

*Developing Denmark's  
Electronic Research Library -  
An International Review*

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## **1 Preface**

In the beginning of August 2001 a number of international experts in different areas of information and library services participated in a review on the project developing the Danish Electronic Research Library (DEF). The review was led and initiated by the chairman of the Steering Committee, Kim Østrup, and took place in Copenhagen.

The review meeting took place over two days and comprised all the individual project areas.

The purpose of the meeting was to receive criticism, ideas and recommendations and get assessments as to whether the methods and procedures chosen will achieve the goals and objectives of the project. The overall goals of the project are to enhance the quality of research and education and provide equal and democratic access for all users.

The report contains a short presentation of the discussion by the members of the review board and their subsequent comments and recommendation for the further development of the Danish Electronic Research Library

The report is written by Jakob H. Petersen of the DEF-secretariat and has subsequently been approved by the participants in the review. The conclusions of the report will be presented to the Steering Committee for DEF and form the basis for a revision of the project plan.

## **2 Executive summary**

The review of DEF is divided into five sections: national infrastructure, digital resources, user facilities, marketing and organisation.

The overall conclusion of the review is that the plans and objectives of the project are reasonable and that the project has achieved good results so far.

The most important recommendations are that DEF should focus on providing remote access for users and be very attentive to the interface and functionality of the national portal. In relation to digital resources DEF should document the success of its centralised licensing agreements and perhaps use the organisational model in other areas. In planning and prioritising digitisation initiatives DEF should formulate clearer goals and be more focused on which objectives these initiatives should achieve.

The development of user facilities such as Subject Based Information Gateways (SBIGs) should proceed after considering the results of the evaluation of the first SBIGs and formulating a clear strategy on the scope and target groups of new SBIGs. Subsidies for projects should continue, as they are important vehicles for developing the skills of library staff and fostering cooperation between libraries. DEF should supply courses in project management to ensure better implementation and planning of projects.

In marketing the projects the most important aspect is to try to adjust the expectations of users. DEF should develop a strong profile in supporting e-research and e-learning and emphasise the advantages of having a central body coordinating library development.

DEF should be very attentive to the possible problems of a 3-tier infrastructure and especially in connecting the layers and DEF should develop a better description of the interface between the layers. The longer-term support and financing of initiatives such as local it-systems, SBIGs and projects should be considered and DEF should take steps to retain a high level of library involvement after the implementation of a new organisational model.

## **National infrastructure**

### **Introduction**

This project area comprises the centralised planning of the IT-infrastructure of DEF as well as the programme to support and update the IT-systems of individual libraries.

## **3 System architecture**

### **Presentation**

The decentralised architecture of DEF reflects that it is a network of libraries and thus a system of systems. The architecture is 3-tiered consisting of a thin user layer/interface, a service layer and a data layer. This modular z39.50-based architecture should allow libraries and other institutions to use data and services in different combinations and with different user interfaces.

The tender for the security system enabling users to access licensed resources from home was called off in July 2001 due to circumstances outside DEF control. The main priorities in the remaining 1½ years of the project period are to obtain a suitable access control system, additional services (journal system, link service, toolkit) and a national portal.

### **Views and comments from the review board**

In the UK there is a tendency for libraries to want access to central resources and integrate local resources in a customised local user interface. Lots of pros and cons are being discovered through the JISC hybrid library project. A customised user interface depends on underlying standardisation and although it may be relatively easy to achieve 80% of the particular customisation, the remaining 20% require human intervention, which is costly. It is important to carefully consider and weigh the user's needs and wishes in relation to the cost of fulfilling them.

From the user's perspective a very important service is remote access to full text. Users place a high value on being able to access services, particularly journals in full text, from their desktops and DEF will need to focus on the provision of a suitable security system to enable this. In connection with this DEF as a coordinating body is in a very good position to promote and facilitate standards for remote authentication.

