
INTEGRATED AND PERSONALIZED DIGITAL INFORMATION SERVICES

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***Abstract:** Digital information services are gradually becoming integrated with other systems and services such as library automation systems, student information services, and electronic learning systems. Users demand seamless access to a multitude of digital information services without leaving their desktop computers. They prefer using systems that recognize them when they log on, acknowledge their rights and privileges, and thus provide personalized information services. This paper summarizes the recent developments concerning integrated and personalized digital information services. It first emphasizes the role of the Internet in providing information services and then goes on to discuss the integration and personalization issues by emphasizing their importance for digital information services.*

***Keywords:** Digital information services, Personalization, Integrated information services, Personalized information services.*

Digital Information Services

A large number of digital information services are offered to users by library and information centers today. Table of contents services, full-text access to electronic journals, current awareness services, electronic document delivery, and virtual reference services are among them. The Internet plays a paramount role in providing these services. While Internet removes both temporal and spatial barriers and makes it possible to provide information services on a 24/7 basis, it also provides "instant gratification" to users. In other words, users can get what they want instantly, from anywhere, at the best value for their money [Reich, 2002, p. 15].

Information technology (IT) in general, and the Internet in particular, has had a significant impact on information management in that it enabled library and information centers to shift their services from centralized information services to the networked and distributed ones. Consequently, economic models of information provision have also shifted from models based on centralization to that of personalization. The ability to make an information source simultaneously available to multiple users through networks removed the "one source – one user" limitation of the print world. Information centers are no longer bound with their own information resources to provide services as they can easily get access to remote information sources "just in time". While the ownership of information sources in the print world dictates the use of centralized information management models, simultaneous access to the same source by multiple remote users through networks paves the way for more cooperative/consortial information management practices.

The costs of information sources have increased tremendously within the last 20 years. The material acquisition budgets of the members of the Association of Research Libraries (ARL) in the United States can no longer keep up with the accelerated price hikes of information sources, especially scientific journals. Libraries devote about 20% of their material acquisition budgets to electronic information sources. The total expenditures of ARL libraries for electronic serials have increased more than ten-fold between 1995 and 2002 [Kyrillidou, 2003]. Cooperative practices tend to ease the burden of library and information centers and enable them to spend more money to license electronic information sources. At the same time, such consortial initiatives increase the responsibilities of collection managers as they have to prepare separate policies of licensing, processing, maintenance, storage and use for electronic information sources. Moreover, consortial agreements make each library and information center "interdependent" on other such centers, library consortia, information producers/providers and aggregators.

Traditional information management practices are usually based on centralization of resources and services. Access to centralized information sources and services is provided through intermediaries such as reference librarians or information specialists. Intermediation requires centralization. It is expensive; it usually means long lines queuing for centralized services; and it does not serve the remote users. The use of IT and networks on the other hand makes information management less centralized and more distributed. Remote use of resources and services is often carried out without intermediation. Disintermediation decreases in-house use of library materials,

reference and circulation transactions while it increases interlibrary borrowing transactions and electronic document delivery requests. For instance, the number of reference transactions in ARL libraries was declined almost one-third while the inhouse use of libraries was almost halved since 1991. Interlibrary borrowing, on the other hand, has doubled during the last decade [Kyrillidou, 2003]

Integration of Digital Information Services

Nowadays, digital information services are often integrated with other computer-based systems. For example, digital information services are usually blended with library automation systems, student services, financial services, research and grants data management systems in universities. More often than not, digital information services have links with off-campus electronic learning, electronic government and electronic commerce systems. Interoperability makes it possible to integrate digital information services with other on- and off-campus information systems.

In the recent past, a library has usually provided access, by means of different user interfaces, to its online catalog, bibliographic and full-text databases, table of contents services, electronic preprint archives, citation indexes and the resources available through the Web. Users had to invest time and energy to learn how to use each interface with differing modes of interaction and to study each database with differing record structures, metadata schemes, etc. in order to carry out successful searches. The recent availability of commercial, off-the-shelf software packages such as SFX enabled libraries to integrate different digital information services and offer access to them through a single interface. Such systems link different databases that are available in the library and create more complete records that would likely satisfy users' search requests. For instance, certain parts of a bibliographic record representing an item may come from a citation database, library's online catalog, serial holdings, subject gateways or reference databases such as Ulrich's or PubMed. A library may have access to the same source in different formats (e.g., printed, CD-ROM, on-line). Each format may have some advantages and disadvantages. While the on-line copy may be the most convenient from the users' point of view, it may not be the most cost-effective from the library's point of view. If a source is available in more than one formats in the library, such software packages can also handle what is called the "appropriate copy" problem based on library's specifications. Furthermore, link software packages are usually integrated with the library automation systems (e.g., Millennium of the Innovative Interfaces, Inc.) that take care of routine maintenance tasks such as acquisition, cataloging, and circulation.

Personalization of Digital Information Services

Personalization is defined as ". . . selecting and filtering information objects or products for an individual by using information about the individual" [Koch, Möslin and Schubert, 2002]. It became cheaper to produce personalized goods and services using advanced IT. Toffler pointed out that ". . . as technology becomes more sophisticated, the costs of introducing variations declines [Toffler, 1970, p. 236]. In fact, mass customization and personalization is an indication of a rich and complex society (Information Society) whereas mass production and mass distribution has been one of the identifying characteristics of the Industrial Society. The Industrial Society is based on what Mitchell M. Tsang called "make, store, sell" approach while the Information Society promotes the "sell, make, deliver" approach. In other words, producing faster, cheaper products in large quantities has been the cornerstone of industrial societies. On the other hand, an idea or a product is first sold to a customer and then it is developed according to the customer's specifications and finally delivered to the customer.

