The Unseen and Unacceptable Face of Digital Libraries

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Abstract. The social and organizational aspects of digital libraries are often overlooked but this paper reviews how they can affect users' awareness and acceptance of digital libraries. An analysis of research conducted within two contrasting domains (Clinical and Academic) is presented which highlights issues of user interactions, work practices and the organizational social structures. The combined study comprises an analysis of 98 in-depth interviews and focus groups with lecturers, librarians and hospital clinicians. The importance of current and past roles of the library, and how users interacted with it, are revealed. Web-based digital libraries, while alleviating most library resource and interaction problems, require a change in librarians' and DL designers' roles and interaction patterns if they are to be implemented acceptably and effectively. Without this role change, users will at best be unaware of these digital resources and at worst feel threatened by them. The findings of this paper highlight the importance on DL design and implementation of the social context and supporting user communication (i.e. collaboration and consultation) in their information search and usage activities.

Keywords: Digital libraries, user communities, social structures, usability, grounded theory.

1. Introduction

Digital libraries are used in a wide variety of ways and to support a multitude of needs across different domains (e.g. academic, clinical, business). The social context and needs of these different domains are very different, yet DL design varies very little to support those differences. Academic and clinical contexts are two contrasting domains that illustrate well the importance of social context in DL awareness and acceptability. Within academia the importance of DLs as a learning resource is highlighted while within the clinical domain its role in decision support is paramount. Although the needs within these two contrasting domains may differ, this paper investigates whether the social repercussions of DL implementation vary with regard to awareness and acceptability. Digital libraries are reviewed with reference to two socially relevant issues:

1. The disciplines and tasks we are seeking to support (e.g. information roles, perceptions and interaction patterns).
2. The organizations we are seeking to implement the technology into (e.g. social structures, status)

Within the clinical domain the increased importance of evidenced based medicine for healthcare professionals necessitates the use of current best evidence in clinical decision-making [29]. Reddy & Dourish [27] confirm the importance of information being available at a glance to members of a unit. There is, therefore, an escalating need to improve the accessibility of reputable information sources. Within the academic domain web accessible information resources present the potential to greatly advance learning capabilities regardless of users' location and time restrictions [2, 8, 14]. In comparison with traditional libraries, digital libraries can provide specialized information in a format that is easily updated, with speedy searching and access facilities.

The roles of the library and librarian within different domains determine how users interact not only with them but also with information within their domain. Digital libraries, in particular, can change the context of people's work-practices and can therefore restructure their relationships with both each other and the task in hand [31, 34]. The restructuring of these professional relationships can have far-reaching social and political consequences. These socially relevant issues, in turn, have repercussions for digital library design and implementation, which have not been fully researched. In our previous papers [1, 2, 3] we have reviewed the design and implementation of digital libraries within specific social contexts and domains. In contrast, this paper discusses the implications of digital libraries on librarians and DL designers' roles and required changes needed to ensure the acceptable and effective implementation of these resources. This paper, therefore, seeks to review a potential gap between digital library

design and social context that may impact upon users' awareness and acceptance.

2. Background

With the advent of web-accessible digital libraries and remote authentication (e.g. Athens password as opposed to IP address authentication), users' physical interaction with the library could completely change. Digital libraries (DLs) have the potential to transform aspects of both the clinical and education process, with remote access to specialized information in a format that is easily updated and speedy searching and access facilities. However, the invisible presence of these resources, their poor usability and user support has made their impact less dramatic than it could have been [7, 35]. A key element in the successful design and implementation of digital libraries has, in the past, been identified as their social context [9, 13, 14]. Borgman [8] suggests that 'social informatics' is an important new area of research. The social contexts and work practices of organizational systems can have important impacts on the community involvement in resulting technology systems [16, 23, 36, 15].

2.1 Social Context and Digital Llibraries

Covi and Kling's [13] research into patterns of usage for DLs within an academic context identified the importance of roles within effective DL design. Crabtree *et al* [14] identified problems with digital libraries through research into physical academic library interaction patterns with regard to information searching strategies. There are two principal aspects of their findings:

1. The collaboration between the librarian and the user in the searching activity.
2. The social context in digital library design.