A successful integration between the layers may prove very difficult and it may also require considerable technical skills from local libraries to implement modules. Furthermore there is a strong reliance on a single protocol, z39.50.

In addition many services have built value-adding functionality around the data, which may mean that the use of data in the 3-tier architecture would entail a loss of functionality. Finally licensing issues may arise when reusing data and modules in different contexts. It might be wise to conduct a risk assessment of the 3-tier

architecture to identify potential weaknesses and to develop a better description of the interface between the layers.

Although compatibility with Denmark's Virtual University (DVUNI) is very important, DEF should not, given the time frame, delay further development of services and systems architecture. DVUNI will have its own requirements for and ways of using the resources of DEF in connection with courses and curriculum. These requirements will be developed gradually in response to user feedback. International standards are being developed in relation to learning environments and their integration with library services and need to be tracked.

### **Caveats**

- The heavy reliance on z39.50 could be a cause for concern
- The integration between the layers can cause problems
- An archiving mistake in the data layer will be replicated throughout the system
- There may be licensing problems with the reuse of modules
- There is often a connection between database and data that makes that data unique to that service
- The implementation of modules in local systems requires technical skills and resources – the decentralised approach requires support. The ease of implementation should be an important success criterion.

### **Recommendations**

- Given the timeframe, the most important factor is remote access and single sign-on i.e. a security system. DEF might consider the Athens system, which already provides similar functionality in the UK.
- The user interface of the national portal is crucial
- Considering the differences in the time frames for DEF and DVUNI, DEF should not wait for DVUNI, especially as DEF will not require the same level of security as DVUNI.
- DEF should work with DVUNI to track international standards for data interchange between library systems and virtual learning environments
- DEF should carry out a risk assessment of the 3-tier architecture to identify critical issues and develop a better description of the interface between the layers.

## **4 Library Infrastructure**

### **Presentation**

DEF supports the upgrading of IT-systems of individual libraries on the condition that the upgrading of the systems is in accordance with national standards and that the subsidies paid by DEF enable the library to participate more fully in the national infrastructure.

### **Views and comments from the review board**

The development of systems is accelerating and the libraries will need to change or upgrade their systems more often. As it is only possible for a library to receive

a onetime DEF-subsidy it is important to demand that the libraries provide for on-going system maintenance and development of systems in the budget.

DEF might consider the Finnish model where all libraries buy the same systems, as this might put the library sector in a stronger bargaining position in relation to the supplier and save time in standardisation efforts. On the other hand it can create too strong dependency on one supplier.

**Caveats**

- The long-term development and upgrading of systems after the project period could be a cause for concern.

**Recommendations**

- DEF should consider a study of the long-term possibilities and advantages of establishing consortia between libraries when buying library systems.

## **Digital resources**

### **Introduction**

Digital resources cover all the content of DEF i.e. the licenses negotiated by DEF, digitisation planning and initiatives and The Danish National Research Database.

## **5 Licenses**

### **Presentation**

Since November 1997 DEF has administrated licenses to electronic journals and databases on behalf of the Danish research libraries. These license agreements are negotiated and signed by the Danish National Library Authority (DNLA) on behalf of DEF. A DEF license is defined as a license agreement signed by DNLA on behalf of DEF irrespective of whether DEF subsidises the license or not. The subsidy from DEF is usually seed money that helps facilitate cooperation between libraries.

### **Views and comments from the review board**

There is a growing need to document the savings and advantages that result from negotiating licenses through consortia and although this is difficult, DEF should try to calculate the savings from centralised negotiations. In general monopolistic vendors have pushed up prices and are able to offer a symbolic discount as a prize to a particular consortium. On the other hand consortia have been successful in moderating the price increases and they are often able to get better terms and conditions than libraries would have achieved through individual negotiations.

To the extent possible, focus really ought to be on the value of the information to the student or researcher and the increased efficiency and new opportunities that the access to journals and databases bring about. DEF should consider a way to measure or estimate this value.

