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DIGITAL LIBRARY DEVELOPMENTS - A REALISTIC FUTURE?*

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Introduction

The concept of the digital library is already a confortingly familiar one, although it has been with us for a staggeringly short pace of time. International organizations, governments, commercial and public sector organizations have been seized by the concept of the information society and have grasped at the digital library as one of the tools which can help mould this into a reality. As a result the pace of experiment is accelerating fuelled by a mixture pf public and private funds.

This rapid expansion of talking, lecturing, writing and research has tended not to address a critical underlying question, the question discussed below - how near are we getting to digital libraries as a real vehicle for service delivery and a clear way forward for library provision? It has become clear from many successful small scale experiments that there is an issue of scale and that turning experiments into operational services poses substantial problems in itself. Building the digital library may be seen as having four components:

- there is a need to get material into it (content in critical mass)
- there is a need to be able to find it (resource discovery)
- there is a need to get material out of it (store, retrieve and delever in useable way);
- and a need to be able to pay for it in acceptable ways

It is not the purpose of this paper to examine or describe the technical issued surrounding digital library research. It can be argued that many of the technical problems are in the process of being solved through major national digital library programmes and commercial initiatives and that the major outstanding problems are economic. There is, however, no sign of an emergent, robust economic model for the development and operation of such libraries. They will change fundamentally the roles and relationships of aa those in the chain of scholarly

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communication and yet attempts at modelling have proved disappointing.[1] As a result we are left with a situation where it is not yet clear how to make the Digital library economically supportable and where we need new funding and business models, which are themselves likely to involve new stakeholders and changing roles and relationships.

International endeavours

It is very clear that Digital Library initiatives are happening all over world and that there is much to be gained from sharing experience and knowledge. The Digital Library appears to have developed and unstoppable momentum, although is quite clearly has different elements and priorities in different countries.

At not wholly random but certainly incomplete list of initiatives demonstartes the global nature of the enterprise.

In June this year a consciously international conference was held in London which set out to be indicative of that sharing. Ist sponsors were: CNI, CAUSE (USA); JISC, BL (UK) and CAUL (Australia) and the conference was planned entirely over the Internet on a closed Listserv list. Although the audience was in the end predominantly American and British, the programme featured speakers from Japan, Germany and the European Union Libraries Programme, as well as Australia, the United States and the United Kingdom.

United States of America. The USA has seen major investment in digital libraries. Although much of the funding has gone into blue skies research, there is clear evidence of operationalisation,

- eg. University of California Santa Barbara has support from the library budget and the Vice Chancellor to provide the Alexandria digital library (a geospatial library) as an ongoing service;
- Berkeley has real users (Californian Springe floods - data on water flows and aerial photography model used), and is continuing work on image retrieval;
- the State of California is proposing a statewide digital library;
- Michigan is experimenting with school and public libraries in digital form. It has undertaken oberservations of children using the Internet - (they soend a quarter of their time on Web pages with content and stay on each page about a minute);

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[1] See for example the work done for CNI by the Ubell Consultancy, which found it very difficult to extract meaningful data from stakeholders, even given genuine goodwill from the parties. Http//\www.cni.org/

- Illinois - new work on developing semantic mapping, automatic clustering and categorisation (on a 25,000 article database)
- Carnegie Mellon working on video analysis and speech recognition.
- the National Science fFoundation is considering a second Digital Libraries programme and is committed to substantial additional funding for five years. Discussions are taking place on possible USA/UK collaboration;

Japan. In Japan the Nara Institute of Science and Technology Mandala Library has created what may be the only „operational" electronic university library;

European Union. The EU Libraries Programme is in the final stages of the Fourth Framework Programme and is thought likely to fund 4/5 integrates subject demonstartors; the EU proposal for the Fifth Framework programme is under discussion in the European Parliament and is expected to contain an information society programme, but without a direct libraries line as in FP4; content is seen as a key action area;

Australia. There has been some concentration ontraining and on national data services; funding has been found for experimentation; there is involvement in electronic document delivery including joint funding with the UK of operational developments to the RLG's Ariel software; experimental resource discovery gateways are also being explored.

Denmark. The Danish Goverment claims to have no natural resources but ist people and even a country of five million people has seen fit to launch a majot digital library programme. It believes this essential to the very future of the country and so the programme aims to provide the operational services which will equip ist graduates to maintain the country's economic and social position. Although it recognises that it must work with and learn from larger and richer geopolitical blocks, the programme hopes to deal with some issued, such as the future model of scholarly communication, at a national level which have proved intractable in larger countries.

In sum, we are witnessing a dazzling array of innovation, which is very gradually emerging into service provision.

The UK Electronic Libraries Programme[2]

It is worth focussing on the United Kingdom's eLib programme and related national initiatives in order to give a flavour of a centrally planned and implemented programme which is making substantial progress towards the

[2] Details of both the programme and individual projects may be found at http://ukoln.bath.ac.uk/elib/

implementation of the Digital Library, under the auspices of the JISC (Joint information Systems Com mittee). Over a five year period the work of the JISC has made substantial steps to providing a range of reasearch, development, content provision and services at a national level which are now being connected together to give organised and meaningful service at local level.