However, Crabtree *et al* [14] concentrated on one aspect of library interaction (i.e. information searching) within the confines of a physical library and with library assistants. The role of the librarian is also highlighted by Theng [36] as being paramount in the service provided by the library. The librarian, it is suggested, acts as a kind of psychotherapist whose skilful questioning supports the user in understanding their own needs and then supports them in meeting those needs. Her review of digital libraries with regard to supporting this need shows their limitations in this respect. Kajberg [22] argues that digital library technology is beginning to shape librarian roles to produce new professional identities such as the net navigator, the educator, the information consultant, and the gatekeeper. Covi & Kling [13], however, argue that understanding the wider context of technology is essential to understanding digital library roles and its implementation in different social worlds. Reddy & Dourish [27] reviewed information seeking behaviors in a clinical setting where two important points were identified:

1. Colleagues are the first information reference point for clinicians.
2. Clinical and organizational issues were intertwined in the unit.

It is interesting to note the similarity in findings between Crabtree et al [14] & Reddy & Dourish [27] despite the different domains of study. The crucial difference is the importance of the collaboration between librarian and user in the academic domain while colleagues take on this role within the clinical domain. This reflects the important different social structures within these two domains. Cicourel [12] pointed out how team members on medical ward rounds provide contextualising information to each other. This was confirmed by Reddy & Dourish [27] who found that clinical staff provided the contextual information that could not usually be provided in a hard copy format.

When hospital information systems were first introduced, it was found that the greatest difficulties in the system's deployment lay not with technical issues but with the users, their reactions to its introduction and the acquisition of new skills [19]. Recent health informatics research also reveals that social and organizational factors can determine the success or failure of healthcare IT developments [17, 20, 21]. Heathfield [20] suggests that this is due to the complex, autonomous nature of the medical discipline and the specialized (clinician or software engineer) approach to system development. Negative reactions to these systems is often due to inappropriate system design and poor implementation. However, there may be other less obvious social and political repercussions of information system design and deployment. The diverse organizational culture of hospital structures, made up of many different professions with their own specific social identifiers, can often produce conflicts between those professions [26, 28, 37]. Symon et al [34] have identified, within a hospital scenario, how social structures and work practices can be disrupted by technology implementation. Although academic DL systems do not deal with sensitive, personal information, but with apparently innocuous data, they can also be perceived as a threat to social and political stability [1, 2, 3]. To understand the social impact of DLs, an in-depth evaluation is required of the introduction and later development of these applications within their specific social and organizational settings. However, as Covi & Kling [13] have highlighted, there are few high-level theories that aid designers in understanding the implication of these issues for DL design and implementation.

2.2 Work Practices and Digital Libraries

DL Research increasingly focuses on the importance of directing DL design towards the work practices and communities they support [25, 13]. However, it is important to establish the differences between formal and informal work practices and the impact of social structures within those communities. Formal procedures relay the correct way to conduct the work but do not allow for organizational dynamics, changing situations, evolution of task definitions, or social and political aspects (e.g. staff motivation or hierarchies) [18]. An organization's culture has a direct impact on informal practices that can develop into social and organizational norms [30]. The distinction between formal and informal work practices can be even more important for health care systems. Symon *et al* [34] identified conflicts within a clinical setting relating to social status and information procedures. Higher status professionals were found to be more concerned with keeping their status as an expert than adhering to formal organizational norms. Schneider and Wagner [32] also highlighted the increased importance, within a clinical setting, of local knowledge, informal collaborative contexts and technology to support the sharing of information.

Covi and Kling [13] highlight the importance of work practices within the academic domain. Lave & Wenger [24] suggest that learning within any domain is more than a formal acquisition of knowledge or information but has a social element, which is often ignored. They suggest that learning should be a process of participation in '*communities of practice'*. This participation is at first peripheral but gradually increases in both engagement and complexity. They proceed to argue that the emphasis within learning should be on the whole person and is equally comprised of the agent, activity and world. Wenger's [38] book on 'Communities of Practice' continues with a framework in which the two basic streams are *Practice* (from collective social norms of practice to accounts of meanings) & *Identity* (from impacts of organizational power and social structures to those of personal subjectivity). It seems evident that, for a DL system to be an effective learning resource, its design should support communication with communities of practice at varying levels of interaction. It has been suggested that the problems developing countries have had in acquiring digital library access could be counteracted by support for library collaboration and community building [5, 11].

Ultimately DL systems designed to support only formal work practices can be too inflexible. Adams & Sasse [4] found that systems which do not take into account informal work practices and are perceived to restrict these practices will be circumvented. DL designers must therefore design their systems around both formal and informal procedures, understanding social and organizational norms.

3. Research Methods

The two domains were studied over a 3-year period and results from 98 users – both end-users and librarians – were gathered, compared and contrasted to identify socially relevant issues both specific to each domain and generic. A pre-defined concept for a 'Digital Library' was not employed so that users were allowed to explore what they perceived comprises a digital library.

