

# Information provision to knowledge creation: Danish digital libraries strategy

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## **Abstract**

This paper describes Danish digital libraries strategy in knowledge creation. While doing so, authors describe the role and issues for digital libraries. They have analysed the Danish deliberations regarding the development of digital library services in order to provide inspiration outside Denmark. They have described in detail history and strategies for development of e-services in public libraries in Denmark. They have also described how and why Denmark's Electronic Research Library was established, via a network of cooperating electronic research libraries and how they developed digital library services in the library's environment. They also describe changes in education and learning, consequences for library development, developing a new role for the library, digital library services, concrete activities, and service development, institutional repositories and open access and organizational aspects – institutional partnerships in developing digital library in Danish point of view.

## Introduction – role of, and issues for digital libraries

We often hear that libraries (and librarians) select, organize, retrieve, and transmit information or knowledge. That is true. But those are the activities, not the mission, of the library. ... the important question is: 'To what purpose?' We do not do those things by and for themselves. We do them in order to address an important and continuing need of the society we seek to serve. In short, we do it to support learning.

*Lorcan Dempsey, Keynote presentation at European Conference on Digital Libraries 2004<sup>1</sup>*

As indicated in the above quote the focus in recent library development has been on new ways to fulfil the purpose of the library. In 2003 OCLC (Online Computer Library Center) carried out a very comprehensive study of the information environment and the library's situation in general. The subsequent report from this Pattern Recognition Scan highlighted the need for libraries to focus more on the overall mission and less on the activities and workflows traditionally used to achieve the goals of the library. The report contained an explicit criticism of the libraries' focus on their specific collections and a recommendation to focus more on user needs. These recommendations have since been strengthened by a number of reports from OCLC for instance on the libraries' catalogues and their image among users. The theme of these reports is not so much a questioning of the library's role or mission as a need for new approaches to support learning and research.

<sup>1</sup> Lorcan Dempsey, Libraries, Digital libraries and digital library research, Keynote presentation at European Conference on Digital Libraries 2004, University of Bath 12–17 September 2004. Details available at <<http://www.oclc.org/research/presentations/dempsey/ecdl2004.ppt>>last accessed on 8 July 2005.

This issue has been the centre of Danish library development in recent years and of the attempts to formulate national policies and strategies on the subject. The Danish strategies and policies have been formulated on the basis of surveys and analyses carried out in Denmark that confirm general developments in end users' information habits.

The natural starting point for a discussion of library tasks is the library's traditional role in information provision. It is this role that is being challenged in the digital environment but it remains an important task for all libraries.

We will argue, however, that information provision is not the only important role for the library in the transmission of information through the value chain from author to end user. The individual library should consider the new tasks in relation to e-publishing and e-learning as being as important as the more traditional role of information provision. The task of information provision remains central but should probably be organised in a new way – changing the role of the individual library. You may argue that we can identify a need for enabling users to benefit better from their information access and that libraries at universities and other academic institutions tend to build institutional repositories and in consequence should promote the research carried out at their institutions.

The following presentation of Danish deliberations regarding the development of digital library services hopefully provides inspiration outside Denmark.

### Strategies for development of e-services in public libraries

In 1995 the first Danish public library (in Silkeborg) offered access to the Internet for its users and at the same time presented a homepage. The immediate success of these services inspired many libraries to follow, and at the same time a discussion on the

possibilities of the web-technology gained a very broad basis in the Danish libraries.

In 1996 the Danish National Library Authority (today DALM (Danish Agency for Libraries and Media) published guidelines and introduced some basic standards. A national programme was launched offering economic support to libraries in small municipalities to establish internet access and homepages.

The following year the discussions on extending e-services led to the first introduction of a Danish e-ask-a-librarian-service. The service was based in a few co-operating libraries. Today the service is based on a co-operation between some forty public and ten academic libraries and with support from the DALM is run as an open and free service for everybody.

In 1998 the work on a new Act on library services was initiated. The vision for the legislative work was to establish the framework for library services based on the needs of users in the information society. The Act was passed by Parliament in 2000.<sup>2</sup> It made access to the Internet and establishment of homepages obligatory for all public libraries. It stated that access to all published information – regardless of the medium on which it was stored – was free for any user. This led to a general building of collections of compact discs and multimedia materials in all libraries.

