriate initial point of access to resources;
- a device to educate and develop users as independent learning resource users.
- a customised means of access to the large variety of electronic journals which the library provides

A site should be user-centred in that it is based on knowledge of the site's users, in particular their technological and physical capacities, their cultural context, and their information needs.
A brief usability evaluation of the site was carried out as a mean both of evaluating the appropriateness of its design and content, and of establishing what modifications might be necessary.

4. Conclusions

Although this article reports on a small sample of library web portals in Romania, nevertheless, it represents an important sample in terms of practice. Future research directions for this research lie in verifying whether the aforementioned assumption would hold and also whether the issue of quality is observed in a larger sample of library sites.
Recommendations for further extension to the research have been made by putting suggesting that the criteria considered important by library users and web designers could both differ from each other and differ from those of the information professional. These both should be further investigated in order to establish a comprehensive view of website quality issues.

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The Role of Information Literacy in Measuring Management Performance of Projects Financed through Public Funds

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Abstract

This paper presents some aspects of information literacy in increasing the efficiency of management of projects financed from public funds.

Currently, there is an increasing interest in funding the research and investment projects through public programs. At the same time, the projects financed through public funds are implemented in a highly regulated and bureaucratic environment.

Public projects are enrolled in a high complexity level, dealing with a large number of aspects, like social, economical, environmental, political issues. These projects are financed from national public funds, by the European Union, such as pre- and post-accession programs, other European funds etc., or by other international financing institutions (IFI).

Rigorous planning is essential for an efficient management of public projects. The management performance of public projects is assessed through specific indicators defined along the 5 criteria set out by the OECD – relevance, efficiency, effectiveness, impact, sustainability. In this regard, updated information is critical for an accurate measurement of management performance of projects financed through public funds.

In the new economy, the new technologies are useful means for data collection and processing, for disseminating and sharing information, for follow-up and better management, for setting up future strategies and actions. The project managers and other various stakeholders involved in public funds management are forced to develop additional abilities and skills. Intranet systems are developed as real knowledge systems, created as large libraries, where the information is shared and available upon access. Maintenance of these knowledge centres is an important responsibility.

1. INTRODUCTION

Presently, in Romania there is an increasing interest in the projects financed through the public programmes. The present paper aims to present several aspects related to the new economy in the context of the management of projects financed through public funds, focusing on the role of information literacy in assessing the implementation of public financed projects.

Management of the projects financed through public funds is referring to those projects receiving funding from public sources, national and international. Because the projects financed through public funds have specific characteristics, their management should take into consideration these elements.

The way these projects are implemented should take into consideration the evolution, or better say revolution, of the social and economic activities, the new approaches and perspectives that the new economy is bringing in the day-to-day activities, the new available technologies and techniques etc. Working in this sector requires a redefinition of the capabilities including the project management, in order to successfully implement projects and to achieve proposed objectives. This type of project management gains a higher importance for the organisations

which are mainly or exclusively aimed to this sector. For such organisation their survival is determined by the success achieved in the management of these projects.

The assessment of the implementation of the public financed projects is needed to establish the compliance with the pre-defined objectives, to define the extent of achieving the expected results and to draw up lessons for future programmes.

2. CHARACTERISTICS REGARDING THE MANAGEMENT OF THE PROJECTS FINANCED THROUGH PUBLIC FUNDS

In order to assess the performance of the public funded projects, firstly, we need to better understand the characteristics of these projects, the aspects guiding their implementation and the environment where they are performed.

The public funds represent a significant source of financing taking into account the amounts available on through Government programmes. The financing source can be both national and international and there are various international financing institutions (IFI) providing financial assistance such as long or medium term loans, or as grants (non-reimbursable funds), like European Commission, European Bank for Reconstruction and Development, World Bank, Asian Development Bank, etc. There are also funds supporting the joint ventures initiatives of nationals in other countries, like the German Government (GTZ), Swedish Government (SIDA), The Netherlands Government (MATRA), etc. The European Community has defined specific investment programmes, i.e. to support the *acquis communautaire* implementation in accessing countries, to eliminate the discrepancies between Member States, to support regional development, to stimulate researches and pilot studies, etc. Romania benefits of the EU Structural and Cohesion funds, implemented through the Operational Programmes (following the PHARE, ISPA and SAPARD programmes) in a co-financing structure from the National Fund.

The allocation of funds is made at national, regional or local levels based on defined priorities according the public policies. The activities performed and the initiatives taken are limited by the macro-economic level decisions. In this respect, we need to emphasise that the public sector is a very well defined field of activity, highly regulated. Specific procedures and regulations are established and need to be followed. Many times these are considered too bureaucratic and time consuming. Also, many times the management of projects financed through public funds is facing discrepancies between the objectives defined at national level and those at regional or local level or the financing programmes are not correlated. The negative effects are easy to understand.

The project related activities are performed in a bureaucratic environment leading to many implications. The documentation requested for the public financed projects is much more extended compared to the requests of the private sector. Therefore, the whole process of project preparation, project evaluation and project implementation is slowed down by the bureaucratic aspects and existence of an over-sized hierarchical structure. The reply time or waiting time to the submitted documentation and reports for consultation or approval is significant and determines major delays, with cascade effects.

The public authorities had and have an important role, in their position as Contracting Authorities (defined as the government of the beneficiary country or the legal person governed by public or private law concluding the contract, or on behalf of which the contract is concluded with the Consultant, and the entity which is making the actual payment for the contract) or Beneficiaries (the public entity/entities mentioned in the Project Fiche and which is directly responsible for the project implementation from the technical point of view and according to the law being the final beneficiary of the project results) of these projects.

Another specific element is related to the client behaviour (in this case we cannot mention customer behaviour) and the particularities of the relations between the public client and the other stakeholders involved. Thus, the client behaviour is guided and restricted in the same time by the public strategies, public financing programmes, the requirements defined and mentioned in the project fiche, tender dossiers, or guidelines for applicants in case of direct beneficiaries. The influence on this client behaviour is very limited. Additionally, an important factor that should not be neglected is the political factor. The influence of the political factor is well known in definition of the public strategies and programmes promoted by the public authorities. Specific tools, like public consultations or researches made by the public authorities, lobby activities, provision of notifications and formulation of recommendations can provide to stakeholders useful information in designing the future public programmes and to tailor the public policies. At governmental levels there are established the priority axes for public investments, which areas should be sustained more and which less. The management of projects financed through public funds should be oriented to the areas that benefit of these funds and which vary from a financial period to another, from region to region, from country to country, based on the defined public priorities.

Another aspect that needs to be mentioned is referring to the personnel existing in the public authorities structures. Both an over-sizing and an under-sizing can be seen, determined by the lack of correlation between the defined programmes, activities involved and available staff. Additionally, there is a high fluctuation of personnel in the public sector determined by underpaid work, which determines loss of knowledge accumulated through the extended training programmes, and in the end the lack of specialised personnel.

The above mentioned aspects presented hereby represent some of the most important issues that affect and limit the management of projects financed through public funds and in consequence the implementation of these projects.

3. IMPLICATIONS OF NEW ECONOMY IN PUBLIC FUNDED PROJECTS

It is not possible to ignore the impact of the new economy on the activities the organisations perform, the new emerging technologies available and knowledge based activities.

The public sector needs support in developing capacities and institutional strengthening. Most of the pre- and post-accession programmes included/include a training component that facilitates the know-how transfer and allows the foreign and local specialists to provide trainings including in management of projects financed through public funds. The innovative consultancy companies in this field employ new approaches, have an integrated vision and further changes can be seen also in the public management.

The new economy has determined revolutionary changes in the social and economical life, a new era has emerged, an era of information technology revolution, an era of knowledge based society. We face new transformations, new perspectives and new approaches, we see new tools and methodologies in which knowledge has an essential role and real knowledge communities are built. The knowledge communities are described as concentrations of knowledge within the economic entities, where the learning is not limited to the accumulated knowledge and knowledge is considered as the main engine of the new economy. The knowledge creates the intellectual capital of the new economy organisations, including those activating in the management of the projects financed through public funds. The public sector is making significant steps towards implementing these developments.

The changes in technologies are leading to changes in mentalities. The successful result of applying quality management principles and tools in various sectors is well known. Application of quality management in these areas determines an increase of efficiency and effectiveness of the implemented projects. A new approach can be seen, replacing the technical-managerial

orientation by the rationale-responsibility orientation, in which the responsibility belongs to every member of the community, the communication is direct and quick, the ideas are expressed without fear, and the human capital has a central role.

In the new economy, the organisation chart is changed; the pyramid type model is replaced by a network model, which is a model that facilitates the knowledge exchange in a simple and easy way, understanding that each part is important in creating the whole system. Implementation of this approach is made mainly in consultancy companies involved in private sector projects and in research areas where the common goal is better understood.

The new economy is based on new information technologies which provide new communication ways – internet, intranet, websites, messaging programmes, etc. By using these tools the information transmitted quicker and the knowledge is spread more easier and become available to various stakeholders regardless of the location or time. The multi-national consultancy companies have developed internal communication systems, the classic meetings are replaced by tele- and video-conferences, reducing the travel time and using time more efficiently. These facilities are widely used in public sector by IFI entities as a regular way for conducting activities. On the other hand, it can be seen that these systems are used extensively, often replacing direct communication. We may say that there is a high risk of dependency on the hi-tech communication instruments.

The internet is a huge source of data, a channel to disseminate information, a platform for communication. At organisations level, the intranet systems are not used only for communication but consist of real knowledge systems, created as large libraries, where the information is shared and available to the inside staff. Maintenance of these knowledge centres is an important responsibility and it is mentioned in the job descriptions.

The human capital has a central role in the new economy. Various ways to stimulate creation of knowledge are developed, inside training facilities for the personnel are created and participation in trainings, internships and study-visits is promoted. Two levels of knowledge can be defined within any economic entity: the individual knowledge and the organisational knowledge. The individual knowledge comprises the tacit and explicit knowledge available at each member level, while the organisational knowledge refers to the individual knowledge of the organisation members integrated at entity level. The intelligent organisations understand these two aspects and are focusing in motivating its members to share and create new knowledge.

Knowledge is very dynamic and the transformation is permanently made. The knowledge services have a specific characteristic – the initial cost of generating them might be high, but once they are created, the cost for replication, multiplication, usage is close to zero. Based on this aspect, in the management of projects financed through public funds, new specific tools and methodologies are defined, and their usage in the day-to-day work does not request high investment costs for design and creation, but only reduced costs related to their adaptation to the existing situation because the conceptual idea is already elaborated. Such an example is the logframe – logical framework. It is an instrument used mainly for the European Union projects for defining the project and at the same time for monitoring and evaluation during the project implementation. The logframe is mainly defining the objectives, results and activities of the project in terms of monitoring indicators, sources of verification and assumptions. The assessment of the logframe based on the inputs, outputs and effects is made using a specific evaluation system.

Various similar instruments are used in the management of projects financed through public funds. The international financing institutions have defined their own tools in order to establish a unitary management system for the projects they finance. At the same time, the consultancy companies have developed systems of tools, gaining a real competitive advantage on the market.

4. EVALUATION OF PUBLIC FUNDED PROJECTS PERFORMANCE

EU is providing financial assistance through various programmes for supporting national development efforts. Responsibility for public money requires paying special attention to assessing Government actions. Therefore, evaluation is not only a process that analyses the results by reporting to a set of defined criteria and specific performance indicators, but also the process that assesses the performance of existing actions and draws up recommendations for further improvement.

The Practical Guide for The Commission Services elaborated by the DG BUDGET defines the main purposes for carrying out evaluations as following:
- To contribute to the design of interventions, including providing input for setting political priorities;
- To assist in an efficient allocation of resources;
- To improve the quality of the intervention;
- To report on the achievements of the intervention (i.e. accountability).

The above definition gives a comprehensive understanding and is applicable both at programmes level and to individual projects, regardless of the specific operation field. Further, the most applied criteria are the DAC Criteria developed by Organisation for Economic Cooperation and Development (OECD). These are considered in evaluation of the development assistance programmes and projects and analyse the key elements defined in the logframe. The five criteria are as following:

1) *Relevance* – examines the extent to which stated objectives are appropriate to the addressed issues and the project feasibility in relation to the environment where it is implemented;

2) *Efficiency* – evaluates the link between resources involved in project, activities performed and obtained results if the cost is reasonable, in other words "value-for-money";

3) *Effectiveness* – concerns the degree to which the project achieves its objectives through the envisaged activities and provision of foreseen outcomes;

4) *Impact* – follows the impact of short, medium and long term, how the project affects the environment, the political and social aspects, changes in behaviour etc.;

5) *Sustainability* – refers to long-term positive benefits that the project can bring, taking into account its connection with other projects.

In addition to the above mentioned criteria, some other can be taken into account, like coherence, economy, utility, consistency, distributional effects, acceptability etc. Not all these criteria are analysed altogether in all the stages of the programming cycle. According to the temporal scope, three types of evaluation are established:

a) *ex-ante evaluation* – it is a process that supports the preparation of public actions. It examines the project before the implementation in order to determine the best suitable public interventions and to make the necessary adjustments if needed. Its purpose is to gather information and to carry out analyses which help to ensure that the delivery of policy objectives will be successful, that the instruments used are cost-effective and that reliable evaluation will be subsequently possible.

b) *interim evaluation* – it is made during the ongoing activities of the project during implementation in order to see if it respects the initial programming. It produces direct feedback into the implementation process and thus helps to improve the quality of ongoing interventions. Moreover, interim evaluation is also an important source of information for the design purposes for the next generation of a programme, new policy orientations, etc.

c) *ex-post evaluation* – it is conducted after finalisation, in order to analyse the results obtained in relation to established objectives and to determine the general effects. It covers the entire

intervention period, with a special interest on the impacts, efficiency and effectiveness of the intervention. It also assesses how sustainable the realised impacts are and what are the main factors behind the success or the failure of an intervention.

The relation between the evaluation criteria and the temporal scope of the evaluation is defined according to their main applicability: the relevance criterion is assessed during ex-ante evaluations, the efficiency and effectiveness criteria are assessed during interim evaluations and the impact and sustainability criteria are assessed during the ex-post evaluations.

All the evaluation criteria are analysed through specific quantitative and qualitative indicators. The indicators are established in line with the project objectives and area of activity. The indicators are SMART, which the acronym for Specific, Measurable, Achievable, Relevant, Time-bound. The SMART criteria are creating a framework for a more objective evaluation of the public interventions.

The data for qualitative and quantitative indicators are collected through known statistical methods and methodologies, like questionnaire surveys, surveys based on individual interviews, surveys based on focus groups, surveys based on case studies, statistical analysis, expert panels, use of econometric models, development of a new econometric model. The new technologies facilitate the data collection, process, dissemination and providing to stakeholders and decision makers accurate information quicker.

6. CONCLUSIONS

Information literacy is playing a major role in assessing the implementation of public financed projects. Knowledge is inherent in an intelligent organisation and it is considered a valuable asset. Criteria for projects evaluation are made based on the previous expertise available. The evaluation criteria are further assessed through specific indicators that evaluate the project results and quantify the performed activities. In the area of projects financed through public funds the results of evaluation are supporting the definition of future public interventions. Availability of on-line databases developed by sound professional institutions provide useful information and help decision makers to better document their programmes. The high volume of information could not be efficiently used without the facilities provided by the knowledge society. New tools and approaches are elaborated and extensively used in management and evaluation of public funds.

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The Role of Innovation in Romanian Statistical Field – Key Factor in Meeting Users' Needs

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Abstract

Romanian official statistics is in a continuous improvement process to ensure the development strategies, know-how and common approaches to EU Member States.

Innovation in the business of statistics requires actions that are intended to enhance and strengthen confidence in the statistics for providers and users of statistical data, increase the quality in statistics, at comparable levels to other European countries, identify and consult key users to understand their needs.

The wide variety of users of statistical data has a significant impact on the production of statistical information, this being the reason why it is necessary to develop statistical concepts and design of relevant statistical products for users in the public or private sector.

In developing the Annual National Program for statistical research all the stakeholders should be involved to formulate proposals for significant changes on data collection, methodologies and statistical products.

The National Institute of Statistics has proposed to review regularly, at intervals as short as possible, both the users' needs and the standards of statistical products, increasing the web accessibility for statistical data and improving information quality.

The innovative actions in the field of statistics can contribute to adapt statistical research programs to current and future requirements of data users, to strengthen the technological infrastructure, organization and human resource development, to strengthen the national statistical system, to measure the economic and social status, the evolution of Romanian society.

1. INTRODUCTION

The role of the statistics in the modern knowledge-based society is crucial because it represents the base for public policies and private entities policies, NGOs policies and in general of all the members of the society.

This paper aims to highlighting the role of official statistics in Romania and consequently the responsibility of The National Institute of Statistics (NIS), as a specialized body of central public administration responsible for coordination and elaboration of major official statistics. At the same time, the paper wishes to emphasise the new activities undertaken in the field of statistics, in order to enhance and strengthen the confidence of users of statistical data and statistical information and to improve the quality of statistics.

The activity of The National Institute of Statistics is to collect, process, analyse, disseminate and define the series of official statistics, with demographic, social, economic, financial or legal content, necessary for documentation and evaluation of economic and social policies, government decisions and of economic entities. Other equally important activities are public information, development of scientific research, submission of statistical data to international

organizations, according to the obligations taken by the Romanian government, as well as other internal and external user groups.

Ministries, National Bank of Romania and other public institutions are making statistics in their field, and these are integrated as part of official statistics. Statistical research methodologies organized by these institutions are approved by the NIS, to ensure timeliness and accuracy of research and statistical methods used.

Compliance of Romanian statistics with European Union standards is supported by adequate institutional capacity development, in terms of collecting, processing, storing and dissemination of statistical data, using methodologies adapted to EU standards.

The aim of the present study is focused on the need to develop the statistical culture at users level to generate statistical data that are of quality, credible and according to the "Fundamental Principles of Official Statistics", namely: autonomy, confidentiality, transparency, relevance, proportionality, ethics and cost-effectiveness.

2. THE NATIONAL INSTITUTE OF STATISTICS – ASPECTS REGARDING THE ORGANISATION MARKET POSITION

In a global economy, statistics has become ubiquitous and indispensable, meaning, on one hand, the need to develop a culture of statistics in order to provide accurate, timely and relevant data to different categories of users and, on the other hand, to strengthen the credibility of the institution by a correct perception of its activity at public level.

Considering the growing interest of users for statistical information, it appears necessary to put into practice methods and techniques to better exploit new information technology capabilities, to assure the maximum statistical accuracy in a transparent and efficient way.

The relationship with users of statistics is made by the NIS through publications, press releases, notes on the NIS website with relevant information, dissemination of statistical research results, redesign of the website and publication of the on-line time series database - TEMPO - and the consumer price indicators database, advises given to users of statistics, specific answers (written and on-line) to the users requests, promotional actions for statistical products, participations in exhibitions and scientific seminars.

In order to better meet the user needs for statistical information, NIS issues statistical publications tailored to the general public requirements and in accordance with the evolution and restructuring of the current economy. Among the most requested statistical areas we can mention: Consumer Price Indices, Labor Market, Income, Expenditure and Consumption, Industry, Construction, National Accounts, International Trade, etc.

The results of statistical researches are materialised in the large number of statistical publications issued, as follows: synthetic publications, social statistics, enterprise statistics, housing, construction, information society, agriculture, forestry and environment statistics, transport statistics, tourism statistics, trade and services statistics.

Special attention shall be given to the following papers: Romanian Statistical Yearbook, International Trade Yearbook, International Trade Statistical Bulletin, Bulletin of Prices, Romania in figures, Romanian Travel Summary, World Economy in Figures (occurs at every 2 years), Code of Conduct of Statisticians, Demographic Bulletins, Services and Publications Catalogue, etc. The highest level of editions is represented by the Romanian Statistical Yearbook and Monthly Statistical Bulletins.

Positive aspects:

- The National Institute of Statistics has achieved, especially in recent years, a high level of confidence among the providers and users of statistics, as a result of

applying with consistence and professionalism the principle of impartiality, respectively the non-discriminatory treatment of all data users regardless of their position in society.

- Confidence in official statistics, in this case, of the National Institute of Statistics, of the respondents and data providers was emphasized by the fact that based on the data provided, there are elaborated relevant and quality statistics, which are supplied in an aggregate form and used in their current activity.
- The staff of NIS is competent and quick on the activities performed, and comprises professionals who provide effective statistical work for the society.
- NIS enjoys a good reputation and a great prestige in relation to the other official statistics providers. The norms and standards used by NIS are also applied in the statistical activity of other data producers.
- The National Institute of Statistics enjoys a good reputation and high prestige in comparison with other producers of official statistics. The standards and methodologies used by NIS are applied in activities performed by other statistical data producers.

3. DEFINITION OF THE NATIONAL INSTITUTE OF STATISTICS OBJECTIVES REGARDING QUALITY

The development strategy of the national statistical system during 2008-2013 comprises a set of objectives, actions that follow a coherent and integrative conception, a more efficient involvement of statistics in the national programs and policies for economic and social development, as well as a full integration of the Romanian statistics within the European Statistical System.

The main strategic objectives are aiming to:

- Enhance and strengthen the statistical confidence of suppliers and users of statistics;
- Gather in a coherent and coordinated framework the statistical services and activities of public institutions by establishing, operating and strengthening the National Statistical System;
- Full integration of the Romanian statistics within the European Statistical System;
- Expand the coverage of statistical research programs and adapting the research programs to current and future needs of users of statistical data;
- Increase the quality of statistics in levels comparable with other European countries, introduction and monitoring of quality management in statistics;
- Improve management within the National Institute of Statistics; strengthen the technological infrastructure, organization and human resource development.

The overall concept and vision of the strategy are essential premises for increasing the capacity of the national statistical system in all its components, to quantify the economic and social status, the evolution of the Romanian society.

Lately, in the definition of quality in statistics, a strong emphasis is made on meeting users' needs. Given that they have different requirements, the specialists should pay attention to the balance between quality and utility as to obtain the maximum accuracy it is needed more time and more resources, but late publication of results determine no longer interest of the users.

In the statistical offices, the concept of quality consists of a number of criteria that reflect the statistical user needs. In this respect, quality is defined by a total of six dimensions, namely: **Relevance, Accuracy, Contemporary (Opportunity) and Punctuality, Accessibility and Clarity, Comparability, Coherence.**

- **Relevance** – represents the extent to which user needs are met adequately. It measures the relevance of the statistical product for users and the extent to which the statistics provided meet users' needs.

One of the main keys of quality management is targeting the official statistics to its users. Understanding users' needs is a crucial step.

The wide variety of users has a significant impact on production of statistical information, which is why the products of the national statistical institutes must be a public product (part of the information infrastructure of a democratic society) and a private product (research and analysis made upon order of individual clients). These features make the statistical product to be different from other products for the market. In order to understand the users' needs, they have to be known, described, classified and investigated (interviewed).

- **Accuracy** – is related to the concept of error and represents the closeness of the final retained value (after collection, editing, inputting, estimation, etc.) and real value, but unknown. The difference between the two values is the error. Accuracy is a relative concept, not an absolute one, but it is fundamental to quality statistics.
- **Contemporary (Opportunity) and Punctuality:**

Opportunity – refers to the period between the date of providing statistical data to users and the reference date. For many decisions, particularly in macroeconomic management, timely information is essential.

Following the introduction of computer assisted interviewing (CAI) and the improvements that followed regarding the processing systems, the time spent on these operations has been considerably reduced. In addition, the introduction of computer assisted interviewing resulted in improved data quality.

Punctuality – refers to the period of time between actual date for supply the data to users and scheduled delivery date (mentioned in the catalogue of publications). For example, the number of days elapsed since the 5^{th} of every month when it is planned to dispatch the Monthly Statistical Bulletin, until when it is actually released.

- **Accessibility and Clarity** – assesses whether the statistics are accessible to users and whether they are delivered in the form required by users

Accessibility – refers to the physical conditions in which users can obtain data (where they can obtain data, how they can order data, delivery time, etc.). Not only the opportunity on how data is entered and processed is important. A vital element for quality is the easiness on how the relevant data are located, retrieved, understood and reused.

Clarity – refers to the way in which the information about data (metadata) is supplied. Statistical figures must bring with them the appropriate metadata, so that the user can understand and correctly interpret them.

- **Comparability** – represents the impact determined by the differences between statistical concepts and definitions, when comparing statistics from different geographical areas, non-geographical areas or reference periods. Comparisons refer to:

- *Comparisons over time:* possible breaks in time series and information on the reference period, differences between two reference periods, quantitative assessments of the effects of change, etc.;
- *Geographical comparisons*: differences between national practices and the Eurostat standards (European Union Institute of Statistics);
- *Comparability between fields*: comparison of statistics based on fields, often defined according to classifications or nomenclatures, for example, comparing unemployment in industry and commerce, two areas that can be defined according to NACE classification

- **Coherence** – represents the capacity of statistics to be combined in different ways and for different purposes. It focuses on the combined use of statistical data received from various primary sources. Ideally, the same definitions should be used in all data sources. This is not always possible, but there should be valid motivations for any difference, otherwise coherence suffers. Examples of coherence:

- *Coherence between annual statistics and short-term statistics;*
- *Coherence between temporary statistics and final statistics;*
- *Coherence of statistics with national accounts;*
- *Coherence between statistics in the same field.*

Structures similar to the *National System of Accounts* are extremely valuable for achieving coherence. Recommendations of the new European Agency regarding the *European System of Accounts (ESA)* has requested a more motivated coherence use in Europe, although regulatory, administrative, linguistic and cultural differences contribute to differences in the interpretation of the results.

4. COOPERATION AREA

NIS is part of a system of bilateral and multilateral relationships with suppliers, manufacturers and users of statistical data that all together form the global statistical system. The National Institute of Statistics manages complex programs such as PHARE National Programmes and Multi-beneficiary (Horizontal) Programmes, which aim to support the major objective of the Romanian statistics, namely the integration into the European Statistical System (ESS).

National PHARE Programme envisaged the progress of the statistical information system and institutional strengthening of the Romanian statistics. Recent programs have emphasized quality, promoting and achieving compliance with norms, methods and standards of the European Union. In all statistical areas were defined priorities to ensure the conformity with the statistical *acquis communautaire*.

National PHARE Programmes address the particular needs of NIS and are more consistent in terms of size and content, while the PHARE Horizontal Programmes aim at developing common statistical methodologies and are complementary to the National Programmes. They have the following objectives:

- Institutional strengthening of the statistical system to better meet users' needs by providing accurate data, timely and elaborated in accordance with international standards;
- Improving the methods used for calculating statistical indicators to meet the needs of decision makers.

PHARE Multi-beneficiary (Horizontal) Programmes are devoted to know-how transfer, including implementation of pilot projects, data collection exercises in various areas of statistics (macro-economic statistics, social statistics, enterprise statistics, agricultural statistics, regional statistics, quality in statistics, etc.)

Currently, there is under implementation the Sectoral Operational Programme Increase of Economic Competitiveness, Axis 3 – Information and communications technology for public and private sectors, which generally aims to increase the services offered by the NIS, through a web portal to retrieve statistical data on-line, thus improving access for citizens, businesses and public institutions to information through modern public services.

5. CONCLUSIONS

Increasing the prestige of the NIS, domestically and internationally, represents a challenge to maintain and preserve the fundamental principles of official statistics, especially those related to objectivity and independence from political institutions. Comparability of data represented continues to be one of the future issues to be developed.

Experienced experts in statistical theory and practice consider that Romanian statistics need to be developed, taking into account EU Membership. Their views are defined along the following directions:

- Development of a new legal basis in accordance with the changes made in the Community Framework of the European Statistical System;
- Participation in European Centres of Excellence;
- Implementation of Total Quality Management in Statistics;
- Improving strategic planning;
- Prompt response to users' needs;
- Integration into the European Statistical System.

Phenomena such as globalization, information society, and sustainable development have an impact on production of statistical data. Statistics plays an essential role in ensuring appropriate responses to changes that take place in society generated by such phenomena as global crisis but also the development of communication technologies.

Efforts must be directed towards actions that help to increase user confidence in statistics because data availability is not simple enough. Statistical data must meet the requirements of comparability, accuracy and credibility. A deeper analysis of statistical data prepared by the NIS might be helpful to users in order to know and to better understand the role and content of certain statistical indicators.