The findings in the clinical domain are based on data gathered from a London-based teaching hospital. In this hospital, computers have been placed on the wards, with web-accessible digital libraries [1, 3]. Focus groups and in-depth interviews were used to gather data from 73 hospital clinicians. 50% of the respondents were nurses while the other 50% were junior doctors, consultants, surgeons, Allied Health Professionals (AHPs; e.g. occupational therapists), managers and IT department members. Although there were a wide variety of digital resources mentioned the three main DLs discussed were Medline, the Cochrane library and the UK National electronic Library of Health - NeLH). Medline and Cochrane are two clinical libraries which provide access to journal information in a summarised form. The NeLH provides a portal to clinical information (e.g. guidelines, standards, decision support information), journals, specialist libraries and clinical bodies.

The findings in the academic domain are based on data gathered from a London-based university that is split over several geographically distributed campuses [2]. Focus groups and in-depth interviews were used to gather data from 25 academics and librarians from 4 different campuses within the university. 10 of those interviewed were from Humanities, 10 from Computer Science and 4 from Business, the split of the sample being approximately 50% librarians, 50% academics. The final respondent was from a key managerial role within library services. The academics were selected from all levels within their departments (i.e. Lecturer, Senior Lecturer, Reader, Professor). There was a representative sample from each department of teaching and non-teaching staff. Of the 13 librarians interviewed, the majority were subject librarians with responsibility for acquiring and supporting digital resources for their disciplines. Although various electronic resources were reviewed, three main DLs were discussed: the ACM DL, Proquest and Lexus. The ACM DL provides remote access to journals and proceedings relating to computing research. Proquest is a library of national and local newspaper articles and Lexus is a library of business resources; both are currently accessible by computers with university specified IP addresses.

Four issues guided the focus of questions within both studies:

- Perceptions of their role within the setting, and their information requirements.
- Perceptions of how information is currently accessed, and how these processes accommodate or inhibit current working practices.
- The impact of organisational social structures and patterns of interaction on information resource awareness, acceptance and use.
- Technology perceptions (specifically of DLs) and how these affect other issues already identified.

An in-depth analysis of respondents' perceptions was conducted using the Grounded Theory method. Grounded Theory [33] is a social-science approach to data collection and analysis that combines systematic levels of abstraction into a framework about a phenomenon which is verified and expanded throughout the study. Once the data is collected it is analysed in a standard Grounded Theory format (i.e. open, axial and selective coding and identification of process effects). Compared to other social science methodologies, Grounded Theory provides a more focused, structured approach to qualitative research (closer in some ways to quantitative methods) [33]. The methodology's flexibility can cope with complex data, and its continual cross-referencing allows for grounding of theory in the data, thus uncovering previously unknown issues.

In the results discussed below, many points are illustrated with verbatim extracts from the interviews and focus groups. In these quotations, the speaker is identified by role, but not as an individual (so, for instance, multiple excerpts from a 'Pre-registration nurse' are not necessarily from the same individual).

4. Results

The results from the two studies show why within these organizational settings digital libraries are either overlooked or unacceptable. The importance of current and past roles of the library, and how users interacted with it, are revealed. Web-based digital libraries, while alleviating most library resource and interaction problems, require a change in librarians' and DL designers' roles and interaction patterns if they are to be implemented acceptably and effectively. Without this role change, users will at best be unaware of these digital resources and at worst feel threatened by them.

A high-level analysis of social issues from the two studies seems to fall into two categories:

1. The user interactions and tasks we are seeking to support. The results highlight how different information roles and users' perceptions of traditional libraries, digital resources and the web within an organisation affect interactions and tasks.
2. The organisations we are seeking to implement the technology into. The findings also show how issues of social status and change management within the organisation impact upon perceptions of acceptable technology implementation.

4.1 Traditional Information Roles

Both these studies have shown that the accessibility of information relies on a persons perceived information role. Both domains focused on traditional hard-copy information dissemination procedures and information roles that produced perceptions of information hoarding and resentment. It is also interesting to note that both domains highlighted the practical aspects of their job roles: for the clinician that of healing, for the academic that of teaching. Digital libraries were seen as a resource for the student or the researcher, not for day-to-day clinical decisions or teaching.

Within the clinical domain information is traditionally disseminated either by hard copy or verbally. However, hard copy (e.g. paper guidelines, books) and verbal dissemination is hampered by poor accessibility due to priority access for those whose role is of a higher status. Verbal dissemination, due to the time restrictions and the status structure, was also inhibited by a crisis management approach (i.e. information is released and passed on as and when a crisis occurs or is imminent).

