

The hybrid information environment and our Intranet solution to access it

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Abstract

In the first part, a theoretical discussion points out two main reorientations in the goals of recent library automation. It is stated that technical innovations created possibilities and needs for new end-user services. A first reorientation, enabled by the combination of LAN and CD-ROM brought libraries into the domain of database networking. A current reorientation - amongst others - caused by client-server technologies and global information networking, brings libraries into the development of services, aiming at the disclosure of a new, hybrid information environment. The discussion tries to identify the potential scope and characteristics of new library solutions in this new context. A second part introduces the Executive Lounge, a new library solution developed by the library automation team of the University of Ghent, according to the propositions made in the first part.

Two major reorientations in recent library automation

During the last decade, technological innovations have generated possibilities for libraries to deliver new, appealing services to end-users. Two waves of innovations have resulted in two major reorientations in library automation.

A. The first reorientation

A first, remarkable one, occurred when concentration shifted from automating in-house library procedures (cataloguing, loan, acquisitions, serial control, ...) that controlled the traditional print-based collection, to automating the information and information delivery procedures. This was a shift from empowering the library towards empowering the end-user. Seminars addressing this reorientation would carry titles such as "From automated housekeeping of archives and libraries to automated information" (Ref 1).

This shift originated from a technology-based impulse, in which the sudden availability of secondary information on CD-ROM and the increasing use of Local Area Networks were the main catalysts. Suddenly, technology enabled libraries to offer their end user community more than catalogue information and as such, an ever increasing amount of libraries have chosen that new path.

But - although the possibility to deliver extra services to the end-user seems to be obvious and appealing - it is noteworthy to mention that the shift has been a slow one. The basic required technologies were made available between 1985 and 1990, and - still - numerous libraries are waiting to undertake concrete actions. An important cause for this is the underestimation of the immense importance of secondary sources in an

academic environment.

A. The second reorientation

While some libraries are still evaluating the feasibility of riding the first reorientation wave, there is already a new one to surf. An inspiring résumé of what this new wave is about, was found in the title of a recent seminar held at the University of Padua: "From database networking to the digital library" (Ref 2). This title suggests that a future library solution is more than the sum of electronic networked databases.

In order to clarify this important nuance, it is inspiring to use a metaphor taken from Marvin Minsky (Ref 3). In "The society of mind", Minsky reveals his ideas on the functioning of the human brain. He explains the notion of an agent, the smallest operational entity in the human brain, capable of a very simple, specific task. The interaction between some agents that form a group, can result in handling a more complex task, and the co-operation between groups of agents, in yet more complex tasks. Finally, using the right interactions between agents and groups of agents, intelligence emerges.

The solutions that resulted from the first reorientation, are characterised by information made accessible on a network, searchable via different kinds of monolithic software. The fact that there is no interaction between these software results - for the end-user - in the lack of integration between information, that is, can or should be related (Fig. 1). Referring to Minsky, the agents are not co-operating in a first shift solution. The second reorientation means building intelligent solutions, by creating interactions between information entities, and by doing so, using the sum of the pieces rather than the individual parts (Fig. 2). The solution in the second reorientation is more than a browsable list of searchable items, it is an easy-to-use entry point to an intelligent interlinked information environment.