Because of knowledge gained during the process of reform and harmonization of statistical production to EU standards, statistical analysis would be a step forward, a new activity, which will need further support in terms of know-how and resources. Know-how transfer would increase data quality, following the feedback received after the analysis.

By adopting existing *acquis*, Romania will need substantial support to adapt to new elements of the *acquis*. *Acquis* and statistics are not static. They develop in a dynamic way. Every year 20-30 new elements are included in the Community statistical *acquis.*

EU development is based on the definition of new policy or modifications of current policies. Elaboration of new policies and monitoring their implementation is needed for a harmonized development. Statistics must be adapted to these developments, defining the purpose and extent of harmonization of indicators. Romanian statistics must be developed also in the following areas: structural indicators (serving the EU objective in order to become the most competitive and dynamic economy), urban statistics (designed to support policies to improve living conditions in European cities), surveys on the use land, sustainable development indicators, data on poverty and social exclusion, monetary statistics, etc.

Romanian official statistics contributes through input of data and information and by improving working tools and methodologies to support national efforts to achieve structural reforms, economic and social development, and modernization of Romanian society as a whole.

Production of quality statistics, harmonized with EU norms and standards, ensures that the results of statistical activity meet the requirements of statistical data users.

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Open Access to Informational Resources in Pedagogical Approach of Information Literacy

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Abstract

The impact of academic communication is important for society and for the progress of science. Working papers, proceedings and other products of scientific research are supplementary and alternative to traditional documentary sources. This kind of scholarly material is also important in order to realize where research within a given field is heading, or how it was developed, and who are the important researchers involved. In more and more universities all over the world this kind of material is being published and archived in open access repositories belonging to the university's institutional archive.

The academic world of Romania suffers from lack of information literacy education, lack of institutional repositories and open access publishing. The first institutional repository in the country was developed at Transilvania University of Brasov. The institutional repository open access publishing have been introduced into the information literacy course for the first year students in the engineering department.

The structure of this course will be presented in this paper, as well as the qualitative marketing research that was done among these students and among the library and information science students of the same university (LIS students do not have this course yet).

The students' attitudes, wishes and opinions about open access and its impact in science will be presented. The research was done by a 6-question questionnaire (2 background questions and 4 questions on open access: 1) Do you know about OA principle, 2) Do you agree with OA-principle, 3) Have you accessed the OA publications of the Transilvania University Institutional Repository and 4) If you will publish, would you agree to put it in the IR?)

Key words: *Information literacy, Open access, Institutional repositories, Open access journals, Education, Scientific production.*

1. INTRODUCTION

1.1 "Transilvania" University of Brasov-model of engineering learning *RESEARCH AND WRITE TUTORIAL*

RESEARCH AND WRITE TUTORIAL is an online teaching model. The web pages of tutorial are presented below. Every theoretical page has practical exercises. This tutorial is used to teach all engineering students in the first year at Mechanical Faculty of Transilvania University of Brasov, Romania, (Figure 1).

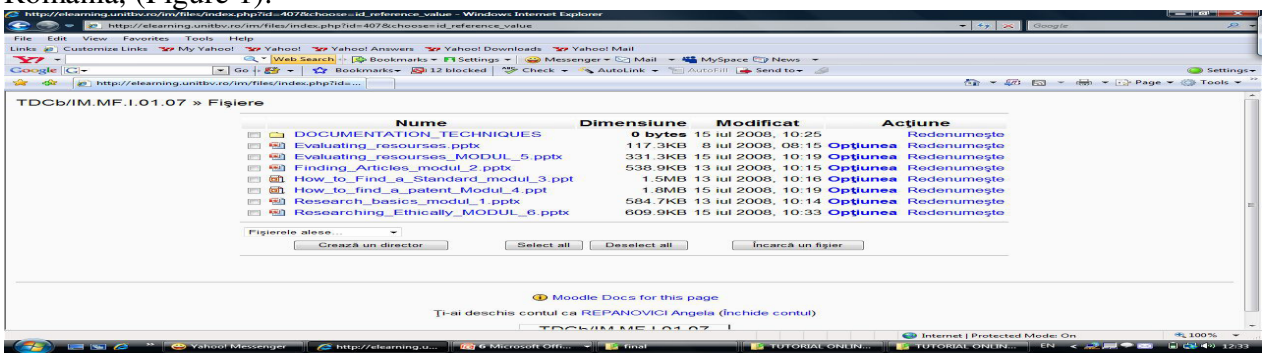

Figure 1: Image from E-learning platform with SERARCH AND WRITE TUTORIAL

1.2 First institutional repository Brasov. Influence of Open Access in Information Literacy

The first institutional repository used by research departments of the university was developed in Brasov (Figure 2). The members of research departments may self-archive here their published scientific articles and the master thesis of master research directions. This documentary source, this documents archive for open access to scientific research can be a very rich and good source on information and documentation.

http://aspeckt.unitbv.ro/dspace/

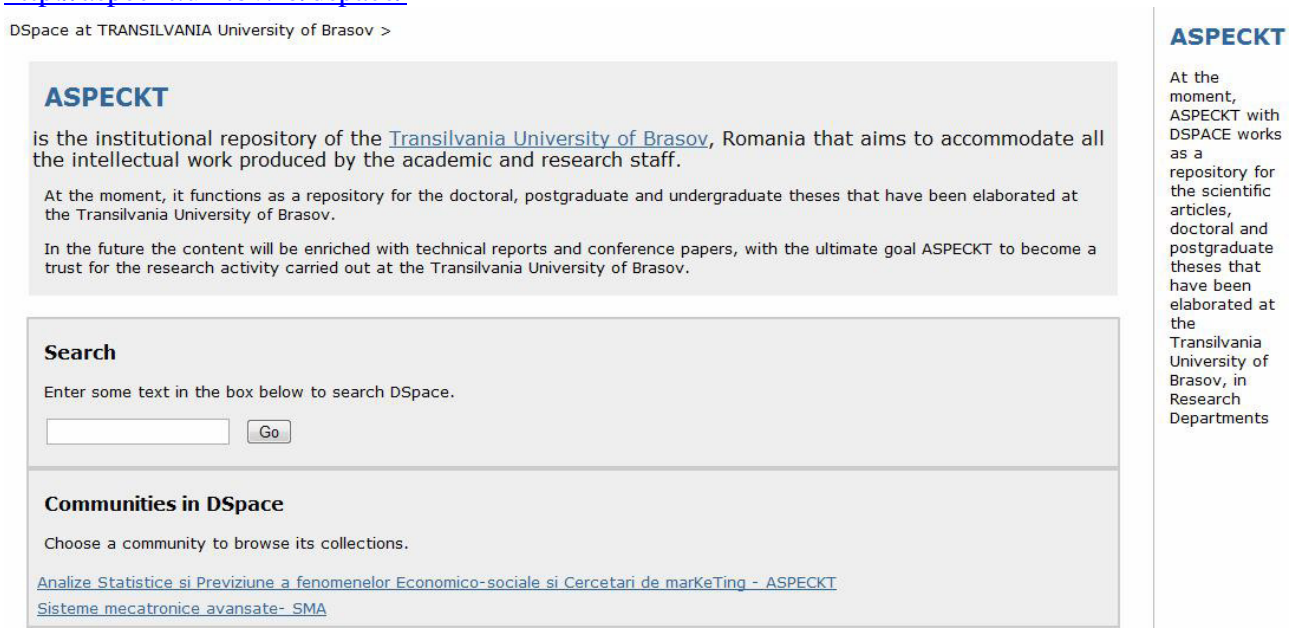

Figure 2: Image of ASPECKT-DSpace, institutional repository at Transilvania University

2. TRANSFORMATION OF CURRICULA AT TRANSILVANIA UNIVERSITY OF BRASOV, TRANSFORMATION OF INFORMATION LITERACY TUTORIAL WITH OPEN ACCESS MODULE

Open access is a scholarly communication movement developed by scholars for scholars to increase the impact of future scientific research and create a cost-effective publication system. The goal of open access is to enhance scientific knowledge work by making peer-reviewed research literature openly available on the Web with the creation of institutional preprint repositories or archives (the green route) and free online journals (the gold route). The Open Access movement in scholarly communications poses new issues and concerns for education in general and information literacy education specifically. Open Access can affect the availability of new information, instructional materials, and scholarship in education.

2.1 Module OA: Open Access to scientific literature

Here are presented some of the subjects teach in this module:

"Berlin Declaration on Open Access to Knowledge in Science"

Basic principles of open access: What is an institutional repository? Why should my institution have an IR? What is self-archiving? Can authors legally deposit articles in IRs? What software is used for institutional repositories?

Open access journals, Directory of open access journals

Copyright and self-archiving-archiving to be available in the Internet, SHERPA-Romeo

2.2 Informational resources found in institutional repositories

Institutional repositories— An increasing number of academic and research institutions are relying on repositories to showcase their research. This section offers several guides and directories to repositories, (Figure 3). In addition, several prominent repositories are singled out.

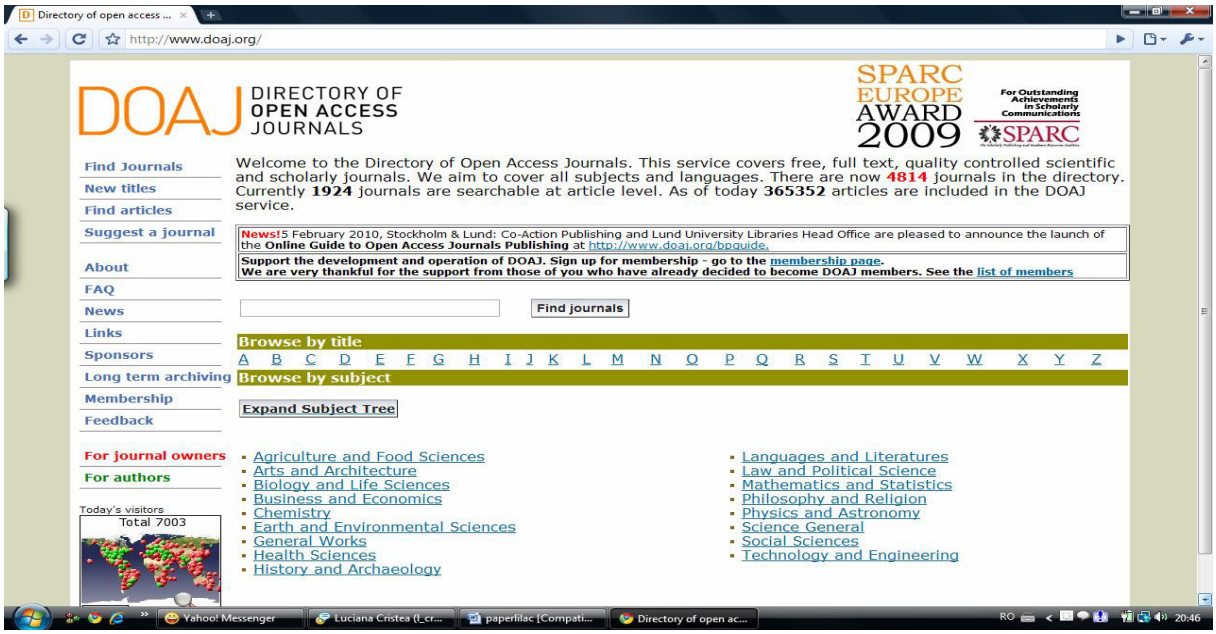

Figure 3: Image from directory of open access directory

OpenDOAR – The Directory of Opan Access Repositories

This is an international and comprehensive listing of repositories. By November 2008, it included 1,200 entries, (Figure 4). According to its editorial policy, each repository has been visited and its value verified. This directory has, in addition to an alphabetical list, an index by major continental areas and countries within each of them. It also has a search engine for searching and browsing repositories according to several parameters: subject area, content type, repository type, country, language, and software. A summary attached to each repository includes: name, organization, description, software, size, subjects, content, language, and policies. The section of Statistical Charts provides a graphical description by several criteria such as: types, subject, languages, etc. Housed at the University of Nottingham, UK, OpenDOAR is recognized as an authoritative source and it is supported by the Open Society Institute (OSI), along with the Joint Information Systems Committee (JISC), the Consortium of Research Libraries (CURL) and SPARCEurope.

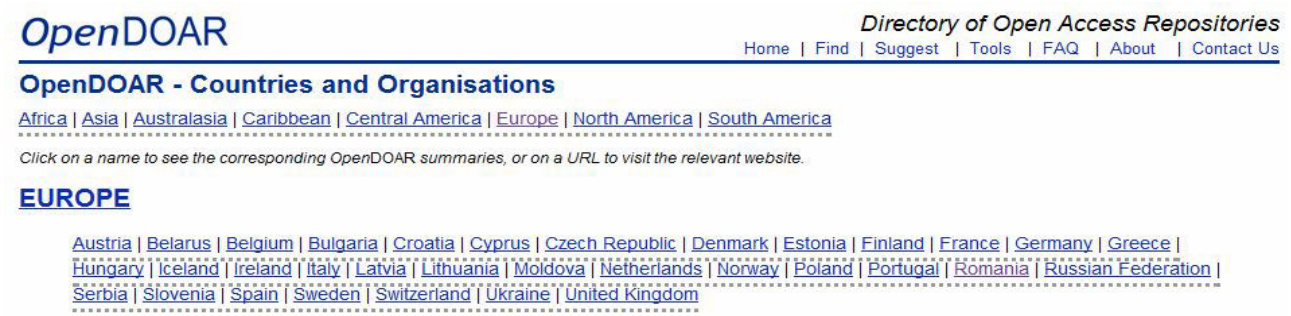

Figure 4: Image from the directory of open access repositories

3. RESEARCH METHOD

A pilot survey was conducted in the winter semester of 2009. We analyze here just the answer regarding Open Access perception. Survey responses were coded and put into the SPSS statistical package for analysis and the hypotheses presented above were tested.

QUESTIONNAIRE

In view of the study **ATTITUDES, OPINIONS AND BEHAVIOR OF STUDENTS REGARDING DIRECT ACCESS TO SCIENTIFIC INFORMATION**, please be kind to answer these questions. We assure the confidentiality of your answers. Their accuracy is of great importance for our research success. Publication in open access means free access online by anyone and anywhere to the document published. Thank you for participating!

In this study it is hypothesized that:

H1: Students who have been taught about open access principle are very interested to use these documentary sources

H2: Students accept open access principles

H3: Students have no information about open access principles

4. RESULTS AND DISCUSSION

Data from 142 usable surveys showed that the class was composed of first year engineering mechanical faculty and all students from Information sciences department.

1. How do you assess the volume of information we have about publishing in open access?

☐ Very low ☐ Low ☐ Neither low neither high ☐ High ☐ Very high

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Cum apreciati volumul de informatii pe care le detineti, despre publicarea in acces liber?	133	93,7%	9	6,3%	142	100,0%

Descriptives

			Statistic	Std. Error
Cum apreciati volumul de informatii pe care le detineti, despre publicarea in acces liber?	Mean		,29	,065
	95% Confidence Interval for Mean	Lower Bound	,16	
		Upper Bound	,41	
	5% Trimmed Mean		,28	
	Median		,00	
	Variance		,554	
	Std. Deviation		,744	
	Minimum		-2	
	Maximum		2	
	Range		4	
	Interquartile Range		1	
	Skewness		,041	,210
	Kurtosis		,256	,417

Table 1: Research results of the question: How do you assess the volume of information we have about publishing in open access?

The students had very low volume of information about open access principle.With a probability of 95% the mean of their information is 0,20 , [0,16-0,41] on a scale of 1- very low, 5-very high, (Table 1)

2. Do you know journals in open access? Yes/No

Cunoasteti jurnale in acces liber?

N	Valid	127,000
	Missing	15,000
	Mean	,417
	Std. Error of Mean	,044
	Std. Deviation	,495
	Variance	,245

Cunoasteti jurnale in acces liber?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nu	74	52,1	58,3	58,3
	Da	53	37,3	41,7	100,0
	Total	127	89,4	100,0	
Missing	99	13	9,2		
	System	2	1,4		
	Total	15	10,6		
Total		142	100,0		

Table 2: Research results of the question: Do you know journals in open access?

Reffering to knowledge about open access journals 52,1 % students don't know and use open access journals while 37,3% do. (Table 2)

3. Consider the need to establish a digital institutional repository of university scientific production? Yes/No

Considerati ca oferirea unui serviciu de tip depozit institutional digital de catre universitate, reprezinta o conditie esentiala pentru alinierea universitatii la cercetarea stiintifica internationala?

N	Valid	130,000
	Missing	12,000
	Mean	,954
	Std. Error of Mean	,018
	Std. Deviation	,211
	Variance	,044

Considerati ca oferirea unui serviciu de tip depozit institutional digital de catre universitate, reprezinta o conditie esentiala pentru alinierea universitatii la cercetarea stiintifica internationala?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nu	6	4,2	4,6	4,6
	Da	124	87,3	95,4	100,0
	Total	130	91,5	100,0	
Missing	99	10	7,0		
	System	2	1,4		
	Total	12	8,5		
Total		142	100,0		

Table 3: Research results of the question: Consider the need to establish a digital institutional repository of university scientific production?

Reffering to the development of an institutional repository at our university 87,3 % of students agree that there must be one, this being the best way of increasing scientific research, (Table 4)

4. Please sort benefits in open access publication (multiple responses)?

	Researchers world wide access to information
	Scientific recognition by citing
	The author holds the copyright on the material
	Increasing the visibility of scientific research

Statistics

Accesul cercetatorilor din lumea intreaga la informatie

N	Valid	133,000
	Missing	9,000
	Mean	,842
	Std. Error of Mean	,032
	Std. Deviation	,366
	Variance	,134

Accesul cercetatorilor din lumea intreaga la informatie

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nu	21	14,8	15,8	15,8
	Da	112	78,9	84,2	100,0
	Total	133	93,7	100,0	
Missing	99	7	4,9		
	System	2	1,4		
	Total	9	6,3		
Total		142	100,0		

Table 4: Research results of the question: Please sort benefits in open access publication (multiple responses)?

84,2% of the students believe that open access is important for the world wide access to information and 78,9% that it is important for increasing visibility of scientific research.(Table 4, 5)

Cresterea vizibilitatii cercetarii stiintifice

N	Valid	133,000
	Missing	9,000
	Mean	,767
	Std. Error of Mean	,037
	Std. Deviation	,424
	Variance	,180

Cresterea vizibilitatii cercetarii stiintifice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nu	31	21,8	23,3	23,3
	Da	102	71,8	76,7	100,0
	Total	133	93,7	100,0	
Missing	99	7	4,9		
	System	2	1,4		
	Total	9	6,3		
Total		142	100,0		

Table 5: Research results of the question: Please sort benefits in open access publication (multiple responses)?

5. Do you agree with the principles promoted by the movement of OPEN ACCESS TO INFORMATION? Yes / No

88% of students agree with open access principle.(Table 6)

Sunteti de acord cu principiile promovate de miscarea ACCES DESCHIS LA INFORMATIE?

N	Valid	126,000
	Missing	16,000
	Mean	,992
	Std. Error of Mean	,008
	Std. Deviation	,089
	Variance	,008

Sunteti de acord cu principiile promovate de miscarea ACCES DESCHIS LA INFORMATIE?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nu	1	,7	,8	,8
	Da	125	88,0	99,2	100,0
	Total	126	88,7	100,0	
Missing	99	14	9,9		
	System	2	1,4		
	Total	16	11,3		
Total		142	100,0		

Table 6: Research results of the question: Do you agree with the principles promoted by the movement of OPEN ACCESS TO INFORMATION?

5. CONCLUSIONS

Open access principles and information literacy have the same basic principle to respect: copyright agreement and ethics principles in scientific research. It is required to implement this basic principle, for the new generation education, developing new mentalities regarding access to information and the role of visibility and promotion of scientific research.

Students will agree for their benefit to publish their master thesis in open access and this will be rewarded by scientific community impact and visibility.

Information literacy has to be one of the first basic courses for starting study and develop one's carrier.

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Assessment of information literacy skills, some experiences from University of Bergen

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Abstract

In many universities in Europe, the teaching of information literacy is the domain of the library, in larger or smaller degree in cooperation with faculty. Information literacy may be included as a small part of ordinary courses, or as a subject that the library has control over. The information literacy skills of the students are therefore not assessed especially. One of the consequences may be a lack of understanding of the importance of information literacy skills among the students, and following lack of participation in the training opportunities.

Pedagogical research has found that students place more emphasis and more importance to subjects that are assessed and given feedback. Maybe, to find a way of assessing the information literacy skills will be one of the ways for institutions of higher education to ensure that the students have these important skills?

In this paper different ways the students' level of information literacy can be assessed will be explored, with practical examples of different assessments methods. We will also see how the assessment must be depending on and closely connected to the learning goals/learning outcomes. Thirdly, it will be discussed what assessment methods will be most useful and relevant, depending on whether the teacher of information literacy is the subject teacher or the librarian.

Introduction

Information literacy is widely recognized as an important skill that is needed for citizens today:

"To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information." [1]

Information literacy has become a task especially for Institutions of higher education, as they recognize their own crucial role as providers of learning and skills for young people. However, studies have shown that the students only partly recognize that they have a need for information literacy skills. [2] [3]

Information literacy at the University of Bergen, Norway

At the University of Bergen, as in many universities in Europe, the teaching of information literacy is the domain of the library, in larger or smaller degree in cooperation with faculty. At the moment the library offers information literacy courses for students at most subjects. First term students and students at bachelor, masters and ph.d-level are being offered some kind of information literacy training. As part of the information literacy, we have developed an online tutorial called "Søk og Skriv" (Search and Write) in cooperation with other institutions of higher education in Norway and Denmark.

Some of our own experiences with the teaching of information literacy run by the library show that "ordinary" information about information literacy courses only to a limited degree are successful when it comes to motivating the students to attend the courses.

In the following I will use select examples from the Arts, Humanities and Social Science library at the University of Bergen.

In this library, which serves the scholarly needs of researchers and students from the fields of Humanities and Social Sciences – approximately 6.000 students and 1.000 faculty – the library offers special courses for students at the first term study, as well as for many of the other subjects. Typically, the library will offer a course of 90 minutes (2 teaching hours) in connection with a course module that has an essay, bachelor theses or what we call "home exam" as the final assessment.

Situated learning – collaboration with subject teachers

Part of the learning philosophy behind the program for information literacy, and behind all the teaching in the library environment, is based on the idea of situated learning; that the students will learn more, better and faster if the teaching or training is given to them at the same time as

they are doing the relevant task. So if the students have a deadline for an essay at mid September, they will learn about relevant resources in late August/early September.

This way of thinking and planning trainings makes the library dependent on good and close cooperation with the teaching staff at the departments. They are the ones that plan the courses and the exams and know about the timing. The academic staff at departments is the ones that have control with the type of exam or essay to be written and assessed. Are the students given a broad field from where to write? Then they must be taught how to narrow the task. Are they given an already formulated hypothesis to answer? Then they need a different content of the teaching and training from the library. The learning outcomes are discussed and set in cooperation with the subject teacher, and the subject teacher will arrange for smaller groups to be sent to the library. [4]

The subject teaching staff is very positive to the library courses of information literacy. To quote former Dean of the humanities, Professor Gunnstein Akselberg:

> "In recent years the University Library has developed excellent courses which focus on central topics related to the use of library sources and information in text production. These courses concern for instance quotation and reference techniques, the treatment of information and information ethics. In recent years the problem of using reference texts and reference ethics have increasingly become a challenge at all academic levels; from the graduate level to the postgraduate/doctoral level. The university library has been actively involved in this department, offering tailor-made courses for our academic users of the library. Today there is a great need for this kind of competence, which is still not met, and there will be an increased need and demand for this kind of teaching in the future.
> We are presently integrating these courses in the programme descriptions/curricula so that they become an integral part of the teaching offered at the faculty and in the respective subjects." [5]

However positive the Dean and department heads, the teaching of information literacy will normally be included as a small part of ordinary courses only, and unfortunately often seen as a subject that the library "owns".

This does not help the integration of information literacy teaching in the ordinary subjects of the University.

What else can one do? Students are busy and tend to optimalize their use of time. If something is not seen as relevant, they will not do it. How can we ensure that the teaching of information literacy is seen as important and relevant enough for the students to participate?

From our experiences, we see that the impact of the subject teacher from the department is crucial. If the subject teacher clearly informs the students that this is expected of them, more of them will come. The teacher can do this in several ways. He/she can tell the students to go. He/she can make sure the library is clearly marked in the students schedules for the relevant subject. He/she can inform the students that this will be relevant for the assessment of exams and grading of papers.

Let us stop there for a moment, and explore the assessment idea.

University exams

What is the idea behind an exam at university level?

The exams are needed for selection, certification and control. We must however also remember the other aspects of exams: standardisation, reliability, relevance, practical knowledge, justice in the grading, confidentiality etc.

Pedagogical thinkers and developers as well as policy makers are looking more and more to the need for alignment between the learning goals and the assessment in the university situation.

Assessment in context is most important. If the assessment is done out of line with the task or fact that we as a university want to assess, the assessment will not be successful. We will be measuring something else than what we want to measure. [6]

By thinking of assessment in the form of exams as a carrot rather than a stick we will be able to redesign the traditional exams into a more learning-friendly task, and enable the students to show their potential and what they have really learned from our teaching.

An example from the Arts and Humanities Library

The first year students are offered a two hour course in information retrieval and ethical use of information. We have had this course since the autumn of 2005. Attendance has varied from about 25% (2005) to about 40% of registered students.

We are not satisfied with these figures. Maybe there is a group of students that has gone through similar training at the University of Bergen and other places, but from what we observe in other areas we think that students choose to not take this course due to experienced time pressure, or a misunderstanding about the value of the course. Seminar leaders and coordinators at the Department for the first semester studies believe students should prioritize this course, as they consider the skills the students learn to be vital for their university studies. We've even got the signal from one of the coordinators of the course that is should be extended to 3 school hours, from 2 today.

The discussion about making the library course mandatory has begun. In the discussion we also want to bring in methods that will make us able to assess what, if anything, the students are learning from the course. Assessment can of course be seen from several aspects – are we assessing the quality of the students' learning, or are we assessing the quality of the library's teaching? As long as the library course, or the library component of the subject course, is not graded separately, the main focus of the assessment will probably be the quality of the library's

teaching. For the library it is actually more interesting and relevant to try to gauge the impact of what the library is teaching than anything else

An argument for making the course mandatory that this is an important and useful course that cover information and skills the UiB are obliged to teach new students, especially in relation to citation and ethics. Still, we see that the number of students who attend the course is smaller than the University likes, from their point of view of making sure students are equipped with skills for ethical and efficient research.

Arguments against making the course mandatory may partly be that it is undesirable to have compulsory education at all at this stage, partly practical, how this should be arranged, and partly probably a misunderstanding, that some of the students may have this knowledge already. Feedback from coordinators and seminar leaders, however, suggests that there are very few of the students in the first semester that can be said to have some degree of knowledge of citation and ethics at the university level from before.

If the course should be compulsory it must be done in line with the modern university pedagogic thinking, and we would also like to see some useful way of assessing the learning outcomes from our teaching.

We will in the following outline five possible ways to cover the practical control aspect if the course is mandatory.

1. Name lists, either by giving the course teacher a name list from the first semester study administration to check, or that the lists are sent around in the classroom, and students sign. Then the administrative must enter in the Student System that this mandatory requirement is completed. Another similar option is that the seminar leader is with the group as they take the library course.
2. Towards the end of the activity students go into the My Space / Kark, where there is a multiple choice test developed by the library that they fill out and that will be corrected automatically. Questions may for instance be about numbers of Plato-versions from a particular year, the placement of literature or loan statuses, or examples of incorrect quoting for the student to point out and correct. The administrative responsible will then pick up the results and post in the Student System that this mandatory requirement is completed.
3. Students will be given a task with some questions that they should respond within a given (short) deadline. Librarians access unto the My Space-area, correct the assignments and send a message to the administrative coordinator who post in the Student System that the claim is complete.
4. In the final essay the students will write one page reflection note on ethics and ethical use of information, or a reflection note assessing his/her own use of supporting information / support literature in the essay. Course teacher *and* librarian will evaluate the quality of the reflection as part of the grade.
5. In the final grading of the essay the student will also be measured and assessed on the quality of use of information and references / bibliographies.