The Electronic Libraries Programme has funded some sixty projects, all of which are at different stages of completion. The areas covered are: electronic journals; electronic document delivery; on demand publishing; training and awareness; access to networked resources; digitisation; a small programme of supportinh studies. From the beginning it was felt vital to have a proper process of external evaluation. This external evaluation shows success so far, not least in the development of a cadre of information professionals, familiar with project management, understanding how difficult library issues are, able to deal with copyright, publisher relations, etc., and capable of wrestling with business plans and oprationalising and maintaining experimental projects.

The managing committee for the programme is committed to next phase of eLib development and has just completed a bidding process in three major areas for implementation over the next three years:

- hybrid libraries; an assupmtion is being made for the foreseeable future in most libraries there will be a need to integrate traditional and electronic resources to provide service for users. In some libraries „traditional“ may already include a range of media. Music collections are a good example of this. At the time of writing five projects have been chosen as exemplars in this area.

- „clumps“; an inelegant term, used to indicate a logical physical or virtual grouping of resources (bibliographic or cross domain). It is hoped to fund several regional and subject clumps, providing users with seamless access to much wider range of catalogues in more integrated way. Such clumps might consist of the M25 libraries (London libraries within the M25 motorway ring), or all map libraries.

- digital preservation; an important but technically, economically and organisationally fraught area; the aim is to have a practical demonstrator project, probably involving the British Library with ist legal deposit concerns, and other research libraries, in order to test the major issues involved.

In addition the committe is getting plans from many of the existing projects for their ‘exit strategy’. In general these are either looking for transitional help which will give them time to become commercially vialble or are exploring opportunities for federated service. For example the resource discovery projects see little

individual future but potential in providing an integrated service, perhaps even a spart of a faulty-based model, along the lines of the Arts & Humanities Data Service (AHDS).

Wider JISC Initiatives

Although much the highest profile programme funded by the JISC, it is important to the sLib programme in context of much wider electronic information service initiatives of JISC to get a picture of the very real richness of UK developments. In 1996/7 a further fifteen million piunds was spent on these initiatives. Some examples are:

- *AHDS* - the Arts & Humanties Data Service. A new centrally managed/distributed provision model for the support of humanties research and teaching. There is integrated service provision for digital resources in these areas - archaeology, history, Oxford Text Archive, performing arts, visual arts.

- *COPAC* - a nationally available online catalogue of research library resources. Curiously the UK has been very belated in ist creation of a national union catalogue of research libraries, in part due to a deeply divise proposal which failed for political reasons in the late 1970's.

- *National Datacentres*. The BIDS centre at Bath, EDINa at Edinburgh, MIDAS at Manchester and the longstanding data archive at Essex support national deals for content. Much of this bibliographic, ranging from Science Citations Index to Beilstein, but increasingly there is provision of full text (it is hoped to be first non USA JSTOR mirror site), images (such as the Visible Human), and datastreams from satellites.

- *Advisory and research services.* It is often difficult for those involved in the practicalities of offering services to find the time to discover relevant developments. JISC has found it extremely cost effective to fund a handful to technology watch centres which act as an information filter for the community at large, run updating seminars and workshops or conduct small pieces of research. AGOCG and UKOLN are good examples of this. The latter has undertaken particularly important work through the so-called Models workshops to define distributed networked information architectures, and also to work on metadata, linking to international initiatives such as the Dublin Core.

- *Images*. Early work has begun in defining possible work activities has begun with BUFVC (the British Universities Film and Video Council) and BFI (British Film Institute) to develop moving image services over the network and pilot services will be underway early in 1998.

- *National Digitisation Centre.* This has been set up to develop a content programme and test ist economics. Early work will include images and some major historical materials.

- *Non Formula Funding for the Humanities.* A major funding programme has been instituted to improve access to special collections in the humanties and to support the cataloguing, preservation and in some cases digitisation of library and archive materials. This again stresses the strong wish to support all disciplines and not just „big science".

- *Pilot Site Licence Initiative.* Hundreds of electronic journals (effectively electronic facsimiles of print journals) have been purchased from three publishers as part of a deal to acquire paper copies. The project is currently being evaluated but is aimed at testing yet another model of the provision of commercial materials. This Funding Council initiative is to be taken over by JISC, where it is likely to be primarily electronically focussed.

Goals of the UK Programme

In summary, taken together these various initiates represent a substantial annual commitment on behalf of UK higher education to consolidating the building block of the digital library, which are defined as:

- Acquiring a critical mass of content. This is well underway;

- Resource discovery and retrieval. Exemplars are available on a large scale, both subject based and generic, and including underpinning technologies;

- Delivery in useable form. Work is underway on the integration of JISC services interfaces with camous systems;

- Economic models. The programme has been served well by ist „free at the point of use" philosophy for content. This helped to shape the dialogue and debate with commercial suppliers. New deals are likely to modify the existing approach in order to provide greater choice of payment methods, especially to suit smaller institutions. An authentication initiative for JISC services has proved an important underpinning technical development.