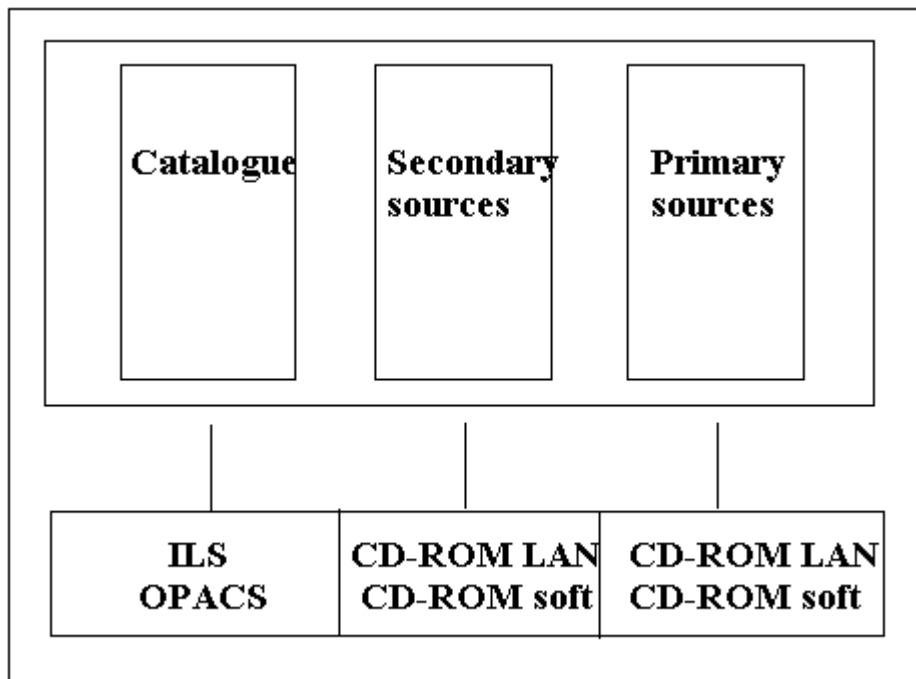


Fig 1 : first shift solutions

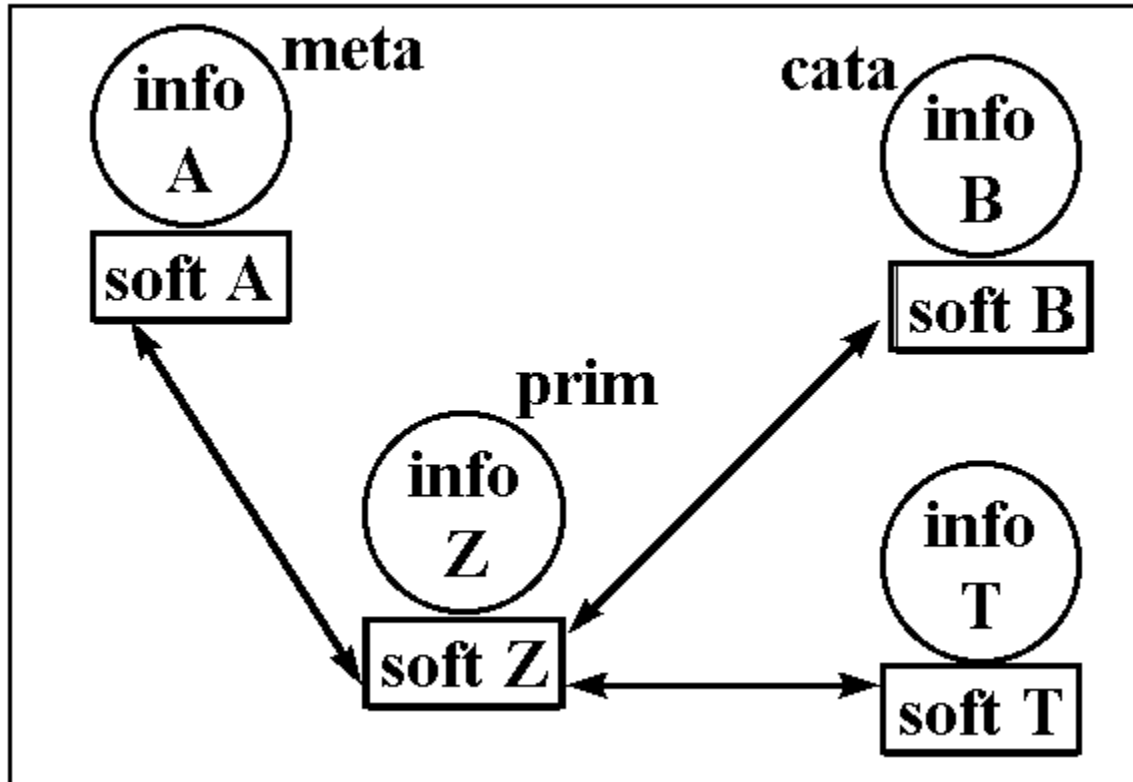


Fig. 2 : second shift solutions

Again, this second shift is technology driven, with open client-server technologies, inter-application tools, global networking and the increasing availability of primary electronic information as the most important catalysts. Amongst the first building blocks - of particular relevance for libraries - were the WWW, client-server based CD-ROM solutions (SilverPlatter ERL, Ovid) and the Z39.50 protocol. The potential of DVD-ROM in this context has only very recently been investigated (Ref 4).

It is more than possible that this shift is going to happen much faster, and probably some libraries that have been slow in reacting to the first shift, will move immediately into the second one. There are very good reasons for doing so. According to EC experts (Ref 5), the future of libraries depends on the success new networked library services will be realised with. This means that - in order to survive - the implementation of certain electronic services is no longer optional, but a must. If these will not be delivered by their "own" library, researchers - no longer limited by geographical boundaries - will address other libraries, making the raison-d'être of the "own" library less and less relevant.

Here, the survival of the library itself is not the main issue, but the survival of library values, that might become endangered. Libraries must - in the context at hand - also be interpreted as new solutions originating from innovative companies, competing with services traditionally delivered by or via "real" libraries, but operating from a mere commercial perspective. Traditional libraries should be active in this domain, by implementing new solutions and by co-operating with such new companies, constantly

keeping a close watch on crucial values such as the democratic provision of information, the archiving of information, the integrity of information, ...

I.Characteristics of second wave solutions

Some major features distinguish second wave from first wave solutions. The following will be discussed below: the hybrid information environment, the interlinked information environment, the accessibility.

A.the hybrid information environment

Due to the Internet-explosion and to the increasing availability of digital content from traditional publishers, the spectrum of the information environment has diversified far beyond the traditional print-oriented library. New solutions should deal with that environment, as a whole:

<i>information</i>	formal	non-formal
paper based	traditional library	traditional library
digital	digital library	Internet

Using these parameters, a solution to access the whole environment is composed of 3 sub-environments. Fig. 3, shows a representation of these, with the direction from left to right indicating the shift from atoms to bits (Ref 6) and from formal to non-formal information. Indicated from top to bottom are the various steps of the consultation chain (Ref 7). We distinguish:

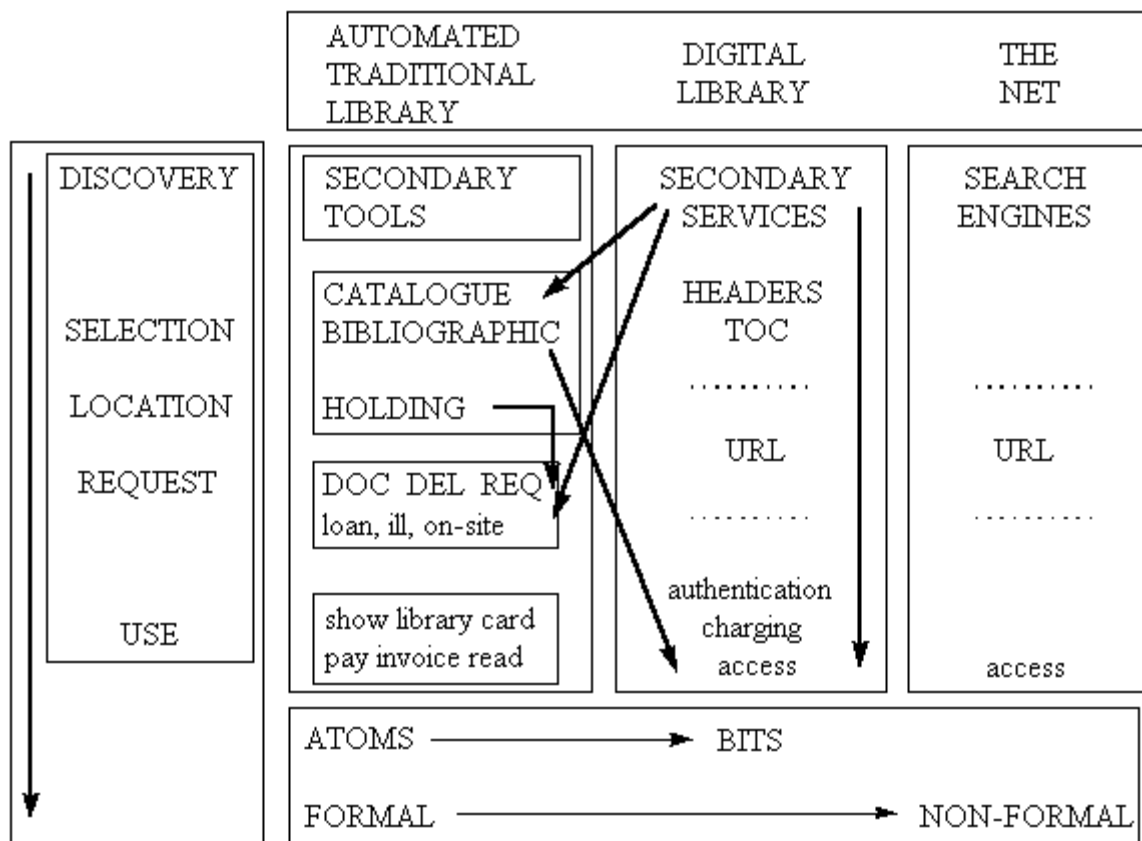


Fig. 3 : the hybrid information environment and the consultation chain

* The **traditional library solution**, aiming at the optimisation of the access to print-only, primary information. The used tools are catalogues revealing locations of that information; secondary tools providing an insight in the scientific production independent of local holdings; and document delivery mechanisms.

* The **Internet solution**, aiming at the optimisation of the access to digital-only, non-formal information. Some interesting initiatives (Ref 8) have been undertaken to disclose information of academic relevance in user-friendly ways. This is a very challenging domain, and the solutions being presented range from manual compilation of an academic Internet catalogue to automatic classification of Internet resources. Due to the extent and the dynamics of this problem, and given the financial and organisational restrictions faced by most libraries (Ref 9) only few will be able to provide relevant input in this domain. Luckily - for the time being - libraries can point to the solutions compiled by their colleagues or direct users to the free Internet search engines. No doubt we shall see new commercial secondary services arise in this area.

* The **digital library solution**, aiming at the optimisation of the access to digital-only, formal information. It is obvious that the digital-only solutions will be inspired by the Internet-mechanisms, linking directly from secondary tools to primary electronic information. In the commercial arena, this is the domain of an increasing number of vapour-, paper- or operational solutions such as Blackwell Navigator, SwetsNet, Elsevier Science Direct, UMI Proquest Direct, SilverPlatter's SilverLinker, ISI's Electronic Library, Ovid's Biomedical Collection. In the non-commercial arena, this is the domain of in-

house, peer reviewed electronic publishing, a possibility that is increasingly being investigated by academic institutions. For the discussion at hand, it is important to point out that in-house electronic publishing as such is not enough. We want users to be able to find the publications, as well. This means that secondary services remain essential, and should be provided either via the established - commercial - information providers or via new tools.

From the above we might conclude that none of the existing terms identifying the new library solutions - virtual library, electronic library, digital library - are able to name the complex problem at hand.

* Traditional libraries do not operate in a mere virtual, digital or electronic environment. The services - for years to come - are based on both print and digital material.

* The term "library" itself, almost implies "formal information" and "structure". Therefore, it might not be very appropriate to use it when referring to future solutions that take into account the "non-formal" information flow generated by the Internet.

The truth is that from now on, libraries will have to deliver solutions in a hybrid information environment.

A.the interlinked information environment

The expectations of a net-traveller when using a library solution are inspired by his hyperlinked experiences in the non-formal information environment (Fig 4). To this user, it is not comprehensible that formal secondary sources, catalogues and primary sources, that are logically related, are not functionally hyperlinked. As illustrated conclusively in the Mecano EC Project (Ref 10), linking information in a first shift library solution is not quite feasible. But the client-server based building blocks of second shift solutions enable the development of linking mechanisms. The library-holding link - between secondary and catalogue information - is an obvious, and meanwhile popular example (Refs 7, 10, 11). A gateway from secondary information to an interlibrary loan service - being a special case of document delivery - is another example, as is the link between a catalogue system and primary document servers within the institution or at an information providers' site.