All these examples of ways to deal with the control aspect of a mandatory course have their advantages and disadvantages. They are neither all "secure" in relation to students responding or signing for each others, or that answers to the assignments in example 3 can circulate to the students who were not on the course. We believe however that this can be a starting point for further discussion on the issue with the faculty.

Another question is how they will work as assessments of the learning done by students, following up after the library course in information retrieval and ethical use?

The course is only two or three hours long, and the assessment can therefore not take a disproportionately large amount of time or work for the students. We must bear in mind that "Information retrieval" and "Ethical use of information" are two quite different skills. Will it be possible to design one single assessment activity that can cover both the control aspect, and assessing learning both kinds of skills?

The first option, to use name lists that the librarian teaching reads out or send around in the classroom, has the benefit of being very quick and easy, does not disrupt the teaching, and, especially if the seminar teacher is also there, will probably be quite correct. Of course, if somebody decides to "aye" or sign for another student, and the teaching librarian notices when doing a head count, it can take a longer time and will be disturbing. And worse, from the library point of view: It will give the library absolutely no feedback on the teaching provided.

The second option, to do a multiple choice test while still in the classroom situation will show if the student is there and has been awake enough to learn some of the technicalities about use of the library. Depending on the phrasing of the questions for the multiple choices, it may also show what the student has learned in terms of ethical and correct use of information.

The third option, where the students will be given a task to do away from the library but rather quickly (short deadline) after the teaching is completed, we see clearly both the risk of cheating in the control-part, and in the answering part. This may designed to be a better assessment form for master students, who easier can be given individual tasks, related to their master theses.

The fourth option, where the students write a reflection that is included in their final essay, either about the ethical use of information or about his/her assessment of some of the information used in the essay, will probably be able to try to do also for students that have not actually taken the course. As a control mechanism in a mandatory course it would therefore not work. However, if the students had learned this already, it would not be a problem. Unfortunately, the feed back from seminar leaders at the first term study suggests that a sizeable group of students are quite over confident when it comes to their ability to manage information retrieval and use of information on their own, so to speak.

Unless we could control for which of the students that had been at the course, we would also not be able to find out what the impact of the library teaching had been, since we would not know who of the students had attended the course and who had not. But if we could find out who had been at the course or not, the possibility of really assessing the impact of the library teaching in information retrieval and ethical use of information would be quite large. If the reflections were "graded", and afterwards divided into "attended course"/"not attended course" we would be able to see and show the impact.

In this option the library takes on a bit more work; to assess the reflections with the subject teacher. At the same time, it will provide a very good collaborative and networking opportunity, and as such, a possibility for influence for the library.

The fifth option, where the subject teacher grades the essay and also bases the grading on the quality of the student's use of information, the control aspect is not covered, and unless the subject teacher finds out and tells the library, we will not be able to know about the impact of our own teaching. If, however, the subject teacher informs the students that "this is part of the exam, and you learn it by taking the library course", most of them will probably want to attend the course anyway. But again, we have the group of over-confident students.

Who teaches?

From the fifth option, where the subject teacher includes the information retrieval and use when grading the exam, we can also reflect over who is doing the teaching of information literacy; the librarian or the subject teacher. How will it be possible for the library to ever be fully integrated in the teaching of the subjects? In Norwegian Universities, we have academic librarians; library staff that has an academic and non-librarian background. For most of the library teaching, they are the teachers, especially on Masters level, within the subjects for which they have a special responsibility.

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New requirements for the librarian seen as data manager

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Abstract

Librarians and libraries all together are in a process of adaptation to the research system needs and scholarly communication exigency existing already in the community they are serving. Necessity of an active and continuous partnership between libraries and science community must be ensured incorporating the paradigm of guiding the user and helping the researcher. Information literacy is a step forth on this path as the nowadays practitioner that calls himself a librarian is learning and has to rise up to the new status of information science specialist with an active role of being the information broker in the future knowledge exchange processes.

1. Introduction

It is said that the historic phase we are crossing this very moment belongs to information society and we may even see political structures designating branches inside their administrative circle with buzzwords like Information Society as is the case of European Commission programmes or different denominations containing the word information with regards to Governmental bodies like Ministries or specialised departments seen in many different countries. There is a continuous trend to put an “e” to as many traditional domains that one might think the times we are living are destined only to fulfil this purpose. Let alone this change in the structure of administrative services things are indeed changing and part of this upheaval is the underlying fabric of mashed electronic services having at their foundations the network of networks in itself.

In all this conglomerate that continuously winding itself up there are to be seen human and financial resources allocated in order to build and sustain the infrastructures having in mind the pervasive potential of changing for the better the informational climate and doing so adding continuous value to the common knowledge body.

There is one very important aspect in this movement and sometimes the global implications are not taken into a throw scrutiny: the personnel powering these infrastructures and the evolution of their training and their continuous professional development (CPD). This aspect is one of the out most importance and should be taken into a very careful consideration being in fact the real engine for the future electronic environment.

2. A live job market

In order to have a base it is necessary to take a look upon some real cases and see what are the real needs of those who are developing complex services, what institutional profile fits these requirements and most of all who are those on who's hands the electronic scientific and cultural heritage await for solutions. A suitable point to start is the vacancy positions advertised and some of the highly relevant adds were selected based on their capacity to express a future profile of the specialist evolving in the electronic landscape seen as a response to the need for regulating information flow.

For this purpose, there were consulted the mail profiled mailing lists with the intent of sampling the job vacancies being circulated among the specialist who are active: BOAI Forum, dcc-associates mailing list, DIGITAL-PRESERVATION – JISC mailing list and American Scientist Forum. After consulting these sources (meaning the message archives), 9 different job openings were chosen: 3 of them involving management responsibility (2 managers[1], 1 director[2]), 2 officers[3], 1 specialist[4], 1 research assistant[5], 1 senior developer[6] and 1 analyst[7].

All of the vacancies entail in description that a would be applicant will:

- Manage day-to-day operation of the research repository service,
- Be involved in PR specific activities in promoting the repository internally, locally and internationally,
- Provide assistance to different stakeholders,
- Provide training and information for others in the organisation (knowledge exchange facilitator),
- Be involved in overseeing different internal strategies and implement policies and procedures,
- Have to be well fit to understand data modelling in general,
- Ensure the effective and robust transfer of information.

A profile for requirements has been refined and it has the following points:

- Recognised professional qualification (at degree or postgraduate level) in librarianship or information science,
- Familiarity with repository software and metadata standards,
- Understanding of open access,
- Understand what curation of data (including electronic preservation and associated technologies) is and what management of research data is,
- Good understanding of digitisation processes,
- Good knowledge of Cultural and Heritage Informatics and Digital Humanities,
- Tertiary qualification in information technology/computer science qualification (database technologies).

The question is not if this general profile as it is presented above fits all future requirements for the new bread of librarians, the question is how fast all job vacancies postings will look like those and if there is a coherent response from the community of specialists and also of those teching and training the future specialists in knowledge and information management field.

2.1 Why should we address such a concern?

Because in the digital environment the differences between different memory institutions are fading. “Therefore, on practical level memory institutions explore possible ways of collaboration and on the theoretical level convergence or, at least, closer interaction and interchange of knowledge between museology, library and information science and archival science is considered

1 Repository Services Development Manager and Digital Preservation Project Manager
2 Director of Digital Curation Centre
3 Research and Enterprise Officer and Research Institutional Repository Officer
4 Digitisation and Digital Preservation Specialist
5 Research Assistant in Metadata Standards
6 Senior Developer for Digital Archive
7 Digital Archives Analyst

as a future of the disciplines. In higher education these trends result in experimental curricula, which integrate studies in LIS, museology, and archival science."[8]

2.2 A starting point

In order to have a better view on the real life dynamics of the information brokerage and doing so, to catch a glimpse for the future specialists requirements, we should take into account the seven headline information skills[9]:

1. *the ability to recognise a need for information,*
2. *the ability to distinguish ways in which the information 'gap' may be addressed,*
3. *the ability to construct strategies for locating information,*
4. *the ability to locate and access information,*
5. *the ability to compare and evaluate information obtained from different sources,*
6. *the ability to organise, apply and communicate information to others in ways appropriate to this situation,*
7. *the ability to synthesise and build upon existing information, contributing to the creation of new knowledge.*

With regard to this frame here must be said that these abilities are to be considered a needed foundation for understanding the fact that those who are in charge of managing digital assets must be information literate and also able to cross the boundaries of the initial qualification in terms of appropriation of new skills that help them in evolving their own particular electronic environment.

Although the foundation should be solidly described by the seven points above, there is a certain feeling that the right description of the position within the institution is not presenting itself as a clear landscape.

When it comes to managing data or several electronic collections of digital assets, the most visible reaction out there is to call on the internal computer department and request for help as if computer scientists are also those who should be knowledgeable with regards to all the complexity of running such a specialised service as a repository would imply. Usually the answer is mixed and is based on experience and alternative information channels that forms the inside knowledge of such a department. The problems start when this department do not offer strict calibrated responses to those who are producing the digital assets as the latter would've expected to.

The second reaction is a forced move towards externalisation of the needed services with the cost of running a fragmented service (in the sense that there is no really a full control of the electronic resources) which in turn induces some certain negative aspects when it comes to project's whole life cycle of the collections. But, reality confirms these tendencies as a natural response to align to efficient running costs. The immediate effect is seen often in how the staff perceives such a decision and there are indications that they usually sense that the assets do not belong to them any more and they are just becoming a mere portfolio separated from the core business.

Another type of reaction is moving towards establishment of consortia that manage collectively electronic resources according to the specialisations of the partners, a context of symbiotic responses and harmonised articulation of services and contributions. This type of response is based on cooperation and are run not without problems. Usually the communication channels clog in administrative and coordination issues.

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8 Leif Kajberg, Leif Lørring (2005). *European curriculum reflections on Library and Information Science education.* Copenhagen: Royal School of Librarianship and Information Science. available at http://www.library.utt.ro/LIS_Bologna.pdf

9 SCONUL Task Force on Information Skills (1999). *Information Skills in Higher Education.* London: Society of College, National and University Libraries. available at http://www.sconul.ac.uk/groups/information_literacy/papers/Seven_pillars.html

Another picture similar to the consortia is the project driven coalitions which are the most visible ones in terms of activity and outputs and also they are the most volatile with regards to preservation and continued access to the products or services as generated resources. Still, in between all these choices there are those in charge of the digital assets. They come as positions inside the administrative structures like computer department and various practitioners who distinguish themselves as computer literates, librarians (web 2.0 librarians), different kinds of hired experts and in some fortunate cases even programmers. The clear delimitation of the various roles is at times hard to be done as in fact the institutional structure usually thinks in a more conservative manner and fall into a subtle gap thinking that as long as there is funding all matters might be easily managed. Here is a good chance also for institutional cultural change that should attract a profound reconsideration of the way the existing personnel should be looked upon. Large funding dependency may be tackled if investments would be made into existing personnel training and continuously adding qualifications. The real power of every institutional landscape are indeed the people and in the whole they are making a strong body of knowledge which may be turned for a change with beneficial effects also in terms of cost efficiency and funding.

In one Report to the JISC[10] made by Key Perspectives is also acknowledged that there is no clear understanding of the various roles reflected by the practical experience of those who are in charge with organising the information environment, but as it stated the starting point is the term "data scientist". This report distinguishes roles attributed to data field: data creator, data scientist, data manager, data librarian.

Of a particular interest is data librarian distinguished as "people originating from library community, trained and specialising in the curation, preservation and archiving of data".

3. The evolving landscape of librarians

All the main actors, let those be LAMs (Libraries, Archives, Museums), public administration bodies, research funding agencies and even private institutions, all share a common need these days for expertise with regard to managing increasing volumes of data and documents. The amount of digital born objects build-up is putting a constant pressure on managers and also on those who are the creators (when it comes to finding and reusing). These digital objects may reflect a wide range of activities concerning sustainable knowledge and should be put in a wider context in order to have it continuously endowed ensuring also the contributor's recognition and his entitlement to benefits.

In order to understand better the position of the future librarian and most of all what his role would be, two illustrations were devised in aid of understanding better the context of future changes that the nowadays librarians and information specialists have to fit in.

All these born digital artifacs are presenting themselves as rivers of continuous information and streams of data. These digital assets may reflect a wide range of activities concerning knowledge that has to be preserved and conveyed for further enrichment.

First circuit – Ring 1/Ring 2A

For reference we will use here the phrase *data collections universe* with the same meaning given in the NSF report: Long-Lived Digital Data Collections Enabling Research and Education in the 21st Century[11].

10 Alma Swan and Sheridan Brown (2008). *The skills, role and carrer structure of data scientists and curators: an assessment of current practice and future needs.* Truro: Key Perspectives. available at http://eprints.ecs.soton.ac.uk/16675/

11 National Scicence Board (2005). L*ong-Lived Digital Data Collections Enabling Research and Education in the 21st Century.* National Science Foundation. Available at http://www.nsf.gov/pubs/2005/nsb0540/

Illustration 1: Two rings approach – data collections universe

This first circuit is the most productive with regards to cultural heritage, scientific and educational literature resources. It is close related to the research departments of the university, and also together they establish a loop of knowledge ready for future enrichment. It proves to be a veritable mesh-up of diverse services that have the users at their centre.

All of these actors involved are already developing services that stride to offer the best infrastructures to their users and contributors. These involve electronic publication services for the different kind of contributions like research articles and open monographs, for OERs (Open Educational Resources), and also well articulated institutional repositories dedicated to wide dissemination of research and, of course, the associated data sets.

All these resources that are exchanged in this scenario need to be managed, curated and preserved in a flexible manner adapted for internal use and exchange.

As it is seen the university is put in the middle of the information brokerage market as this very important player has the capacity via its research departments to be the major player in this arena. Universities communicate through open channels with the memory institutions around them in a continuous partnership in order to step further the theoretical and applicative research, and also to augment the teaching and training processes. Universities are also those who have the out most responsibility when it comes to training of those who will serve the future institutional partners in the Ring 2A.

One of the most important aspects that has to be put in the context of the central role of the universities is that this is the cradle of the commercial spin-offs. In fact, as it is seen reflected in EU policies and programmes, universities has to develop also the relation with the private initiative as they are expected to be true centres of technology transfer working as a progressive forum for private investment. With these regards, universities as they are presented in Illustration 1 are those who make also the link with the actors in the Ring 2B. They are beneficiaries and also act as a bridge between those in the Ring 2A.

All these aspects are revolving around a circuit that powers their evolution: highly trained people. And by that meaning people that are able to find, collect, organise, store, curate, retrieve, interpret, transmit, transform, and use the information[12].

The second circuit: Ring 1/Ring 2B is one of a particular aspect because it stores different types of data and documents, but still they show particular interest in preservation in the context of archiving and maintaining collections out of which some with high societal and administrative value. Both rings are to be seen in close relationship with the Ring 1 – the ring of specialists who are trained to be the glue of the service mesh-up knowledge services.

Illustration 2: Response areas

We should take a look at the context in which these specialists are evolving.

There are for big area where the new profiles need to find the proper responses:

- management,
- technology,
- access and
- workflow.

These four areas should be considered as complementary one to each other and should be thought of as a possible integrated environment for the abilities needed to the professionals in information field. They extend on four levels of different qualifications picturing also the possibilities for specific skills. Also it must be pointed out the fact that there is no complete design for a curricula or training programme that builds upon such a model as many of those who are involved now in the information management processes are responding to the oscillating needs expressed in their own institutional environments.

Also, here is partially reflected the framework for the future requirements which will be pushed the librarian to cross the boundaries in order to offer responses to the necessity for building responsive

12 Harold Borko (1968). *Information science: what is it?* Available at http://www-ec.njit.edu/~robertso/infosci/whatis.html

services in data collections universe. The most visible part of this environment is the increasingly visible silhouette of LAMs – Libraries, Archives and Museums. This fragmented reality is evolving in more coherent forms of aggregations as the users needs are put in the centre of their development. It becomes more and more counterproductive to think the services for knowledge dissemination targeted to users needs as separated realities by the particularities of the institutional profiles existing in the framework of LAMs.

4. LAMs – the cradle for change

It would be very useful to remember a thing related to the user's perspective when it comes to access: it really is no matter of concern for where the information comes as long as access is provided.

Michele Doucet (Libraries & Archives of Canada) described the user experience as supported by " an integrated, one stop access layout, with a reference model that basically works like a triage system in an emergency room. All visitors come to one location where their specific request and level of need are quickly assessed."[13] This is an example of how nowadays LAMs should establish crossing points and meet user's needs.

The relevance of putting real user needs into the middle of the efforts regardless of the institutional background of those who respond to these needs is also stressed out in the resulted study from the discussions upon the future shape of the EU LIS curriculum: "from the user point of view, collaboration between memory institutions brings multiple benefits because it destroys artificial barriers posed by different formats and provides a holistic view of human knowledge preserved in libraries, museums and archives."[14]

So, it comes to the perspective of a different approach concerning the organisational culture change and proper interconnected management set for the actors who offer access and the means of setting useful contexts for the benefit of their users.

LAMs are coming together more easy often when they are integrated in the same electronic informational structure. Also the most important component involved in the evolution of LAMs is true collaboration which "it inevitably and fundamentally involves change. Collaboration is transformational and the elements, institutions and individuals involved in collaboration must change." (Ken Soehner, Chief Librarian at the metropolitan Museum of Art Thomas J. Watson[15]). It is most relevant to cite from the same report the following: "a collaboration in which campus LAMs agree to utilise a central trusted digital repository to safeguard digital assets for the long-term creates deep dependencies as well as tangible economic rewards. As units reorganise their flows and policies around the shared capacity, they discover new ways in which to leverage their combined assets, and overtime realise the transformational quality which is the hallmark of deep collaboration."

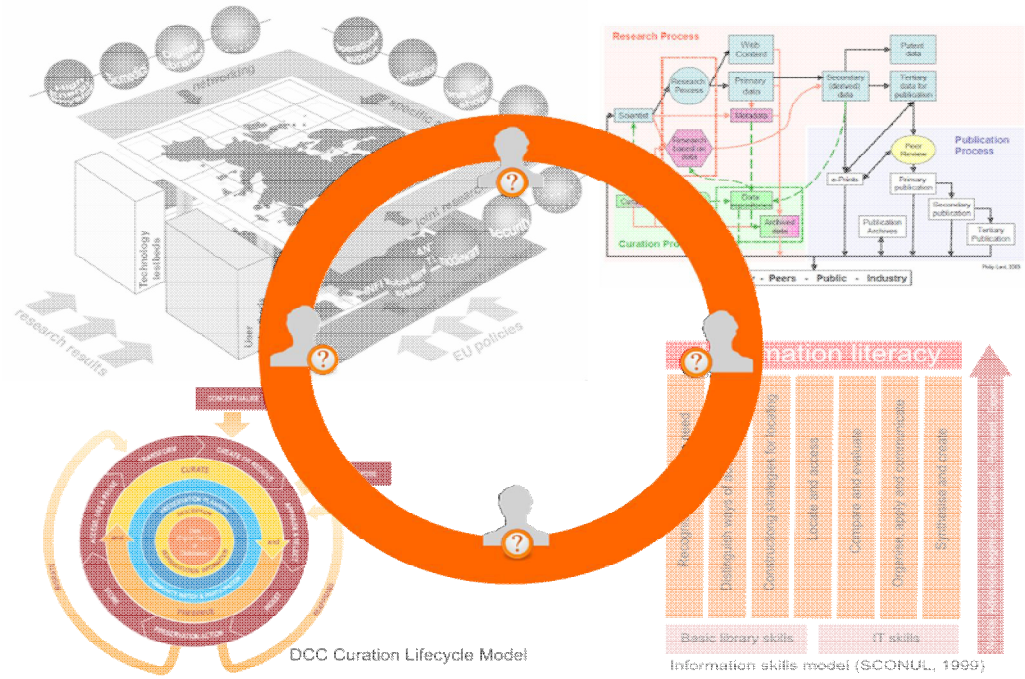
There is also another phrasing for LAMs which is circulated as "memory institutions". Memory institutions is a denomination that has been accepted by all the professionals working in the respective fields and it seems this is because also implies maintaining of the internal borders set by the different practices. "Despite «memory institutions» being a buzzword in professional and

13 Diane M. Zorich, Günter Waibel and Ricky Erway (2008). *Beyond the Silos of the LAMs: Collaboration Among Libraries, Archives and Museums*. Dublin, Ohio: OCLC Research. Available at http://www.oclc.org/research/publications/library/2008/2008-05.pdf

14 Zinaida Manžuch, Isto Huvila and Tatjana Aparac-Jelusic. *Digitisation of Cultural Heritage*. In Leif Kajberg, Leif Lørring (2005). *European curriculum reflections on Library and Information Science education.* Copenhagen: Royal School of Librarianship and Information Science, 37-60

15 http://www.oclc.org/research/publications/library/2008/2008-05.pdf

academic literature there is still a lack of an in-depth studies on the perspectives of convergence and/or networking of archives, libraries and museums" - EU LIS.



This is the European view but there are also different opinions like the one presented by Robert S. Martin[16] from the Institute of Museum and Library Services: *The point is simply that the distinction between library and museum and archives that we now accept as common is really a matter of convention, a convention that has evolved over time. That convention is predicated on a perception that libraries and museums collect very different kinds of things. In fact, however, from one perspective or frame of reference-one school of thought-libraries, museums and archives all collect precisely the same things. They all collect documents.*

4.1 Points of convergence

Where these practices converge and what should be the starting point for a real space that will realise a needed singularity in terms of vision and practice coordination?

This question is brought by the need for offering the user the best response to their informational needs.

Articulation of such space is forced by the information and communication upheaval. Users being also those who are entitled to access the best knowledge body that information actors have to offer are not interested in understanding the differences between the different bodies and communities of practice. They are usually interested to satisfy their needs with the minimum of effort.

Realistically speaking a complete convergence will not occur on the medium term, but there are to be observed two concurrent levels of involvement of the bodies inside LAMs: one that keeps a clear separation due to the fact that they still manage assets in traditional form having also different social roles which entail techniques and practices that cannot be easily bridged and the other level is the collaborative one usually project driven that is pointed towards pooling resources in the data collections universe.

16 Robert S. Martin. Cooperation and Change: Archives, Libraries and Museums in the United States. World Library and Information Congress: 69th IFLA General Conference and Council. August 2003, Berlin http://archive.ifla.org/IV/ifla69/papers/066e-Martin.pdf

There is an interesting converging point between the conclusions drawn in the report submitted to JISC by Alma Swan and Sheridan Brown and the OCLC study about the LAMs. This points to the professionals involved and brings to light some particular aspects:

- the experts managing data gradually traverse the boundaries of their field and slowly turn into data scientists;
- these actors have their scholarly roots in one domain but they tend to open and embrace quickly adjacent fields usually following the institutional needs of solving information management situations;
- they do not have a clear career path and are easily caught on the border of different many little data managing crisis;
- they find it difficult to retain a feeling of continuous buid-up of skills as the opportunities for training are rare or the funding in these regards is scarce;

There is not a common profile for many today's denominations of apparently differently positioned actors in the life-cycle of digital objects. Today many actively involved specialists in the life and evolution of digital repositories understand in a holistic manner the life-cycle of digital objects.

The reality is influenced by the fact that there are no dedicated structures for managing data and electronic collections inside LAMs and also if there are services put in place to such purpose these are at best working on project bases having no perspectives with regards to future preservation or life-cycle policies for the collections. There are many exceptions but the average is described as such.

The best solution available seen in practice is the collaborative road chosen by the actors in LAMs arena in order to establish future *digital data commons*[17]. That means establishing elements of

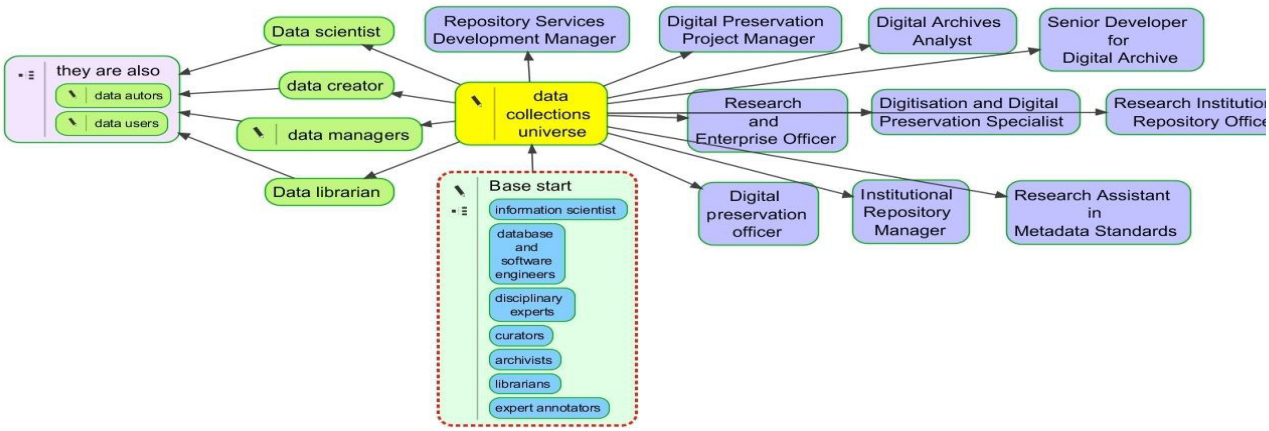


Illustration 3: Different roles in data collections universe

infrastructure that work in a harmonised manner. In this context, the specialist and the expertise that LAMs are packing become a real bridge towards establishing articulated and user oriented responses. Also, on this moment the most complete expertise complex is concentrated in data centres and different bodies that offer externalisation services, but there should be devised mechanisms to ensure a large diffusion of those qualifications also to LAMs via training and continuous professional development. These resorts should be thought of mostly because in the end they present the opportunities to step up into a different kind of institutional behaviour in the sense that usually the roles with regards to data management have interchangeable and crossed diffused aspects (skills and abilities).

17 National Scicence Board (2005). L*ong-Lived Digital Data Collections Enabling Research and Education in the 21st Century.* National Science Foundation.

4.2 The front runners and the reality check

In order to have a perspective upon who train and what the future information scientist should be taught for him to be able to perform in the future digital environment, I thought it would be appropriate to take a look on what possibilities are opened for those interested in becoming data specialists. The most visible in this context are so called iSchools.

There are two examples that were picked for how they understand to prepare the future professionals in information field:

University of Illinois Graduate School of Library and Information Science with its Master of Science: Specialisation in data curation. The Data Curation Education Program (DCEP)[18] is ALA-accredited master of science offering insight on data collection and management, knowledge representation, digital preservation and archiving, data standards, and policy.

Highlights:

- Foundations of Information Processing in LIS,
- Document modelling
- Information modelling
- Metadata in theory and practice
- Information storage and retrieval
- Electronic publishing
- Preserving information resources
- Information transfer and collaboration in science

School of Information Studies – Syracuse University

This institution it is called also by the name of iSchool and was ranked as being number one for Library and Information Studies in the United States according to U.S. News and World Report. It is of interest the Master of Science in Information Management with Data Management Specialisation of Study offering competence to the students in with regards to managing and presentation of data including *relational and object-oriented approaches to archiving, retrieving and protecting information, as well as web-based user interfaces and geospatial information systems.*

Highlights:

- web design and management,
- database management,
- research techniques for information management,
- information system analysis,
- data mining,
- data warehousing
- theory of classification and subject representation
- data administration concepts and database management
- designing web-based database systems

This example is for understanding that in order to get a complete picture of how the trends will finally shape a profile of the future professional or it will spawn a complete different bread of professionals needed to manage the digital landscape.