Internet users should be familiar with personalized information services such as personal banking services, on-demand publishing and on-demand video services, automatic current awareness services, electronic document delivery services, recommender systems, and personal information agents. The availability of personalized services makes life easier for us as it is usually more convenient to get access to, say, our bank accounts through networks from wherever we happen to be (home, work place, etc.) instead of paying a visit to the bank.

In order to personalize information services, personal information about users (their demographic characteristics as well as their information seeking and use behaviors) needs to be gathered. This can be achieved either implicitly or explicitly. For instance, several search engines collect personal data about users by means of "cookies" or by using click-stream analysis techniques. Or, users may take a more active role in personalization and define their interests by voluntarily filling in web forms. Once the user profiles are created by using both

implicit and explicit methods of data gathering, "pull" and "push" technologies can be used to provide personalized digital information services.

Personalization can be applied in three different levels. Most web users are familiar with the personalization of the display environment of such information services as My CNN, My Yahoo!, My Bank, or My Library. Users themselves can easily specify where each item or icon should appear on the computer screen. The content can also be personalized based on user data or specifications. For example, users can choose the type of news (sports, politics, etc.) they wish to read when they connect to the system or the weather forecast for their geographic region. Personalization of content is also used in library and information centers. The digital collections available through the library can be made accessible to users based on their statuses (e.g., student, academic) or their origin of network connection. For instance, the use of digital collections of a library is often restricted to licensed users only. Remote users connected to the library from computers outside the specified IP domain(s) may not access to some of the digital resources even though they are available. Or, certain electronic reserve collections can only be accessible by those students taking a specific course. In other words, "availability" and "accessibility" are two different things. The digital content can be personalized according to users' characteristics. The digital information services such as "alert" or electronic document delivery services can also be personalized. The personalization of services requires a more sophisticated approach. Not only does the digital content get personalized but also the services need to be tailored according to each and every user's rights and privileges. For example, if a library does not own or has access to a certain information source, a professor may place (up to a predefined threshold) electronic document delivery requests using the facilities provided through the library automation system whereas a student may not be able to do so or may do so only through the intermediation of an information professional.

A complex matrix defining the users' rights and privileges as well as collections' characteristics (e.g., open to campus users only, or open to students taking a specific course) needs to be created beforehand to provide personalized digital content and digital information services. Online bookstores such as Amazon.com keep data about past browsing and buying behaviors of their clients so that they can recommend new items to consider/buy when the user logs on to the system next time. Although library and information centers can easily gather similar data about users' past borrowing or downloading behaviors and use this data to provide more personalized services, they refrain from doing it for various reasons. First, they may not keep personal data longer than a specified period of time according to the law and the personal data may only be reported in aggregates and destroyed later. Second, some users may feel uneasy about being "observed" by the information providers. Third, the library automation systems are usually not configured to relate content and service data with personal data. Lynch [2001] points out that "circulation systems typically break the link between a patron and a book that has been borrowed when that book is returned" and thus libraries lose the opportunity of providing more personalized services. Lynch also emphasizes the fact that it is quite difficult to implement personalization in a distributed information environment as personalization "occurs separately within each system that one interacts with" and "[i]nvestment in personalizing one system (either through explicit action or just long use) are not transferable to another system." However, personalized digital information services should be provided to those who are willing to experiment. There should be nothing wrong with sending a personal message automatically to a user's mobile phone informing her that the article she has requested earlier is now available or sending an electronic copy of the article to her electronic mail address.

Information centers are increasingly designing "portals" to facilitate the users' access to the available resources. A portal can be defined as an information hub or an entry point to digital information sources and services available through the Internet and intranets. It is an application that provides metasearch and support services. A portal can be an entry point to an institution's repository as well as to community repositories and commercial resources. It can provide a number of services ranging from terminology services to rights management, from harvesting data to identity management, and from configuration to presentation. A portal also provides personalized sources based on personal demand or specific roles and organizes the digital content so as to help different users. Portals can be seen as a "one stop shop" because they are designed in such a way that users could find what they want by simply visiting a portal's web site. Yet Dempsey [2003] warns us that, if not designed carefully, portals may also function as "one shop stops," thereby limiting users' choices of access to information. He further adds that a "portal is not a strategy replacing effective use and management of information sources in a networked environment, but, rather, is a part of such a strategy" [Dempsey, 2003].

Conclusion

When one gets access to a library web site, it is not unusual to see that the standard content is offered to all users regardless of their rights and privileges. Yet users should be recognized when they log on and the content and services should be personalized accordingly. This can be done using, among others, various “pull” and “push” technologies, smart cards and – in the foreseeable future – biometric features. To do that, library and information centres need to move from “resource-centric” approach to “relationship-centric” approach. To put it differently, library and information centers should take into account not only the relationship between bibliographic records and the information sources that they represent but also the relationship between information sources and the users. As I emphasized elsewhere, “instant gratification” is only possible with the availability of instant access to networked, personalized digital information services. Without this, more demanding users will take their business elsewhere to get instant satisfaction [Tonta, 2003].

Several issues should be tackled in order to be able to offer truly personalized digital information services. Personalization is difficult to implement in distributed environments. It requires networking infrastructure (access to personal, local, regional and wide area networks). It also requires interoperability in that digital information services should be interoperable (i.e., work together) not only with library automation systems, student information systems, financial systems but also with e-banking, e-commerce, e-health, e-government and e-(l)earning systems. Sound policies to tackle security and privacy issues should be implemented along with more sophisticated budgeting, pricing, use and training models. If library and information centers do not succeed in their endeavors of providing personalized digital information services, there is a danger that they might be ignored and neglected by the potential users in the future.

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