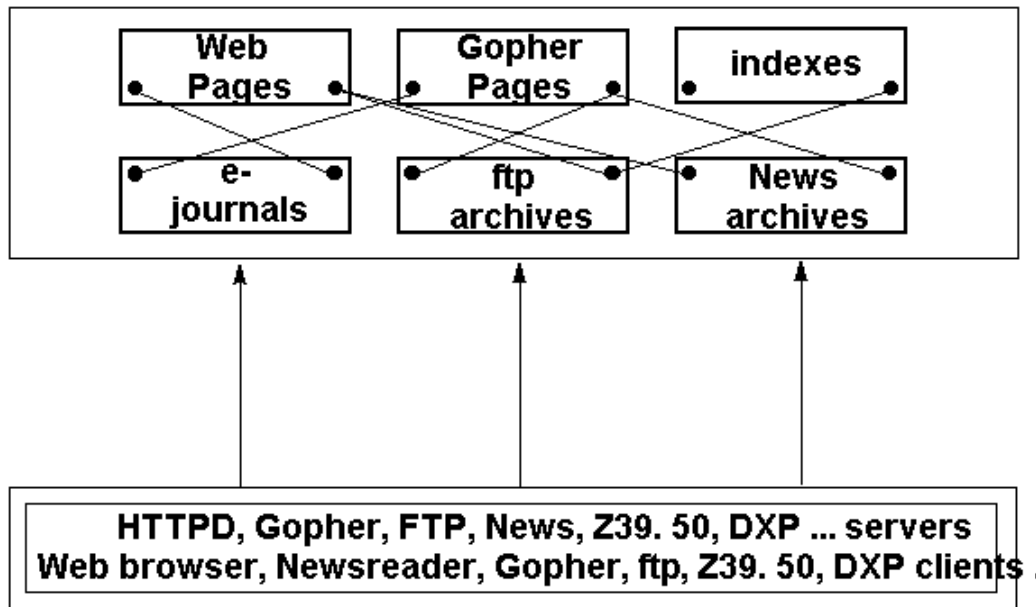


Fig. 4 : the interlinked informal information environment

The realisation of these links requires co-operation amongst libraries, providers of library housekeeping systems, providers of secondary services and providers of digital library solutions. In the course of building a next generation solution, libraries will choose amongst building blocks from different providers. Within the wide variety of criteria that will be used during that process, the willingness of the provider to co-operate in the domain of integrating the information environment might be one of the major ones.

A.the accessibility

Because of technical limitations of the building blocks, first shift solutions have very rarely been accessible to the whole community they were addressing. Only in some cases, where - for instance - computer centres have been able to impose certain technical choices upon their peers (Ref 12), we have seen the realisation of a general, uniform access to the available information. Second shift solutions arise in a completely different setting, characterised by client-server building blocks, cross-platform protocols and software (TCP/IP, HTTP, HTTPD servers and Web-browsers) and even cross-platform "operating systems" (Java). Therefore, the new solutions can fundamentally broaden the scope of the potential user-community by implementing:

* **location independent solutions:** Even in most first shift solutions, the user goes to the library for electronic retrieval. The second shift library reaches out to the user. The user accesses the library through the network, no longer restricted by geographical boundaries, since he is wired to the global network.

* **platform independent solutions:** The second shift library delivers services to a heterogeneous user-community, in which each user chooses a computer platform that fits his overall needs. Therefore access to the new library should be possible through the most common computer platforms and access-software is required for all these platforms.

* **access via standard user-interfaces:** The library user picks his own brand of software(s) to wander on the information highway. Therefore, the new library solutions should be able to deliver services to a variety of de-facto standard net-communication software.

* **access-control and accounting mechanisms:** In the course of gathering commercial information via the library solution, users will be accessing both intranet and Internet based services. The access mechanisms and accounting procedures of the information providers that will be "visited" during searching will be quite different. A new solution should free users from the burden of keeping track of numerous passwords and financial mechanisms, by developing access-control and accounting mechanisms between end-users and libraries and between libraries and information services.

I. The hybrid library implementation at the University of Ghent

The theoretical discussion above and the points of view expressed therein, are the main starting-points for the recent Intranet realisation of the library automation team of the University of Ghent (Fig. 5). The whole realisation could be seen as "just another library web site", but the authors feel it is something more.

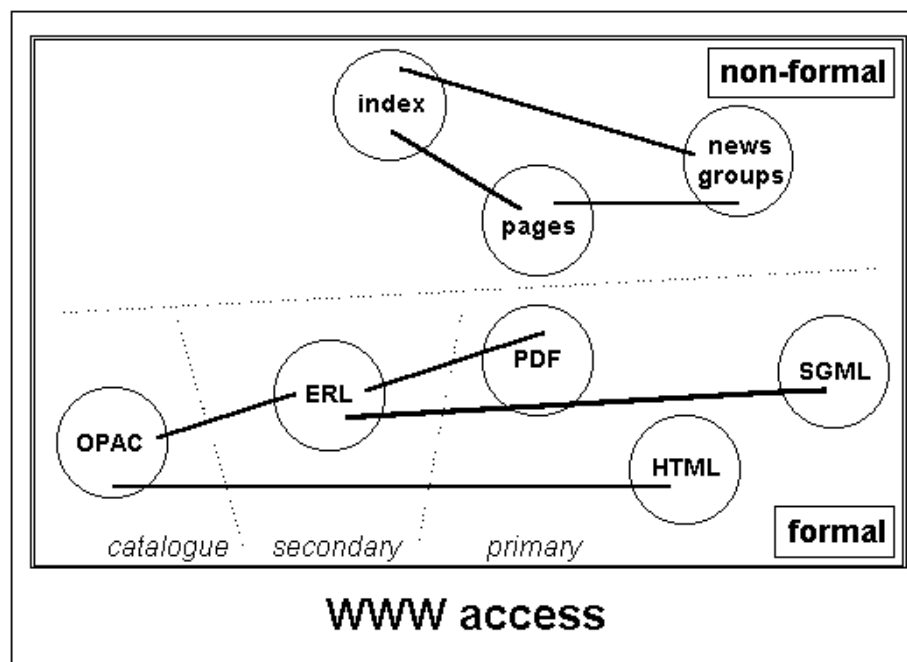


Fig. 5 : the interlinked hybrid information environment

The new web site is strictly divided into two parts:

* **the Information Desk:** a traditional library web site, being a guide to the library of the University of Ghent;

* **the Executive Lounge:** a web-based solution to access the new information environment, based on the philosophy expressed above.

For obvious reasons, the Information Desk will not be discussed here. The remaining paragraphs will address the Executive Lounge as seen from the point of view of the user and of the technician.

A.the Executive Lounge built for the end user

It should be clear that the best way of getting an insight in the functionality of the Executive Lounge is to pay it a visit (Ref 13). Nevertheless, since some of the available functionalities will not be visible to external users, a brief description is given below.