To have more insight of the future of such programmes that prepare the future information specialists, a good resource would be WISE – Web-based Information Science Education. WISE represents a collaborative model based on three pillars: Quality, Pedagogy and Collaboration. WISE

18 http://www.lis.illinois.edu/academics/programs/ms/datacuration

is in fact a consortium (http://www.wiseeducation.org/) of universities that have leading schools in the information field.
Let us take a look of the few highlights:

- Administration and Use of Archival Materials
- Advanced Database Management
- Applied Information Security
- Audio and Visual Information Sources and Delivery
- Bibliographic Organisation
- Cataloging & Organization of Digital Resources
- Data Administration Concepts and Database Management
- Digital Libraries
- Distributed Computing for Information Professionals
- Electronic Publishing
- Government and Information
- Globalization and the Information Society: Information, Communication & Development
- Indexing and Abstracting Systems and Services
- Information Architecture for Internet Services
- Information Quality: Principles & Practice
- Introduction to Archives Management
- Introduction to Records Management
- Introduction to Strategic Information Management
- Law (Legal Resources)
- Licensing for the Information Professional
- Management and Administration for the Information Professional
- Management of Library Services
- Metadata
- Reference and Information Services
- Research Methods
- The School Library Media Specialist
- Topic Maps
- Use and Users of Information
- Web Design and Architecture
- Wireless Interactive Communications
- XML for Libraries

These examples are here only to put stress on the need of broadening the horizons in order to be prepared to respond to a few essential questions that hold the future of librarians and their transformation into data librarians:

- How to discover where my skills should be best matched with the evolving job market (data managers, data curators, science output curators, etc.)?
- From where do I start my training according with the future needs of the evolved libraries with regards to their new roles?
- How to answer patron and manager's questions if my institution is able to manage and preserve research output?
- Am I ready to match the requirements of the science field I'm serving? Who or what may lead me to an answer?
- Am I capable to open the horizon in terms of answering the challenges my institution is facing?
- Is there an open forum for discussing these topics in a continuous productive debate?

5. What a librarian could do with base training?

This question is to be found more and more as the shift in training paradigm moves towards the digital landscape. There are a few points where the nowadays librarian may be able to give a full positive yes:

1. ***Metadata creation and enhancement*** as many of the repositories out there after a basic set of metadata are introduced by the contributing authors, need a further refinement and enrichment in order to maximise relevance internally for the system and also for metrics assessment purposes. (A DRIVER's guide to European repositories, pg. 39)

2. ***Mediators*** where this is common practice at depositing stage or for making sure all the contributions stay in quality targets set for the content.

3. ***Targeted information gathering*** (reference services evolved): gathering information of specific interest to specific users, mapping information across networks.

4. ***Publication and dissemination services*** (they should take active roles in promoting the new means for publication and also opening opportunities for those who are in search of new distribution channels).

5. ***Trainers*** for the researchers to become more data-aware

6. ***Adopting a data archiving and preservation role***

There is to be observed another thing that seen from above the landscape of library and information science schools and programmes. This view is not a regular one nor is presenting itself as a harmonised evolving body but a competitive field that has to bring solutions according to he needs of the information market out there. These also bring many differences and so there are as many solutions as the contexts existing. There is not a clear unifying context for now but the environment requires a move to such goal.

6. Conclusions

A general conclusion is that the profile of the future information scientist and its different specialisations may only be determined if the institutional climate will let himself changed by the benefits of collaboration. At this moment we should expect for a change in attitude on the level of individual librarian, archivist, museum curator, information officer, information architect and every other profession that manages information. If it is to evolve as a profession as many as possible librarians should understand that "at every stage, collaboration can benefit from the presence of a «change agent» - a trusted individual, department or program that keeps the effort alive, injects it with a dose of resources (ideas, technology, staff) at the right time and keeps participants focused on the overall vision they are aiming to bring to life. Change agents think beyond red herring issues and offer possibilities for advancement. They are usually neutral parties whose ability to anticipate needs and present new ideas is highly valued " (Beyond the Silos of the LAMs).

As far as we are concerned as information science professionals the question is: are we change agents? Are we capable of developing a symbiotic coexistence in order to spawn the profiles of the information scientist? LAMs professionals have to make the switch to become information and data curators being the forefront of the real informational needs in research, education and leisure.

There is one aspect that concludes this paper and this would be the need to acknowledge the fact that information literacy must be perceived as building blocks for the future profile for the data managers. Both *information skills* and *information technology skills* are to be seen as the foundation of educational process that would lead a student or a lifelong learner into become the future professional that is able to manage digital assets.

It should be acknowledged further that this new profile, this new figure that is brought into focus by the increasing need for managing abilities and skills with concern to digital assets follows clearly the steps towards a unified vision for the information science. Soon there will be a time when all the distinctions will fade away and most certainly bear needs for the information brokerage will set a different job market in this context.

The question is: are librarians as vectors of change along with the other professionals in this domain up to recognise themselves as a branded guild that is ready to take on the digital world and regulate the informational deluge?

The University Library Role in Information Literacy Instruction

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University Library Director

Abstract

Electronic environmental impact on all sectors of social and economic life influenced the university training too. Thus, it is required to introduce in training, indifferent of specialty disciplines, a course of information literacy to develop theoretical knowledge and practical skills concerning the construction, processing and communication of information. The paper try to analyze what kind of methods and resources must be used in information literacy instruction provided by a university library. An investigation of formal information literacy strategies in Romanian universities was initiated to examine their content and presentation. We try to demonstrate that the information literacy instruction is very important for the university users because it demonstrated the importance of all kind of information (traditional or on line) and how different kind of strategy concepts and models could increase effectiveness in this area of professional practice. The study found that all the strategies aimed to integrate information literacy into subject curricula by engaging stakeholders in collaborative partnerships.

Keywords: university library**, i**nformation literacy, electronic environment, information strategy, information society

Introduction

The new information and communication technological developments, educational reforms must establish the universities to integrate information and technological skills instruction into the curriculum. New technologies create opportunities for learners but they must be approached critically and used correctly. Information literacy became a necessary requirement for university students in the present information era and university libraries are able to cultivate students in this area. In this context librarians must be part of the process to inform and empower learning with technology that enables users to access information in its many forms and formats-real and virtual- and use it responsibly.

The changes affect not only library services but also the way how users access information and the type of skills needed to do it effectively and efficiently. As the availability of online databases grew and users need special training, librarians become even more concerned about teaching students in using libraries and information. In this context many faculties also needed help and guidance in using electronic information formats but often don't admit it.

Librarians have become increasingly more concerned about the need for people to gain information skills so that they can be successful in the Information Society. A report of the American Library Association provides an excellent rationale for university librarians to integrate information literacy programs into the curriculum.

Information literacy proved to be an ambiguous concept which was given a variety of definitions. For the beginning we will give two definitions for "*Information literacy*" to understand better what is all about, especially because this term has several interpretations. In **ACRL Information**

Literacy Glossary it is defined like *"the set of skills needed to find, retrieve, analyze, and use information. Information literacy is more closely tied to course-integrated instruction but it extends far beyond coordination between the reference librarian and the individual faculty member"*[1]. According to this definition the students must demonstrate competencies in formulating research questions and in their ability to use information as well as an understanding of ethical and legal issues surrounding information. The final report of the ACRL Presidential Committee on Information Literacy stipulated that *"Information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand."*[2] The second definition emphasizes the informational independence of the user, independence that he win skimming through such a course.

The term "*information literacy"* is used in this paper to refer to the set of skills required to identify information sources, access information, evaluate it, and use it effectively, efficiently, and ethically. Also, we try to demonstrate the importance of information literacy instruction, as an important tool to inform university students about library collections, services and other activities, in order to stimulate them to use the library for supporting and developing their learning and scientific research processes.

The present situation

The university libraries plays an important and active role in the field of scientific research as a starting step and is one of the basic elements that support universities in achieving their objectives related to scientific research and quality management. So, information literacy instruction must be one of the courses offered by the university library that aims to educate its users on how to use information how to become information independent. The university library must provide courses related instruction, tutorials and other methods to support student development of information literacy skills.

Nowadays it is known that the way in which a university library can be instructive is larger than the traditional understanding [3]. Many information literacy courses have to encourage the collaboration between faculty (department) and library with the goal of helping students develop these skills to enable them to recognize various information sources and to use information in a right and suitable way. They have to get a set of abilities that enable them to understand which the library services are and how to use them; which are the library departments; which are the importance of university library in supporting the research skills; how to find information sources; application of ethical principles in consultation and use of information sources etc. On the other side the students must obtain practical skills allowing them to apply theoretical knowledge to practical work: how to access and use the library site; how to use the library catalogue; how to access and use electronic databases; what kind of research strategy have to use for a particular research; how to evaluate information; how to use special collections etc.

The purpose of this paper is to examine this phenomenon in the context of higher education, by assessing the quality of current information literacy strategy documentation and exploring the application of corporate strategy concepts and techniques to this emergent field of professional practice. Analyzing this aspect in Romanian universities it is observable that only a small proportion of Romanian students use the library, and this fact depends upon the faculty expectations. Many times they don't know what information is available, they have difficulty determining the information they need and the quality of it, they are unable to compare and evaluate alternative information. Therefore, it is imperative that librarians work collaboratively with academics. Also, the information literacy instructions are not comprehensive in all university libraries. Not many universities offer the required lectures that inform students about the importance of libraries and libraries' departments, the practical training of online access to databases through

internet etc. In conclusion, not in many Romanian universities, information literacy is formally integrated into the curricula of general education.

The librarians and information literacy

The librarian must support teachers' roles by building up information skills and discovering how to integrate them into the course. In this role, librarians encourage faculty in the establishment of learning priorities which ensure that students develop the abilities that will allow them to be information independent in this digital world. The university communities need to understand this, and in turn to support the librarians' effort. [4]. We must reconsider our role as university librarians in the new information age and we need to build relationships with all educational factors, encouraging and supporting them to integrate an information literacy course into curricula.

Permanently librarians were concerned to offer students information literacy skills, to change the faculties' attitudes toward the library and to demonstrate the importance of the library's involvement in curriculum development. The question is what practical steps can university librarians take to become more a part of the educational mission?:

- Knowing and understanding the university organization;
- Identifying the university councils, the Senate and working groups which are involved directly in academic program and make lobby for librarian membership in these committees;
- Taking a leadership role in providing information literacy courses for all specialties in the university.

Educational processes may be traditional, electronic, in an online environment or through distance education. Analyzing the Romanian educational environment we notice that the faculties have a determined role in the degree to which a library contributes to the academic programs, specifically the curriculum, because the responsible factors, in most cases, consider that kind of courses not so important. They have to realize that students will obtain necessary library and information skills through a coursework determined by faculty. Also, the librarians must involve in curriculum planning and cooperative teaching with faculty to help students develop information skills.

In many foreign university librarians are equal partners with faculty in the instructional process, a model which not function very well in Romanian university environment. There the library instruction is compulsory, being a required part of the general curriculum and the students have to pass a test to assess library skills before they graduate. From this point of view the librarians must become involved in curriculum planning. So, there are some directions on which librarians must involve:

- intervention by the university makers which must realize the importance of introducing such courses in university curricula;
- library administrators must demonstrate need for such training;
- they had long-term commitments to integrate library instruction into the curriculum;
- expand their collaboration with faculty in building the curriculum;
- help students understand the role of the library in the information world;
- prepare a brochure explaining the concept of information literacy, goals and objectives for the information literacy program, and a basic checklist for evaluating information;
- begin to experiment with various faculty members to develop the most effective way to teach basic information skills
- developing criteria to measure information literacy outcomes

There are some criteria that provide librarians with a powerful rationale in their demand to become involved in the teaching/ learning process to participate in the education of students for success in the Information Age:

- librarians must understand the curriculum and have good relationships with faculty leaders because this support is crucial;

- librarians must facilitate the integration of electronic information into the curriculum
- librarians must offer their expertise in teaching information skills to students
- librarians must help faculty become knowledgeable about electronic information formats
- librarians must be very well prepared for teaching, understand different learning styles, and engage students actively in the teaching process;
- librarians must be flexible to accommodate the range of the curriculum and disciplines, as well as a diversity of faculty and students;
- librarians must use effective marketing techniques to demonstrate the importance of information and technology literacy and their crucial role in it;
- librarians must stay somewhat ahead of the technology developments so they can be the first to teach new information formats and networks.

In Romania librarians hoped to be seen like partners in the educational and teaching process, a hope that wasn't fully realized in most universities. The higher Romanian education has not yet embraced the concept of integrating information literacy instruction into the curriculum. Reasons for this include such factors as the faculty's control of the curriculum, individuality and autonomy of each institution regarding curriculum and educational outcomes, and the status of librarians within higher education. University librarians and the members of the Librarians Association of Romania have worked to integrate library and information skills into the curriculum, and in several institutions they have been successful (universities from Brasov, Sibiu, Pitesti). At this time there is an interest within the Librarians Association of Romania to bring information literacy into the universities curriculum, and this may be one way to ensure information skills as an important learning outcome of higher education.

It is urgent to teach information literacy to students especially because most of them usually work while studying, their work environment involving to know how to use the new technologies in information and communication. Through the information literacy program, students will be able to locate, evaluate, and use information more effectively to satisfy their information requirements. Librarians will work with all faculty members to include information literacy modules into appropriate courses, and to monitor students' progress in becoming information literate [5].

Why is necessary to introduce an "information literacy" course in university curricula?

Over time was reiterated the important role of the library in higher education reform and was explained how librarians can involve themselves in this process. There are some reasons for which is necessary to integrate the teaching of information skills into the curriculum:

- anyone can become information literate;
- information literacy is action-oriented, helping to solve problems and make decisions;
- information skills are transferable from one discipline to another, from one task to another;
- information skills are needed for lifelong learning;
- information literacy helps people handle information and new technologies.

Our proposals regarding the introduction of an information literacy course into curricula are:

- the higher education accrediting agencies have to incorporate information literacy outcomes as part of the accrediting criteria for higher education institutions;
- conduct more research studies on information literacy instruction in academic libraries;
- modifying education and performance to include information literacy concerns;
- each professor who proposes a course for the various areas within the basic curriculum has to fill out a form which includes a question on how the course will deal with information literacy in the field;

- allocating specialized course credits for students to participate in promoting library usage and academic achievement;
- pay more attention to offering various methods of information literacy instruction to students concerning practical aspects.

The university library can organize and deliver a basic information literacy education program for different levels of students. As teacher and librarian I notice that first-year students have only a minimal understanding of how to use information effectively So, at the first level will be delivered to new students and may include a course about how is organized and how to use the library, the purpose being to allow students to become familiar with the library's collections, enquiry systems, layout and functions.

The second level will consist of a course about documentation and all the aspects on this problem. Will be explained how documents are organized and disseminated, will be defined own documentation needs and develop an efficient plan to retrieve it.

The third level will consist of a course on information searching, and it is intended to develop students' capacities in undertaking scientific research and practical work to lay strong foundations for future study and scientific research. It will be a course that describes the methods and technology received to seek and utilize the scientific documents and materials, particularly the electronic resources. Students will learn to utilize the retrieval methods of each database and digital resources. Once completing the course, the students must to achieve the following:

- to distinguish between different types of information identified during the in-class group activities;
- find and use a variety of sources related to the selected current topic using more research tools;
- apply given criteria for evaluating evidence and assess the authority, reliability, scientific accuracy, and validity of sources of information;
- research, integrate and synthesize information from various print and electronic sources regarding a practical question;
- write a thesis statement for the final project using the main criteria provided by the thesis statement worksheet;
- communicate the thesis statement with the found sources using a multimedia presentation

After attending such a course, students will be able to [6]:

- Apply professional standards, policies and accepted practices for the use of a variety of documents and technologies including accessibility.
- Apply appropriate means of documenting their work
- Understand and apply legal and ethical uses of information and technology including copyright and intellectual property
- Use of search engines and databases
- Evaluate online and printed material
- Synthesize information and methods of presentation

Conclusions

The university libraries and implicitly all educational structures faced with challenges due to the new information and communication development and changes that affect every program and process. In present educational reforms are taking place in Romania to improve educational outcomes and these developments causing major changes. Curriculum reform is necessary because students and employers are demanding improved educational outcomes to ensure better individual and business productivity. In this context librarians must maximize their potential to be in the position to assume their role in the teaching and learning process.

Each university has to develop educational strategies and learning resources to help students develop information literacy skills. It is necessary to have an active and continuing program concerning information access, developed and supported by the faculty's makers, librarians and other information providers because we must be willing to promote and share our experience in this information age in support of our institutional educational mission.

We are confident that will be accepted by most Romanian universities to develop and integrate an effective Information Literacy course because it will be able to enhance students' generic abilities which include problem solving, critical thinking, creativity, collaboration, communication and presentation. In this way, our students will be undoubtedly better prepared, both for their future studies and for their careers.

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Information Literacy at Makerere University: Progress, Prospects and Strategies

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Abstract

This paper defines Information Literacy (IL) and gives a brief background to the current IL programme at Makerere University. The main methods of data collection used were informal interviews with the IL instructors at Makerere University since very few publications about IL at Makerere University could be obtained. Emphasis was therefore placed on the description of the different situations experienced by the IL instructors, the Author's experience gained in Library User Education and the general assessment of the programme. The IL programme aims at empowering users who have recognized a need, to locate scholarly sources of information, evaluate and effectively use suitable information gathered to accomplish the task at hand, improve on the quality of users' learning experience, and create an information literate community with efficient and portable skills for lifelong learning. This paper therefore gives an overview of the IL programme at Makerere University, discusses how it is conducted, addresses the importance of periodic evaluation of the IL programme and proposes a way forward towards improving the IL programme at Makerere University.

Introduction:

Instruction in the use of libraries and literature by Librarians has become so popular globally. The students of Makerere University have benefited from the Library User Orientation, Library User Education with IL sessions over the years. In addition to the above two common programmes, Makerere University Library (MakLib) conducts another IL programme, designed as an Information Competence and Management (ICM) cross-cutting course for the graduate students and researchers (Musoke & Kinengyere, 2008:94). This programme has been piloted over a period of three years now, with the objective of developing it further to meet the study, teaching, research and outreach information needs of the community of library users at Makerere University.

Information Literacy programmes are organized and basically conducted at the Main (Central) Library of Makerere University. Training is conducted continuously throughout the year in sessions. There are very few IL programmes conducted at the departmental, faculty, institute and school levels.

There is a considerable amount of experience and expertise in IL instruction developed at MakLib, although documentation of the IL activities is still at low levels. There is need for more interaction between the IL instructors and those engaged in research with the objective of identifying future pointers to developing better IL practitioners. It is hoped that the interviews carried out with the librarians currently involved in the IL programme in preparation for this paper will stimulate thought and discussion among the instructors, with prospects developed to steer IL to its heights at MakLib.

Methodology:

The preliminary information for this paper was mainly obtained through informal interviews with the IL instructors at MakLib, who assisted in expounding the author's prior knowledge of Information Literacy as conducted at Makerere University. The informal interviews with two of the IL instructors enabled a considerable amount of factual information to be gathered in addition to the author's experience in conducting user education sessions.

Information sought from the IL instructors at MakLib included:

- The origin of the IL programme- when, how and why it was started
- The organization of the programme- publicity, selection of instructors, etc.
- Aims/objectives of the programme
- The content of the programme
- Facilities available to the IL instructor
- Evaluation of the IL programme
- Limitations in carrying out the programme.

This paper therefore presents an overview of the present IL programmes conducted at Makerere University. Since there is limited written literature about the IL programmes at Makerere University, it is hoped that as more MakLib IL instructors write up their experiences about the programme, the different perceptions together with their varied experiences could yield useful contributions towards addressing some of the different IL aspects, in addition to developing the IL programme further.

Information Literacy

Definitions of Information Literacy may vary from one author to another depending on how it is perceived.

From the presentation by Akiteng (2008), six aspects were mentioned in the definition of IL as given below:

Information literacy is:

- Recognition of the information need
- Translation of information need into query
- Identification of suitable information sources
- Application of relevant ICT knowledge
- Selection, integration, dissemination of retrieved information.
- Continuous evaluation

Bruce (2003) also defines IL as *The ability to access, evaluate, organize and use information in order to learn, problem-solve, make decisions – in formal and informal learning contexts, at work, at home and in educational settings*. This paper argues that since the Information Seeker can access information from all formats depending on his/her choice, then media/digital literacy skills should be acquired and the Librarian would add more value to his/her work when s/he takes part in this kind of instruction. MakLib's experience with the establishment of the IL programme is that, e-resources trainings were interchangeably referred to as IL programmes. Library e-resources trainings started way back in 2000 (Musoke & Kinengyere, 2008:92) but using the concept of Information Literacy began around 2005. Since then, it is carried out as routine library work by MakLib according to the demand expressed from the faculties, institutes schools and colleges (Musoke & Kinengyere, 2008:92).

According to Musoke & Kinengyere (2008:93) the sessions included in an e-resources training session expound on the following aspects:

- Brief description of ICT-related library resources
- Outline of how ICT-related library resources are provided
- Who is eligibile to use the resources
- Proceedures one has to follow to access the resources
- Participation in awareness-raising and dissemination of information about the resources

Since 2000, MakLib basically conducted e-resources training sessions which included the following: procedures of accessing the e-journals, e-books, the ELIN system, the online catalogue, the institutional repository and the procedures of obtaining articles/books through the document delivery service for further research. In 2005, an Information Competence and Management (ICM) course was introduced by Prof. Maria Musoke (Musoke, 2007) based on her experiences as a graduate student. The topics in the ICM course include the following:

- Introduction to research process
- Qualities of a good research
- Introduction to bibliographic searches for literature review
- Sources of information and document delivery
- Searching the internet search engine and specific databases
- Management of multiple electronic files and word processing
- Professional citing and quotation
- Reference management using endnote
- Presentation of research work

The ICM course is advertised for graduate students to apply for participation and conducted about twice in an academic year. It covers most of the aspects considered in an IL programme although it has not yet been incorporated into the University curricula.

Challenges based on the findings in organization and carrying out IL programme

Organization of the ICM course

In 2005, the ICM course developed by Dr. Maria Musoke was still a new concept to many librarians and it took some time to be well perceived and organized for piloting in 2007.

Few IL instructors

Identifying IL instructors to conduct the ICM course at its inception at Makerere University was a hard task because the most senior librarians had left for further studies. Only four Librarians were available to carry out the training.

Qualities and qualifications of the IL instructors

The four ICM pioneer instructors were trained in some of the programmes that were included in the course in preparation to running the course. However, the trend of recruiting more IL instructors has been slow to the extent that the total number of students trained in the IL programme is still limited.

Attitude of Librarians

Many Librarians believe that they are not meant to teach. Standing before students leaves Librarians especially beginners in IL instruction, intimidated by the class.

Methods adopted in instruction

Librarians are perceived as poor educators by many people although in real life, most of the methods used in conducting the IL programmes by the librarians are to the expected standards. Formal education may be a viable recommendation in advancing the IL instructors skills among the librarians, which may also help in winning the peoples' confidence in having librarians as instructors.

Promotion of IL programme

All possible methods including usage of faculty notice boards for displays, Library notice boards, collaboration with the Post graduate school, emails to university staff, the library website, etc are used to promote the IL programmes. However, it is always unfortunate that only a few students turn up for the training in the first weeks (especially for the user education programmes) and large classes later in the final days of the programme, with only a few paying critical attention. More attention would be given to the IL programme by the students if it was integrated in the university curricula. However, this is an aspect that is still being advocated for in order to streamline the training process university wide.

Poor turn up of students for IL programmes at the Library

Nalumaga (2005:26) noted that interest of users to attend user education programme is minimal, the classes at times are too large and time allocated is really short for adequate guidance. Aguilar & Keating (2009) digs deep to identify reasons as to why students probably miss out on important programmes of the Library. The timing for the programme is not favorable for everyone thus creating the under-represented students. The under-represented could be those students busy:

- with classes or jobs,
- taking care of children,
- traveling to and from home,
- students not familiar with librarians,
- students who find sophisticated libraries and complex library systems,
- and minorities (racial, religious, ethnic and other minority groups)

Teaching facilities

MakLib has a small special computer laboratory for training purposes; however, it accommodates very few people in comparison to the University community that is normally invited for training. Most times, an alternatively bigger computer laboratory is instead booked and used within the Library. In order to appropriately reach out to the wider community of users (even at faculty level), there is need to plan for an improvement in the training facilities provided for the IL programme.

Evaluation of the programme

While the OPAC arena could be flooded by many information seekers, not all know what to do because of lack of skill. MakLib attempts to conduct Information Literacy training throughout the year but various cases are being noted despite the effort to have the programme on going. Some of which include students, who had never stepped into the University Library because of their attitude towards the Library. Some students find it a complicated process to locate e-resources. The uninformed students go to private research units for help where they pay a lot of money for information resources and assistance in research or report writing. Some departments like Medical school prefer to have IL sessions during lunch time while the School of graduate Studies would prefer to take a whole day yet the Library sets its own dates.

Future strategies

Below are some of the strategies that may help in tackling the IL programme instruction issues:

- Taking surveys before scheduling and designing the IL programme
- Revising the IL programme to include media and digital literacy in order to keep up with the modern and technological developments.
- Creating a more conducive learning environment with fast internet, enough equipments and facilities for the IL programme
- Thinking of other possible areas where the IL programmes could be conducted beyond the Library premises. Such places could include using the computer laboratories at faculty level.
- Need for supporting documentation in form of handbooks, manuals, etc specifically for the IL programme.
- Consider revising the length of the training session, space and training facilities and including exercises and examples in the trainings.
- Adjust Library programmes to fit into information seekers timetables.
- Identification of subject experts to help the students at departmental level could also help in scaling down the number of those who need to go through the IL programme. These experts could be lecturers since they spend most of the time with their students or it could be the subject librarians located in the various branch libraries in the different faculties.
- Improvement of the IL Instructors' skills in delivering the IL programme could be geared towards guiding the IL instructors in the following areas:

    - Preparation to teach the session
    - Attitude toward the class
    - Ability to conduct the session
    - Ability to communicate ideas
    - Ability to respond to questions
    - Opportunity for hands-on practice
    - Ability to relate IL to students' research
    - Another important attribute could be having a professional qualification that is not lower than that of the students being trained in addition to having the teaching experience and personal qualities of an instructor.

Conclusions

From the discussion above, this paper arrives at the following conclusions:

Based on MakLib's mission and vision, librarians always seek for all the possible ways of supporting the teaching and learning process in the institution; and helping students to develop independent learning research skills. Some of these ways could include designing a programme with interactive technologies and participation of information seekers. The IL instructors should also attempt to change the attitude of the students about the Library so that they fully attend the library IL programmes.

The IL programme organization and planning or scheduling has always been dependant on the library staff involved in IL instruction. Invitations to academic staff at the departments, schools and faculties could be extended to involve them in designing the programme, which would lead to lecturers planning to incorporate and allocating the appropriate time and venue for the IL programme within units. The Heads of departments, faculties or schools could then assist in promoting the IL programmes within units and encourage more students to attend the programmes. As a result the population coverage would be improved. It is not enough to rely on the sessions conducted within Makerere University Library alone or as requested by individual faculties or departments but as a requirement for each and every faculty, school or department.

Professional development of the IL instructors should be regarded highly as it is known that knowledge keeps on growing and changing. Therefore staff should attend trainings, workshops/conferences, pay visits to other first world libraries and learn from them. This will breed updated librarians, providing up to date information services. MakLib librarians should remember to implement lessons learnt from elsewhere in order to take their own library through the expected transitions and developments.

Mentoring is another aspect that must be embraced to keep the circle of IL instructors widening. In each of the individual librarians there's potential to soar higher and higher, working as a team brings wonderful results, bridging gaps, to mention but a few. Mentoring is one way to develop oneself and give birth to new IL practitioners. Therefore seniors in IL instruction should walk hand in hand with the juniors to help them get on board for capacity building. IL instruction can become one of the outreach activities to be conducted by an academic library.

IL instruction is usually provided on intuition. IL instructors, at the end of the sessions, congratulate themselves upon accomplishing their tasks. Very little is done on assessment of the programmes conducted. Evaluation is one of the tools IL instructors can use for managing change and it can act as an eye opener to loopholes in the programme. The evaluation process should involve having a fellow Librarian and other staff members not necessarily from the Library to attend the sessions and pass on their comments. Students can be approached by the young Librarians to have an informal interview with the students trained. An evaluation form can be designed and given to students at the end of the session. Suggestion boxes should also be placed at strategic points in the Library and at departments to encourage students to give feedback without fear.

In an effort to evaluate IL programmes, this will result into remodeling of IL programmes to meet information seekers' needs. Makerere University Library's strategies in promoting the IL programme could be instrumental in promoting the library's activities and services to the general university community for academic excellence.