Extending access to more institutions can often be difficult and very time-consuming, as smaller institutions need more support and training. In those cases where the libraries are very small it may be better to focus directly on the end-user both in regard to marketing services and providing training. Agreement on selection of content may prove increasingly difficult for a consortium as the number of licenses grows and the choice of additional licenses becomes less obvious.

DEF has been very successful in negotiating licenses and should identify the factors critical for success in order to further strengthen cooperation and identify opportunities to use the model in other areas. It will be important to facilitate cooperation in case DEF has to agree on which licenses to cancel, which is often more difficult than agreeing on new subscriptions.

An important success factor seems to have been the professional way in which negotiations have been conducted with full responsibility delegated to negotiators.

In general, negotiations with commercial vendors should be considered commercial in confidence and this is another good reason to choose a future organisation that has negotiating autonomy, with a small professional steering committee providing advice as needed.

Marketing of licenses is important in ensuring customer loyalty and continued funding, and the vendors can help educate library staff and end-users. The libraries are often more willing than universities to cooperate with commercial vendors. In any case an overriding attention to user-need is not commercial in itself; it was just the commercial sector that did it first. The cooperation between libraries and vendors can build on a joint interest in creating long-term customer loyalty.

There should be an emphasis on the liaison between library staff and faculty with a named contact person, for instance a subject librarian. These contacts are also very important to a successful marketing of licenses.

The access to journals can and should be given through multiple services e.g. library catalogues, vendor's interfaces or SBIGs. DEF should investigate how important it is to users to be able to cross-search journals. This functionality will be very difficult to achieve given the timeframe of the remaining project period.

### **Caveats**

- Consider the smaller institutions' need for support when including them in licenses
- Deciding to terminate particular agreements on licenses or journals may prove difficult and put cooperation to the test.

### **Recommendations**

- DEF should document the saving and advantages of cooperation and if possible the increased value to users
- DEF should consider a way to measure or estimate the value of electronic access for students and researchers
- The broadening of consortia should proceed as a gradual process
- Identify prerequisites for success in cooperation and use them in other areas, perhaps there are organisational lessons to be learnt from this area
- Local marketing and liaison with faculties should be facilitated
- The importance of cross-searching journals should be examined.
- DEF could consider project(s) to provide support for smaller libraries and their users from larger institutions, on a regional basis

## **6 Digitisation**

### **Presentation**

DEF has supported a limited number of projects in the area of digitisation. This is primarily due to the uncertainties in regard to standards/techniques and the very difficult task of prioritising between different areas and types of material. There is,

furthermore, an almost unlimited number of potential digitisation projects and a lot of political focus on the digitisation of the cultural heritage.

DEF is going to initiate a number of digitisation projects, decide on an organisational model for digitisation and draft policies on digitisation.

### **Comments and views from the review board**

DEF should decide whether to create a minimum critical mass of digitised material or select a few projects and do them really well. An argument in favour of the latter approach could be that this area will receive additional funding, and DEF could demonstrate the possibilities of digitisation by doing a few projects really well.

There is political pressure for digitisation of important cultural resources, key academic journals and resources for the public libraries. DEF could do projects in these areas.

DEF should identify the most important goals to be achieved by any project to digitise materials. Whether the challenge is to select the best possible content, or determine the best technological approach, there are, unfortunately, no absolutes. There is no standard answer that fits any project, no standard method, no standard budget, etc. But there is an approach that is the best possible match for the mission and that has the best possible chance of allowing the DEF to meet its established goals and objectives.

DEF has to clarify the success criteria within this project area, because the current ones pull in different directions i.e. different projects will satisfy different criteria. Preservation and access are examples of criteria that can be satisfied by different projects but the strict adherence to both can result in additional expenses and effort within a given project and the criteria can even be conflicting.

