The impacts of enterprise-wide network technology on service management: a corrective model for a technological university library management

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1. Introduction
University libraries are complex enterprises, and when enterprise-wide network technology replaces older ways of conducting business, many impacts are felt, and many changes follow. Being an information technology, electronic networking is attractive to the librarian in service delivery. However, because of its mechanistic nature, it also presents dangers. In this paper it will be shown that the relationship between user and librarian is drastically affected by such networking, and that a new way has to be found to maintain the benefits of the traditionally consultative role of the librarian as the information expert. A "safety net" has to be provided for the users, and to this end a model for service and communication management is proposed. In this paper the focus is on the process rather than on resolving specific impacts.

2. What is meant by EWN technology?
EWNs (enterprise-wide networks) refer to the integration of LANs throughout the enterprise (with the focus being on the organisation/enterprise, not the hardware), thereby providing system-wide LAN benefits and access to information resources. From the hardware point of view, EWNs consist of high-bandwidth (e.g. 100 Mbit/s) connections (the part referred to as the campus backbone or campus network) between LANs. Together, these two component parts (the LANs and the inter-LAN links), as well as possibly WAN links, use open systems technology. The resultant infrastructure must, to be classified as an EWN, be integrated to such an extent, especially on the software level, that it presents itself as one virtual computer to the user, even though it runs any number of distributed processes and functions. This means that, in EWNs, any single access point provides exactly the same services in exactly the same way as any other access point.
From the functional viewpoint, such an inclusive and pervasive software-driven network provides electronic communication throughout the enterprise at speeds acceptable to the users. EWNs specifically function as carriers of multiple applications of which the library OPAC will be one. Total applications-sharing is characteristic in EWNs. EWNs often contain WAN (wide area network) features (having links via digital utility networks), thereby linking to local packet switching networks, Internet etc., and linking up the geographically remote units of the enterprise, e.g. remote campuses.

Use of an EWN creates two major groups of benefits: extension of communication possibilities, and integration of the enterprise. Its power lies in its flexibility, as it supports a host of information needs (such as document transfer, enquiry facilities, etc., in one-to-one and one-to-many modes), across a wide electronic spectrum (images, text, video, CD-ROM etc.). Typical services carried on EWNs in universities include e-mail, file access, extraction facilities, file transfer in the widest sense, diarising, gateway services, access to catalogues and application programs, etc.

3. Network impacts that are relevant to libraries

In South African tertiary educational institutions, following world-wide trends, there is presently strong interest in, and already good examples of, using the EWN for library purposes. There is also the same general recognition that the new technology will have two major levels of impact on libraries, viz. (a) on the organisation, and (b) on the individual in the organisation. It is evident from the literature that these can be either beneficial or detrimental, and much depends on how these probable impacts are handled operationally, and how the process of addressing the impacts is managed.

Impacts on the organisational level

When discussing the impacts, I have found that we normally list the desirable impacts on work, which consist of productivity gains in a number of forms. Some examples are: resource sharing, time independence of communication, better-informed decision-making and facilitating of peer contact. We also recognise that the network supplies a communication interface for access to the enterprise and to the external environment. This way of discussing the features, while valid, is too general to be of much use in managing the impacts. It nevertheless leads us to some important strategic insights.
The communication infrastructure sketched above clearly has revolutionary potential for the libraries of the enterprise. It not only integrates major library technologies and provides a new, and possibly dominant, communication infrastructure, but also provides an opportunity to strategically restructure and strengthen the library's fourfold role as primary information resource, gateway, identifier of unknown resources and specialist information consultancy for the enterprise. The following table summarises areas of possible strategic development from the perspective of library roles with regard to access to resources:

**TABLE 1: ROLES OF THE LIBRARY FROM RESOURCE PERSPECTIVE**

<table>
<thead>
<tr>
<th>SPHERE (RELATIVE TO THE LIBRARY)</th>
<th>RESOURCES</th>
<th>SUBLIBRARIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL</td>
<td>KNOWN</td>
<td>CENTRAL INFO RESOURCE (TRADITIONAL LIBRARY)</td>
</tr>
<tr>
<td></td>
<td>UNKNOWN</td>
<td>DEVELOPER AND CONSULTANT</td>
</tr>
<tr>
<td>EXTERNAL</td>
<td></td>
<td>GATEWAY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LOCATOR</td>
</tr>
</tbody>
</table>

Table 1 also leads us to thinking about some of the questions that arise through, or are accentuated by, the possibilities of the new technology. Eventually one is led into rethinking the library's mission and goals in the context of the larger enterprise. As librarians, we recognise the importance of consulting with our users on such matters as possible impacts and changes. This point is important, as the model proposed later is presented as a specific way of addressing this need for consultation about service development.
The problem of technology in human service

As the new technology is particularly relevant to the library's operational communication with its users, I see this as the source of a key problem.

From the literature (e.g. Martini, 1992) it appears that this technology is typically so pervasive and revolutionary in its operational effects, that it replaces previous work patterns and can substantially redefine the nature of the enterprise. Looking at end-user access to the collection as the most prominent example, we see the networked OPAC, and particularly access to indexes and full text data, creating an immediacy of access not possible in the non-networked library. Table 2 illustrates this, and it also shows, in the integrated mode, how the library staff are bypassed.

<table>
<thead>
<tr>
<th>ACCESS ROUTE</th>
<th>MODE</th>
<th>ADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>USERS—RESOURCES</td>
<td>direct mode</td>
<td>immediate limited access</td>
</tr>
<tr>
<td>USERS—STAFF — RESOURCES</td>
<td>consultancy mode</td>
<td>expertise of librarian</td>
</tr>
<tr>
<td>USERS—STAFF — OPAC etc. — RESOURCES</td>
<td>librarian</td>
<td>expertise enhanced</td>
</tr>
<tr>
<td>USERS—LAN—STAFF — RESOURCES</td>
<td>e-mail mode</td>
<td>eliminates visit sometimes</td>
</tr>
<tr>
<td>USERS—LAN—STAFF — OPAC etc. — RESOURCES</td>
<td>non-integrated</td>
<td>as above two</td>
</tr>
<tr>
<td>USERS—OPAC etc.—ON LAN—RESOURCES</td>
<td>integrated mode</td>
<td>immediate, wide access</td>
</tr>
</tbody>
</table>

Alienation between user and librarian

Based on the access advantages, we tend to correctly, but somewhat naively, think that the ideal should be the integrated mode. Although it has immense advantages for us and our users, it does bypass the librarian. In effect, a new dependency on the system, as opposed to the librarian, develops. Furthermore, it happens on an enterprise-wide scale where the librarian is not physically present to assist. It is precisely for this reason that the question about the human dimension arises. It would seem that the danger of
alienation between users and librarians emerges on an unprecedented scale. Alienation will develop when the traditional personal contact, with its previously rich face-to-face communication features, is replaced by a mechanistic type of communication. This danger is intensified by pressure on service staff to be continually more productive/economical. The network can easily, yet unintentionally, be seen as an opportunity to let the library/information users find their own way, without simultaneously adjusting service managerial processes to ensure continued library effectiveness. This problem should be dealt with specifically in the networking and library service management processes on our campuses.

One interesting manifestation of the users thinking in a system-determined way, is the "suppressor effect". Users passively accept features and impacts of the system which can be changed, relatively easily, to their advantage. They might also accept impersonal, and therefore potentially degraded, service as an inevitable aspect of the new way of working.

The impacts that relate to the people in the enterprise
In the previous paragraph the importance of the individual dimension has emerged. In the literature on the effects of networks on enterprises, the impacts relating to people and communication are often reported as impacts on the individual.

These can be presented in two classes:
(a) as direct or side-effects which follow necessarily and contribute to a redefinition of the enterprise, and must consequently be dealt with throughout; and
(b) as undesirabilities which may creep into the process and must be guarded against should they occur.
(The literature has been interpreted in the library context wherever valid. "Client" and "customer" then become "user", "company" becomes "library", etc).