The Act stated a number of tasks that were the responsibility of the state. A major service was public access to a web-based version of the Danish Union Catalogue, which was launched in 2000 on 'bibliotek.dk' (English version: 'library.dk) containing all material registered in any public or academic library in Denmark, and giving access to search and request. Requested titles can be ordered to be picked up at any library chosen by the user. The success of this service convinced the

DALM of the necessity to establish a national service for distribution of interlibrary loans. This national delivery service now delivers materials to libraries on a day to day basis, changing the policies for collection building and maintenance of many libraries. The library.dk portal is under constant development and improvement. In 2009 we plan to add user generated tags and ratings and we have agreed with the biggest Danish publisher, Gyldendal, to integrate access to the biggest Danish encyclopedia in library.dk. This integration will result in a search facility where you will be offered access to the full text article by subject or name searching.

From 2000 to 2005 the strategy of DALM was to support new web-based services in libraries, and many portals and subject-gateways were established. Among the most successful are an internet-guide, an e-zine on fiction, another on music and a portal for information for immigrants on the Danish society in eleven languages ranging from legislative to practical local community information covering the whole country. Other examples are e-support for home work.<sup>3</sup>

These services are provided by libraries in close co-operation. Majority of public libraries in Denmark contribute to this kind of web-based services and see them as integrated part of the new library concept.

From 2005 DALM started developing a new strategy for library development. One of the first elements analysed was the web-services of the public libraries. Several problems were identified. Among the major challenges were the lack of co-ordination and a coherent plan for development of these services on a national scale, the lack of clear criteria for success, and the cost-effectiveness of the services. A new organizational model has

<sup>2</sup> Act regarding library services. Copenhagen 2001

<sup>3</sup> Some of the library-driven webservices and portals can be found at the list in 'bibliotek.dk', the union catalogue: <<http://bibliotek.dk/netbib.php>>

resulted in a central co-ordination of the development and financing of the services. Plans and priorities are decided by a board representing the municipalities and the board. This step towards a more co-ordinated development has in the first place lead to a decision to establish a new library website for children. This website is planned to interact with daily children's library telecast that are planned from the autumn 2009 as well as with activities in the children's library space. Such an effort to create 'cross-over' from one platform to another and letting virtual and real offers to support each other would probably be one of the trends in the media-development in the coming years.<sup>4</sup>

In 2005 a new service was presented giving access to remote download of music files from the users own devices on a 24/7 basis via the library that pays for the license. This service was a major achievement in the effort to fight music piracy by supplying an alternative. This is particularly important in a small country like Denmark, where music piracy is a severe threat to the Danish music scene.<sup>5</sup>

The first step in the project was a digitization project carried out by The State and University Library in Aarhus that serves as national music collection. All published Danish music was digitized and an agreement with the association of right holders (an association of this kind is rare but probably a prerequisite for a broad national license) negotiated by a consortia consisting of DALM and a number of central libraries.

Initially the service was limited to Danish music, but international music is now

<sup>4</sup> The strategy 'From Information to Knowledge' is only available in Danish, 'Fra information til viden' Copenhagen 2005

<sup>5</sup> Access to the services can be established at any local library in Denmark. See link: <http://netmusik.shop2download.com/cgi-bin/WebObjects/TShop.woa/wa/PSHelp/faq>

available as well. At the moment the license covers more than 1 000 000 tracks, that can be downloaded by library patrons in municipalities covered by the license agreement. Almost all municipalities offer this service. The files can be borrowed for a day or a week (free of charge for the users). A new addition to the agreement will make it possible for libraries to give access for users to listen to 30 seconds of any track in the database without payment from the library. A similar service for download of films and videos from your home computer via a local library license has been launched in June 2009.

After a number of years where libraries have been aiming at giving access to e-books and other e-texts and have tested various models a new service has been launched, e-bog.dk, in a cooperation between the Association of Publishers and The Danish Bibliographic Centre. The service aims at e-access to all examinations requirement texts in all Danish education. Publishers have been somewhat reluctant in agreeing on e-services, as they are not yet convinced that the business-models running internationally will work in a national context as small as the Danish. DALM is constantly pushing the publishers to accept the conditions of information accessibility in the knowledge society. Now a service is running but at rather slow speed.