This paper therefore proposes that IL programmes be remodeled to tackle all categories of literacy (technology, information, media, social, digital, etc.) since sources of information are acquired in different formats e.g. print, non-print, media, web, and computer files. IL instructors should also think of delivering services Beyond the Library Premises (BLP). It is hoped that this paper will also stir unlocking the potential the Librarians could be having, as they think of innovative practices that meet the modern technologies. This could benefit the users in making use of modern tools and creating some fun in their studies as they advance their learning process.

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Pilot System for Information – Documentation Based on Web Platforms

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Abstract

This paper presents achievements of research activity conducted under projects funded through national research programmes, as well as analysis of such information and documentation systems existing abroad. Also, the design of such a System for Information and Documentation (SID) is presented. The SID is accessible through Web platforms in the field of science and technology. Working procedures of the system are illustrated, as well as, its functional structure and standards that the design was based upon. Key features offered by the system are revealed along with a *modus operandi* for users and for information providers that have to ensure the digital content of the database.

1. Introduction

Development in the field of informatics and information & communication technologies (ICT) has allowed the human civilisation to shift from an industrial society to an informational society.

The dissemination of information is transiting the globalisation process, on a great scale, sustained by IT. In this global context, access to information plays a fundamental role in facilitating access to knowledge and more efficient economic action.

Technologies modify and industrialise information, thus transforming the concept of "knowledge" in a product and a resource for development. Information becomes borderless, and distributing it will be possible increasing the connectivity (with enhanced links through the Internet networks) and by access to open sources.

Nowadays, distribution of electronic information through Internet represents the sole method able to satisfy the needs for complete documentation among specialists, to ensure their autonomy, and generate confidence in one's own possibilities and personal capacity for an efficient activity.

In order to be effective in real life, results of research need to be disseminated, known and acquired by potential users; hence, the need for use of modern methods in accessing scientific information.

In this context, a process that has been amplified on international scale is the representation of RDI (Research, Development, and Innovation) activities using the technologies of Information Society, through Internet sites.

Access to global scientific and technological information sources is a necessity and managing those sources has become an economic and political challenge in order to ensure unrestricted access to every citizen.

Information systems based on new ICT have interdisciplinary knowledge transfer and unprecedented evolution of information media, structures that deal with rapid collecting and processing of information, storage in massive data collections and offering access through communication networks, to this information.

The creation of information systems for Research and Development is signalled as a strong tendency both in USA and in EU member states. The majority of these systems are based on a close cooperation among institutions that coordinate, at a national level, the R&D activities, and organisations directly involved in those activities, such as institutes or major research laboratories along with universities.

A significant example of a dedicated informatics system is the CORDIS portal that contains information pertaining to the results of R&D projects conducted under concluded European framework programmes.

Complying with the worldwide trends and the EU recommendations, in Romania it is very important to create and implement information systems for R&D in various fields, accessible through Internet, integrated into an informational network for the Romanian R&D, integrated, in turn, to the European informational network for R&D.

At a national level, the information related to results of budgeted R&D projects is stored in databases managed by the authorities that conducted the programmes. This information is not yet accessible to the public nor to the Romanian scientific community.

Because of that we have taken into consideration the implementation of a "Pilot System for Information – Documentation Based on Web Platforms", that would take this information, store it into a database within the system and make it available to those who are interested, through a Web portal-type platform.

2. System presentation

Worldwide practice and concerns highlight several aspects that define the Information - Documentation Systems:

- Specialisation on increasingly narrower areas;
- Cooperation of various institutional structures in creating these systems;
- Integration of specialised systems in networks used in informing process, accessible through Internet, in order to use and capitalise with maximum efficiency the information resources.
- Construction and maintenance of databases – the most valuable electronic resource for information – that would contain increasingly complex information and could be accessed increasingly faster.
- The importance, for the R&D&I field in particular, of the existence of databases that would allow information exchange in regard to the potential research and the results of undertaken activities.

Systems used in informing – documenting process are backed by well-structured, relational databases, have interfaces equipped with search engines for these databases, and usually, the access (even to summary information) cannot be done without on-line registration.

The pilot system for information – documentation based on web platforms is an integrated system that contains two basic modules, namely:

- National educational system for usage of electronic resources in accessing the international fund of literature on science and technology;
- The data warehouse-type system for information-documentation, for access and usage of the national fund of literature and achievements in science and technology.

The pilot system is modular and flexible, expandable in quality and quantity, safe and reliable, easy to manage and having adequate, user-friendly interfaces.

Both components will be accessed through a Web portal-type platform.

National educational system for usage of electronic resources in accessing the international fund of literature on science and technology is associated with a shared informatics system, meant to serve a nationwide network of support entities.

Creating a network of support entities in information-documentation and communication activities requires creating an information and communication environment, an electronic network that would include the support entities. In this respect the support entities will be connected through an informational network accessible through the Internet. A central server dedicated to this network will function in informing and training the personnel in methods of accessing the external information resources in science and technology fields.

The system offers searching functions oriented on multiple criteria, based mainly on categories of information that will be defined (patents, articles, books, scientific reports, etc.) on type of information depository, searchable by authors, country, availability, etc. Data related to available information resources will be stored in a unique database, on the server.

The system has also a component of continuous training for the network's members, aiming the acquirement of skills and necessary abilities in the information and documentation field. For this purpose, the system also includes a platform for distance training, platform that would be created within this project.

At this level, within the system, the *Repertoire of electronic pedagogical resources in information-documentation and communication training* will be created and implemented. This will be stored in the database, on the main server. The contact data and activities for the support entities will also be stored there. The system will be provided with a separate module for web-based maintenance.

The data warehouse-type system for information-documentation, for access and usage of the national fund of literature and achievements in science and technology is based on two main components:

- *Digital pilot platform* for information-documentation and communication on national research programmes and projects, and their results;
- *Pilot database* containing the national fund of literature and achievements in science and technology, with reference to the international indexing systems.

The digital pilot platform is employed both in extracting and displaying information from the database to the user, and in up-dating on-line the database by the personnel authorised in this respect.

The platform will contain automated updating modules with information from other databases with which it would collaborate on-line. In this respect web services will be used.

The platform offers users a unique, ergonomic, intuitive, interactive interface and having a solid search-engine for the database.

The access in the system will be governed by defining and implementing a system of access rights, oriented on several users' categories, namely:
- technical administrator;
- contents administrator;
- personnel that has the right to update on-line the data;
- common user.

Pilot database containing the national fund of literature and achievements in science and technology, with reference to the international indexing systems is situated on the first level of system's architecture (the data level). On the same level there is also situated the managing server for the database.

The database is a relational-type one, and it contains restrictions that would ensure the integrity and the coherence of the data. Data updating and adding new information will be achieved through the digital platform described above. For uploading information into the database the following methods will be used:
- automated feeding, using *web services* over the Internet;

- feeding through introducing data in on-line forms provided by the informational system that would be created;
- feeding by uploading files on-line through the interface provided by the system; the uploaded files will be processed automatically on the application level, useful data being automatically extracted and introduced in the database.
- manual feed, through the web-based maintenance module that will be created within the project.
- manual feed, directly on the server (*back-end*).

3. Solutions used in designing and creating the system

In designing the SNIDCo-ST system the characteristics that define a modern and efficient system were taken into account, including:

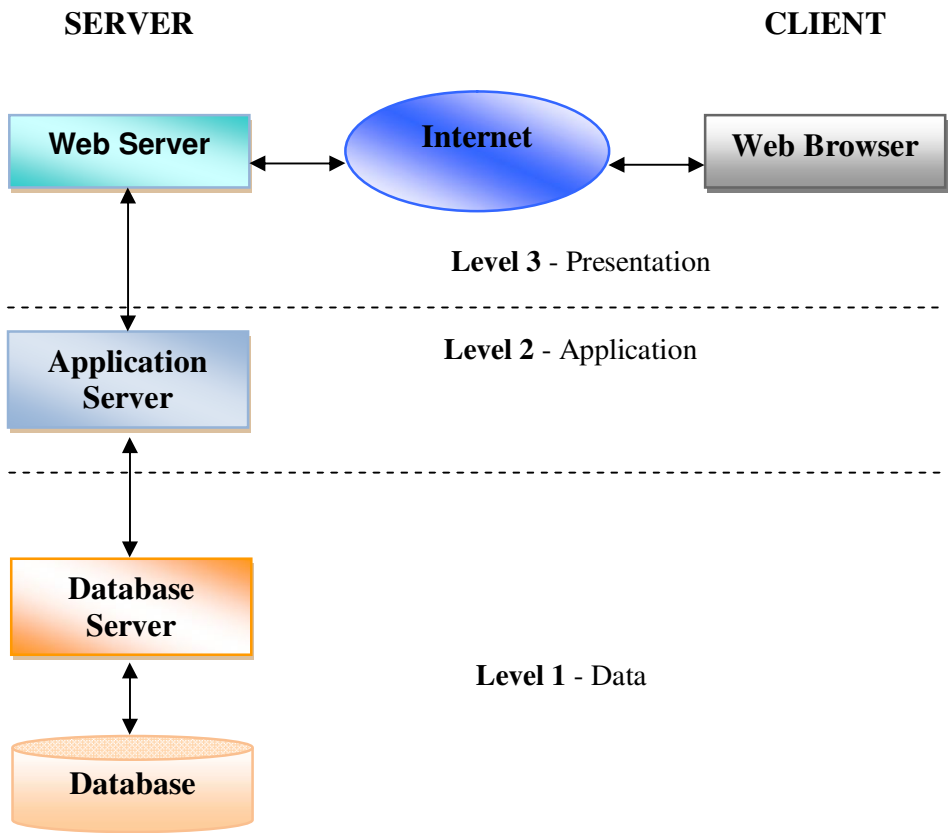
- a modular structure, opened, flexible and scalable;
- usage of Web technologies that allow access through Internet using merely a Web browser.

Due to the dynamic character of Web applications and the complexity of applications required by the system we have opted for a *three level client / server architecture*.

The *three-tier* architecture model is characterised by:

- *the data level*, where we have the database and the database maintenance server. At this level, information is stored and extracted. Separating the data on a dedicated layer improves scalability and global performances.
- *application level*, or application server (connecting level) in charge with application functions by undertaking complex processing of the information.
- *data presentation level* includes the Web server and the client (a standard Web browser) is the highest level of the application and deals with displaying the information, exchange of data / results with the inferior level and is represented by the interface visualised by the client through an Internet browser.

Graphically, such architecture can be represented as below:



On levels 2 and 3 the pilot digital platform for information-documentation and communication concerning national research programmes and projects and their results is realised and implemented, while on level 1 there will be the pilot database containing the national fund of literature and achievements in science and technology.

At database level, the database will be maintained by a fast and reliable dedicated server. We are considering using one of the *MySQL* servers, *MySQL Server.* All these servers provide backup and data restore mechanisms, so that the developers should define a coherent and reliable strategy of periodically saving the data.

At the application level *PHP* software developing environment will be used, given the great degree of interoperability with other environments and the interfaces that it offers to all kinds of database servers. On a limited scale we look into using *JavaScript* modules.

The data presentation level will be realised using *HTML* (directly or as a result of *PHP* programming). Control of display styling will be ensured by *CSS (Cascading Style Sheets)*.

Hardware-wise, the system for information-documentation in science and technology implies a platform composed by two servers (solid and reliable, one as application and Web server, the other as database server), with a limited number of local station for administration/off-line data processing, workstations for the support entities registered to the network created (one workstation for each support entity).

The support entities designated for the demo period are: The libraries of the Universities of Bucharest, Cluj, Iaşi and Timişoara, and as a research library: the Romanian Academy Library.

4. System database

The databases are fundamental for the modern scientific research, both as information archives, and as research instruments by using their contents.

The system's database is relational-type, accessible through the Web. In creating the database and handling the data, we used a maintenance system for relational databases that allows to:

- define the database;
- upload data into the database;
- access data for addition, deletion, modifying;
- maintaining collections of data and retrieval in case of accidental loss;
- reorganising the database;
- ensuring security.

Procedures for administration/maintenance of the database deal with problems related to:

- coordinating data acquirement into the database, modifications in order to preserve coherence, consistence, integrity and pertinence;
- data saving and restoration, in order to prevent accidental loss and reconstruction of database if needed;
- archiving data, compacting the storage media, in order to optimize the resources, both as physical space on the storage media, and as the system's response time;
- administration of users and their rights, generally by defining and carrying out the security policy for the whole system;
- defining the function of monitoring system's usage (connection number, period, types of actions), in order to evaluate the output and to substantiate improvement decisions (increase of available resources, reorganisation of access modus, etc.).

The administration/maintenance of database is being carried out on two levels:

- basic level, offered by instruments on the database server;
- complementary level, carried out as application or managing applications.

In designing the system database the EU recommendations contained in the CERIF standard were taken into account.

For various systems of information-documentation and communication to exchange information, data needs to be converted from source to reception.

The classical method of dealing with database interconnection is writing interfacing software for each pair of systems that need to communicate. Development and maintenance of such programs is costly and time consuming.

Database interoperability [7], through standards and universal scientific formats, facilitates information-documentation and communication related to research projects and their outcome. A modern and efficient solution in achieving interconnection of various databases is using the format offered by the **CERIF** standard (**C**ommon **E**uropean **R**esearch **I**nformation **F**ormat) [8].

CERIF is a model created as a support for the management of information contained by research projects and their outcomes, providing a set of rules that facilitate interoperability amongst various systems of information-documentation and communication.

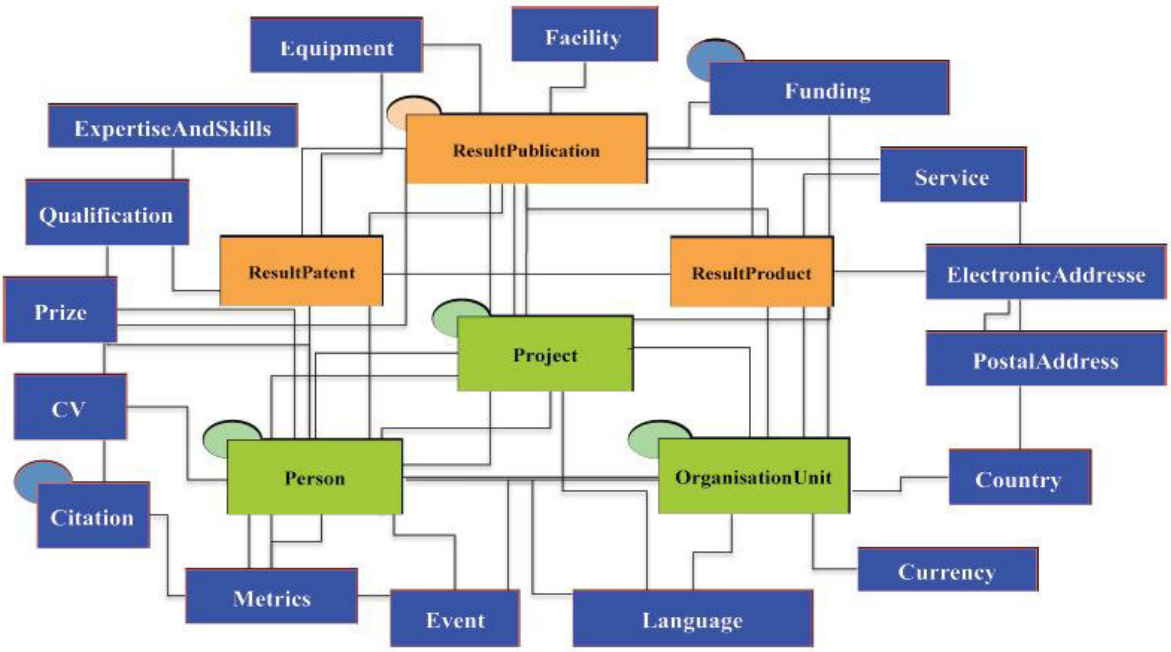
On one hand, research information (information contained in research projects) is information about research entities, such as: people, projects, organizations, publications, patents, products, funding sources, or equipments and relations between them and secondly, systems of information-documentation and communication can be considered tools for structuring, storage, maintenance, information exchange, access, dissemination and evaluation of the information they contain.

CERIF, through the entities and their relationships, as well as, through semantics management, is a powerful instrument in correlating national databases related to R&D and technology, and in making inventories of R&D projects carried out in universities, industry or research institutes.

CERIF model is considered a standard, being recommended by the EU to all member states. It was developed with the support of the European Commission in two major steps: 1987-1990 and 1997-1999. In 2000, the European Commission handed the development and custody of CERIF to **euroCRIS** (**Euro**pean Platform for **C**urrent **R**esearch **I**nformation **S**ystems http://www.eurocris.org), a not-for-profit organization dedicated to promoting information systems for research - **CRIS** (**C**urrent **R**esearch **I**nformation **S**ystems).

The **CRIS** model offers the possibility of registering all information contained in R&D projects, both, referring to on-line management of such projects, starting with the competition phase, and information related to: research programs, research groups / laboratories, research centres / institutes, funding sources, research results (publications, patents, products, etc.), events, expertise / consulting.

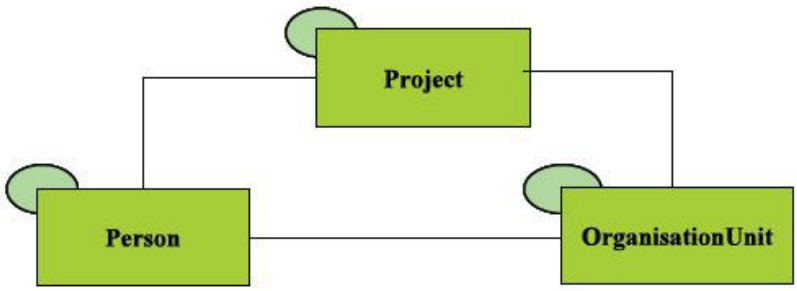
From the point of view of the concept, the CERIF model is composed by entities and relationships. Among the CERIF entities one can point out the following types: basic entities that form the core of the model, ***(b)*** result entities, and ***(c)*** second level entities. Structure of this model with entity types is illustrated in the graph below:



The conceptual **CERIF** model

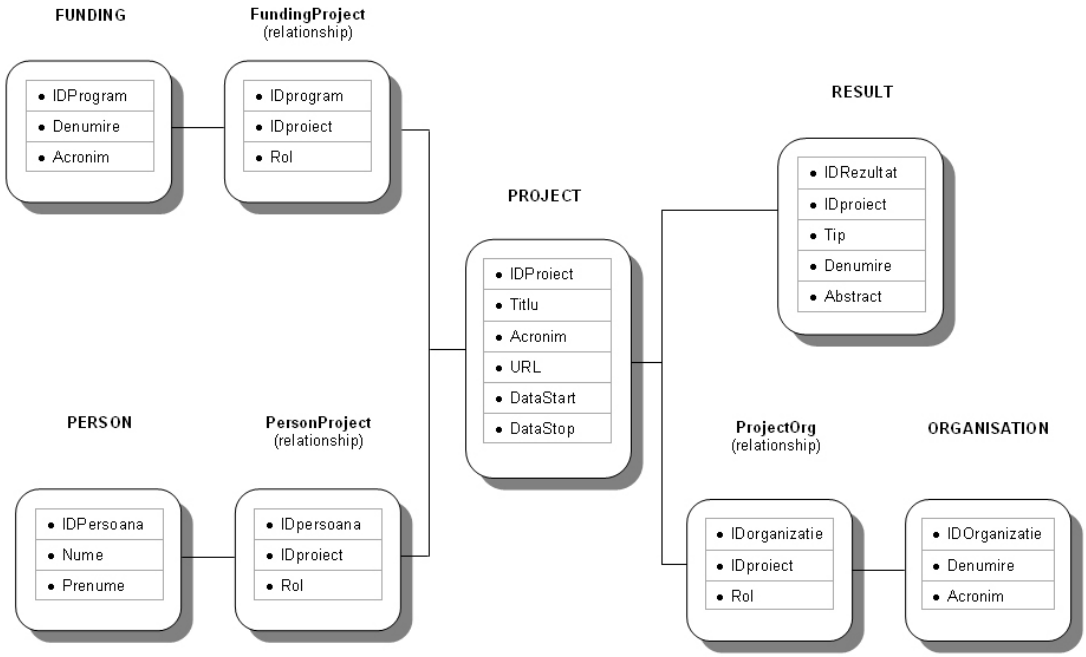
Based on this conceptual model, the database for the digital pilot demo platform for information-documentation and communication of the system proposed for accomplishment will contain, two main types of entities, namely, the *core* (projects, people, organizations) and the *results* (publications, products, patents), the level (c) being represented by the *Programme* entity (funding sources).

The database core consists of *People, Organisations* and *Projects*. The figure on the right presents the basic entities, relationships between them and recursive relations.



Database core structure

Each entity has recursive links to it and maintains relationships with the other entities of the core. The detailed graph of the database is represented in the figure below:

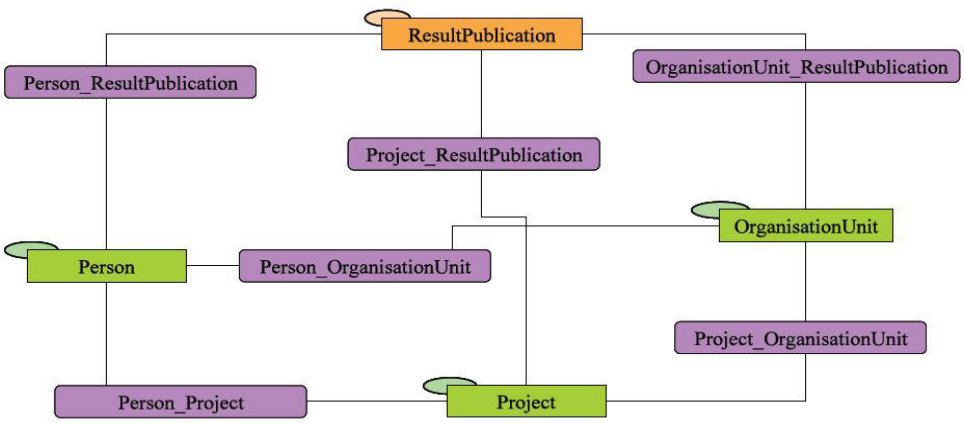


The entities of level *(b)* - *Results* in the CERIF model are *ResultsPublications*, *ResultsPatents* and *ResultsProducts*. The figure below illustrates entities and types of relations existing at this level, entities representing the result of research undertaken during the projects.

Entities of the **Results** level

Results–type entities allow storage of information related to identification and description of types of results of research undertaken during the projects.

In the database structure, *Results*-type entities are correlated with the *Projects*, *Organisations* and *People* entities, as it can be seen in the figure below:



The linking entities within the database

Results-type entities allow storage of information related to identification and description of types of results of research undertaken during the projects.

5. System's Web-type user interface

The main goal of the user interface is to ensure a simple, logical and intuitive user interaction, centred as much as possible on the user.

In achieving a Web-type user interface, we used the existing standards for creating Web applications, ensuring that these applications can be easily adapted to future Web developments. In addition, these standards allow a separation between content and display, with implications regarding accessibility.

The best known and most used Web standards are: structural languages (HTML, XML, XHTML), presentation oriented languages (CSS, levels 1, 2 and 3), object models oriented languages (DOM, level 1 and 2), creating scripts (ECMAScript - a standardized version of JavaScript), and additional presentation languages (MathML, Scalable Vector Graphics).

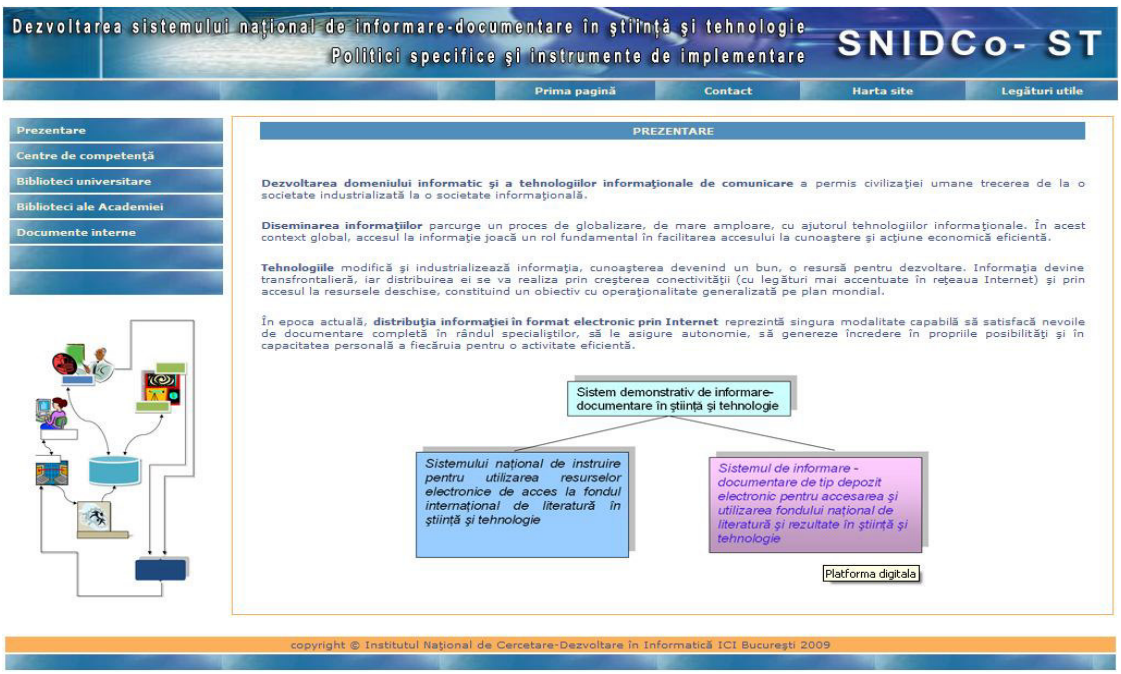
In designing the user interface we took into consideration that it should be unitary and ergonomic, easy to understand and intuitive to use, allowing the user easy access to databases and information, needing only minimal computer skills.

The user interface (GUI) allows communication with the application, using graphical objects on the screen: windows, buttons, check boxes, menus, etc., operating them using the keyboard or the mouse.

The main functions of the *information-documentation system's interface* are:

- information management (collecting, processing, storage, delivery to the users, in a suggestive and useful manner)
- user management (registration, granting access rights, personalisation, interactivity, securing private data)
- communication management (editing and distributing newsletters, creating mailing lists, discussion forums, FAQ)
- system management (the administrator would have access to all resources, both through the Web interface where it should be identified through an username and password, and directly into the system (back-end)).

The main page of the Web interface looks as follows:



Regardless of the selected component, all pages are designed in the same manner. Thus the banner and the logo are chosen so they would express the portal's goal, and displayed on the top of every page.

For each of the system's component, on the top page, the user finds, in the central area of the page, a general presentation of the selected system, then, on the top and on the left side, there are horizontal and vertical navigation menus for the system. To the left there are the main sections of the application, allowing differentiated access of users to the information available through the training system.

The central area is a dynamic zone, changing upon the option selected in the user's menu and containing the specified information.

In the lower part there is information regarding copyrights. The upper and the lower part are static and don't change from one page to another.

Regardless of the selected component, according to the top page of each component, a visitor can ***register***, if it is the first visit, choosing a username and a password, or can ***authenticate***, if he/she has registered previously. Registration is not compulsory for common visitors that only want mere information.

Exploiting the system implies usage of *dialog interfaces* with users, through two key elements: forms (screen layouts) and results presentation reports.

One of the key components of *the data warehouse-type system for information-documentation, for access and usage of the national fund of literature and achievements, in science and technology* is offered by the *on-line data acquisition module*.

The on-line data acquisition represents a modern method of data harvesting, available – on the Web – through *on-line forms*.

A Web form contains blanks on a Web page and the user fills information in. The communication manner ensures the interface among applications, components and application modules.