As regards (a) the inevitabilities, the following impacts were found:
Communication, e.g. document delivery, becomes distance-independent (Jackson, 1993:15), which replaces face-to-face contact (additionally, time-independence means that the user and librarian do not need to communicate in "real time"). As processes are structured for end-user self-sufficiency, it promotes intermediary-independence.
ii A need for new working methods/tools/systems emerges, to replace the previous physical presence of the service provider (cf. Martini, 1992:4). New procedures, e.g. in quality control, are required (Lane & Summerhill, 1993:156).

iii The enterprise has (unexpected) new ways of "metabolising" information (Martini, 1992:4).

iv A need for adjustments to, or new, human communication (Martini, 1992:4).

v A new way has to be found of "understanding" problems (Martini, 1992:5).

vi Leadership-type contact is still required as part of good management (cf. Shores, 1992:53).

vii In the final analysis communication remains essentially a human action, and technology such as networks comes between people, leading to a decline in interpersonal communication (Gerber, 1992:26).

viii Data problems, e.g. relating available data to problems and dealing with incomplete data, emerge (Martini, 1992:5 and Lane & Summerhill, 1993:156).

ix Sound knowledge of the human and other implications of new technology is essential (Senker & Senker, 1992:42). This is as true for the user as for the librarian.

x New services, previously inappropriate and undreamt of, need to be developed (cf. Martini, 1992:3).

xi On a very practical level, end-user access to commercial databases and services, bypassing the library, would require a new billing system thus introducing new financial challenges (Alexander & Fox, 1992:130).

xii The document delivery system alters, and it is complicated by the alternatives available to the end-user, as well as by the strategic thinking the user has to employ to find what he wants (Leach & Tribble, 1993:359).

As regards (b) the undesirabilities:

i There is the danger of focusing on the network, and not thinking like a user (Kanter, 1992:2).

ii Technologies, not the desires of the users, become the focus (Kanter, 1992:3).

iii Unilateral decision-taking becomes tempting (Senker & Senker, 1992:42).

iv The new technology could threaten the earlier, more personal, participative management of our users.
Interpersonal communications decline (Gerber, 1992:26).

The library starts thinking about performance, while the user keeps thinking of service (cf. Kanter, 1992:2).

The danger of losing support among the users is a serious matter: it is much more expensive and difficult to regain users than to keep existing users satisfied (Babich, 1992:65).


Invisible mistakes, i.e. invisible to the library staff, will lose support for the library. In a transition as complex as networking, library managers should do as all good managers should, that is "...spend more time worrying about what they do not yet see" (Kanter, 1992:2).

The danger of managerial convenience arises; the network provides the possibility to do only the convenient (cf. Kanter, 1992:2).

Computerphobia still exists. The network will probably highlight this. By bringing it into the open, the library staff will be forced to deal with it.

Translation of impacts into challenges for the library

It is clear that EWN technology, if pervasive enough, will tend to replace personal contact with the users and substitute it with a computer screen in the user's workplace, whether office, laboratory or dormitory. Library managers will have to find new ways of handling the emerging issues such as management, development and control of access. Optimisation (e.g. in decisions on CD database licensing), costing (e.g. of co-operatively purchased/developed resources) and skills training would require attention, as would copyright, ownership and information literacy. Some further impacts relate to mindset-changes required among staff, users and central funding authorities, changes to organisational structure, user orientation, shifting definitions of services and criteria for service performance evaluation, as well as regulation of service processes.

To return briefly to the strategic level, (following on Table 1), the challenges are:

setting up all library services, systems and procedures for increased performance (in the domain of the internal, known resources);

widening the scope of the library staff's involvement in campus information management (that is, contributing to the exploitation of the internal information
resources that have remained unused/under-utilised as a result of having been unknown as widely available information resources);

iii developing and gaining control over certain technical and financial managerial processes (relating to the management of the utilisation of external, known resources); and

iv becoming involved in information resource exploration (that is, exploring the realm of the external, unknown information resources so as to identify resources of value to the enterprise).