A new public library service moves faster. This service gives access to downloading of e-talking books to ipods and a number of other devices. The services was inspired by the same service offered by the Danish Library for the Blind.<sup>6</sup> But has now proved to be a very popular service for the general public. The major problem with this service is the high price the libraries pay per download.

<sup>6</sup> The Danish Library for the Blind changed in June 2009 its name to 'Nota' in consequence of the fact, that the biggest user group are not blind people but dyslexia users.

Also e-access to films seems to be a field with great potential. Libraries have for some years offered schools and other educational institutions access to web-based download of film with presentation in a DVD-quality. The titles are made available by cooperation with the Danish Film Institute and a few other rightholders. Now the general public also have access to this library service. The collection is still limited, but growing with more than a hundred titles per year.

Since the year 2000 where The Act Regarding Library Services first established the equality of status of the different types of media, the libraries have from many users experienced a quick shift from physical media to web-based delivery of the same information. Still the use of physical media exceed the digital, but the user pattern is clear: digital use is growing analog use is shrinking. The strategy in the public library area has subsequently been to establish remote accessible e-services in all fields and to develop more personalized and interactive services in the library place. This is an ongoing process.

### DEFF – brief overview

Denmark's Electronic Research Library was established as a project in 1997 following an analysis of the development of a range of research libraries into electronic research libraries. The idea was to establish 'Denmark's Electronic Research Library', via a network of cooperating electronic research libraries. The initiative was launched as a five year project by three ministries with a total funding of approximately 27 million euros over a period of 4 years from 1998 to 2002.

By the end of the project period in 2002 the ministries decided to make DEFF as a permanent organization with its own funding on the National Budget. Since 2003 DEFF has functioned as an organizational collaboration between educational and research libraries in

Denmark with an annual budget of 2.3 million euros.

In the period from the 2003–2006 the activities were organized around six focus areas: e-learning, e-publishing, licenses, portals, system architecture and user facilities. The primary objective of all activities was the development of local library service. It was thus highlighted in the DEFF strategy that the local library is the primary gateway for the servicing of end users. In 2006 the thematic focus areas were reduced to three: meeting the user, architecture and middleware and information provision. This division reflects DEFF's three-tiered architecture as the overall architectural blueprint for digital library development. The three layers are: joint information resources at the lowest level, middleware and webservices provide functionality at the intermediate level, and the user interface ensures the correct presentation for the user. It is a service oriented architecture where the three layers are independent of each other. The model of a three-tiered architecture functions both as a technical and organizational concept, because it allows the individual institution to collaborate on joint functionality and procurement of information resources, but preserves its own institutional user interface in interaction with the end user.

DEFF's new organization is supposed to ensure a stronger focus and a better coordination between the activities. It has, however, also been an opportunity to discuss more general aspects of digital library development and to re-examine DEFF's overall vision and the strategy for realising it. The focus areas retained the focus on local library development.

The priority of the development of local library services within DEFF is closely linked to the way IT-competence and development resources are distributed within the organization. IT development is carried out in

collaboration with employees at the individual libraries in projects that receive funding from DEFF. The original justification for this model was to ensure that solutions developed in one library are available to a wider range of libraries thus minimizing parallel development. The local institutional perspective was furthermore seen as a way to increase the chances of user-oriented solutions and to ensure that the projects were relevant to the libraries' specific needs, in this way increasing the possibility of the projects being actually implemented and sustained after the development phase.

The increasing complexity of IT development and the need for professional solutions are putting increasing pressure on this model of IT development because many of the smaller libraries are unable to maintain proper IT development departments and thus contribute to the development of IT solutions.