Application to a social science library - the BLPES experience

BLPES, the library of the London School of Economics, is probably the largest research library in the world dedicated to the social sciences, with over four million items in stock. Although a large research library rich in print and archival materials it has been heavily involved in a range of electronic library projects as

that is where at least part of ist future must lie- A range of relevant research and other project work going on, helping to create a working „hybrid“ library in social science:

IBSS Online published by BLPES, with ist provision as a national database at BIDs free at the point of use for the whole UK higher education community. This provision was negotiated by JISC under ist national datacentres budget. IBSS is now beginning to index electronic journals and link to thier URLs;

SOSIG[3] - is the Social Sciences Information Gateway and is a resource discovery service based at Bristol University. It is one of the first such services, at least, at least in in the UK, and has done pioneering work on standards. It has already become very important to social science researchers and is embedded in a wider desktop tool for access to a range of networked resources.

Decomate project -the successful camous provision of electronic copyright material under licence, working with Barcelona and tilburg; provided for Elsevier journals in economics and information systems for desktop access.

Decomate 2 under final negotiation with the European Union - to provide for wieder and more intelligent integration of access to digital resources at all three partner sites, on a virtual basis, and seamless and transparent provision to end users.

Superjournals -BLPES is an evaluation site for this eLib project, leading work in the politics area. It seeks yet another critical mass of electronic journal provision.

LAMDA -a document delivery project involving a number of higher education libraries in London andd manchester. It is based on Ariel sod´ftware and intends to manage and deliver documents electronically, thus providing a source of revebue to participating libraries.

Edulib -a member of information services staff is gaining accreditation as a trainer under this University of Hull based project. It is anticipated that this will lead to a posotive cascade effect on trainers. In addition the project is having a huge impact thinking about the delivery of taining materials.

hybrid libraries - two bids have found funding in this area. The first successful bid was within the Research Libraries Group initiative of digitisation on global migration. BLPES will be digitising the letters of emigrants. Under the Non Formula Funding Programme mentioned above BLPES will undertake the

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[3] SOSIG may be found at http://www.sosig.ac.uk

digitisation of unique pamphlet material (i.e. full content) to be linked to electronic thematic guides.

Summary: the list above is illustrative of how things have changed in the UK in the last three years. It is both invigorating and intimidating to find that BLPES is involved in such a wide range of digital library developments of relevance to social science. These projects have implications for the jobs and skills of all library staff; for collection development policy (renting much more electronic material rather than purchasing it); for expenditure patterns - perhaps requiring more research and IT staff; for users - who are almost uniformly enthusiastic - only impatient for more critical mass (especially electronic backruns of journals); for the university as a creator and manager of intellectual property. Clearly much remains to be worked through, but the shape of the future is beginning to emerge.

Digital Libraries and Universities

Now that Digital Libraries are moving towards reality, it is important to set them in context and to ensure that we do not see them as discrete entities. There is a need to focus on the Digital Library as a support to learners and researchers. Information per se is not that important. We must seek a knowledge based, research focus and not an information focus. Mike Fitzgerald, Vice-Chancellor of Thames Valley University has described the power, space, learner, responsibility nexus. He forecasts a paradigm shift in the balance between these attributes. It is then important for the library to be aware of this shift and to set the digital library in a context where it is not simply an interesting development in ist own right but is clearly contextualised within this wider institutional agenda and offers support to learners, teachers and researchers, mirroring rather than dictating their changing needs.

A realistic future?

The short answer to the question must be „Yes“. It is clear that the hybrid library is already well on the way, technically, experimentally and supported by users. The major outsanding issue is to discover how business and economic models will work out, although one must allow that a greater deal of experimentation is going on in projects and by commercial publishers. That said there is a continuing danger of experimentation being driven by the science model and large commercial interests despite the fact that in most universities science will represent half or less of academic activity. Similarly if one looks at scholarly communication the norm is a small learned society with a single journal and a newsletter not the large media interests of global conglomerates. There is a real

need for the academy to explore how scholarly communication will be conducted and financed in future, lest a simple financial model emerges which constraints academic need.

It seems worth concluding this look at how present programmes are defining the future of the Digital Library with some interesting predictions of digital library developments and projected date lines. Drawing on expert views in USA, Mike Lesk is his new book has taken advice from a wide range of sources, including such well known thinkers as Clifford Lynch and Ken Dowlin. As a result he predicts:

- 50% of Library of Congress digitised - 2043
- First virtual large library - 2016
- Free network access in public libraries - 2003
- Virtual reality in libraries - 2005

In short - the Digital Library is coming, and coming soon, so get involved!

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