If the success of digitisation in DEF is measured in relation to real usage then critical mass is crucial. So if funding bodies evaluate DEF on the basis of usage this could be a problem considering the budget. If the success is measured in relation to a successful project with scalability and potential there are much more encouraging possibilities. DEF should consider whether it will attempt to attract additional funding or satisfy demands for documented usage of digitised resources.

Digitisation of journals could be done by selecting those journals most cited. There are a lot of cases of materials which “you cannot not digitise”, so selection criteria are important. One approach is full digitisation of first level material and selective digitisation of second level material (article level). Another method could be to have researchers and subject librarians within the relevant area prioritise the most important journals and do selection on the basis of those journals.

Interoperability is important because the digitised material should be made available in different contexts.

At the start of a particular project two questions should be answered: What are the information goals (what will be presented)? And what is the environment (the technical infrastructure)? There are a finite number of methods, and once these questions have been answered, the method becomes self-evident.

When selecting libraries to digitise materials, it is best that they have experience doing similar things. The costs of building digitising expertise and systems are considerable, and if those factors are not in place much of the budget could end up getting spent on that before even a single page was digitised.

Another important point is the fact that costs will go down as scale goes up, so the average cost of adding, delivering and maintaining each additional page goes down as scale increases.

### **Caveats**

- The DEF objectives for digitisation are unclear and which results in difficulties with prioritisation and formulation of success criteria.

### **Recommendations**

- DEF should decide which objectives the digitisation projects should achieve
- The success criteria should be reformulated in accordance with clear objectives
- It is important to utilise existing library experiences and technical infrastructure.

## **7 The Danish National Research Database**

### **Presentation**

The Danish National Research Database is based on information delivered from universities, institutions of higher education, government research institutes, research councils and other public institutions carrying out research. The database is therefore based on decentralised cataloguing of data and harvesting of data. It contains three types of information: Literature, Projects and Profiles.

The interface of the database and the data import functionality are being updated as part of the DEF-project. Open Archive Initiative-functionality (OAI) will possibly be included in the second phase of this update.

### **Comments and views from the review board**

The addition of OAI-functionality has exciting perspectives although it is still a new initiative.

The success of the database requires full support from the research community, so the idea must be sold to the researchers.

It will be difficult to ensure the quality of data given the decentralised nature of the database. It might be wise to study the possibility of developing a centralised database in the long term, as it will be easier to maintain and perhaps cheaper to operate. It is, however, necessary to keep in mind that the choice between a centralised and a decentralised database is often based on political and psychological considerations and not on technology and cost.

**Caveats**

- The quality of data might be very uneven.

**Recommendations**

- Conduct a study of the possibility of a centralised database
- Examine how to get support for the database from the research community.

## **User facilities**

### **Introduction**

This project area includes projects carried out by libraries by themselves or in cooperation with other libraries. The projects within this area are not exclusively concerned with user facilities, but the general emphasis is on user facilities.

## **8 Subject Based Information Gateways**

### **Presentation**

DEF has thus far developed three SBIGs and four more are underway. The SBIGs are quite heterogeneous both in regard to size (number of links) and level of ambition. This reflects that they are developed serially as development projects intended to give Danish libraries and the DEF-project experiences with this kind of library service. DEF is currently sponsoring usability studies of the first three SBIGs and the toolkit used in constructing them. The results of these studies will form part of the basis for the Steering Committee's decision on whether or not to fund additional SBIGs.

### **Comments and views from the review board**

In Norway one central portal is being developed, but there is no decentralised development of individual SBIGs. This central initiative is based on the work carried out through 20 years of building an awareness and infrastructure concerning shared cataloguing in one central database (through Bibsys).

The UK higher education community has identified twenty-four basic subject areas (which do not correspond to those 26 chosen by DEF). JISC started with five SBIGs (through call for proposals) and evaluated them after three years. On the basis of this evaluation it was decided to continue with a call for proposals for a further three SBIGs and subsequently projects were chosen that provided coverage for all twenty-four basic subject areas.