Consequently, there is an increased focus on consolidation of IT development. These consolidation efforts are also extended to the operation of IT systems at the individual institutions because it is proving very difficult to develop IT solutions for a lot of different IT platforms. This continues to be an issue for DEFF.<sup>7</sup>

<sup>7</sup> The development of DEFF can be studied in the three reviews of DEFF:

- i) Denmark's Electronic Research Library, Review of Denmark's Electronic Research Library 2008, Copenhagen 2008. Details available at <<http://deff.intrasuite.dk/showfile.aspx?IdGuid={E231456E-1548-4406-9EE0-22D470B4EEE2}>>
- ii) Denmark's Electronic Research Library, Plans and perspectives for Denmark's Electronic Research Library – An international review, Copenhagen 2005. Details available at <<http://www.deff.dk/showfile.aspx?IdGuid={C1613369-ECD5-46DA-A0FD-623F0E2336A9}>>
- iii) Denmark's Electronic Research Library, Developing Denmark's Electronic Research Library - An International Review, Copenhagen 2001 . Details available at <[http://www.deflink.dk/upload/doc\\_filer/doc\\_alle/806\\_DEF%20Review%20report%20.pdf](http://www.deflink.dk/upload/doc_filer/doc_alle/806_DEF%20Review%20report%20.pdf)

## Developing digital library services – a general perspective

### *Developments in the library's environment*

Analysing the changing information environment in a Danish context is probably no different from the patterns and trends identified elsewhere. The changes identified are primarily related to the digital information environment and the changed user behaviour it has caused.

The shift from 'collections to connections' and the changes in the information environment from a situation of information scarcity to information overload have together with increased use of search engines created a new breed of self-sufficient users who do not see the library as the centre of their information environment. These developments have created new working conditions for all libraries. The library collection only constitutes a small part of the relevant supply of information, and the library faces increased competition from new sources of information. The end result is an increased risk of 'library bypass'. It is no longer necessary to visit the library in order to get the information you need.

These developments have been recognized and discussed for many years, but very few libraries have taken the challenges seriously and taken steps to actively formulate strategies to counter these developments. We have had a lot of Danish user surveys, usability studies, web statistics, and behavioural studies which indicate that libraries are increasingly losing their traditional strong ties with their patrons.

### **OCLC report – criticism and recommendations**

OCLC's Pattern Recognition Scan from 2003 provided a very useful overview of these tendencies, and it also succeeded in highlighting some of the underlying causes.

The overall conclusion of this exhaustive analysis was that libraries are too focused on collections and that they should shift their focus to the end user. There was great emphasis on the term 'info sphere', which was defined as the network of information surrounding the individual.

The general recommendation was that the library's services should be brought to the user's 'info sphere' thus avoiding library bypass. Another interesting recommendation was that libraries should invest more resources in developing and offering collaborative technologies to users.

The increased popularity of collaborative technologies is seen as an expression of a more general trend of collaboration among users in the information environment. The most common term for this development is web 2.0 and the distributed collaboration this term implies. This trend means that users demand facilities for communication with other users and tools for further processing of information and for communicating the results.

The trend towards increased collaboration is one of three major trends highlighted in the conclusion of the analysis. The other two trends are disaggregation and a decrease in guided access to content.

Disaggregation means that services, institutions, information, and other entities in the digital environment are increasingly split into smaller parts and made available as such. There is for instance a demand that functionality must be available independently of the particular service. This concept is an important part of a service oriented infrastructure. But the trend is quite general and can be witnessed when a music CD is split into individual tracks, a book sold in separate chapters or an institution is viewed as a collection of services rather than a coherent entity.

The decrease in guided access to content is a natural consequence of the development and

better quality of search engines. This trend implies that link collections are redundant and that libraries should not try to select and present only those information resources that are best suited for the user. The user has apparently become self-sufficient with the help of search engines. This means that information must be searchable and be presented in multiple contexts outside the library.

Although the report focuses on these three trends it points to a development that could be seen as a reaction or a complement to the trends: the demand for context. The exact meaning of the term is not defined but it points to the user's need for a frame of reference or assistance in a situation where: 'the people and institutions that acted as guides to content disappeared into a virtual world and have not been replaced in any meaningful way'.<sup>8</sup> The replacement of guided access to content with increased use of search engines is thus accompanied by a need for assistance and context at the point where the search result is presented to the user. The libraries' use of link resolvers (for example, SFX) and recommendation systems can help to create such a context and provide access to relevant resources at the search result. In the physical library context can be provided by supplementing the widespread introduction of self-service with the possibility of social interaction around the information resources.