However the strategic challenges in a library are prioritised, the one constant is that the library remains responsible for satisfactory information service to users, previously accomplished exclusively through personal contact with the users. With EWN technology, the intervention that the network causes because of its impacts has to be managed deliberately.

Thus far an analysis of the impacts of network technology as well as some indications of the redefinition that a library undergoes have been presented. It is likely that new impacts, not covered here, might emerge in a specific organisation. It is also to be expected that each organisation will experience a unique pattern of impacts, with impacts in different organisations varying in severity. Much can be read and said about how the library can exploit/ameliorate specific impacts. Given the importance of communication between the users and the library, and also the extent to which the network affects previous communication practices, the challenge is to construct a communication process that is generally applicable, through which all the impacts can be managed successfully.

4. The major challenge in managing the impacts: an interactive service management model

Critique of the traditional model

The traditional managerial model used in libraries is essentially based on a top-down decision-making framework, typically featuring library committees, a library executive/directorate and operational management. It is, however, often the operational-
level decisions which impact most severely on the end-users, and about which consultation is necessary. With the EWN impacts, this is critically important. Strategic overall planning is ineffective if its implementation is not managed effectively on this level. The traditional processes might be good for policy decision-taking, but does not provide adequate interactive communication with the wide base of end-users, nor does it supply a solution to the clear need to deal with impacts on a small-group or individual basis.

Requirements of the new model
What is required is a service management model that will:

(a) maximise the opportunities to identify and deal with the "inevitabilities" resulting from the use of the network;

(b) create opportunities to identify and correct/counter the "undesirabilities" before these snowball into vested, permanent problems;

(c) provide opportunities for testing and evolution of new strategies in collaboration with the users;

(d) create an effective means to develop communication between users and the library staff;

(e) work during the network planning and implementation, and will continue as a permanent monitoring mechanism as regards any developments or contingencies;

(f) be effective in serving the communication and managerial needs that are unrelated to the network and its impact, i.e. provide for all issues relating to the contact between users and the library;

(g) use group dynamics, such as consensus, and will create a situation where all users "buy into" developments and solutions, viewing these as essential, contracted matters.

Earlier it was seen that changes in communication was a recurrent theme which underlies many of the impacts that should be expected. Effective communication should therefore be the logical starting point when dealing with the changes resulting from networking. It is also clear that there is a need for a communication process that will counteract the expected alienation process.
Another basic tenet is that the management process is interactive, requiring constant feedback and adjustment to ensure optimal effectiveness of the library, on and off the network. After all, planning, leading and control are only possible through communicating with users. It also makes managerial intervention an integral part of service routine, instead of "ivory tower" management. It is equivalent to the managerial processes seen in user groups.

Features of an interactive, cyclic model

One approach, which focuses on the interaction and communication between the library and the users, has been shown to be very successful when introducing new technology.

The model (see Diagram 1) ensures repeated attention to any impact-related problem until it is resolved. In practice, many cycles of discussion with users, feedback to the library, formulation of suggestions and solutions, and renewed discussion with the users may be required to resolve an issue.

Diagram 1: The Service Management Model
Typically the library staff, being managers of the information supply process on the campus, become aware of a problem in a user department. The process is then initiated by brainstorming among library staff, by means of which an agenda of issues to be discussed in a specific user department is drawn up. This brainstorming process takes place on two levels: (a) initially on the level of the subject librarians and/or general library staff, or during a staff meeting of one type or another; and (b) thereafter the subject librarian in charge of serving the specific department meets with the director, who assists in adding related issues for discussion, and adds the strategic dimension to the agenda. This phase is important, as the library staff have the expertise and sensitivity to anticipate problems among the users with regard to the library facilities/services on the network.