"the supervisors they don't have time to tell you this is the policy for here"

(Pre-registration nurse)

"you're just sort of thrown in at the deep end and when you do it wrong they do sort of pull you up about it." (Pre-registration nurse)

Within the academic domain information is again traditionally disseminated via hard copy but hierarchical status did not reflect negatively on information accessibility. However, perceived roles and interactions between lecturers and librarians did reflect some of the organizational issues highlighted within the clinical domain. Lecturers perceived that librarians were tied to books and hard copy resources. For example:

"They would keep the list of the recommended books with them; if there was Internet URL's then they would print them out and put those in the library as well."

(CS lecturer)

It was highlighted that library systems also reflected this book-orientated approach:

"… if they go into the library and they punch into the machine I want something on this subject and it will come up with some books in that area because of the keywords in the title or keywords in that area. It won't come up with journal articles."

(Humanities senior lecturer)

The subject librarians, when detailing their role, always mentioned resource acquisition as the first priority, and then training. Few highlighted the marketing or on-going support for electronic resources:

"Provision of materials which involves book selection, journal selection and I suppose even online resource selection … A major part of our work is on library education."

(CS librarian)

Many nurses and AHPs perceived accessibility problems as being associated with senior staff's information hoarding behaviours (e.g. hoarding books, guidelines, standards etc.). These behaviours produced resentment in the nurses as being unnecessarily time consuming (taking them away from their patients), resulting in feelings of social restricting pressure (i.e. putting them in their place, shutting them out).

"Why shouldn't we have anything that they are hiding from us." (Post-reg nurse)

"We should be given the opportunity to learn as much as we can, be as much, be as effective as we can be for the sake of the patients" (Pre-reg nurse)

Some academic library users also perceived that the librarians were information hoarding by centering on and being possessive of the resources rather than supporting and understanding the users needs:

"… the librarians are not user-centred they're information resource centred … they want to protect their resources not to gain access to them."

(CS lecturer)

All the clinical senior staff members confirmed the current dissemination processes detailed above. Senior staff members also noted that status directed current information dissemination because:

- Higher status staff required more theoretical knowledge
- Lower status staff required more practical knowledge

Written policies and guidelines were noted as of limited use for those whose main objective is hands on knowledge. Some senior staff expressed a concern that junior staff would not be able to interpret or fully understand some information sources. For example:

"… you find that people will just go off and they will misunderstand the national guidelines because they come out in long documents which interpretation requires further study. So I think for junior doctors they can be misleading, harmful, damaging."

(Consultant)

Within the academic domain, librarian roles were perceived as library-bound and student-centred. The perceived role of librarians related to current interaction patterns between lecturers, librarians and students. Interactions between librarians and lecturers or students occurred primarily within the physical boundaries of the library. Lecturers and librarians interacted on an informal ad-hoc basis either by 'bumping into' one another (primarily in the library) or by direct instigation from the lecturers or students themselves. Library instigated interactions were email based, usually regarding course-based, hard-copy resource acquisitions or discontinuation:

"But I haven't spoken to a librarian directly for at least 3 years."

(CS lecturer)

"I filled in an email two days ago if that counts saying what was good and bad journals. But no, not on the whole. We send in our requests for books." (CS lecturer)

Within the humanities department some interactions became more pro-active, with librarians arranging meetings with the lecturers. However the interactions were always focused on the students and course requirements.

4.2 Users' Resource Perceptions

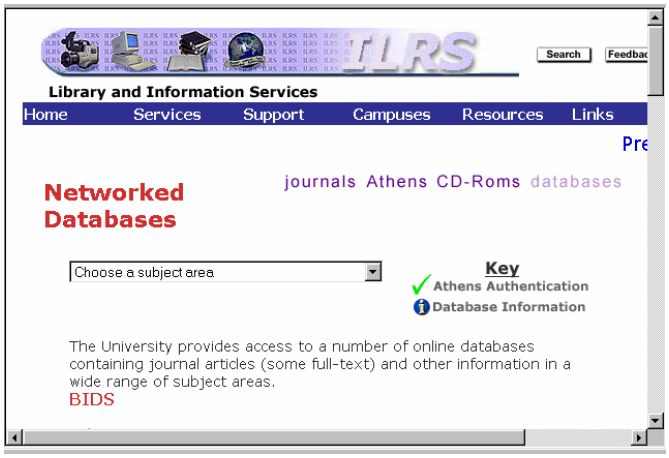
All the respondents noted that traditional libraries were perceived to have limited accessibility due to the physical location of the libraries. The poor usability of current library systems made it difficult to access specialized information and limited the use of information sources. Limited supply of source materials was also considered a major problem with traditional libraries, which users perceived could be quickly and effectively solved via electronic supply of documents.