By gathering necessary information for uploading on-line the system database, the Web interface contains the following types of forms, used in collecting information in regard with:

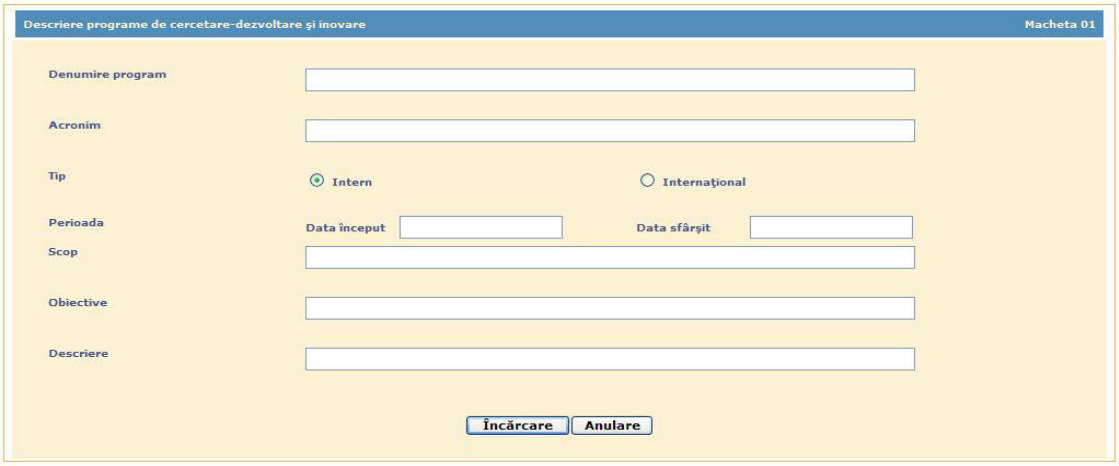
- Research-Development and Innovation programmes
- R&D&I programmes' modules
- R&D&I projects
- organisations participating in R&D&I programmes
- people participating in R&D&I programmes

Each Web form can be accessed individually. Each blank field of the acquisition form contains a description of the field itself, avoiding confusion.

Validation of data collected through Web forms depends on the type of the blank field, as follows:

- for the *hidden list* type, the user is lead into choosing one of the valid variants offered by the Web form, eliminating the risk of introducing void data.
- for the *text* type, there have been created two functions: one, that tests the compulsory fields for null value, and the other that tests the value of numerical fields in order to avoid non-numerical values.

Fields marked with [*] are compulsory. In the example below we present such a data acquisition form.



Another essential component of the interface deals with information search and display, regarding research projects, upon different criteria, such as: type of program, organization, type of project, the person involved, the project results, etc.

Types of allowed searches: *simple search* – the user can use a single searching criterion, *advanced search* – the user uses simultaneously one, two or three searching criteria, link by logical operators and *browsing search*.

The interface can be accessed from any point of the Internet, without any restrictions related to IP addresses or networks the users connect from.

Conclusions

"The pilot system for information – documentation based on web platforms" is modular and flexible, expandable in quality and quantity, safe and reliable, easy to manage and having adequate, user-friendly interfaces.

The system aims to:

- create a national educational system for usage of electronic resources in information-documentation and communication for accessing the international fund of literature on science and technology;
- creating a digital pilot platform for information-documentation and communication on national research programmes and projects, and their results;
- creating the pilot database regarding the national fund of literature and achievements in science and technology;
- creating a unique interface for searching, information and documentation on existing research projects, that will ensure easy and rapid access to information regarding the progress of the research, the results in the fields of science and technology.

The system addresses professionals in information and communication science, as well as, users, especially, within the scientific community.

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How to put the Librarian at the User's Service. Information Retrieval

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Abstract

For many years people have realized the importance of archiving and finding information. Along with the appearing of computers, it became possible to store large amounts of information and finding the right information at the right time from such collections became a necessity. In the era of virtual research environments the ideal librarians must be qualified for satisfying the relevant requirements of the community they are serving. The article is a review about the concept of information retrieval, techniques to improve search effectiveness (relevance feedback, cluster hypothesis, natural language processing), different measures for evaluating the performance of information retrieval systems and some tools to aid the retrieval of information (from traditional information retrieval systems – OPACs, bibliographic databases – to more sophisticated tools – digital libraries, institutional repositories, "next generation" catalogs). The article also describes the new role of librarians as professionals who intermediate between information and users. Being an expert in searching for materials and data they are required to have deep knowledge about retrieval system, new qualification and competencies: IT skills, information literacy skills, creating search strategies, guiding and training users to understand the information retrieval process, how to construct queries and how to use the system.

1. Introduction

Traditionally, librarian had to deal with acquisition, collection development, classification and cataloguing, circulation, reference service, preservation, conservation and archiving the printed documents, also helping the users in locating the information needed; in other words he have aquired, organised, and disseminated information. With the progress of information technology and information science, the paper collections have given place to user searchable, networked collections, like Online Public Access Catalogues (OPAC), bibliographic databases, virtual research environments (VRE), digital libraries, digital repositories or institutional repositories.

The role of librarian is now expanding to include managing electronic scholarly products, and participating in the evolving scholarly communication process; he needs to adapt his classical library tasks to modern tools and opportunities for providing faster, complete and more advanced services to the users.

With the exponential growth in the amount of information available from digital libraries or digital repositories, has become increasingly difficult to do effective retrieval over these large collections; so that the information retrieval is fast becoming the dominant form of information access, overtaking traditional database-style searching. [1]

2. Information retrieval – concept and tools

Information retrieval involves the process of searching, finding and extracting useful information from large amounts of stored data, such as a database. [2]

In principle, the process of information retrieval concerns with: a user formulates a question (query) to which the answer is a set of documents satisfying the information need expressed by his request. He can obtain the set by reading all the documents in the store, retaining the relevant documents and discarding all the others. This constitutes a "perfect" retrieval, but this solution is not realistic because the user either does not have the time or does not wish to spend the time reading the entire document collection, apart from the fact that it may be physically impossible for him to do so.

The process of information retrieval is related to access information efficiently and effectively and to evaluate information.

- Access information efficiently and effectively

Efficiency is usually measured in terms of the computer resources used (like computer's response time or performance speed); effectiveness of retrieval is measured in terms of precision and recall.

In the early years of information retrieval, researchers realized that it was quite hard for users to retrieve effective search request.
In order to improve search effectiveness (or efficiency) they studied several methods such as:

- relevance feedback – the user is asked to judge the relevance of the top few documents retrieved by the system. Based on these judgments, the system modifies the query and issues the new query for finding more relevant documents from the collection. Relevance feedback has been shown to work quite effectively across collections;
- cluster hypothesis – states that documents that cluster together (are very similar to each other) will have a similar relevance profile for a given query. Document clustering has allowed several developments in information retrieval for browsing and search interfaces; [3]
- natural language processing – users begin their search process using natural language to describe their information need. The system takes this query, matches it to terms in documents, and retrieves relevant items. The disadvantage is that the words users choose to describe their information need are different than those used in titles, texts or indexes. To overcome this problem, searchers are encouraged to expand their initial queries by using synonyms or other terms that related to their information needs. [4]

- Evaluate information

Information retrieval systems are design to evaluate information automatically on the bases of relevance, which is reflected in their display of documents to the searcher. [4]

The purpose of an information retrieval system is to retrieve all the relevant documents for a particular query at the same time retrieving as few of the non-relevant as possible.

The success of search is often evaluated in terms of:

- **Recall**: the proportion of relevant documents retrieved by the system (number of relevant documents retrieved in comparison to the overall number of relevant documents in the collection);

$$\text{Recall} = \frac{\text{Number of documents retrieved that are relevant}}{\text{Total number of documents those are relevant}} =$$

$$= \frac{\{\text{relevant documents}\} \cap \{\text{retrieved documents}\}}{\{\text{relevant documents}\}}$$

- **Precision**: the proportion of retrieved documents that are relevant (how closely the retrieved documents relate to the user's information need);

$$\text{Precision} = \frac{\text{Number of documents retrieved that are relevant}}{\text{Total number of documents that are retrieved}} =$$

$$= \frac{\{\text{ relevant documents }\} \cap \{\text{ retrieved documents }\}}{\{\text{ retrieved documents }\}}$$

- **Fall-Out**: the proportion of non-relevant documents that are retrieved, out of all non-relevant documents available (the probability that a non-relevant document is retrieved by the query);

$$\text{Fall-Out} = \frac{\text{Number of documents retrieved that are non - relevant}}{\text{Total number of non - relevant documents available}} =$$

$$= \frac{\{\text{ non - relevant documents }\} \cap \{\text{ retrieved documents }\}}{\{\text{ non - relevant documents }\}}$$

- **Average precision**: evaluate ranked retrieval (the order in which that returned documents are presented).

When people retrieve information their activities are classified in two broad categories: searching and browsing. Searching implies that the user knows exactly what to look for, while browsing should assist user navigating among correlated searchable terms to look for something new or interesting. Most of the major works on information retrieval systems focus on supporting these two kinds of activities. [5]

There are various tools available to use in digital information systems and they facilitate in accessing, searching, browsing, navigating, retrieving, indexing, storing, organizing and dissemination of digitized information.

Traditional information retrieval systems (OPACs, bibliographic databases) have given way to more sophisticated tools to aid the retrieval of information from digital repositories (digital library, institutional repositories, "next generation" catalogs). **Online Public Access Catalog (OPAC)** refers to the concept of electronic library and it is an online database of materials held by a library or group of libraries, giving a wealth of remote access to library information resources. Users typically search a library catalog to locate books, periodicals, audio/visual materials or other items under control of a library.

A **bibliographic database** is a database of bibliographic records, including journal and newspaper articles, conference proceedings and papers, reports, government and legal publications, patents, books. In contrast to library catalog entries, a large proportion of the bibliographic records describe analytics rather than complete monographs, and they generally contain very rich subject descriptions in the form of subject-indexing terms and abstracts.

The next step of evolution in information science was the appearance of digital content repository, which made available the access to rich sources of information, data, images, and valuable research results. **Digital libraries** are a set of electronic resources and associated technical capabilities for creating, searching, and using information. In this sense, they are an extension and enhancement of information storage and retrieval systems that manipulate digital data in any medium (text, images, sounds, static or dynamic images) and exist in distributed networks.

The content of digital libraries includes data, metadata that describe representation, creator, owner, reproduction rights, and metadata that consist of links or relationships to other data or metadata, whether internal or external to the digital library. Digital libraries are constructed and organized by,

and for a community of users and their functional capabilities support the information needs of that community.

Another way of providing and organizing digital content is by establishing institutional repositories, which are a new but important area within the educational landscape. [6]

An **Institutional Repository** is an online place for collecting, preserving, and disseminating in digital form the intellectual output of an institution, particularly a research institution. For a university, this would include materials such as research journal articles, preprints and post prints of journal articles, technical reports, research data, and digital versions of theses and dissertations, but it might also include important print and image collections, other digital assets generated by normal academic life, such as administrative documents, course notes, learning objects, and materials documenting the history of the institution.

There are four main objectives for having an institutional repository:

- to create global visibility for an institution's scholarly research: institutional repositories can facilitate greatly enhanced access to traditional scholarly content by empowering faculty to effectively use the new dissemination capabilities offered by the network; [7]
- to collect content in a single location;
- to provide open access to institutional research output by self-archiving it: through free and unrestricted online availability, they make it easier for researchers to disseminate and share research outputs and thus support the open access goal of scholarly communication;
- to store and preserve other institutional digital assets, including unpublished or otherwise easily lost ("grey") literature (theses or technical reports): the broad view of institutional repositories as a means to manage and preserve effectively an institution's knowledge base and intellectual assets results in the content of institutional repositories expanding beyond e-prints to include research data, e-learning materials and other forms of institutional intellectual outputs, which are generally not published or preserved elsewhere. [8]

Librarians are taking leadership roles in planning and building these repositories, fulfilling their roles as experts in collecting, describing, preserving, and providing guidance for documents and digital information.

Another step in the evolution of information retrieval tools is the **"Next Generation" Catalogs** which are a solution that libraries can use to make their materials easier to be accessed and also to create some flexibility to improve the catalog in the future.

Because the majority of today's library users are those who were born into the Internet age and whose scholarly habits are tightly bound with their overall internet experience, this type of library catalog must come to meet user's expectations. For this reason, the search process in this catalog is like user searches, do not necessarily like the librarian (who develops a search strategy before actually searching).

"Next generation" catalogs which provide access to databases of a library either to a consortium of libraries, let users search usually by displaying a sidebar on the results screen that allows users to limit simply by clicking on such options as format, subject, date, author, or title.

Compared to traditional OPACs, "next generation" catalogs have mainly the following advantages:

- content integration (can incorporate data from multiple sources in multiple formats);
- social features (they are utilizing social media features such as tagging, user generated reviews, links to similar items, and the ability to create lists and share them with other users);
- data visualization (many catalogs has friendly, simple search interfaces, use icons to indicate item aspects of format, search ranking results, and circulation status).

Examples of already created "next generation" catalogs:

- **WorldCat®** catalog developed by OCLC (Online Computer Library Center) in 2006 is a global service who brings together in one place the databases of several libraries so that when the

user initiates a search, the system simultaneously examines all databases submitted libraries providing it precisely where desired information was found *(http://worldcat.org)*. (Fig. 2.1)

Main steps in finding user's information in this catalog:

- make a query;
- refine searching (by author, format, year, content, audience, language or topic);
- make a choose;
- find out what libraries own that item (depending on the user's location);
- find out reviews of other users.

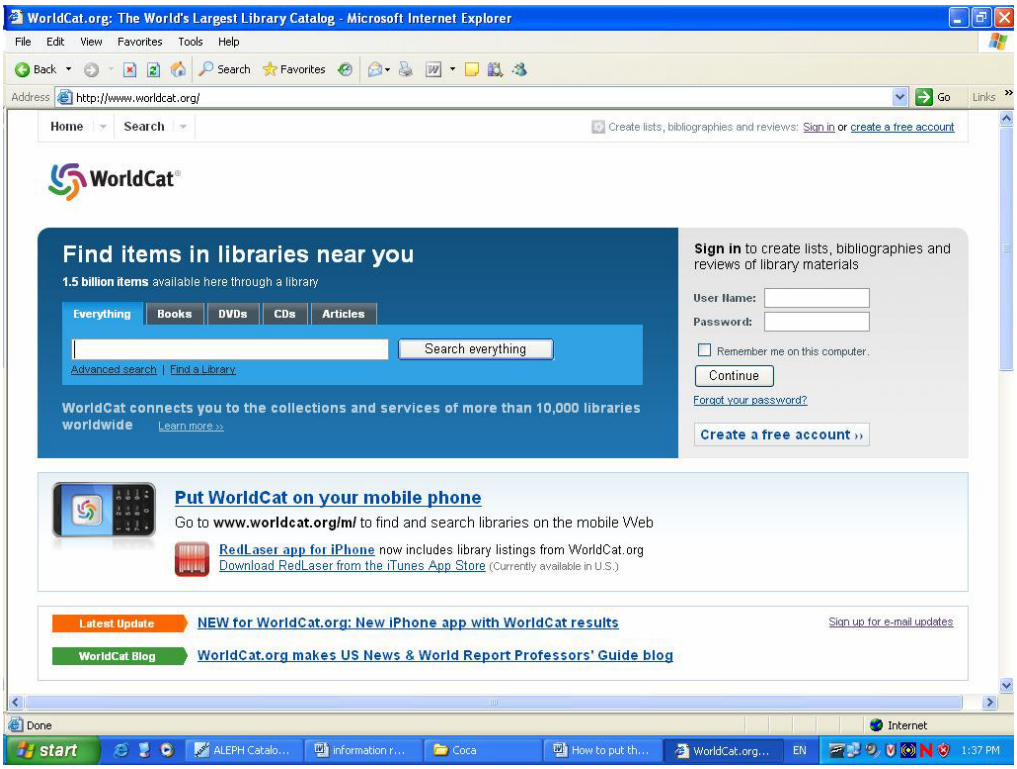

Fig. 2.1. WorldCat Catalog developed by OCLC

● In Romania, there is the collective catalog **ROLINeST**, product MetaLib® of ExLibris, released on 2004, and it is in a continuous development and diversification of information services provided to its users. Today, ROLINeST (fig. 2.2.) gathers together heterogeneous information resources such as bibliographic records from the OPAC catalogs of twelve university, academic and public libraries, electronic resources (pictures, video, audio, electronic documents full text from e-collections), electronic journals, bibliographic databases (full text or abstracts), citation databases, virtual libraries with electronic books, web pages. [9]

● **Primo®** released by Ex Libris in early 2007 *(http://www.exlibrisgroup.com/category/PrimoOverview)*;

● **Encore®** developed by Innovative Interfaces in 2006 *(http://encoreforlibraries.com)*;

● **AquaBrowser® Library** developed by MediaLab Solutions in 2005 is a local solution tool for Queens Library *(http://www.aquabrowser.com)*;

● **VuFind®** developed by Villanova University is a library resource portal *(http://vufind.org)*.

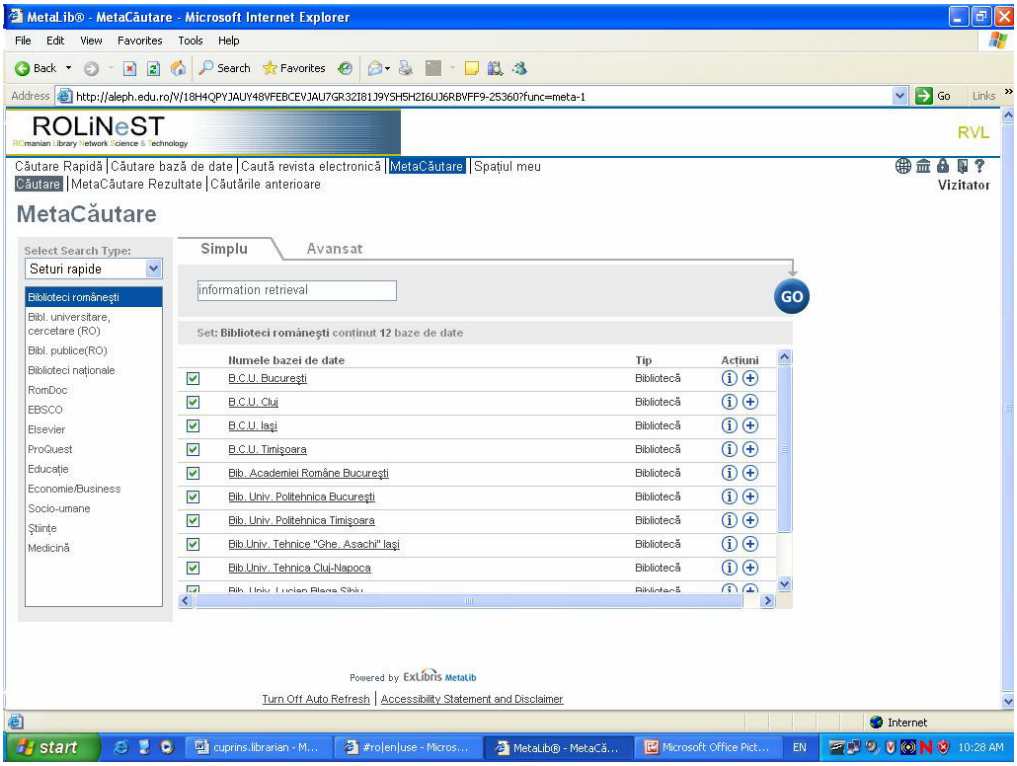

Fig. 2.2. The Virtual Catalog ROLiNeST

3. The changing role of librarians

Librarians need to possess besides the competences connected with the information and communication technology (knowledge about the structure and functioning of the computerized systems, like internet searching, techniques for evaluation of information, web pages design, etc.), competences about information retrieval systems, their structure, retrieval levels, commands and retrieval techniques, etc.

In the vision of Malgorzata Kisilowska and Maria Przastek-Samokowa, the librarian it is seen as a Personal Information Adviser. [10]

According to them, a PIA does not always have to answer any question, but he shall either indicate or select adequate information sources, or teach a method of information searching (develop information literacy skills in a selected area). The new role of librarian can be perceived as a way of adapting professional tasks to changes being realized in a modern society, with positive influence in particular in regard of professional image, indispensability, competencies, and attitude.

To put a librarian better at the user's service means he must posses the following qualifications and competencies: information literacy skills (providing individual training and development of information literacy), psychological and sociological competencies, including perfect interpersonal communication skills, cultural and language competencies (ability to identify one's culture, and to adapt own behaviors to user's values), positive attitude to other people, creating search strategies (adaptation of information searching tools to the users' needs and competencies), guiding and training users (for a librarian it is important to help users to distinguish between different kinds of information resources, especially their functions and purposes, he has to teach users to understand the information retrieval process, how to construct queries and how to use the system), integrating networked sources, analyzing and interpreting information, creating metadata, imaging and digitizing, designing interfaces and portals.

Indispensable are also: perfect orientation in public and private services, in particular in local community, to know where to direct a user for further survey.

He needs competences and time to bind a relationship, to know a user better (his information needs and competences), to learn his information behaviors.

Also librarians have a main role:

- as intermediaries among the users and diversified information sources: they have to be able to link the supply of information to the demand;
- in realizing "an information authentication service": their activities will extend to the creation of literature lists, the correlation of users profiles in relation to relevant collection data;
- in identifying effective, low-cost information retrieval strategies: they must be able to specify how systems involved in searches, navigation, classification, the storage of information, and so on should work, and assess their performance;
- in assisting the users in creation and publication of own information: they have to be experts in the field of provision information, they must be able to offer assistance in the electronic processing of texts, and must know how texts should be structured in order to be properly field and electronically distributed.

4. Conclusions

Along with the information explosion in virtual environments, information retrieval, the dominant form of information access, plays an increasingly important role in finding accurate, complete, rapidly delivered and easily used information, so that librarians must be those that meet user's needs and help them to navigate easily in the ocean of information. Being information experts they must possess not only knowledge of their collections but also skills in searching and retrieving a wide range of information, they have to own skills and competences according with the changing challenges of information retrieval process. They must know how to help, inform, persuade, and also teach users for improve searching significantly. In the same time, for information retrieval tools to succeed, it is essential that librarians be involved in their planning, implementation, and operation.

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The Digital Environment and the Academic Research: new opportunities of knowledge development

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Romanian Academy Library

Abstract

The Open Access Initiative has opened new prospects for knowledge. Within it, the institutional repository, seen as a strategy of both valorization, provided maximum visibility, and preservation of scientific production, ensures a wide spread of scientific information. The digital repository offers facilities that were unknown until now: the free, quick and easy access to the peer-reviewed scientific products. The researcher receives the scientific information, refining his own research and, on the other hand, offers the scientific information that will be used by other researchers too, easing up their study work, under advanced research conditions. The share of the academic information will lead to the speed-up of scientific progress and the grow in cooperation frequency. The researcher will have the main part in a system of free access to knowledge. Open Access becomes a way of ensuring the competition, as the rapid comparison of the research results is possible, and the equal chances, whence, also the researcher's motivation. Within the digital environment, the institutional repositories must constitute, in the near future, a global system of academic communication for the valorization of the scientific content in favor of knowledge and the increase of the academic community prestige.

Key words: institutional repository, academic research, open access, scientific information

1. Introduction

Transition, convergence, digitization, these are the benchmarks of the today world, in competition with time and space. Digitization is a new era in the management and access to information, the most important one since the appearance of the printing machine. Faced with the informational explosion, it induces new paradigms. The document transposed in a digital form behaves according to its new dimension: in a new context, not as a singular entity, but in a complex whole which has to do with a new organisational concept with the aim of ensuring the entire lifespan of the information from the creation, dissemination to preservation, information and knowledge. The academic community complies with the digital world, using strategies which would confer upon the scientific information easy access possibilities, security, authenticity and reliability. In the digital environment, new forms of scientific information management are imposed, in view of deepening and developing knowledge.

2. Open Access and knowledge development

In this context, of an extremely active informational environment, with spectacular changes and an exponentially increasing volume of knowledge, a series of measures concerning free access to scientific information were encouraged at European level. In the digital world, the Open Access Initiative in Budapest (2002) opened up new perspectives to knowledge [1]. The Berlin Declaration (2003) followed, whose signatories have committed to increasing access to research results produced by the scientific community [2]. A call was made for free access to peer-reviewed journals and reviews, two complementary strategies being recommended: the Open Access

publications and self-archiving. The Green Road, one of the envisaged methods, refers to the creation of digital repositories in which researchers can submit the scientific production, the technical infrastructure offering visibility on the Web, non-restrictive broadcasting, interoperability and long-term archiving. Within it, the institutional digital repository is seen as a modern strategy of putting the scientific production to good use under maximum visibility conditions. The institutional digital repository provides a wide dissemination of the scientific information and, at the same time, its preservation.

3. The digital institutional repository: an electronic resource for academic research

According to the American Peter A. Zuber, in the digital era, the institutional digital repository is an essential infrastructure for knowledge and a modern strategy of putting the scientific production to good use under maximum visibility conditions [3]. He gathers the scientific production in a digital form and broadcasts it with open access on the Internet. Clifford A. Lynch presents it as a set of services that scientific community offers to its members for the management and dissemination of the created digital documents, thus becoming an organizational arrangement which includes the preservation on the long-term, organization, access and wide dissemination of scientific information [4].

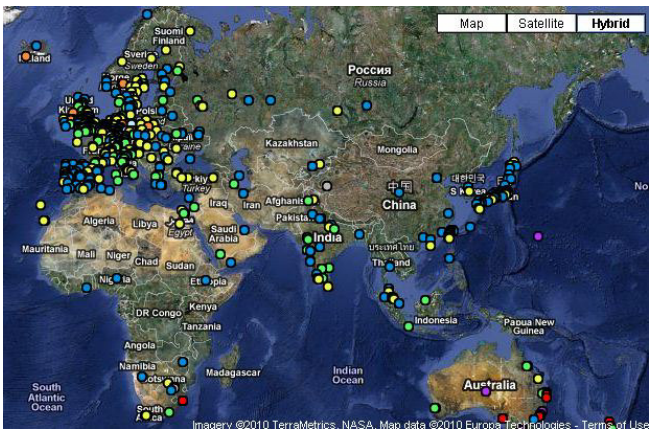

Fig. 1 World map of digital repositories

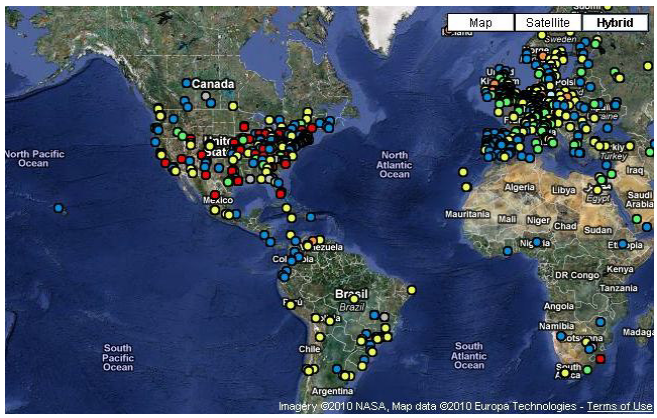

Fig. 2 World map of digital repositories (Source: Repository66.org Repository Maps, 2010)

A graphic can highlight the weighted share of the digital repositories with open access listed in the Open DOAR (Directory of Open Access Repositories), on geographical areas and countries [5].

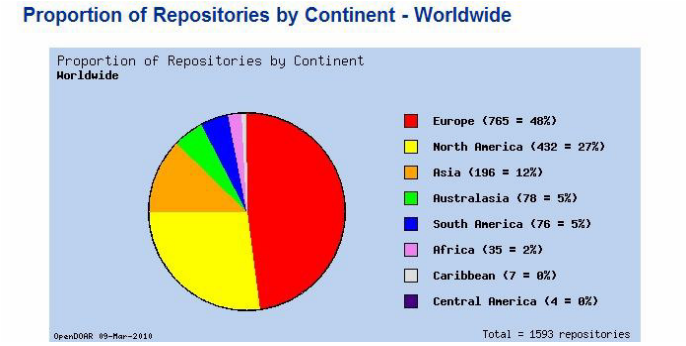

Fig. 3 Digital repositories on geographical areas

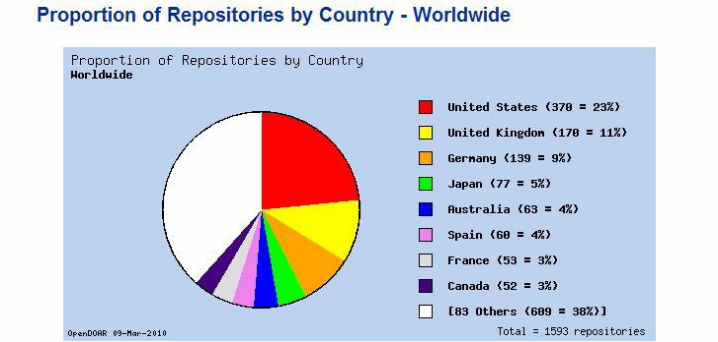

Fig. 4 Digital repositories on countries

Currently, the number of the digital repositories amount to around 1600 worldwide.