### Changes in education and learning

The reduced significance of traditional institutions in a digital environment could be seen as a strengthened individualization of services in the sense that the individual end

<sup>8</sup> <<http://www.oclc.org/reports/escan/future/collaboration.htm>> from OCLC Online Computer Library Center, Inc., The 2003 OCLC Environmental Scan: Pattern Recognition report, Alane Wilson (ed.) Details available at <<http://www.oclc.org/reports/escan/>>

user has been given more choices. It would however be wrong to view the end user as the isolated individual or traditional customer of commercial companies, because the emphasis is increasingly on collaboration and sharing of information. This can be seen very clearly by observing these tendencies in education and research.

The education sector is experiencing the same tendencies as the libraries. There is a shift in focus from education to learning (decrease in guided access to content) and learning is taking place in the 'info sphere' and not on the blackboard. Learning is increasingly a collective activity (collaboration) and it is not based on specific textbooks or institutions, but combined from multiple courses and information sources.

It is no longer instruction in specific skills taking place at a particular institution but facilitation in order to promote the development of meta-competencies for lifelong learning. These concepts have been used as buzz words for many years, but they have been given a new significance because the competitive pressure of globalization and outsourcing on the job market means that the traditional education system is inadequate for handling these new challenges. The rate of outsourcing and creation of new, more skilled jobs mean that there is a huge demand for constant learning and development of new competencies. The traditional Danish education system is neither flexible nor large enough to meet this demand for further education. People will increasingly have to learn together outside a traditional institutional setting. This could be a good news for libraries.

Science and research are also experiencing developments that are challenging traditional institutional settings. E-science and mega-science are making the traditional collaborative nature of science even more pronounced and underlining the need for new

institutional collaborations. Traditional scientific institutions are also losing their monopoly on research as both government and private sector research is becoming increasingly important. Of particular relevance to libraries are the new forms of scientific publication and communication and the focus on the availability of those datasets that form the basis of scientific publications.

### **Consequences for library development**

These developments are changing the role of the library and have actually in the Danish discussions prompted some people to doubt whether there is a future for a digital library. The argument is that search engines, commercial information providers and the Internet have rendered the digital library redundant.

The fast changing nature of the information environment does indeed make it very important to continuously discuss the libraries' tasks and mission. There is a tendency in these discussions to equate traditional ways of doing things with the library's core competencies. This is highlighted by Lorcan Dempsey in the opening quote above. He urges librarians to focus on the mission instead of particular activities. He also formulated those activities in a very general way for instance using the term 'organising' instead of 'cataloguing'.

Nevertheless it still seems relevant to ask whether we need a particular institution to select, organize, retrieve, and transmit information when the Internet and search engines are developing the way they are. We would argue that there is indeed a need for such an institution, but that libraries generally need to shift their focus and think more strategically.

We agree with Lorcan Dempsey that focus should be shifted from particular processes and activities to a broad formulation of the

library's mission. We think that it would be more useful to replace the notion of supporting learning as the library's mission with the notion of facilitating the creation of knowledge. This is perhaps better suited to cover the library's role in relation to research and to underline the fact that the end user is not merely an information consumer but an information producer as well. Many libraries are thus taking on a new role in regard to electronic publishing.