The results showed that, with slight variations, the academic users had a uniform perception of what a digital library, a database, and an archive were. The definition of a DL usually included that they were a large store of general but up-to-date information in various media with frequent current usage. However, an archive was invariably denoted as a subject specific historical collection with clearly defined parameters, which is not in frequent current use. A database was described by most as a way of structuring and organizing information, which could be accessed either by CDROM, local networks or the web. One librarian added that a database contained only summarized, abstract or citation information while a digital library contained the full text.

An analysis of how often the users referred to different terms for resources within the interview identified some interesting differences in how often the librarians and lecturers from different disciplines commented on these resources. Computer science and business lecturers referred to the use of 'digital libraries', while in humanities lecturers talked about 'archives'. However, the librarians invariably referred to all these resources as 'databases'.

It may be noted that the library web site (see Figure 1) reflected the librarians' database terminology without any reference to digital libraries or archives. Several of the digital libraries discussed within the interviews are located under the headings 'databases' or 'journals' without reference to how these grouping are made.

FIGURE 1: Library resource interface



Within the clinical domain the results showed that journals were considered the major form of digital library information. International journals were highlighted as particularly important for obtaining up-to-date information on specialist areas of research.

> *"At a consultant level one tends to go less to text books and more and more to Journals."* (Consultant)

It was recognized, however, that because digital libraries were primarily used to store journals and related summaries, this constrained interpretations of future digital library uses. Restricted awareness of what digital libraries stored curbed perceptions of potential users (e.g. researchers, students, senior staff) and their tasks (e.g. research purposes, continued professional development and new developments).

Users' perceptions of the future relevance of digital libraries within a clinical setting related primarily to their interactivity. The immediate benefits of updated, locally relevant, day-to-day clinical information (e.g. policies, procedures, induction data, guidelines, and protocols), electronically stored and quickly retrievable, were recognized. Clinicians, however, require more than simple electronic representations of documents. These information sources would be invaluable if, subject to appropriate authentication, they could fulfil specific user needs, provide local knowledge and prompt updating requirements. One nursing manager described how this type of interaction might be supported:

> *"... how to care for a wound point 6 ohhh yes I have to use this type of dressing and where are they kept ohhhh right they're kept under there"* (Nursing manager)

Users also detailed the need for flexible libraries of organizational information (e.g. job title, role, contact details, schedules and diaries) that would then link into communication media such as email and ultimately the electronic patient record (EPR).

For a skilled clinician, the Internet was believed to be an important aid in accessing reputable up-to-date information sources (e.g. academic sites, professional colleges). It is important to add, however, that once the digital library technology became more familiar (e.g. familiar language, information groupings), the users' confidence in information retrieval greatly increased. Lecturers across disciplines also frequently noted the importance of the web as an electronic resource. The CS lecturers, in particular, highlighted the importance of using the web as the main supplement to core books. Neither the lecturers nor librarians mentioned the benefits of DLs (i.e. guaranteed reputable resources, discipline focused) as opposed to the web. Lecturers frequently commented about the attractiveness of the web for both themselves and the students. The mystical and consumable qualities of searching the web were identified as key incentives. Web searching and a wide variety of web resources were noted as an easy consumable that led the user towards large quantities of information for relatively little effort:

> *"Some people when they use search engines they type in a question and if they don't get*

the answer that they are looking for they type in another one. Just like prayers" (CS lecturer)

"I mainly use Amazon for books a lot. I find the books and download and print off the summaries for the students" (CS Professor)

4.3 Digital Library Awareness and Acceptability

Both study findings show how organizational issues can negatively impact upon users awareness or acceptability of digital resources. Across both domains it was identified that users had poor awareness of what digital libraries were available via the web or subscribed to by their organisation. Within the clinical domain awareness of digital libraries was poorest amongst senior clinicians. Within the academic domain digital resource awareness was poorest amongst the lecturers:

"It's an area of enormous ignorance for me. If I knew more, I would know better how to advise people." (Humanities senior lecturer)

A key source of awareness problems within both domains was poor communication links between the library and users. Several of the humanities lecturers, for example, suggested that a useful digital resource would be an online newspaper archive so that the students did not have to travel to the physical newspaper library to complete their research. However, all the librarians noted the successful acquisition of this same resource for the past year. This example highlights the importance of not only acquiring the right resources but also adequately marketing them. The main library approach to marketing these resources was by links on the library web page, induction courses, word of mouth or handouts within the library:

"We explain about it at the skills session they get and we have sheets at the desk that we give out." (Humanities librarian)

"When new staff come in we make them aware of the databases that are available which we think they'll probably like in their subject area." (CS librarian)

A survey conducted by the library department, however, had shown that few lecturers knew about the library web site. Users from both domains were found to rarely physically attend the library.