For the end-user, accessing the Executive Lounge starts by the authentication process. On public access workstations in libraries and computer classes, this process is executed backstage. External users can use a guest account with limited functionality. Once entered into the Lounge, the user will be presented a maximum of 3 screen types:

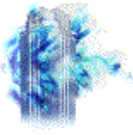
* **the Executive Lounge menu page:** This menu page (Fig 6) is frame based, where the right frame holds the menu information, presented dynamically, based upon users' choices such as language, scientific discipline and information type. Following the tradition of the first shift Bibinfo solution (Ref 14) used in Ghent since 1991, the menu system adheres to the logic of the consultation chain: secondary sources, catalogues, primary sources. The main conceptual difference with Bibinfo is that each of these topics gathers both Intranet and Internet based services, both formal and non-formal information sources. For instance, "secondary sources" gives access to Current Contents, as well as to the major Internet search engines. "Catalogues" links to several important Belgian library catalogues, and also to a catalogue of electronic journals. An extra menu item has been introduced containing links to important scientific communities' sites. The goal is not to present a complete list, but to provide good starting-points.



Fig. 6 : the Executive Lounge menu page with general help

The left part of the menu page contains either general help on the use of the menu system (Fig. 6) or help about specific menu topics (Fig. 7a & 7b), when requested by the

user. Specific help is automatically replaced by the general help after a predefined time-interval.



Current Contents: all editions

Database: CURRENT CONTENTS
Language: English
Vendor: Institute for Scientific Information (ISI)
Producer: Institute for Scientific Information (ISI)
Data Type: Bibliographic

Agriculture, Biology, & Environmental Sciences



Nederlands Exacte OK

secundaire bronnen

- Alle SilverPlatter ERL.databanken
- Analytical Abstracts
- Biological Abstracts 1996
- Chemical Abstracts
- Current Contents 1/3/97-7/3/97
- MathSci Disc 1993-1996
- MathSciNet
- Science Citation Index
- Bronnen op Internet

Fig. 7a : the Executive Lounge menu page with specific help

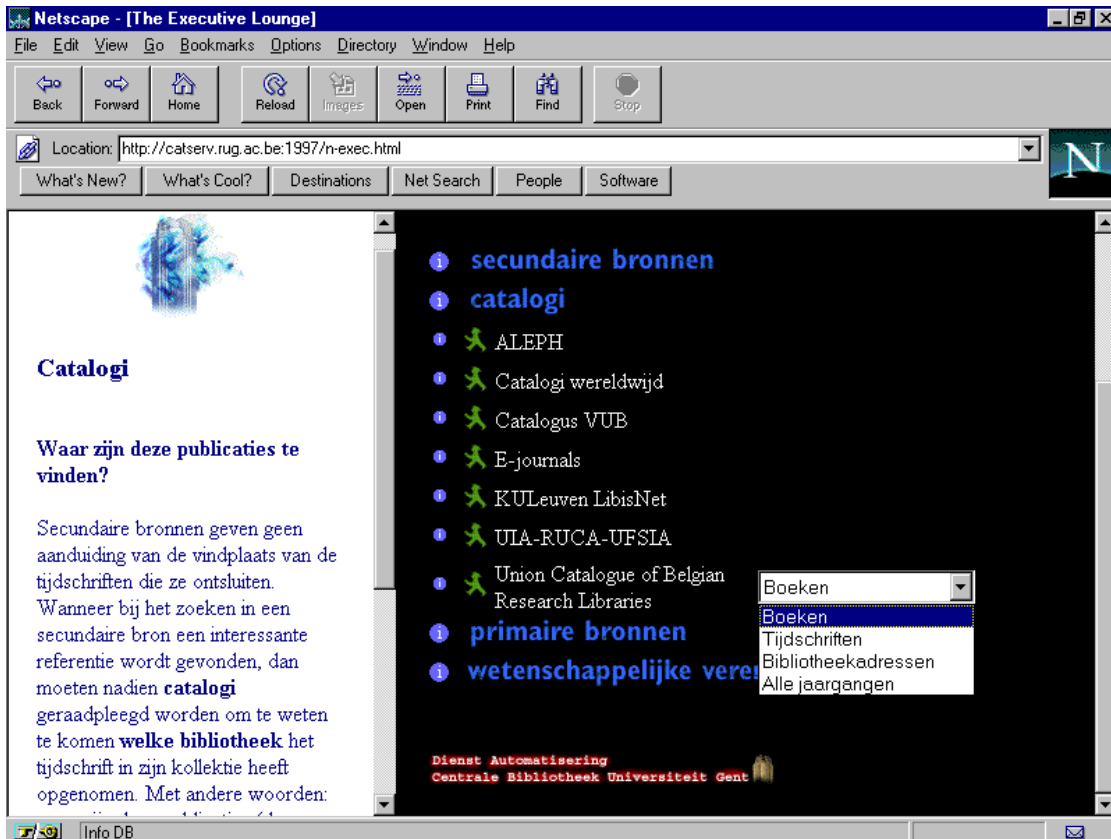


Fig. 7b : the Executive Lounge menu page with specific help

* **the Executive Lounge search pages:** These pages are presented to the user after the choice for an Intranet-hosted database, such as the Aleph catalogue of the University of Ghent (Fig. 8), an ERL source (Fig. 9), or another CD-ROM file (Fig. 10) that is made available via the menu system. To facilitate navigation, these Intranet search pages share a common lay-out, containing the Executive Lounge icon (back to the menu), a common background, ... A nice example of the desired "integration of information" is available when searching ERL databases. References from ERL databases are presented with an extra button, linking directly into the Aleph catalogue system, to check for local holdings (Fig. 11). A second button will be added, linking to the Belgian national serials catalogue, Antilope (Ref 15).