The current central US initiatives include the Online Computer Library Center's (OCLC) Cooperative Online Resource Catalog (CORC) and the various projects sponsored by the National Science Foundation. Additionally there are a variety of commercial enterprises that have attempted to provide similar services. Many of the traditional aggregators, publishers, and abstracting & indexing database are trying to transform themselves into these kinds of roles.

It can be difficult to identify the relevant subject areas, as the users within any given area will like the idea of a new service without being specific as to which content it might deliver, and it is therefore basically a supply side decision in ignorance of the demand. Considering the number and coverage of international SBIGs, DEF should focus on areas that are specific to Danish students and researchers.

The different needs of students and researchers could make it relevant to develop different SBIGs for students and researchers, and for teaching purposes it may be relevant to develop assignments around the content.

SBIGs are relevant tools for research and education, are especially useful for inexperienced Internet users. Commercial search engines are not an adequate substitute as they are often influenced by commercial concerns (a search for apple gives the user Apple Computers sooner than apple pie) and because they do not offer structured academic information.

It should be stressed that intellectual validation of the content is essential and this means that larger SBIGs are expensive. The editorial control and maintenance are the most costly tasks of an SBIG, but if it isn't done properly the user will not have confidence in the quality of information and will leave.

The costs of scalability are a general problem of web-based services. On the one hand it is possible for a single person to publish, create a click-guide or many other web-based services, but developing, marketing and maintaining such a service on a larger scale is expensive, complicated and time-consuming.

DEF should examine user preferences, based on the usability studies from the first 3 SBIGs and proceed cautiously.

### **Caveats**

- Editorial control and maintenance of SBIGs is expensive and the development plan for SBIGs should contain a long-term plan for financing
- Small SBIGs may appear simple but scalability can prove complicated.

### **Recommendations**

- DEF should focus on developing resources that are specific to Danish students and researchers and on improving awareness of international SBIGs among users
- SBIGs are relevant tools for research and education
- DEF could consider developing SBIGs that target either students or researchers
- DEF should proceed cautiously after examining the results from the usability studies and evaluating the value of foreign SBIGs in different areas.

## **9 Projects**

### **Presentation**

The projects are primarily carried out by library staff, with joint financing from libraries and DEF. The projects have had a significant effect in developing the skills of library staff and the collaborative projects such as the SBIGs have done much to foster cooperation between libraries. There has been limited international cooperation in this area.

Some of the projects have experienced problems with delays and estimating the amount of work needed to complete. The costs of these delays and underestimation of work effort have primarily been borne by the libraries responsible for the projects. DEF is currently considering commercial suppliers as an alternative to some projects.

#### **Comments and views from the review board**

The problems with inadequate planning, underestimation of the scope of the project, perfectionism or bad project management are not unique to DEF-projects.

Although some of these problems can be explained by the developmental nature of projects, aiming for perfection rather than completion or difficulties in cooperation (e.g. differences of professional opinions) DEF should take steps to avoid these problems.

A much-used method is having a successful applicant sign a memorandum of understanding thereby making a public commitment to complete the project on time. It might also be wise to demand that the projects utilise particular project management tools.

In the area of competence development DEF need not educate library staff in all facets of running a library, but could instead concentrate on shorter courses in project management which could be mandatory for prospective project managers.

Another measure could be to invite international experts in the area and arrange a town meeting or bring different project participants together to exchange experiences. The latter could be especially valuable in dissemination of results.

In the longer term DEF should consider more international cooperation for instance in regard to SBIGs or by carrying out projects on cross searching and archiving of licensed material in collaboration with the other Nordic countries. Relevant organisations could be the Research Library Group or the European Science Foundation.

In order to create a basis for future decisions DEF should make an assessment of the multiplier effect of the DEF-subsidies to various projects.