"Problems with students - they just tend to be library phobic." (CS lecturer)

"And they don't really use it [the library] themselves [lecturers]. Because they use the same journal articles every year. So in that sense there is no, very little connection between academics and us." (Humanities librarian)

The location of the technology to access digital resources can have a strong impact on the acceptability of the technology. Computers on the wards, in particular, were identified as a perceived threat to existing information dissemination procedures since higher status staff regarded this location as requiring practical rather than theoretical knowledge. Web-accessible digital libraries, in particular, disrupt these processes by increasing knowledge for those of lower status:

"they're going to be quoting text books at us and quoting policy notes but they need to go out there nursing patients." (Nursing manager)

Computers on the wards also increased friction between different user groups (e.g. doctors and nurses, senior and junior staff) trying to access them.

"I know there is some friction between the junior doctors and the nurses about who the computers are there for … sometimes the computer has been put in a place where it is very obviously in one territory" (Doctor)

"I know that there is one computer on the ward which is supposed to be for everyone to use it but because its in the doctors office they don't want people in there in a certain time because they could be putting something on tape, doing their notes. So it ain't for everyone is it." (Post-reg nurse)

The use of a digital library also determined the acceptability of who would support users with that technology. Within the academic domain digital libraries are accessed from a variety of locations but students were often found accessing DLs away from the library. Subsequent DL problems were often relayed to IT support who then directed users towards the library. Library staff noted that students were often sent across the university to them because of IT support's poor DL knowledge or acceptance of responsibility:

"… now there is also a bit of a barrier with the computing staff about whether they should be bothered with this … they're loath to see that their role is also changing." (Electronic resource librarian)

The current information hierarchy of the clinical domain (i.e. information only for those of a higher status) was found to limit perceptions of digital resource awareness and acceptable usage. The approach by some senior staff of information hoarding was identified as associated with that

of technology hoarding. Nurses' and AHPs' access to current technology within the hospital was limited by either physical or social restrictions (e.g. passwords, computer locks, location of computers).

"... But they put a block down on that because they've said well if one student nurse gets to use it then all the student nurses will want to use it." (Pre-reg nurse)

Some senior staff confirmed that they saw technology and specifically digital libraries as a benefit of status:

"People lower down. Well they would resort to the actual standard text." (Nursing manager)

Many senior staff members expressed a desire to retain their expert status by continuing to control information dissemination procedures. Some senior staff argued that they would rather access digital libraries on behalf of junior staff.

"... if they want something on this or that then I'm around to do it for them." (Nursing management)

Junior staff argued, however, that apart from this wasting valuable time for senior staff that security protocols could preclude a third party performing some information retrieval tasks. All the junior staff members (i.e. nurses, AHPs and doctors) considered digital libraries an essential tool in completing their jobs effectively. Nursing staff (especially student nurses) and AHPs perceived them as an 'empowering tool', providing them with the information and knowledge that they require to complete their jobs effectively.

It is also important to understand the power of social structures in acceptable system design. The structuring of information can affect not only how accessible information is but also perceptions of an organisation and the social structures within that organisation. Consequently, there are often power struggles within organisations over where information should be placed and its relative importance. Within one of the studies detailed in this paper the findings of the project were fed back to developers and an initial evaluation of their intranet was undertaken. One of the buttons on the first screen provided a link to a digital library portal. However, although the system was paid for and supported by the organization's library the name on the link was the acronym for the portal. This button then took the user through to the authentication page for the system. The evaluation highlighted that users may not know what this acronym means or that they could obtain their password, advice and support for this system from the library. It was therefore suggested that this resource should be located within the library pages to support users' mental models of the system and support links. However, the designers were perplexed by these suggestions as they had been requested, by influential stakeholders, to put the resource high up in the systems structure while the library links was far lower-down in the systems structure, reflecting its lower social standing within the organisation. To move the link would cause social tension as other departments considered that their status should be represented at a higher level than the library's.