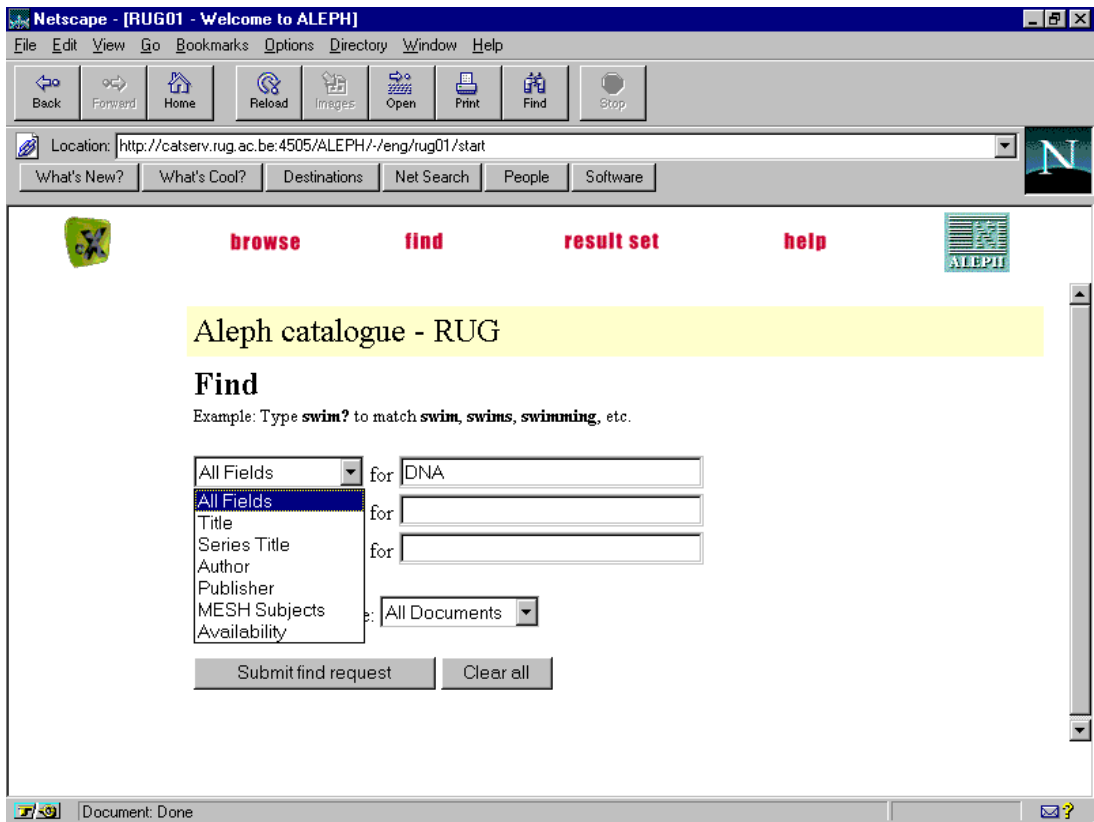


Fig. 8 : an Executive Lounge search page for the Aleph catalogue help

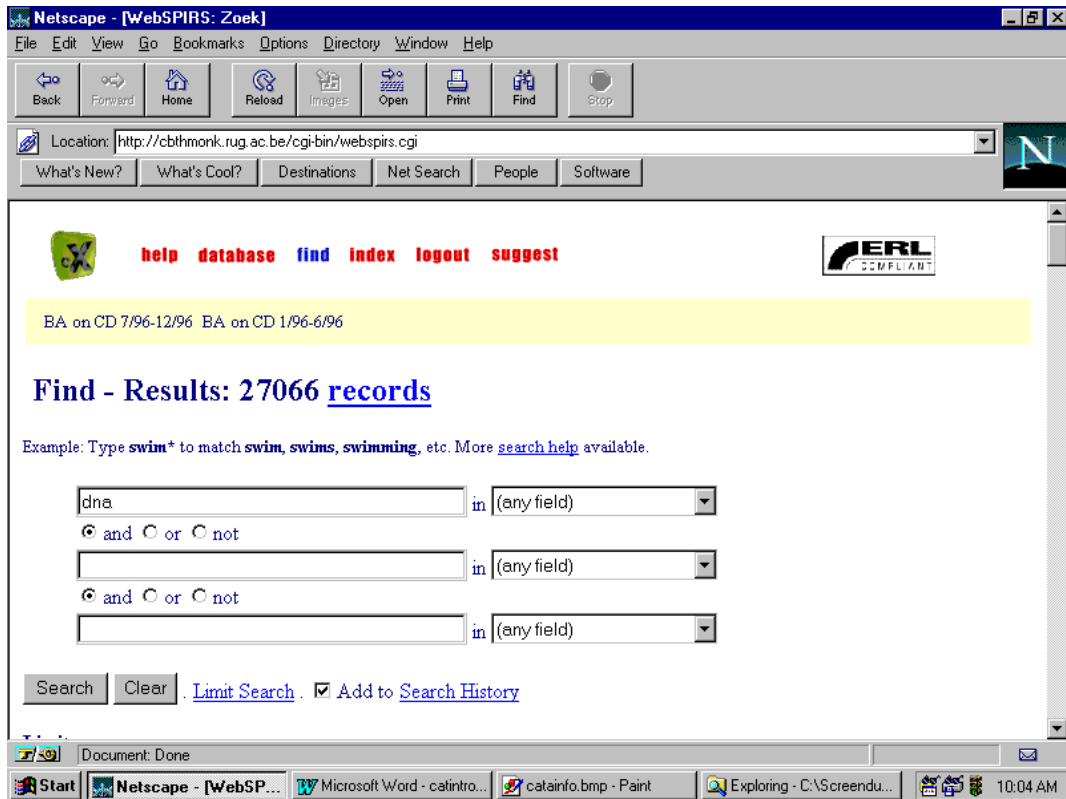


Fig. 9 : an Executive Lounge search page for ERL databases

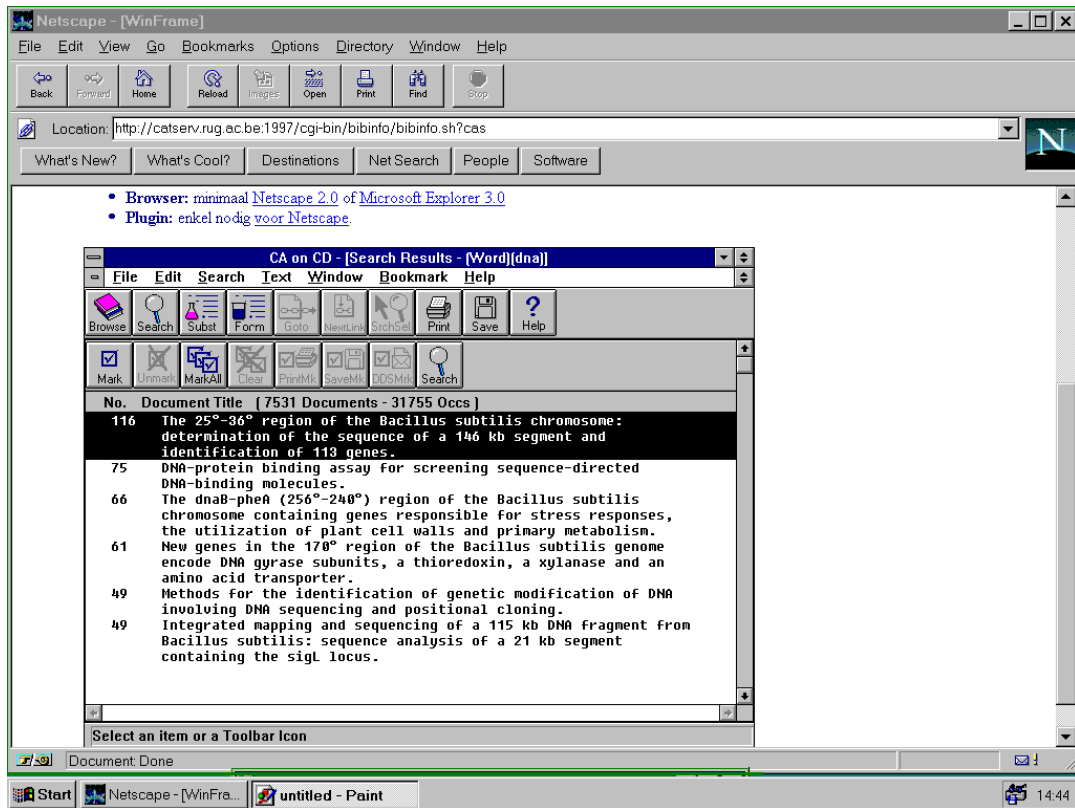


Fig. 10 : an Executive Lounge search page for a WinFrame based source

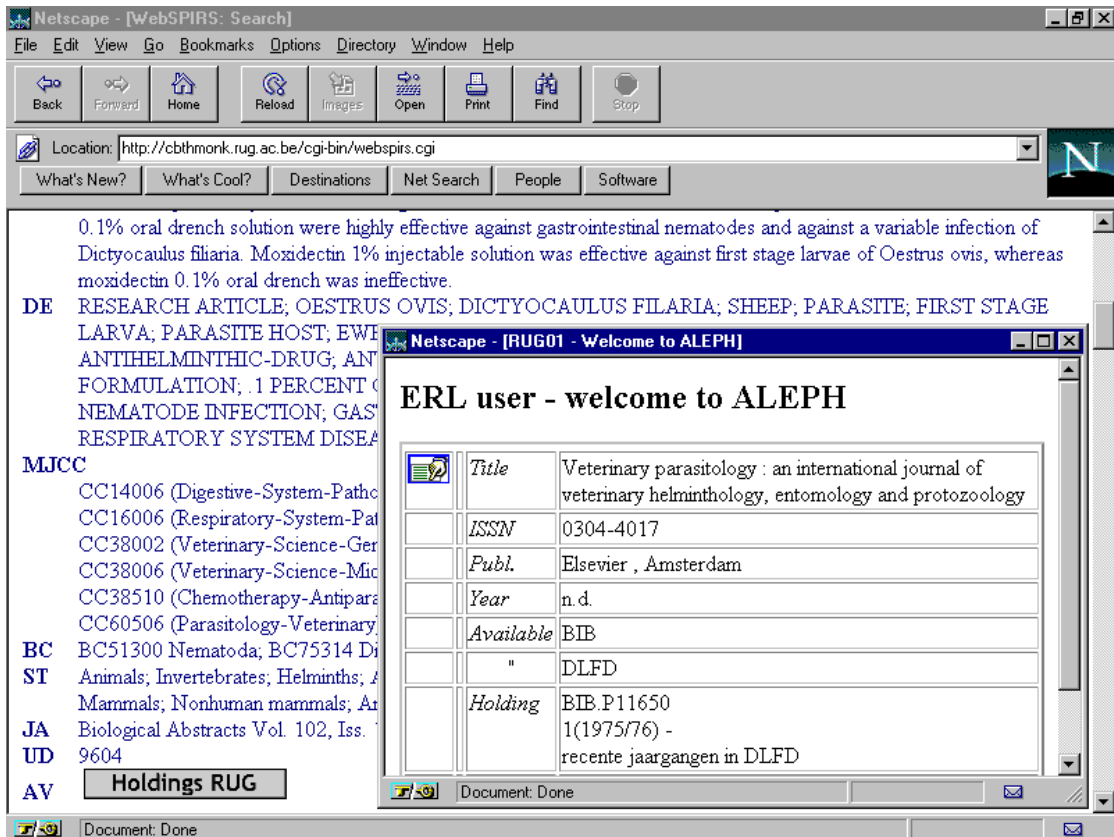


Fig. 11 : the link between ERL and Aleph

* **the external pages:** These pages are the external, Internet-based pages disclosed by the menu system. The pages are presented as they are (Fig. 12), and the only way to get back to the Executive Lounge, is by scrolling through the browser history. In the future, returning to the Lounge might be facilitated by a flying Java-applet showing the clickable Executive Lounge icon.