The objectives of DEF in the project area focuses almost exclusively on products. DEF should perhaps put more emphasis on the side benefits, such as improved collaboration between libraries and the increased skills of library staff.

It is important that DEF should not be seen as a money machine, and DEF should use commercial suppliers where that is relevant, but on the other hand the projects seem an important way to support open source thinking, create ownership, network and pioneer spirit. And in regard to pilot projects a failure rate of 10% should not be viewed as discouraging, because a success rate of 100% would have indicated that the projects weren't sufficiently imaginative.

In regard to web-archiving it is important to involve professionals from archives in the projects in the library sector. Interesting projects are the Pandora project by the National Library of Australia project and the National Archives and Records Administration's Clinton Presidential Materials Project.

### **Caveats**

- Continued failure of projects to meet deadlines
- Balance between commercial and library sector development.

### **Recommendations**

- DEF should consider inviting international experts within a particular project area to attend workshops or give presentations
- The signing of memorandums of understanding with project managers could be a useful measure to improve success rates
- The Steering Committee should reconsider the policy on international cooperation. Some projects such as cross searching and archiving of licensed material could be carried out in collaboration with the other Nordic countries
- DEF should conduct an assessment of the multiplier effect of DEF-subsidies – both financial and otherwise
- The funds for competence development within DEF should focus on courses in project management and the utilisation of project management tools could be made a requirement of DEF-projects
- DEF should continue to fund projects in order to achieve ownership, cooperation etc within the library community.

## **Marketing**

### **Introduction**

Marketing is an independent project area but involves aspects of all the other projects in DEF as the activities in this area comprises all initiatives in the marketing of DEF.

## **10 Marketing**

### **Presentation**

The marketing activities starting in September are the first real marketing effort in the project's lifetime. The project has awaited the development of actual products to market. The most important of these being the DEF-licenses, the portal (deff.dk) and the SBIGs.

### **Comments and views from the review board**

DEF should revise the success criteria in this area so they express targets as improvements to a benchmarking measure and describe what action will be taken if the success criteria are not met. In general success criteria should be as realistic as possible. Otherwise evaluation tends to be a matter of explaining that they were not.

It is very important to get the message across to senior management to ensure that the local marketing coordinators have sufficient backing. A good way to achieve this is to send out a brochure with the core message of the project explaining to senior management what it means in financial terms, for the library sector as a whole and for their library. In addition to the library leaders it is very important to get support from the vice-chancellors. This could be achieved by connecting DEF with the new research paradigm.

In the marketing of deff.dk the major concern is to adjust expectations. It is important not to promise more than can be delivered. Although it is almost impossible to compete with commercial web sites, these provide the benchmark for the user. The most successful web sites provide a good way of working with content and that can be almost as important as the content itself. Good examples in the SBIGs are the guided tours. The design and functionality of deff.dk should be based on user needs and wishes. It is imperative that deff.dk is good enough and fast enough. If possible DEF should try to build a community of deff.dk freaks and create an identity culture among various user groups.

### **Caveats**

- DEF should be careful not to build up expectations too high
- It is very important to secure the backing from library leaders and vice-chancellors.

**Recommendations**

- The success criteria in marketing should be formulated in terms of improvement in relation to a benchmark
- DEF should put strong emphasis on the design and functionality of deff.dk as it will be conceived as the public presence of DEF
- Build and facilitate user communities.

## **The organisation of the project**

### **Introduction**

The organisation of DEF is not originally an independent project area but is included as such in the review because of the importance of discussions and considerations in this area to the future of DEF.

## **11 The organisation of the project**

### **Presentation**

The present Steering Committee of DEF has discussed the future organisation of DEF and there are plans for a small professional board with some representatives from libraries, but with the majority of members from outside the library sector. In making a case for continued funding of DEF after the end of the project period there has also been discussion on which aspects or strategies should be emphasised vis-à-vis the funding authorities.