The distinction between information available on the Internet and the Intranet was found to have strong impacts on the acceptability of information access. Many senior staff members perceived digital libraries stored on an intranet and accessed by junior staff as less politically sensitive than web-accessible digital libraries. The Internet was seen as a threat to their status by providing open access to information sources while providing the potential for abuse (i.e. access for non-professional purposes). Senior clinicians also noted that junior staff members would not be able to interpret the quality of all the information potentially available to them on the Internet.

"... there may be stuff in this country that is of a reasonable quality but it requires some skill to some extent to be able to discriminate. I don't have difficulty with this I don't know how much the nurses or the junior doctors would be able to discriminate." (Consultant)

Intranet information provision, in contrast, was perceived as controlled by higher status staff members. Locally based DLs were also seen as advantageous for provision and effective updating of hospital specific policies, protocols and standards. Although these had not been adequately developed to date, it was believed that these would not only able to increase local accessibility to relevant documentation but also raise awareness of salient issues.

Within the academic domain, it was noted that the level of plagiarism from the web had dramatically increased over recent years. Lecturers and librarians both noted that students have very poor skills in searching and identification of reputable sources and both were seeking to address these inadequacies with training to improve these skills.

Finally one major impact on digital library awareness and acceptability was the interaction between training and social status. Many senior clinicians, although able to navigate the web, did not perceive themselves as computer literate especially with regard to digital library usage. Senior clinicians perceived, in contrast, recently qualified staff members as far more computer literate. The poor usability of digital libraries was identified as a crucial factor in the difficulties senior clinicians encountered.

"So there ought to be something user friendly – especially for older consultants – so that they didn't feel too silly about it, but really showed them how useful it could be for them to have access for these things." (Surgeon)

Of particular importance was the consequent friction developing between recently qualified members of staff and those classed as 'old school professionals' who, in many cases, were techno-phobic.

"the problem is that there is no formal help plan here and a lot of people feel 'well I should know about it but I don't and I feel silly going to somebody that is much younger than I am saying explain it to me'." (Surgeon)

"Because there are a lot of people in the department who haven't had any experience at all. You know who haven't been on training sessions and they're frightened of it." (AHP)

A generation gap was identified as a key factor in producing senior staff's perceptions of computers as a threat to their status as experts. All the respondents noted the lack of support and training available with digital libraries.

Within the academic domain, lecturers noted their poor DL knowledge and highlighted that current library services and training were not focused on their needs:

"No, like, advice. Certainly no tailoring of information from the library service." (Humanities senior lecturer)

The librarians often discussed training sessions, but these tended to centre on student training, as the lecturers were notoriously bad at attending these sessions. Again it was identified that the social status of lecturers reduced the effectiveness of general training sessions as lecturers were embarrassed to disclose their poor electronic resource skills:

"So if you're running one on medieval studies - the medieval lecturer will come and sit at the back of the class and you know that they're not trying to keep an eye on their class, they're trying to actually learn without appearing not to know." (Humanities librarian)

Effective on-line support was proposed as a major factor in changing negative DL perceptions. However, some senior clinicians noted that current online training and support facilities were not given at the right level for users needs.

"Things either seem to be at the 'this is how you turn the computer on' level or very advanced and there doesn't seem to be much in between." (Surgeon)

5. Discussion

Digital libraries are a powerful force for change that have not realised their potential. There are many issues behind DLs' limited successes that need researching. However, social and organizational issues are not often considered as having a negative impact on the acceptance and use of new technologies. This paper highlights how social context and related poor design and implementation procedures, can be the overriding force behind negative digital library perceptions. The results detailed in this paper show some interesting similarities and differences across two contrasting domains and show why within these organizational settings digital libraries are either overlooked or unacceptable. Issues of traditional information procedures, digital resource perceptions and awareness are highlighted. However, the important impact on DL acceptable implementation and usage is their conformance or conflict with current social structures and norms.

This research highlights that within both the clinical and academic domains traditional information procedures were focused on hard-copy and verbal dissemination. However, the clinical domain was governed by organizational hierarchies while the academic domain centred on the librarian and was library and student bound. Digital resources conforming or conflicting with current norms can strongly impact on their acceptability and should be understood in their design and implementation. As highlighted by Theng [36] it is important to understand more about the role the information therapist (librarian) has in supporting our information searching and more generic needs. This research also reveals that the roles and expectations of librarians, clinicians, students, teaching staff and IT support staff are all being forced to change as digital libraries and similar resources are introduced. All of these issues must be understood and supported in DL design and implementation.