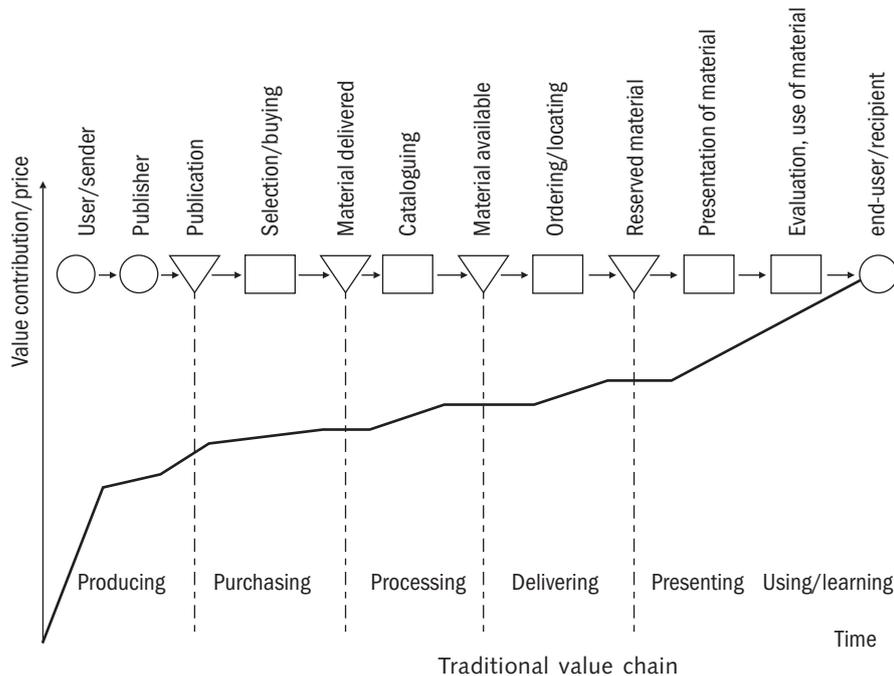
A definition of the libraries role as facilitating the creation of knowledge implies a more pro-active role for the library than merely providing information. It is a very ambitious role in a digital environment, and it is not entirely clear what the implications might be.

In order to retain and develop the more traditional role of information provision the library services must be present in the user's info sphere which means that libraries must either develop services that are sufficiently visible and effective to attract users, or they

must make the library's information resources available via the user's preferred commercial search engines.

The library's own resources in terms of printed and electronic collections only constitute a small part of the potential supply of information relevant to the user. It could be argued that as the information supply on the Internet expands and search engines become better, information provision is fast becoming a commodity service. If this is the case it should encourage libraries to standardize and consolidate this task and focus on other services where the library can add more value.

In developing such services the term 'user focus' should be taken quite literally, because it represents a shift in focus not only from the individual institution but also from the traditional task of information provision to the user's needs. This would imply a shift in focus from supply to demand and an effort to gain a much better understanding of the demands of the individual user.



An intuitive analysis of the information value chain from author/producer to reader/recipient would thus indicate that the largest increase in value takes place at the beginning and the end of the value chain. The model above (on page 77) is a simplified presentation of the different elements in the traditional value chain from the information producer (author) to the information receiver (reader). The model is intended to illustrate that the creation of value is largest at the beginning and end of the chain.

If the library is to add value to an institution or an end user, it should focus on the services at both ends of the value chain and consider outsourcing or consolidating the intermediate processes in the information provision. This is in fact what most libraries have done as we will try to argue later. If the library's role is indeed to facilitate knowledge creation, then helping the user or the institution acquire or produce knowledge could be the starting point for developing new services.

This would suggest following important focus areas for libraries.

- Teaching and publishing (institutional level)
- Communication and information literacy - (individual level)

The activities for the digital library in the first point are of course concerned with e-publishing and e-learning. The second point covers the library's role in enabling students to function as communicating participants in the knowledge society. This requires both information literacy (and i-skills) and the ability to express oneself and communicate using some of the many web 2.0 communication facilities.

### Developing a new role for the library

The shift in service concept from 'what you see is what you get' to 'what you need is what

you get' could help alleviate the risk of library bypass.

This requires the library to devote more resources to user studies, and user involvement including developing a range of services utilising web 2.0 functionality.

Web 2.0 has two major advantages from a library point of view. As it transforms communication from being bilateral (user-library) to being multilateral (user-user-library) it saves resources for instance in relation to reference services as users can answer each others questions and share advice on good information resources. The other very important advantage is that it gives libraries' a unique opportunity to analyse and understand users' information searching behaviour making it easier for libraries to continuously develop relevant library services.

### Information provision

The very traditional role of information provision has undergone significant changes. The libraries have recognised that many of the processes involved, although central to the library role, does not add particular value to the end result. In line with traditional commercial wisdom for such processes the libraries have outsourced, consolidated and developed partnerships.