The subject librarian then sets a meeting in the user department and visits the department. The agenda taken to the meeting, and therefore the meeting, typically consists of two parts. The first, or structured part, is used to deal with the issues which require specific, in-depth discussion. This first part is generally used to inform about technological and procedural changes from the library side, but also to market new network services, provide progress reports, etc., and any issues which require pro-active discussion. The second, or "reactive" part of the agenda contains prompts in the form of open-ended questions, to elicit feedback on matters which the library staff suspect might be problematic. This section normally, and intentionally, leads to unstructured discussion between the subject librarian and the users, thereby often focusing attention on new problems of which the library was previously unaware. Misconceptions about the library, network planning etc. often surface during these discussions.

The subject librarian is always accompanied by one of the support staff, and each visit creates an opportunity for a different support staff member to accompany the subject librarian. As the support staff are generally specialists in one or other function of the library, they normally stimulate discussion on topics of relevance to their work. This often leads to innovative ways of dealing with problems, and serves to sensitise the staff to the real concerns of the users. This also exposes the support staff to the real issues at the service interface, thereby enriching their work and enhancing their understanding of the current concerns of the users.
At the end of the departmental visit, the subject librarian compiles a brief written report on the precise outcome of the structured discussion, as well as on any important new issues raised in the unstructured discussion. The latter is often the larger part. The report is submitted to the director directly after the visit, who then identifies and deals with any matters that should be handled on the level of departmental heads. The other issues are discussed internally in the library with the interested and affected parties, after which the report is copied and circulated to all staff of the library for information and comment. This signals the beginning of a new cycle, as many matters are brainstormed and referred to the next agenda’s pro-active component at this stage. A duration of three months per cycle has been found to be optimal to ensure the continuity and economy of the process.

The above process simultaneously takes place in every user department, consequently it involves virtually all the library staff members, and therefore serves as excellent training for the library staff. Many of the issues raised and handled in one user department signal the existence of problems that are also being experienced elsewhere, leading to many of the issues being placed on the agendas of the other departments.

Benefits of the model
The model provides an effective opportunity to identify problems in the early stages, before they have been allowed time to become widespread. For this reason it places the library staff in a pro-active position with regard to most emerging problems, which not only adds to their ability to deal effectively with the problems, but also creates a perception among the users that the library is alert and able to solve the problems. The process strongly serves to integrate the library with its users, and generates a lot of enthusiasm for library innovation and development among the users. It serves also to disseminate library information among all departments, and is suitable for every managerial intervention required from the library's side.

While it is useful for much more than just the process of networking, it has exceptional value with a change as radical and pervasive as electronic networking.

As regards networking specifically, the model ensures that all new working methods and
technologies are understood and used effectively, that the library staff are accompanied by the users on the road to networking, and it also provides a remedy for the problems of impersonal communication and uninformed users. It allows the library adequate scope to take the lead where necessary, ensures that innovation is consensual and provides counselling opportunities regarding the sacrifices that users are required to make toward networking. It generates library users, rather than losing them, as it allows the library enough opportunity to identify and deal with "invisible mistakes" and misconceptions. It also ensures that the library staff remain focused on the end-user, and view the network as a means to an end, rather than an end in itself. It ensures participative management with those most affected by library decisions, and motivates the library staff to perform to users' requirements. Above all, it eliminates the danger of alienation of users.

5. Conclusion
David Sims (1992:21), in his article titled "Information systems and constructing problems", states that it is the manager's job to construct problems. He also quotes Ackhoff saying that "we fail more often because we solve the wrong problem not because we find the wrong solution to the problem". Many of the network impacts will be problematic for librarians. While these impacts are very real problems, better solutions will be found by first "making" another problem: the problem of systematic and consultative communication with the library users.

ABBREVIATIONS
CD  compact disk
CD-ROM  compact disk read-only memory
EWN  enterprise-wide network
LAN  local area network
MBit/s  megabit per second
WAN  wide-area network
OPAC  online public access catalogue
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