Findings from both the clinical and academic domains identified that traditional libraries and procedures are perceived as having poor accessibility with limited source materials (especially for specialised information). Although, in principle, digital resources can alleviate this problem, they are restricted by several socially dependent issues, one major one being users poor DL awareness. Bishop's [6] study into DL users also found that they can be easily deterred from DL usage and that poor awareness of library coverage prevents a full understanding of DL potential. Users across domains are, however, inadequately

aware of what electronic resources are available, and require support in their learning and use of these facilities [6]. Web-based digital libraries, while alleviating most library resource and interaction problems, require a change in librarians' and DL designers' roles and interaction patterns if they are to be implemented acceptably and effectively. Ultimately, the librarians' role must change into one that is more pro-active and flexible – for example, attending small research / clinical group meetings and helping to develop and support the resources that users need. The feedback to and from the developers and users must also provide the information and contextual knowledge that each requires [14]. The increased importance of electronic resources also means a role change for IT support, with increased collaboration required between IT and library services. Choo [10] envisions an 'information partnership' whereby three groups of specialists work together: domain, information technology and information experts (librarians). However, as White [39] highlights, librarians are too willing to accept their role as bit players and underestimate what their experience can provide. Without these role changes users will at best be unaware of these digital resources and at worst feel threatened by them.

Our findings also show that DL terminology varies across academic disciplines, distorting perceptions of what a DL is and its relevance for their discipline. Blandford *et al* [7] also found that familiarity with the type of information in a collection or the library itself is an important DL usability issue. Within the clinical domain DL perceptions concentrated on journal storage as a primary goal, thus constraining interpretations of digital library uses (i.e. just for research). It was found that DLs need to encourage perceptions of them as flexible, locally relevant resources that support reciprocal activities, while emphasizing the use of reputable information sources. Reddy & Dourish [27] also highlight that digital information resources within a clinical domain lack the cylic and temporal aspects required by users.

Finally these findings highlight that within both domains users perceived a degree of information hoarding by those controlling the information. Within the clinical domain information hoarding led to technology hoarding. Junior clinicians were restricted technology access by either physical or social constraints. Senior clinicians with IT training and control of resources perceived DLs and the Internet in particular as a threat to their expert status. Digital resources on the Intranet and under local control were perceived as far more preferable to the web. This was contrary to academic perceptions where the web was identified as more accessible and attractive than DLs. Across both domains, however, senior status users were embarrassed by their poor DL knowledge and abilities reducing the effectiveness of traditional training and support regimes.

The results highlighted in this paper relate, to some extent, with those of Wenger's [38] framework. The user interactions and tasks link up with some of Wenger's practice groupings and the organizational issues relate to his classification of identity. However, it is important to recognise that these groupings have artificial barriers, and strongly impact and interact upon each other. Users' tasks and roles are strongly affected by perceptions of their status within the organisation. These findings show that the unpleasant and unacceptable face of technology is often associated with these interactions between issues of practice and their identity. Ultimately the findings have identified that:

- Social structures can affect information resource perceptions, and
- Information accessibility can change social structures, producing resentment.

It is therefore important to:

1) identify current social structures and how information interacts with those structures,
2) establish whether DL developments and implementation procedures will breach any current norms,
3) find out whether design, training and support can overcome any unacceptable and unpleasant side-effects of digital libraries, and
4) establish whether role changes can support the successful implementation and use of digital libraries.

Ultimately, to design effective Digital Libraries, we need to identify more than just effective mechanisms for storing and retrieving documents. There are further questions that should be asked with regard to the social repercussions of what is being stored, who will access it and for what purposes.

6. Conclusion

In conclusion, this research reveals that the social element within DL design and deployment has been largely ignored, but it can have strong impact on the acceptability of these resources. From these two case studies we can see that ignoring the social element of DL design and implementation procedures has produced a perception of DLs as a threat to current roles and social structures. As mentioned in the introduction, previous research within both domains [14, 27] and this research suggest that:

1. DL users require more communication support (i.e. for collaboration and consultation) in their information searching and usage activities.

2. The importance of social context must be understood in DL design and implementation.

Ultimately, digital libraries must be designed carefully to reflect organizational social structures and needs. This paper details how related social and organizational issues can impede effective technology deployment. To counteract these problems, DL designers and implementers must first identify the social context prior to technology design and deployment [9, 13, 14, 23]. There is also a need to increase the awareness of digital resources available and their potential to support specific user needs [14]. Additionally, there is a need to strongly support training for some users with a supportive and non-judgmental approach [1, 3]. Users need the services of an information expert role to support and inform them [36].

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