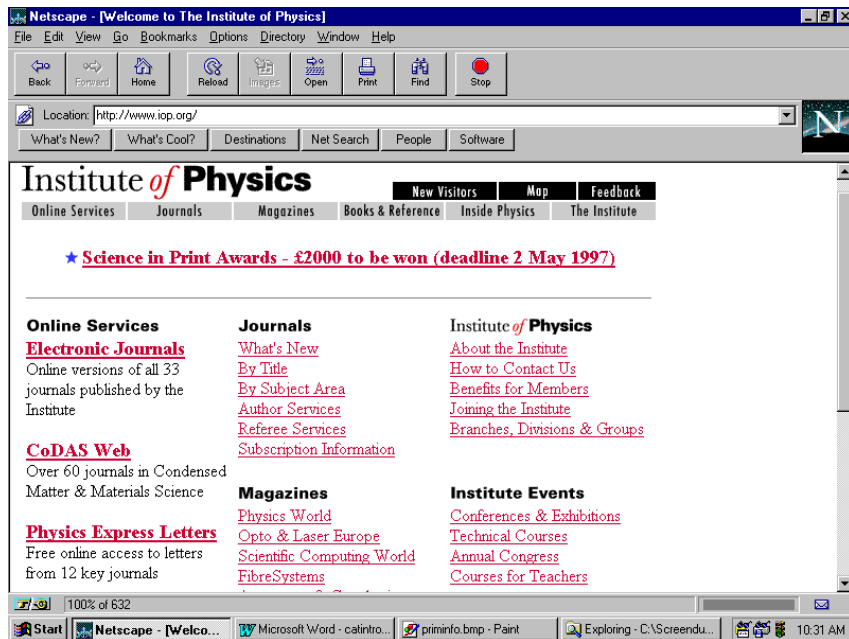


Fig. 12 : an external page

A.the Executive Lounge built by the technicians

The main technical components of the Executive Lounge are:

- * **a Web server**
- * **a database of sources:** This database contains the menu items, and properties for each: URL, information type, disciplines, Intranet/Internet-flag, Ghent-only-flag, ...
- * **the gentsurf cgi script library:** A set of cgi scripts used to build and execute the menu system. This collection also contains tailored scripts to logon to external solutions, hiding account and password information for the user. This library takes into account the browser-type and delivers pages optimised for Netscape, Microsoft, Lynx and frameless browsers.
- * **the maintenance script library:** A set of scripts to maintain the menu database, both in interactive mode - via web-based input by administrators - or in automatic mode, updating the menu system by extracting database information from the ERL server.
- * **the authentication procedure:** For the time being, authentication of users is done, using the database of authorised ERL users. Investigations are made to evaluate the possibilities of using LDAP based mechanisms in this area.
- * **inter-application scripts,** such as the ERL-Aleph link for holdings-lookup, the gentsurf-ERL link for authentication purposes, ...

The basic content-providing Intranet building blocks are:

* **the ERL server**, hosting around 40 Gb of commercial secondary information, in a wide range of scientific domains (Ref 16). This server also hosts a copy of the Belgian Union Catalogue of Research Libraries, the first union catalogue of monographs and serials in the world, built in SilverPlatter format. This database is the result of a national project, managed by the Universities of Ghent and Louvain (Ref 17), and technically realised by IVS nv, the Belgian SilverPlatter Partner Publisher. (Ref 18). Another database on this server - Narrative Sources from the Middle Ages - is the result of a co-operation between the Department of the Middle Ages - that compiled the database - and the library automation team, that brought it into the SilverPlatter format (Ref 19). More projects of this nature are to be expected.

* **the Aleph catalogue system**, being the first Aleph 500 installation world-wide (Ref 20). This system is client-server oriented and based upon an Oracle database. The catalogue actually contains about 400.000 titles, while approximately 3.000.000 more are waiting to be converted to machine readable format.

* **the WinFrame/NTrigue CD-ROM servers**, hosting databases that are not available in a client-server environment (Ref 21). These "graphic terminal emulation" technologies enable smooth cross-platform access to DOS and Windows based CD-ROMs, from a Web-browser or a helper application.

Added to this are Internet-based content providing building blocks. For the commercial ones, that require authentication procedures, scripts are in place to perform backstage logons, wherever the information providers are willing to provide the essential technical information.

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(16) <http://www.silverplatter.com>

(17) <http://www.libis.kuleuven.ac.be/libis/ccb/index.html>

(18) <http://ivs.vub.ac.be>

(19) <http://allserv.rug.ac.be/~jdploige/sources/>

(20) <http://www.aleph.co.il>

(21) <http://www.citrix.com> & <http://www.insignia.com>

Biography - Herbert Van de Sompel has a background in Mathematics and Computer Science. Since 1981 he is head of library automation at the Central Library of the University of Ghent, providing automated library services to the Ghent University community. Already in the eighties, his work has been concentrating on the provision of secondary information, rather than on catalogue information, as is/was the case at many other academic institutions around the world. He has done some challenging work, providing large-scale networked CD-ROM access to a broad and heterogeneous user community. In 1993 his efforts were rewarded when Silverplatter chose Ghent as one of the beta-test sites for the next-generation CD-ROM networking ERL solution. Recently he is also involved in preliminary discussions on the realisation of a consortium aiming at the delivery of electronic information to the Flemish research and education community.