Many libraries have outsourced selection, acquisition and processing of materials to vendors. In Denmark the cataloguing of materials are shared on a national level or outsourced to vendors. DEFF handles negotiation and administration of electronic subscriptions and licenses. Much of the IT administration or development is outsourced to vendors or other libraries.

The processes surrounding lending are to a large extent outsourced via self-service to users. This includes ordering and reserving books, checking out and returning books and in some cases even being directly involved in the acquisition of books. We are fast

approaching a situation where the users can check out and return the books in a library without staff involvement. Information provision in the form of printed books is one area where the library's traditional role of information provision has indeed become a commodity service.

### Digital library services

There is a tendency for digital libraries to focus on the task of information provision not merely as an important task, but as the task that justifies the library's existence. This often means that attempts to consolidate or standardize the task are viewed as threatening to the individual institution. It is considered very important for the individual institution to be visible to the end user, both in the role of information provision and via the user interface. This sometimes makes it difficult to collaborate on developing new services in this area.

Fortunately Google and Amazon have introduced a new standard for digital information provision that has increased libraries' motivation to cooperate in more areas. Two of the most important drivers for cooperation and consolidation in information technology are cost and complexity. Libraries have now realised that they have neither the skills nor the resources to deliver the functionality that users have come to expect from Amazon and Google – unless they cooperate.

Libraries have also come to recognize that users expect to be able to access all available information from one search box and to get exactly the result they need because of excellent search technology. Most libraries' information provision has traditionally been centred on the library catalogue, and this has been the starting point for the ambition to deliver a Google-like search interface. For many libraries this ambition demanded that all the digital information resources was catalogued and made available through the

library catalogue. This strategy proved insufficient, because the library system is ill suited to handle the task, the amount of digital information being too huge, and because of the manual labour required.

An alternative approach is using federated search. This allows users to search multiple information services from a single search box but it normally utilizes the search facilities of the individual services which means that it is difficult to provide an intelligent ranking and presentation of the combined result.

The current approach under consideration in Denmark is to use integrated search. This demands that data in full text or metadata be aggregated and indexed in order to provide the same intelligent search and presentation to the users as Google delivers.

This approach has the advantage of presenting the user with very relevant search results but many of the information resources will not necessarily be immediately available to the user because the library's own information resources only constitute a very small part of the information presented. The presentation of so many information resources external to the library makes automated document delivery services and complex AAA (authorization, authentication and accounting) natural components of integrated search.

In the Danish context libraries are discussing the establishment of a mutual national data repository to be used as basis for the individual libraries' indexing and searching solutions. Other important areas of cooperation include AAA, document delivery, data on user behaviour and webservices to be used in adding relevant information to the presentation of the search result.

### Concrete activities and service development

The different aspects of access control embodied in AAA are becoming increasingly

important, because the transition from print to digital means that 'fair use' is replaced by contractual regulation of the use of digital material. The ability to control and limit the use of information resources is often a precondition of making the material available in the first place. There is a need for a standardized and unified system across libraries and vendors which preserves the privacy of the end user while at the same time enabling single sign on to many different information resources. In a Danish context the project working with Shibboleth is seen as a step towards such a solution. The current initiative for access management for Danish research and higher education is called WAYF (where are you from?). By identifying the user's primary institutional affiliation the system makes it possible for the user to be authenticated at the parent institution regardless of which service the user wants to access. This means that user data is only maintained at one place thus increasing efficiency, security and privacy in the overall system of access management.

Comprehensive and user friendly solutions for integrated search, automated and flexible systems for document delivery and a common AAA-system are important components of an efficient information provision. The functionality required for collaborative filtering, recommendation services, customization and customerization is fast becoming a minimum requirement for the user interfaces to information resources and DEFF is looking to develop this functionality as services in the common architecture. The DEFF support in regard to library development of integrated search is primarily concentrated on building a joint data repository 'a data well' containing abstracts, metadata and full text from scientific journals and e-books. This data well will form the foundation upon which libraries will implement integrated search systems like

Primo developed by Ex Libris or the locally developed open source system Summa.