### **Comments and views from the review board**

Although DVUNI is still in a very early phase of development DEF could put a stronger emphasis on supporting e-learning and e-research. DEF could be a catalyst in those areas and lead the way. A strong profile in supporting e-research could also be important in getting support from deans or representatives from research councils.

JISC has a high ratio of library representatives, and even though DEF needs a board with members without specific interests or partisan views it is important to implement a mechanism for addressing the concerns of the library sector and to continue the high degree of library involvement in decisions.

It is important not to lose the very valuable spirit of cooperation that has been built through DEF when implementing a new organisational model.

Getting researchers more involved in the project is a question of providing interesting projects or content in their area. Once researchers see the value of DEF to their specific area they will want to influence decisions. Of course the researchers should feel that their contributions make a difference.

The other Nordic countries are quite impressed with what the project has done so far and follow the development with interest. It is nevertheless important to adjust the expectations of the funding authorities because DEF should be evaluated on the right criteria.

In making the case for continued funding DEF should emphasise the value of a central organisation in facilitating international cooperation, developing the national IT-infrastructure, creating networks between libraries, ensuring the involvement of smaller institutions and supporting democratic access. In addition a central body makes for economics of scale and can act as a national partner in international collaboration.

DEF should also function as a facilitator or broker between institutions, promoting cooperation and disseminating experiences and project results from institutions. The first job of the new board should be to identify and prioritise activity areas. The activities in these areas should be benchmarked in relation to international projects supporting students and researchers.

**Caveats**

- DEF should be careful not to lose the spirit of cooperation that it has already developed between libraries.
- DEF should implement a mechanism for addressing the concerns of libraries, getting their feedback on services and thus ensure their continued support.

**Recommendations**

- DEF should lead the way in supporting e-learning and e-research and build a strong profile in these areas.
- DEF should emphasise the arguments for a central body for developing cooperation, IT-infrastructure and ensuring democratic access.

## **The participants in the review**

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HEDS is funded by the Joint Information Systems Committee and run by the University of Hertfordshire.

HEDS was initially established in September 1996 as part of the Electronic Libraries Programme (eLib), and following a successful period as a project, HEDS became a JISC Service in August 1998.

The Service provides advice, consultancy and a complete production service for digitisation and digital library development. HEDS supports project development from first feasibility assessment to final delivery of digitised materials.

URL: <http://heds.herts.ac.uk/>

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The Joint Information Systems Committee (JISC) is a strategic advisory committee working on behalf of the funding bodies for higher and further education (HE and FE) in England, Scotland, Wales and Northern Ireland. It also works in partnership with the Research Councils.

The JISC promotes the innovative application and use of information systems and information technology in HE and FE across the UK by providing vision and leadership and funding the network infrastructure, Communications and Information Technology (C&IT) and information services, development projects and high quality materials for education.

URL: <http://www.jisc.ac.uk/>

**Ole Husby** is system developer and project co-ordinator at Bibsys.

BIBSYS is the shared library system for all Norwegian University Libraries, the National Library, most college libraries, and a number of research libraries. The *BIBSYS database* contains information about books, periodicals etc. held by these libraries (8 million copies).

URL: <http://www.bibsys.no/english.html>

**Kevin Guthrie** is president of JSTOR

Originally conceived by William G. Bowen, president of the Andrew W. Mellon Foundation, JSTOR began as an effort to ease the increasing problems faced by libraries seeking to provide adequate stack space for the long runs of backfiles of

scholarly journals. JSTOR is now responsible for maintaining an archive that includes more than 8 million pages from 169 titles. More than 1,100 institutions from more than 50 countries have elected to participate in JSTOR's collection to-date. Usage has been doubling annually, and JSTOR projects that well over 6 million articles will be printed this year alone.

URL: <http://www.jstor.org/>

**Kim Østrup** is chairman of the Steering Committee for DEF and vice president of IBM Denmark.

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