At the time being, Romania is present on the list with only one registered digital repository, the one of the *Transilvania* Technical University in Braşov, which can be identified at the address: http://hdl.handle.net/123456789/32, under the name ASPECKT DSpace.

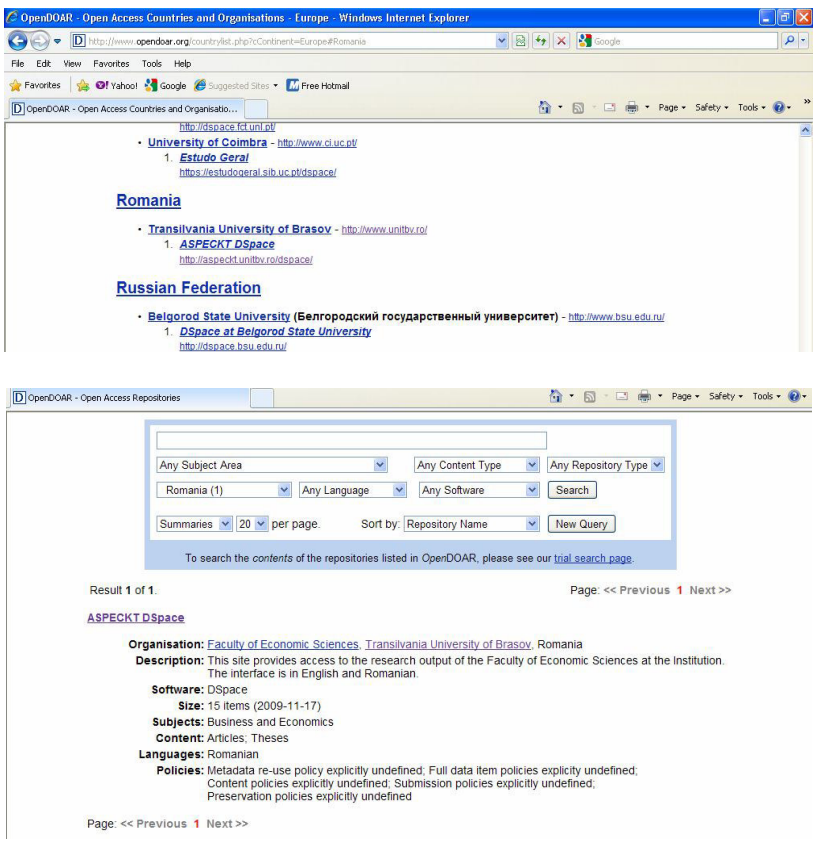

Fig. 4-5 Romanian digital repository of the *Transilvania* Technical University in Braşov

The digital institutional repository is a new IT product which consists of a collection, made of digital documents coming from the scientific production of the research or education communities. Scientific works are gathered in a digital form and then broadcasted freely on the Internet, in order to increase their visibility and impact: pre-publications or articles already published in scientific journals, memoirs, rough data, research protocols, Power Point presentations, conference proceedings, etc. Due to the special technologies, the contents can be indexed by means of search engines of the academic world: Google Scholar, Scirus, etc. Thus, the metadata associated to the documents are exposed not only to the general search engines, but also to the specialized search engines. Researchers must be informed concerning this aspect. Through access to the institutional digital repositories, one gets in contact with an original, reliable, authentic and integral information. There is a certainty, as long as the information is distributed under the mark of an authorised research person or institution, by means of a new model of academic communication. This is the Open Access era, where many barriers concerning free access to information, either juridical or economic, have been overcome. For the researcher, this participation, open in a world of knowledge, means recognition. It is not only a means of sharing knowledge, but also a way of conservation and preservation of the scientific information in a digital form. Here is the graphic representation, on types of contents, of the repositories registered in the Open DOAR:

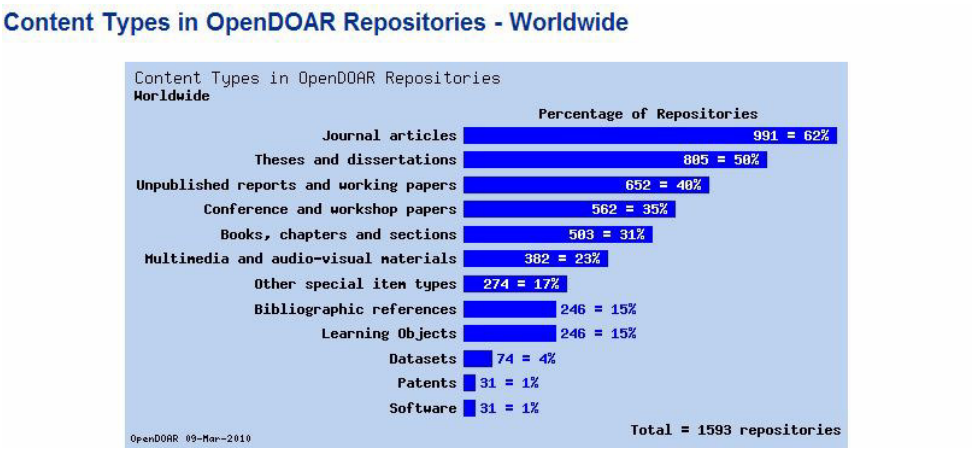

Fig. 6 Types of contents in OpenDOAR Repositories

It can be noticed that journal articles are predominantly present (62%), followed by theses and dissertations (50%), unpublished articles and papers in progress, conference proceedings, etc. The most frequently used languages are: English, with a majority net weighted share (81%), followed by German (10%), Spanish (8%), French (6%), Japanese (4%), etc.

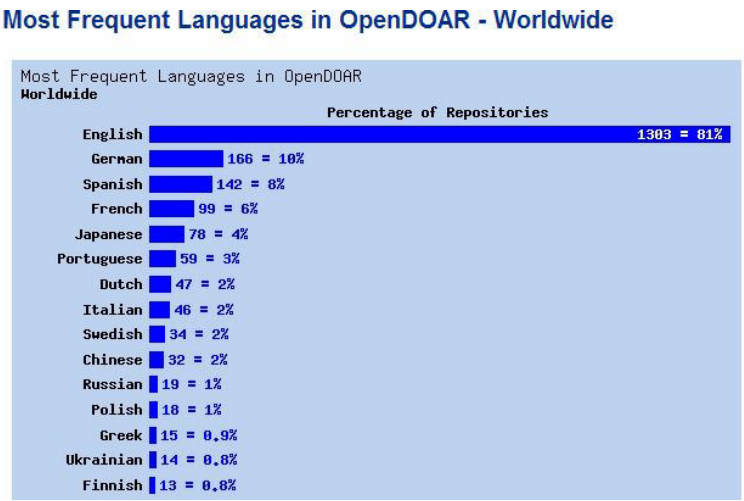

Fig. 7 Most frequently used languages in OpenDOAR Repositories

A key feature of research is the necessity to allow the academic community to assess, confront, change and reproduce the scientific results starting from reference data. The institutional repository is a digital heritage of indexed, referenced electronic resources which can be used. It comprises the documents and their afferent metadata (title, author, description, key words, etc.), drafted in accordance with the appropriate standards in order to achieve the sharing and exchange of knowledge within a global development strategy of the informatics system. The institutional digital repository becomes a way to access electronic resources. The researcher offers the scientific information resulted from his own research. Due to this transfer, another researcher (user, in this case), recovers the information corresponding to his scientific interest, and he can also store it in his turn within the repository of his own scientific community. The more complete the metadata are, the easier it will be to find the article containing the desired information by means of the search engines. Thus, for the researcher, the institutional digital repository can become an important electronic resource. Unlike the most electronic resources offered by the university or academic environment (serials, databases), made available based on contracts limiting the usage to the level of those communities alone, the institutional digital repository allows free access to scientific information. The researcher can read articles, upload and download them, send or print them free of charge, provided he cites them as references.

The institutional digital repository can be considered as being:

• a digital space for collaborative research
• a means of information exchange (information circulates among the community members and gains added value)
• a chance for the research to develop and enrich its contents, become of superior quality
• an opportunity in view of systematic research
• a product with social insertion, through the relational component within the scientific community

The institutional digital repository is an investment in the digital content infrastructure. It aims to develop the digital environment, as well as the understanding of the way in which the new model of academic communication should be encouraged and integrated in order to support the academic research as an important resource. The creation of digital repositories supports the resource discovery strategy and the preservation of scientific information. But, in order for the institutional digital repository to be an important resource of research, it is necessary to make available its uploading with scientific information. In this context, the existing differences between the ways in which the researchers in the humanistic field approach the library services, as opposed to their colleagues from other fields, must be underlined. They continue to be highlighted in the way of looking at digital repositories as well. James Allen's study, from 2005, shows that humanists have a lower degree of acknowledging the benefits of joint usage of research, and that they consider the digital repository more of a facility for its users, continuing to refer to the repositories in terms such as peer-review, plagiarism or intellectual property [6]. A more recent study made by Malcolm Heath, Michael Jubb and David Robey in Great Britain on the impact of free access in the humanistic area confirms the more reduced degree of awareness and, hence, of using these services [7]. One reason would be that the pace in which knowledge in the humanist field advances is slower than in the case of other fields. Journals in the field have a longer lifespan and publishers are less willing to follow the Open Access way. Researchers might be more interested in the final versions of articles or in the post-prints, than in the pre-prints. Another issue is also mentioned: while many humanistic journals allow authors to make their work available by means of digital repositories, in some cases the publishers want to elude the author's option of self archiving.

3.1 Strategies concerning contents development

Supplying contents for a digital repository requires a certain strategy as far as the content recruitment is concerned. The access to articles is free, and subject to copyright. The copyright difficulties must be overcome. If the author gave up the rights to the publisher, access is possible provided the publisher agrees and the conditions he puts are observed (e.g. minimum 6 months after

date of publishing). A series of publishers grant access to the published article. These authorizations are listed in the SHERPA / Romeo database, an extremely useful and at the same time easy to use tool. A colour code is applied, reflecting the editorial policy concerning the digital repository in the case of pre- and post-publications.

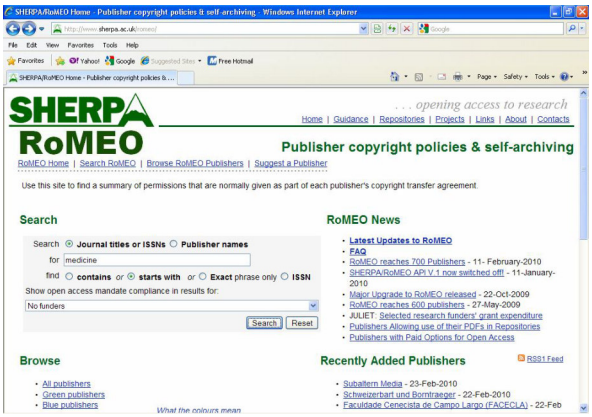

Fig. 8 SHERPA / Romeo Website

This approach has the advantage of gathering all the texts at the time of publishing, and free access to the text may vary. The differential granting of access is easier to manage than the differential collecting of complete texts. Thus, a strategy which would determine the progressive flexibility in the field of copyright management is required. On the other hand, the digital repository will attract researchers easier if it develops a series of services with added value which can facilitate certain requirements. One example could be the creation of bibliographical lists, which could be integrated automatically by the repository when drafting a CV or an activity report. Each researcher should introduce in the digital repository his complete list of publications in order to constitute a representative academic bibliography. The Free University of Brussels, in collaboration with the University of Toulouse, carried out a study for the European Commission, in 2006, which presents recommendations for improving access to research results and avoiding strategic barriers on the scientific publications market [8]. A first recommendation refers to guaranteeing free access to the results of research financed from public funds in a short time after publishing, by means of institutional digital repositories. The recommendation was the object of a petition addressed to the European Commission. Consequently, a communication was made to the Council and to the European Parliament, on the subject of signalling the importance of access to and dissemination of scientific information and its preservation strategies. The result: setting up certain measures at European level, within certain European programs (FP7), meant to financially support the publishing in open access by means of digital repositories. Thus, the DRIVER (Networking European Scientific Repositories) program, financed within the FP7 European program, aims to support the development of digital repositories and the creation of a European infrastructure.

Fig. 9 DRIVER Website

The network is created in order to store knowledge, add value to primary researches and establish the premises for the secondary research. A portal of European information was created for the open access publications, with approximately 1.75 million documents, in 252 institutional digital repositories, in 33 countries [9]. The institutional digital repository is also a scientific performance measuring tool. It becomes a way of assessing the research centres, evaluation which can be done more and more within the network. The representative character of the digital repository can become an important stake, as it will reflect in a transparent, adequate manner, the scientific production. In a pilot study, commissioned by OCLC Research in 2009, it is shown that in Danish libraries, where there is a tradition of gathering scientific information, the evaluation system has an important bibliometrics component which provides to the scientific community various levels of analysis of this type. The Australian experience demonstrates that the institutional repository can play an important role in facilitating the research evaluation process [10].

3.2 Author-user, a dual situation

A researcher who delivers his scientific products in an institutional repository must be regarded in a dual aspect: on the one hand, the contribution to disseminating the information (the repository becomes an electronic resource to other researchers) and, on the other hand, his searching for data necessary to his own scientific work in other institutional repositories. He must be aware of the fact that, by taking and using the scientific information, the researcher will manage to refine the research. Other researchers can also use the offered information, facilitating thus the deepening of their studies. A researcher can benefit from the highest level information. For instance, a researcher with an interest in the medical field can have free access to the works signed by renowned scholars. Hence, accessing the digital repository of the California University – San Francisco, the researcher will get in touch with the scientific products of such personalities as Elis H. Blackburn holder of the Nobel prize in 2009 in this field. On the Open Access platform where the University of California is represented with its scientific production (URL: http://repositories.cdlib.org/escholarship/), this author is featured with four works. The researcher can choose the article he is interested in.

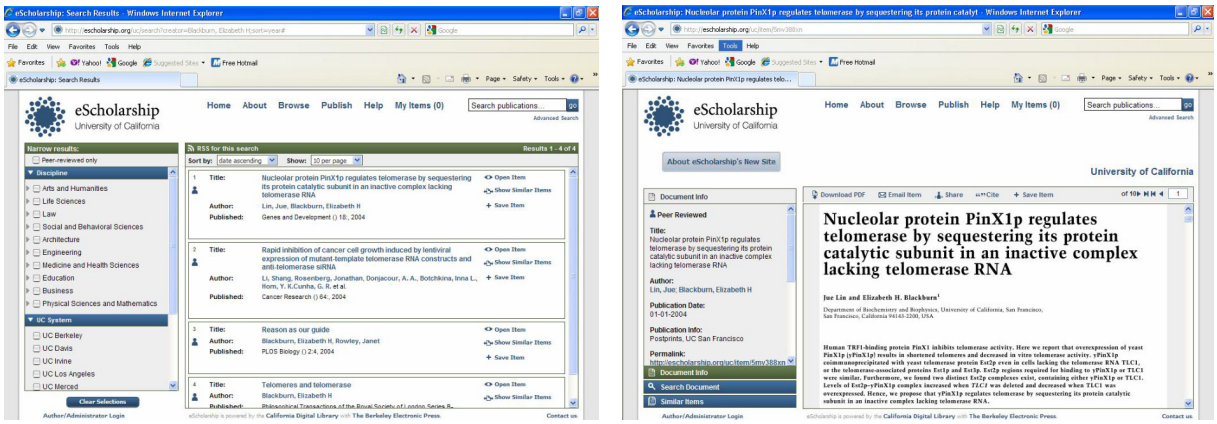

Fig. 10-11 Open Access platform of the University of California – San Francisco

3.3 The institutional digital repository between compulsoriness and free acceptance

The current context demonstrates a clear tendency which encourages free access to the results of research financed from public funds. A controversial policy is the compulsory character of submitting to repositories. To demand or to recommend the creation of institutional repositories? There are institutions which impose the uploading of works in the institutional digital repository: CERN, Queensland University of Technology (Australia), Zurich University, Minho University (Portugal), Southampton University, etc. According to a Canadian study, the universities which don't have a compulsory policy for posting their activity online obtain under 12% of voluntary

repositories. Stevan Harnad, from the Southampton University, strongly argues, citing studies, that 95% of the researchers would auto-register their works if their employer required them to do so [11]. Other studies also confirm the reduced percentage of the authors who voluntarily auto-register their scientific production. Ingrid Parent, a Canadian governmental official, insists, on the occasion of a communication from June 2001, called "*Partenariats et initiatives de numérisation à Bibliothèque et Archives Canada*: naviguer dans un monde sans frontières", on the necessity of ensuring free access to information for the research financed from public money [12].

At present, while the research institutions and the libraries move towards the creation of repositories, in order to maximize the results exposures, there is still enough reluctance from part of the academic community. The reasons, either real or not, act against a broad acceptance of the concept.

3.4 Product development through value added services and interoperability

As far as the software infrastructure is concerned, the DSpace application is usually used, as it allows the storage, listing and accessibility to documents. A digital repository can be made up of sub-repositories corresponding to various institutional research entities. Certain instruments are required for access management: waiting in view of free access to the entire text until a certain period of time since the work issue date passed, partial access granted only through Intranet to the local community, or limited access only to the abstract, bibliographical sources or table of contents. A function can be created, to know the most consulted documents in the repository, other applications as well can be developed in the common purpose to make the institutional digital repository a reference electronic resource for the academic community. The contents of the digital repository represent the starting point of some value added services.

The interoperability of institutional digital repositories facilitates a more advanced and more performing research, which can add value to the academic scientific research. The metadata (Dublin Core) are a basis for developing interoperability. A network of digital repositories will be integrated in other partners' digital repositories networks, providing thus operability, federalization on different levels. In the digital environment, in the near future, the institutional repositories must be a comprehensive, global system of academic communication, by means of which to achieve the valorisation of the scientific contents to the benefit of knowledge and of increasing the academic community's prestige.

3.5 The advantages of introducing the new informatic product

The institutional repository offers a series of benefits, both to the researchers, to the research units, and to the libraries:

a) **for researchers**
- exposure on the Web gives visibility to the research (high chances to be used and quoted)
- increasing the equality of opportunities
- increasing reputation (researchers will be renowned)
- possibility to compare results
- increasing the quality of research activity
- increasing competitiveness and motivation
- avoiding repetitions
- preservation of works in the digital environment
- the protection against plagiarism is more easily done than in the case of printed text

b) **for research institutions**
- effective tool for managing the research activity

• research productivity and quality assessment tool
• provides aggregation and preservation of scientific results
• new model of disseminating scientific information for highly specialized research
• contributes to increasing the prestige of the institution and its researchers
• contributes to increasing visibility at world scale
• opportunity for knowledge exchange and increased collaboration
• lower costs for free access to the scientific production than in the traditional form
• a more economic way and, at the same time, a wider range of disseminating information
• savings on the long-term, due to the preservation function
• highlighting the interdisciplinary character and multifaceted collaboration
• increasing research mobility
• contributes to accelerating the scientific progress
• contributes to advanced knowledge

Libraries benefit from being involved in this initiative (a way of making the academic community's research work results available, especially in the present context, when financial support conditions are limited). The institutional digital repository thus becomes a solution in a difficult social-economical context, when libraries, faced with the journals' cost increases, especially in the case of science journals, react by cancelling the subscriptions (and the researchers lose access to important scientific material). In a survey conducted in 2006 in academic libraries, Soo Young Rieh, professor at the University of Michigan, identified the aggregation of the institution's intellectual capital as the most important benefit of the digital repository. Centralizing content in a standardized format, highlighting the results by an efficient model helps to avoid by the risk of having them dissipated in various publications [13]. Raim Crow, senior consultant at SPARC, situates the institutional digital repository at the convergence of the OA initiative with the libraries' dissatisfaction concerning the monopolist effect of the traditional editorial system (the library will now be able to offer and answer to systematic problems) and with the availability of the new technologies in the digital environment. Improving the preservation of the library's assets on the long-term becomes another important benefit. Creating resources, in the sense of aggregating the interoperable components, represents a challenge for the libraries [14]. In this context, the library's prestige concerning the ability to contribute to the digital information management increases. Libraries proved that they are able to adapt, to become more and more active as far as the advanced research and knowledge are concerned. A study of the University of Rochester shows that the phenomenon is more exciting for the librarians who look at the metadata structures and stable URL addresses, as compared to the researchers' enthusiasm. The role of the libraries is to promote and support the institutional digital repositories. They no longer supply information as they did until now, but find ways by which the academic community integrates its scientific production in a global offer. It is a new context for the libraries, in which the rapport with the researchers is reconsidered, from user, to whom services were being supplied, to partner. The academic library, as an important part of the scientific communication cycle, focuses on creating new knowledge by means of research and collaboration (ensuring peer-review, meeting standards), communication and dissemination, making the knowledge available to the researchers' community. It is an occasion for the library to join the academic community, giving a new perspective to the scholar community.

Professor Stevan Harnad from the Southampton University in the United Kingdom calculates, at the level of year 2005, the impact on research in case the entire scientific production were archived and made available online, after print. The equivalent he finds is the amount of over 1.5 billion £ which could be invested in science yearly. [15]. There are also critical comments concerning this model. The British Paul Miller, manager of Common Information Environment, writes on his blog, on February 2010, referring to institutional digital repositories: "These frequently under-populated aggregations of academic papers produced by 'research active' employees of a particular university

appear aligned almost exclusively to vaguely expressed institutional imperatives, and seem largely unrelated to the selfish aspirations of the contributing authors" [16].

3.6 The institutional digital repository - accept from the academic community

The Library of the Romanian Academy started an enquiry, still on process, to monitor the attitude of the Romanian researchers from the academic institutions concerning the creation of an institutional digital repository. Consequently, an institutional digital repository is considered necessary because it facilitates the access to the scientific information, and offers connexions, visibility and impact. While the publishing in the specialized journals is restricted by the peer review's filter, within a digital repository one may find even less consistent articles, but containing the germs of valuable ideas to be used in the future. Some negative responses refer to the fact that an institutional repository represents a futile parallel activity that doesn't amount to the Science Direct performances. Moreover, the results from the socio-human research can be abusively exploited, especially in the fields of ideologies, national politics, tourism, damaging the institutional image on the level of the information quality, with effects in the long run. In this view, an institutional digital repository is counted just as an auxiliary means of access to the scientific information.

Controversial or not, the institutional digital repository is an emblematic resource in the digital world of this beginning of century. By offering a research archive, a URL identifier which resists in time (reference can be made by it to the document at any time, even if the scientific community changes), full text (distributed / decentralized, with possible limited access on levels), the digital repository appears as a new model of academic information-communication. The institutional digital repository is an excellence support of research and innovation, contributing to the development on national and international level of the informational phenomenon. We must take advantage of this stage which takes a step forward in meeting the desire of free access to knowledge.

This is the digital era, whose valences we should value. The digital universe evolves rapidly (a publication on a CD-ROM, as a finite set in a closed environment or medium represents an obsolete concept), the strategy must be adapted in order to give quality and prestige to the academic research through channels of knowledge dissemination, without neglecting the relationship with the traditional communication system. Provided that control is not enforced, the digital repository will not only be able to increase access to traditional contents, but also provide new models of academic communication. The commercial data repositories (E-prints, U-portal, Pro-Quest, etc.) manage, access, ensure maintenance, seem more comfortable than our own repositories, but they are only destined for the finite production. A local platform also offers scientific production which can be consulted internally, as well as articles in their provisional phase.

Conclusions

• The Open Access concept was adopted by the academic community, the introduction of institutional digital repositories implies a democratization of access to scientific information.
• By means of the digital repository, facilities unknown so far are offered to the academic research: free, quick and easy access to the approved scientific production (peer-reviewed)
• The institutional digital repository becomes a coherent strategy of preserving the academic patrimony.
• The researcher takes the scientific information and thus manages to refine his own research, and, on the other hand, he offers scientific information which can be used by other researchers, facilitating thus their thorough work.

• The connection with other digital repositories leads to the creation of a network of knowledge through which the researcher can track the scientific information disseminated worldwide.
• There is a possibility to recover a part of the scientific work of researchers who publish abroad, which would mean a significant contribution to the Romanian research fund.
• It is a strategic answer to an acute problem (lack of access to recent publications on specialized fields, phenomenon faced by research).
• It is necessary to create a technical and organisational infrastructure in order to support the development of this type of institutional resources.

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Digital information retrieval

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Abstract

The retrieval of digital information from more and more diverse document format types imposes the need for a special attention to the digital representation of documents. For this, data reduction, based on informational measures, represents the theoretical base for the optimization of storage of digital documents, which is even more important in complex multimedia applications. In this paper, besides analyzing data reduction and documents storage, we have also studied the multimedia data models related to the MMDBMS architecture. These theoretical aspects were applied in practice by developing the SCRIBe – Information System for Processing and Visualization of Old Books Inventory.

1 Introduction

Information Theory [Cov91] answers two fundamental questions in communication theory: which is the best compression of data (entropy H) and which is the best communication rate for data transmission (channel capacity C)? Therefore, some consider information theory as a subfield of communication theory. Indeed, it has fundamental contribution to statistical physics (thermodynamics), computer science (Kolmogorov complexity and algorithm complexity), statistical inferences and probabilistic theory and statistics.

Shannon claims that random processes as music and voice have an irreducible complexity the signal cannot be compressed below. This he calls Entropy, by association with its use in thermodynamics.

Information Theory proposes the means to obtain the extreme limits of communication. Although, these theoretical optimal communication schemes, even if wonderful, prove not to be computational feasible. Advances in the field of integrated circuits and design of codes allow us to obtain some of the gains suggested by Shannon theory. A good example for applying these ideas from information theory is the use of error correcting codes on CDs.

Modern research on aspects of information theory in communication focused on information theory in networking consisting of the theory of simultaneous communication rates from multiple senders to multiple receivers in a network. Some gains in the communication rates between the senders and the receivers were unexpected, but have a certain mathematical simplicity. Although, a unifying theory still has to be found.

Computer science (Kolmogorov complexity). Kolmogorov, Chaitin şi Solomonoff suggested the idea that the complexity of a string of symbols can be defined as the length of the shortest binary program that generates that string. Then, the complexity is given by the length of the minimal description. This complexity definition is universal, independent from computer, and of a fundamental importance. Kolmogorov complexity fundaments, the descriptive theory of complexity. Fortunately, Kolmogorov complexity approximately equals Shannon entropy H, if the

sequence is chosen at random from a distribution having the entropy H. We consider Kolmogorov complexity to be more fundamental than Shannon entropy. It is the limit of data compression and leads us to a logical consistent inference procedure.

A pleasant complementary relationship between algorithmic complexity and computational complexity exists here. We can see computational complexity (time complexity) and Kolmogorov complexity (the length of the program or descriptive complexity) as two axes corresponding to the running time of the program and the length of the program. Kolmogorov complexity focuses on minimizing along the second axis and computational complexity focuses on minimizing along the first axis. Few attempts have been made to minimize simultaneous along both axes.

Physics (thermodynamics). Statistical mechanics is the place of birth for entropy and the second law of thermodynamics. Entropy always grows.

Mathematics (Theory of probability and statistics). Fundamental measures of information theory – relative entropy and mutual information – describe the behavior of long sequences of random variables and allow us to estimate the probability of rare events and to find the best error estimator in hypothesis testing.

Philosophy of Science (Occam Razor). William of Occam said: „Causes shall not be multiplied beyond necessity" or, paraphrasing him, "The simplest explanation is the best". Solomonoff, and later Chaitin, stated that we can obtain a universal good prediction procedure if we take a weighted combination of all the programs that explains the data and still look at what they print afterwards. Furthermore, this inference procedure will work in many problems that cannot be solved by statistics. When it is applied on stock market is has to find stock market rules and to extrapolate them optimally. Basically, such a procedure would have found Newton law in physics. Certainly, such inference is not applicable, because eliminating all the programs that do not manage to generate the data takes too much time.