These activities are supplemented by cooperation with Google Scholar with the objective of making the Danish union catalogue and other relevant Danish digital information resources available through Google scholar, thus increasing the visibility of these resources to the end user. A separate focus area in a Danish context is the digitization of Danish scientific and educational material. Legal difficulties and reluctance from publishers have so far blocked attempts to digitize these materials on a larger scale, but initiatives like Google Print and the EU's i-2010 initiative have contributed to a gradual opening in this area.

### **Institutional repositories and open access**

- . DEFF's activities in the area of E-publishing
- . started with projects on institutional
- . repositories and the migration of journals to
- . open access. Inspired by the e-framework
- . proposed by JISC discussions are continuously
- . taking place as to how the systems established
- . would support research registration (Current
- . Research Information System) and how the
- . underlying repositories can interact with those
- . who support e-learning. There is an increased
- . focus on library support for the general
- . knowledge management for the institution in
- . all the processes between import and export of
- . information. These deliberations reflect the
- . more general idea that the libraries take on a
- . much more active role in supporting the
- . information flow and knowledge management
- . for institutions and individual users.
- . An important driver in this development is
- . the need for systems not only to handle
- . publications and preprints but the underlying
- . data sets and part of the research
- . communication as developments within
- . e-science and e-research seem to suggest.
- . Some libraries are expanding their activities

into new areas such as developing research statistics and offering citation analysis and benchmarking of research activity. In addition to these demands in relation to research there is a demand for repositories for student papers and assignments.

The Danish libraries and DEFF have been very successful in cooperating on the development of CRIS (Current Research Information Systems). The collaboration has both included development of a common data model, an organizational structure to support collaboration and the adoption of identical systems in most institutions. This successful collaboration is a useful foundation for the further development of the infrastructure for promoting research registration and open access in Denmark.

A very important part of the work in this area is the technical and legal framework for the activities. Danish political awareness of open access has been very modest, but new initiatives are emerging and there is a Danish franchise of the creative commons movement. At the institutional level we are witnessing the formulation of guidelines for publications demanding that researchers deposit copies of preprints in institutional repositories.

At the national level The Ministry of Science, Technology and Innovation is introducing a metrics based funding system for research. The system is developed in order to ensure that increased future funding for research is allocated to the most productive research environments. The funding system will utilize data from the Danish Research Database which aggregates data from the CRIS at the individual university. In that way the DEFF-supported system of research registration is being developed to support a central metrics-based allocation of research funds. The implications of the metrics-based research evaluation system might be beneficial to the libraries' role as information providers if it turns out that there is a need for full text

in order to judge allocation of points awarded to individual research articles. Such a need would encourage researchers to deposit copies of publications in institutional repositories thereby making it easier for libraries to make the publications available in support of open access. On the other hand the system might contribute to the preservation of the existing publishing system insofar as only subscription-based journals are included.

### **Organizational aspects – institutional partnerships**

There is probably not one right way to develop the library at a particular institution. The local libraries develop according to local competencies and demands from the parent institution. The more conceptual discussions of the role of the library could nevertheless prove important, because it helps alleviate fears of the imminent demise of the library and tries to point to new tasks for the library.

These discussions might also clear the way for more rational cooperation between libraries and a better division of labour between the local library and national digital library services. In Denmark there are discussions as to whether libraries could divide their services into back office and front office functions, thus allowing the further development of shared services and outsourcing. These discussions are particularly important in the area of information provision where the concept of a local digital library is being challenged by increasing technical complexity and user demands.

The concept of the library role as being one of facilitating knowledge creation is sufficiently broad to allow individual libraries to develop services in new areas where they can probably add more value than trying to develop the traditional role of information provision on their own. The new tasks would allow the libraries to develop a new and closer

relationship to teachers, students and researchers. Such a role would imply a closer integration with the parent institution where the library would be perceived less as a monolithic institution and more as a network of services. In order to fulfil this role it would be important for libraries to cooperate nationally or internationally in the area of

- information provision and to collaborate in
- developing the new services and competencies
- in new areas. As an organization of research
- libraries, DEFF sees these discussions as
- essential to the continued development of the
- individual library and as a very important
- contribution to deciding which digital library
- services to develop on a national level.