Economy. Repeating investments in a stationary market leads to an exponential growth of welfare. Welfare growing rate is dual to the market entropy. There is an obvious link between the theory of optimal investment in stock market and information theory. To explore this duality, a theory of investments can be developed.

Computation versus Communication: As we build bigger and bigger computers made by smaller and smaller components we reach both a computing limit and a communication limit. Computing is limited by communication and communication is limited by computing. These become interdependent and, therefore, all the developments in communication theory based on information theory should have a direct impact on computation theory.

2 Data reduction

Feature subset selection is defined as a process of selecting a subset of features, *d*, out of the larger set of *D* features, which maximize the classification performance of a given procedure over all possible subsets [Gue00]. Searching for an accurate subset of features is a difficult search problem. Search space to be explored could be very large.

The measure named *Entropy Based Discretization* is a measure commonly used in information theory, which characterizes the (im)purity of an arbitrary collection of samples, being a measure of homogeneity of samples. The entropy and information gain are functions of the probability distribution that underlie the process of communications. The entropy being a measure of uncertainty of a random variable can be used to recursively partition the values of a numeric attribute.

Given a collection S of *n* samples grouped in *c* target concepts (classes), the entropy of S relative to the classification is:

$$Entropy(S) = -\sum_{i=1}^{c} p_i \log_2(p_i) \quad (2.1)$$

where p_i is the fraction of S belonging to class *i*.

Entropy represents the expected minimum number of bits needed to encode the class of a randomly drown sample from S. Therefore, entropy is a measure of the impurity in a collection of training samples. Using entropy an attribute effectiveness measure is defined in classifying the training data. The measure is called *information gain*, and is simply the expected reduction in entropy caused by partitioning the samples according to this attribute. More precisely, the information gain of an attribute relatively to a collection of samples *S*, is defined as:

$$Gain(S, A) \equiv Entropy(S) - \sum_{v \in Values(A)} \frac{|S_v|}{|S|} Entropy(S_v) \quad (2.2)$$

where *Values(A)* is the set of all possible values for attribute A, and S_v is the subset of *S* for which attribute A has the value v. The first parameter is just the entropy of the original collection S, and the second term is the expected value of the entropy after S is partitioned using attribute A. In other words, the information gain is therefore the expected reduction in entropy caused by knowing the value of attribute A. The information gain is the number of bits saved when encoding the target value of an arbitrary member of S, by knowing the value of attribute A.

Using equation 2.2 for each feature is computed the information gain obtained if the set is split using this feature. The obtained values are between 0 and 1 being closer to 1 if the feature splits the original set in two subsets with almost the same dimensions. For selecting relevant features I use different thresholds. If the information gain obtained for a feature exceeds the threshold I will select it as being relevant, other way I will not select it.

In [For04] the author justified that Information Gain failed to produce good results on an industrial text classification problem. The author says that for a large class of features scoring methods suffers a pitfall: they can be blinded by a surplus of strongly predictive features for some classes, while largely ignoring features needed to discriminate difficult classes.

3 Digital document's representation

Should be take in considered that the main aim is to present the documents to interested users so that the outputs of this system should be documents that allow them to search into text as much as possible without damaging the visual information of the original documents.

That said, it becomes quite clear that the documents that should be managed need to have the following characteristics:

- to contain both pictures and text
- to have the possibility of search
- to be readable by usually web clients
- to have the concept of page
- to have a small dimension
- to be supported by existing OCR systems (as output documents)

By review criteria presented in the Table 1, we have established the importance of characteristics and we take in considered several types of existing documents including a owner document type that could be developed specifically.

The analysis concluded that the development of an owner format is not the best solution, the PDF document appears to be the best solution (see Table 1).

In addition to other documents format, the PDF format allows placing the recognized text after the original image (the text under the image) so that the user will see the pictures but will search in the text. This ensures a high quality viewing even if the recognition was a lower quality.

Characteristics	The relevance of character	TIFF	DOC	PDF	Own format
Image + text	3	0	1	1	1
Search	4	0	0.5	1	1
Compatibility with existing customers	5	0.75	1	1	0
Page concept	2	1	0.75	1	1
Dimension	1	0.75	0.6	0.8	1
Supportability	6	1	1	1	0
Score		**12.5**	**18.1**	**20.8**	**10**

Table 1.

In addition to other documents format, the PDF format allows placing the recognized text after the original image (the text under the image) so that the user will see the pictures but will search in the text. This ensures a high quality viewing even if the recognition was a lower quality.

The PDF documents allow also storing meta-information in them. The protections mechanisms of PDF documents are not overlooked been possible to protect a document at saving, copying, printing, copy-paste ....

The system must be thought so that all intermediate documents to be kept, if errors occurs are no longer necessary to resume the whole process (from scanning to save PDF), but only some parts of it.

Since there are many documents in the classical format, on paper, which must also be made in a digital form it is very important the OCR process (Optical Character Recognition), from our experience we recommend using one of the most successful tools in this sense – FineReader [Aby10].

Because is used the IPA technology, FineReader allows a very good recognition of content. It can recognize text written in 177 languages. Spell check is available also in 34 languages. The recognized text can be saved in a variety of file formats, including PDF (with six options of save), HTML, Microsoft Word XML, DOC, RTF, XLS, PPT, DBF, CSV and TXT.

Portable Document Format PDF - is a file format created by Adobe Company in 1993 for exchanging the documents. The PDF standard was officially published only in 2008.

PDF combines 3 different technologies:

- a subset of PostScript programming language to describe the page, to generate graphs and the basic structure;
- a system for inclusion / removal the fonts; to allow that the fonts to be in the same document with the data;
- a structured storage system to allow these three elements and any associated content can exist together in a single file, also allow data compression.

4 Storing the digital documents

Multimedia means the ability to acquire, store, manipulate, combine and query information presented in more than one format, such as: text, graphics, audio, video and images. Multimedia can not be defined as a technology. It is rather a concept, which describes a number of technologies working together for the benefit of the final user. It transformed the interaction human-computer and today we have, because of it, new software products in fields like:

- *access to knowledge* – multimedia is probably the fastest and the cheapest way to permit access to knowledge for individuals in the manner of electronic encyclopedia
- *document management* – companies documents become more complex each day, containing not only text and numbers but also graphics, images, long text, etc. and multimedia can manage that diversity
- *education* – interactive lessons can be created for all kinds of students and disciplines
- *marketing* – multimedia can improve and diversify marketing activities
- *real-time processes tuning and control* – multimedia can be used to present in a proper way tuning and control information for real-time systems like transportation systems, patient surveillance systems, etc.

These new software products permit multimedia objects to be integrated in it and also provide a different way to visualize and interpret the labor processes. So, multimedia can extend existing applications and can change, in an innovative manner, the way we process information in different domains like economy, science, art, education and even engineering. The use of multimedia can generate benefits for all kind of users. The quality and quantity of information presented to the user is improved and also the interaction men-machine.

To organize and manage multimedia information in a suitable way we need database management systems. A multimedia database management system (MDBMS) is a preferment database management system which supports multimedia data types and can manipulate large amount of such information. A MDBMS tightly integrates three fundamental technologies like:

- database systems
- information retrieval systems
- hierarchical information storage systems.

Multimedia databases can be defined as a database system which can store, manipulate and query information presented in more than one format such as text, audio, video, graphics, and black and white or color static images.

Multimedia databases are more and more present in today's computerized world, because they offer the possibility to easily manage different types of complex data modeled from our real each day world. Therefore, in a multimedia database we will always find new data types like:

- *Image Data* – these are very commonly found in multimedia databases and their applications cover simple figures, icons, medical images like X-rays, etc.;
- *Video Data* - these are video files and have become very important with the advent of technologies like distribution of video, etc. It is now more convenient than ever to store a home video on a personal computer.
- *Audio Data* - these are audio files and are being used extensively to store as well as to distribute music, sounds and speech;
- *Document Data* - these are the traditional text files where information is stored in the form of text. These files are still in use and have changed in terms of the capability of storage size.

Multimedia objects are different from traditional text or numerical documents in the way that multimedia objects usually require a large amount of memory and disk storage. Also, the operations applied to multimedia objects are different (e.g., displaying a picture or playing a video clip is different from displaying a text paragraph).

A multimedia database management system should be able to provide an appropriate environment for using and managing multimedia objects. Besides the traditional functions of a database management system, a multimedia database management system must be able to support the following basic functions:

- Handles image, voice, graphics and other multimedia data types
- Handles a large number of multimedia objects
- Provides a high-performance and cost-effective storage management scheme
- Provides efficient storage and retrieval of multimedia objects
- Provides efficient indexing techniques for multimedia objects
- Supports different multimedia data formats
- Supports database functions, such as insert, delete, search and update also for multimedia objects
- Provides efficient query optimizers

Multimedia objects are mostly binary large objects (BLOBs). It is common that a video clip occupies more than 100 MB of disk storage. On a video server, it is possible that thousands of video clips are stored. Due to the huge amount of storage required, a MDBMS needs a sophisticated storage management mechanism, which should also be cost-effective. The storage management scheme needs to support fundamental database operations as well.

At the same time, a MDBMS should take into consideration also the following issues:
Composition and decomposition of multimedia objects

- Operations of multimedia objects with media synchronization
- Object persistence
- Content-based multimedia information retrieval
- Concurrent access and locking mechanisms for distributed computing
- Security issues
- Consistency and referential integrity of data
- Error detection and recovery mechanisms
- Long transactions and nested transactions
- Data indexing and clustering

Unlike traditional database management systems, in a multimedia database management system data replication is not encouraged because the multimedia objects are bigger than the traditional one and this implies replication of large amount of data.

In case of relative not complicated multimedia applications, the client-server model for accessing the database can be considered appropriate. Otherwise, for complex multimedia applications it will be better to use also a specialized server (e.g. a video server) and a multimedia database management system with a dynamic architecture.

Multimedia database management system architecture

A multimedia database usually contains three layers in its architecture:

- *External layer* - the user interface layer
- *Conceptual layer* - the object composition layer
- *Internal layer* - the storage layer

The tasks to be dealt with in the interface level include object browsing, query processing, and the interaction of object composition/decomposition. Object browsing allows the user to find multimedia resource entities to be reused. Through queries, either text based or visualized, the user specifies a number of conditions to the properties of resource and retrieves a list of candidate objects. Suitable objects are then reused. Multimedia resources, unlike text or numerical information, cannot be effectively located using a text based query language. Even natural language presented in a text form is hard to precisely retrieve a picture or a video with certain content.

Content-based information retrieval research focus on the mechanism that allows the user to effectively find reusable multimedia objects, including pictures, sound, video, and other forms. After the successful retrieval, the database interface should help the user to compose/decompose multimedia documents.

The second layer work in conjunction with the interface layer to manage objects. Typically, object composition requires a number of links, such as association links, similarity links, and inheritance links of an object-oriented system to specify different relations among objects. These links are specified either via the database graphical user interface, or via a number of application program interface (API) functions.

The last layer, the storage management layer, includes two performance related issues: clustering and indexing. Clustering means to organize multimedia information physically on a hard disk (or an optical storage) such that, when retrieved, the system is able to access the large binary data efficiently. Usually, the performance of retrieval needs to guarantee some sort of Quality of Service and to achieve multimedia synchronization. Indexing mean that a fast locating mechanism is essential to find the physical address of a multimedia object. Sometimes, the scheme involves a complex data or file structure.

5 Case study: SCRIBe

As part of the SCRBEe project "Information system for processing and visualization of old books inventory" in the university library of Sibiu a number of 20 old books were digitized. The project was one of valorize and making available to readers of old, rare, cultural important books, by scanning and archiving them in electronic form.

The main objective of SCRIBe was to realize an information system to allow the beneficiaries (citizens, Romanian and foreign researchers, libraries and museums staff) the access to old books inventory, because normally the access is restricted both because of the sparseness of the copies and because of the need to protect copies with a high degree of degradation. The interest for those books is given by their age, their rarity and by scientific reasons related to history, linguistics and theology (mainly orthodoxies).

The SCRIBe objectives were:

- Realization of an experimental information system for acquisition, compression and management of the documents' images;
- Building a WEB site where users can search in the virtual library of old books and express their interest in reading some of them;
- Realization of an experimental OCR system which will be adaptive to the different types of writings in that documents;
- Realization of a system that will allow users to visualize different areas from images at different details levels;
- Designing and implementation of an experimental system that will allow users to apply different methods for image enhancement of some areas and to express their satisfaction about them;

Technological structure and electronic resources used in digitization process**:**

- Technological structure:
  - a Pentium 4 PC – 2,4 GHz, 512Mb RAM, 80Gb HDD,
  - a HP ScanJet 4370 with scanning software,
  - books with Latin and Cyrillic characters, in Romanian, German, French, Russian languages,
- Electronic resources:
  - saving in Acrobat Reader pdf, jpg images, and some books in Word format, with character recognition,

- introducing in a database available on web, in xml format,
- books can be searched and visualized.

As part of that project a number of 20 books were scanned (presented in annex 1). The first 20 pages from each book were automatically transformed in xml format in order to allow indexing and search of information from those books. In choosing that number of pages copyrights reasons were also taken into account. The books were also saved in jpg and pdf formats, for their later use in digitization projects.

The criteria that formed the basis for selecting publications in order to realize digital collection of the library were the degradation risk, value and rarity of publications from the library inventory.

6 Conclusions

The experience gained in SCRIBe realization highlighted the difficulties of storage, retrieval and shared access to digitized documents. The use of modern methods for data reduction based on information theory is now the most rigorous method for realization of digital archives. The future challenges have also been highlighted namely the integration of the various formats present in multimedia documents. What a wonderful thing will be to realize images retrieval in a video archive based on a combination of search words.

Acknowledgements

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[SCRIBe] - http://scribe.ulbsibiu.ro/

Annex 1 – List of scanned books in the SCRIBe project

No.	AUTORS	TITLE	PLACE	PUBLISHER	YEAR
1.	Ioane V. Rusu	Compendiu de Istoria Transilvaniei	Sibiiu	Tiparitu la S. Filtsch	1864
2.	Tim. Cipariu - Canonicu Gr. Catolicu	Elemente de limb'a Romana dupa dialecte si monumente vechi	Blasiu	cu tipariulu sem. Diecesanu MDCCCLIV	1854
3.	Alexandru Philippide	Introducere in Istoria limbei si Literaturei romane	Iasi	Editura librariei Fratii Saraga	1888
4	Dupa Deregintele Preparandialu Ignatiu BARANY	CRESCEREA POPORALA - Manualu Pedagogicu-Didacticu	Oradea Mare	Tipariulu lui Eugeniu Hollosy	1879
5	WILHELM BRAUNE	ALTHOCHDEUTSCHE GRAMMATIK	HALLE	MAX NIEMAYER	1891
6	Karl Prochasta	Lessings - stliche lyrische, epische und dramatische Werke und seine vorzen Prosaschriften	Leipzig	Leipzig und Teschen	1806
7	Heinrich Laube	Lessing s Werke	Wien, Leipzig, Prag.	Verlag von Sigmund Bensinger	1895
8	-	Die Geschichten des Herodotos	Leipzig	Druck un Verlag von Philipp Reclam jun.	1885
9	Johann H. Vok	Homers Werke	Stuttgart	Verlag der J Gottaschen	1869
10	-	Codicele civil	Bucuresti	Tipo-Litografia Ed. Wiegand & C. Savoiu, Covaci	1894
11.	Manolaki D.	Istoria Moldovei pe timii de 500 ani pana in zilele noastre	Iasi	Tipografia Institutul Albinei	1857
12	-	Motii - Rascoala romanilor ardeleni 1784 - 1785 sub capetenia lui Horia Curcanii - Luarea Rahovei de ostile romanesti la Noemvrie 1877	Bucuresti	Editura Librariei Leon Alcalay, No. 37 - Calea Victoriei	1877
13	Studiu comparativ de Lazar Sainenu	Basmele Romane in comparatiune cu legendele antice clasice si in legatura cu basmele poporeloru invecinate si ale tuturoru poporeloru romanice	Bucuresci	Lito-Tipografia Carol Gobl	1895
14	Michael J. Ackner	Die Romischen Inschriften in Dacien	Wien	Verlag Tendler &Co.	1865
15		Histoire des Roumains et de leur civilisation		Cvltvra Nationala Bucarest	1922
16	A.D. Xenopol	Istoria romanilor din Dacia Traiana	Bucuresci	Ed. Librariei Scoalelor	1914
17		Ce sint si ce vor sasii din Ardeal Expunere din izvor competent	Bucuresti	Tipografia "Cultura Neamului Romanesc"	1919
18.	Gheorghie Sincai	Chronica Romanilor si a mai multor nemuri	Bucuresci	Tipografia Academiei Romane (Laboratorii Romani)	1886
19	-	Istoria Literaturilor Romanice in Desvoltarea si Legaturile lor Vol I-iu Evul Mediu	Bucuresti	Tipografia "Cultura Neamului Romanesc"	1920
20	-	Graiul Nostru	Bucuresti	Atelierele Grafice Socec and Co., Societate anonima	1908

Open shelf collection and RFID system

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Abstract

The paper presents the RFID solutions for open shelves collection used for improving library services for users, making easier the process of finding information they need in a shorter time. It is analyzed the case of Central University Library "Eugen Todoran" from Timişoara that implement the system in the new building, opened in 2008. The experience of the library shows how using RFID system in the open shelves collection the patrons have more freedom of retrieving useful information and more circulation transactions are done by the patrons with self check-out and check-in of the documents. The library trained the patrons in using the new library technology, finding information in all kind of documents like books and journals on paper or on line electronic documents. For the librarians RFID system offers the high speed inventory and quickly identifying items that are not on the proper order on the shelves. All of this helps the library to manage its activities with a reduce number of staff in this crisis time.

Key words: RFID, open shelves, circulation transactions

Introduction

The concept "The right information to the right person at the right time" should be the perfect description for the goals of the XXIst century libraries.

The central mission of library instruction is to create information literate students.

The Association of College and Research Libraries (ACRL) provides a set of information literacy standards in the "Information Literacy Competency Standards for Higher Education" helping the students to assume greater control over their own learning.

„Information literacy forms the basis for lifelong learning. It is common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning.

An information literate individual is able to:

- Determine the extent of information needed
- Access the needed information effectively and efficiently
- Evaluate information and its sources critically
- Incorporate selected information into one's knowledge base
- Use information effectively to accomplish a specific purpose
- Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally" [1]

Information literacy is to find the information you need easily. This is what libraries should offer easy access to the information.

This was not at all the case of Romanian libraries before 90'. Almost all had the major part of their collections in the closed stack with no library software and the access to the documents was a very difficult time consuming process for the staff and users.

After 1990 the Romanian libraries starts to find solution for changing this facts by implementing integrated library software, with web OPAC (Online Public Access Catalog), and open the collections by moving them on open shelves for users easily access to the information they need.

Open shelves collections

Free access of the users to the shelves with documents is open shelves access.

In the open shelves, collection should be well organized for user easy access to information. There are systems used for arrange the documents on open shelves by subjects, like Dewey or UDC - Cutter. The documents spine labels contain the call number and also in the bibliographic database the items records contain location information like sublibrary, collection, and call number for helping users knowing where the document is or to find it on the open shelves. The main problems of the open shelves collection are finding the document if it is misplaced and the security of this collection. For both problems there is a solution: the RFID system.

RFID system

RFID -Radio Frequency IDentification is the latest technology to be used in library of XXI century. RFID is a security system with an efficient tracking of materials throughout the library. RFID combines radio-frequency-based technology and microchip technology, for identifying objects using short wave communication. The standards used are ISO 18000 - Information Technology -- Radio frequency identification for item management -- Part 3, the frequency used is 13,56 MHz and SIP2 - Standard Interface Protocol, version 2.

A RFID system needs at least RFID tags and a tag reader. In the tags the information is stored and the tag reader read and sends information from the tags to a library system for processing it.

A complete RFID system could be compound from the following elements:

- **Tags** – with relevant information for material type are stick on
- **Staff Workstations** – a device for librarians to convert the barcode or other information and store on tags and tags On or Off activation; or for documents check in/check out
- **Detection Systems / Security Gates** for detection RFID tags on documents. If there are no loan for the documents and the tags are active will start the alarm.
- **Digital Library Assistant** – a portable device for searching and quick collection inventorying which reads the tags from the documents on shelves, without removing them.
- **Self Check** – for patron check in/check out of the documents

There some supplementary devices like **self check-in items return** for returning documents from outside the library, for example when the library is closed or the **conversion station** for converting a large amount of document's barcodes in RFID tags.

The RFID technology is an important investment for an automated library.

Why a library would make such a decision? There are some reasons like:

- Developing its services
- Protection of the collections
- Making new statistics about holding used,
- Finding more easily the documents and putting them in the correct positions on shelves

- Improving the productivity in inventory checking
- Eliminating the boring check in check out activities
- More efficient library management

LibBest [2] RFID Management System describes very well the system in "**Six Sentences about RFID for Library:**

1. RFID tags replace both the EM security strips and Barcode.
2. Simplify patron self check-out / check-in.
3. Ability to handle material without exception for video and audio tapes.
4. Radio Frequency anti-theft detection is innovative and safe.
5. High-speed inventory and identify items which are out of proper order.
6. Long-term development guarantee when using Open Standard."

The advantages of the RFID systems both for staff and for users are presented by BIBLIOTHECA RFID Library Systems [3]:

Advantages for the library:

- Efficient media management: inventory taking and control made easy, fast location of misplaced items
- All types of media secured reliably with specific labels
- Higher productivity
- Monotonous procedures reduced, making jobs more attractive
- Physically demanding activities handled by the system
- A future-proof investment thanks to an open RFID solution that complies with international standards

Advantages for the patrons:

- Self-service system
- Longer opening hours
- Books can be returned 24 hours a day
- No waiting
- Library staff has more time to provide advice and service
- Independent account administration and management.

Case study - Central University Library "Eugen Todoran" (B.C.U.T.)

Central University Library "Eugen Todoran" from Timişoara had its collections organized in close stack and in some faculty's sublibraries, like in almost all university Romanian libraries. The borrowers had to ask at circulation desks the document they want to borrow. Three –four librarians were working in delivering the document. The reader had to wait 1-2 hours receiving the documents wanted. All this was a time consuming process and needs a lot of staff for circulation activities.

Starting 1995 the library begins the automation process by implementing ALEPH library system. Since then the bibliographic catalog was developed and the library's web OPAC became a useful instrument for quick finding the documents they need. Unfortunately the major part of the library collections remained in the close stacks, the library had no space for organizing new and modern open shelves rooms. When the project of the new building started in 1999, some new projects for library modernization were developed.

Finally the new library building was opened in October 2008. The library extends its' activities in the new generous spaces that offer new opportunities for improving the services and developing new modern one for its users. In the new building there are three modern open shelves reading room with wireless Internet access.

A plan was made for moving a part of the collections in the new locations. The decision was to move the collections of some sublibraies that were located in the old building or in the main West University from Timisoara building. Starting 2007 the library prepared the movement of an important part of its collections in the new spaces.

The open shelf collection needs a system for documents protection. The library had no system anti-theft detection system before.

After studying the market, the decision to implement an RFID system was taken and in December 2007 the RFID equipments, tags and reader cards were acquired.

There were bought:

- 90.000 RFID tags for tagging the documents
- 5 Pad Staff Workstation – 895
- Readers RFID cards
- 1 Card printer Zebra P120i
- 5 Smart card reader/writer
- 3 SelfCheck™ System R-Series
- 3 Digital Library Assistant 803 with 512 memory card
- 6 (3 double) Detection System Model 8900, gates for protecting the collections from theft and for counting the visits.

All over the 2008 year the librarians prepared the documents for the movement and organization of the collections, putting the tags, converting the barcode in RFID tag.

The complete installation of RFID equipments and the integration with ALEPH 500 library system were almost finished in June 2008. Our library becomes the first Romanian university library using and integrated completely the 3M RFID and Aleph 500 systems.

Starting than, the library has, on each of the three floors with open shelves rooms from the new building, almost 1 km open shelves with RFID labels tagged documents, the readers have access to one self check, and for librarians there are two RFID workstations used for barcode - RFID conversion, circulation and one Digital Library Assistant for inventory and rearranging the collection on shelves.

Improving the circulation process and to reduce the number of transactions made at the circulation desk, from closed stacks, was a continuous effort all over the 2009 year, the most used titles from the close stacks were moved on the open shelves rooms, and also a new library for literature was opened. Now there are almost 80.000 items on open shelves locations in the main central library buildings, both in the new one and the old one.

After more than one year we could see that the open shelves collection and RFID system make important changing: the documents circulation locations and the number of transactions. The transactions we are talking about are check in, check out and in house, all made by using Circulation ALEPH module together with RFID system.

From the total 324.590 circulations transactions, made in 2009 with ALEPH system, (see Table 1.) the biggest part, 176.532, transactions were made in locations where we are using RFID system as it may be seen in Figure 1.

Table 1. Transactions - 2009

Location	Transactions
RFID Collections	176.532
Other locations	16.442
Circulation Desk	131.616
Total	**324.590**

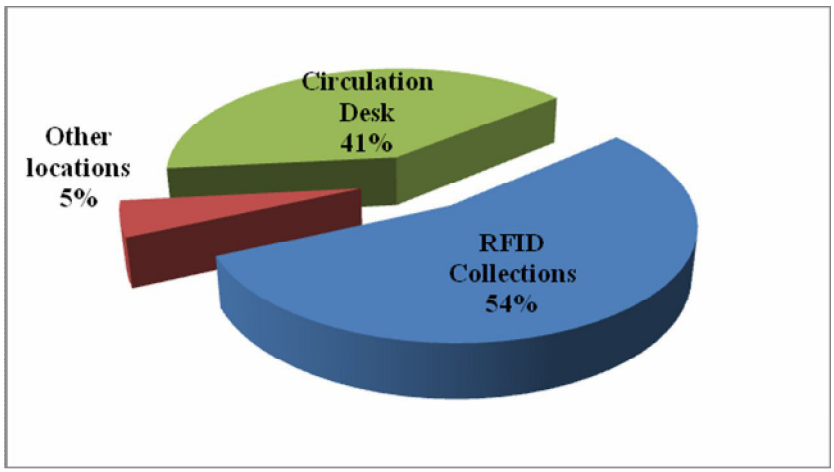

Figure 1. Transactions 2009

Although at the circulation desk the number of transactions is still large (131.616), it is degreasing comparing with the number of transactions made in 2008 (191.235).

From 176.532 RFID system transactions 103.883 were made by readers using the 3 self check equipments library has (Figure 2). Consider that 2009 was the first year RFID system was used, in the locations with open shelves there are still a lot of transactions (72.649) done by librarians, including the in house transactions for the documents used on site. The other reason was the fact that in the beginning of 2008 -2009 academic year the circulation policy was not changed for the collections which were moved from sublibraries in the new building; a lot of status of documents had no lending permission and was possible to be used only on site.

Figure 2. RFID circulations transactions

Even so, a lot of time staff was saved and the staff was free for better service the patron or for others activities needed in the library consider also the insufficient number of staff the library has to face in this crisis time.

Training the readers

For improving the patron ability in finding the information in all kind of documents like books and journals on paper or on line electronic documents and using the new library technology the library tried to make continuous training for the patrons and staff. The number of training proposed by the library or asked by the patrons is increasing each year.

In the beginning of the academic year, in October 2009, when a lot of the new students want to become a library reader, there were organized, in a waiting room, presentations about the library, its branches, services, collection, how the readers could find the information in the web OPAC or how to find the documents they need in the open shelves reading rooms, and how to use the RFID self check equipments.

Also a lot of professors come with their students in the library for library presentation and for on line demo of using electronics resources that library's users could access. From October 2009 until February 2010, there were already done 41 presentations for more than 1000 students comparing with only 19 presentations during 2008-2009 academic year.

The library also offers on its web site movies with presentations for how to find information, how to use RFID self check and a lot of tutorials for helping readers to find what they need.

Conclusions

The open shelves collection and new library technology help the library's clients for identifying of most relevant information resources in the most effective way.

The libraries have an important role in helping the users to manage in the "Data Smog". „This data smog is produced by the amount of information, the speed at which it comes to us from all directions, the need to make fast decisions, and the feeling of anxiety that we are making decisions without having ALL the information that is available or that we need." [4]

Information literacy is the solution to Data Smog.

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