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ORGANISATIONAL COMMUNICATION AND AWARENESS:

A NOVEL SOLUTION

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ABSTRACT

As organizations grow larger and more distributed, the problems of maintaining corporate awareness and effective communication channels escalate. The clinical domain poses particular challenges to maintaining good corporate communications because users have limited time to access information and often have negative technology perceptions. This paper highlights how a screen saver application, initially designed to increase privacy and security, developed into a new communication medium improving corporate communication across the organization. An ethnographic study of the application within a hospital setting, analyzed using grounded theory methods, details the iterative and organic development of the design through *'community of practice'* involvement. This application was found to not only increase awareness of resources, activities and hospital changes but also positively influence users' perceptions of, involvement in and ownership of general IT developments. User involvement also raised the importance, for the designers, of application usability, quality and aesthetics. As well as strengths, application limitations are discussed; we also identify further research and developments required if this approach is to realize its full potential.

KEYWORDS

Communication, Communities of Practice, Organisational Awareness, Social Issues.

INTRODUCTION

As organizations grow and spread to separate geographic locations, it becomes hard for staff to retain an awareness of community activities, events and resources across

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that organization. Without organisational awareness, activities are likely to be duplicated or go unnoticed by those who would appreciate them. Joint resources can be left unused, reducing the likelihood of a collective outlook. Users therefore need support in obtaining a shared understanding of corporate perspectives and establishing productive collaborations across an organization. This is especially true within the clinical domain where the complex, autonomous and hierarchical nature of the medical discipline can isolate users from organisational issues [1].

A range of communication and awareness tools have been used to counteract the growing isolation of users and groups: the telephone, email, video conferencing, shared workspaces, chat rooms and public information boards. However, these tools can simply lead to information overload and overlooked resources, as users lack the time or ability to scan for relevant information or to set up mechanisms (e.g. intelligent agents) to search for them.

Peripheral awareness interfaces have been of increasing importance in the literature but, as Cadiz [2] notes, there are few success stories where the application has been used outside the lab situation. One of the main problems that applications have sought to overcome is how to increase users' timely organisational awareness while avoiding needless distractions [3,4]. Many of these applications deal with the important issues of screen real estate, information searching and information retrieval (IR).

One question that needs to be asked is; should we be looking at information presentation and retrieval OR the role of information in users' work? Wenger [5]

argues that learning, within any domain, is more than the formal acquisition of knowledge or information, but that it has a social element and should be a process of participation in '*communities of practice*'. Recent IR research has highlighted the importance of complex interactions between information, technology, work patterns and social contexts [6,7,8]. Very little research has been done on awareness applications adjusting to the working patterns of the user. Providing information when a users goal is *not* to find further information but to 'not work' and 'break-away' from their current task would, you might imagine, take a sophisticated intelligent agent application - or would it?

In this paper we present a novel solution to an organization's awareness problems. We discuss the iterative design process which produced the 'screen saver' and 'traffic lights' applications and the role of user involvement and '*communities of practice*' in this.

In the following section we review relevant awareness research, the context of the clinical domain and the importance of a *community of practice* approach. Next, we present the organisational context and the iterative design process adopted. This is followed by an ethnographic evaluation of each application, highlighting strengths and limitations. Finally, the implications for further research and development are discussed.

BACKGROUND

Organisational and community awareness of activities, resources and perspectives are hard to maintain in any organization. Contextual factors can, however, have a strong influence on users' awareness and use of technology. Social and economic backgrounds, for example, can impact upon technology expectations and usage patterns [9]. It is, therefore, important to understand the effects that contexts and work practices and patterns have on our awareness and use of information and technology. The relationship between technology, specifically a 'screen saver' awareness application, *communities of practice* and work patterns within the clinical domain are the focus of this paper.

Awareness applications

Research on awareness and related applications is an important and diverse field of study. Most of the original awareness literature refers to workspace and groupware awareness, and used video images as the main data source. A*wareness technologies* sought to allow distributed workers to maintain awareness of their co-workers and of their potential for collaboration [10,11,12,13,14]. This field has developed into a far wider variety of applications, awareness definitions and data sources.

Over recent years new approaches in awareness technologies have developed, including awareness notification systems and peripheral awareness interfaces. These systems seek to develop more peripheral information delivery mechanisms, whereby community awareness can be enhanced. Data sources are far more varied in these applications (e.g. internet sites, community calendars), but the information content is

often time-sensitive and, to some degree, transient. Cadiz [2] makes the distinction between peripheral awareness applications on primary displays (users' primary screens), secondary displays (extra or specialized monitors), ambient displays (embedded in users' surrounding environment) and mobile devices. Mobile devices, secondary and ambient displays represent often imaginative uses of technology; however, these often have limited impact within organizations because the initial outlay for the technology is prohibitive.

Applications such as Tickertape [15], Elvin [16], What's Happening [3] and Side-show [2] remain on the users' primary displays and seek to address the tensions between screen real-estate, user distraction and information depth. Other peripheral awareness applications on users' primary displays either blend into the background of current screen images [17] or remain on desk-tops, hidden by other applications but accessible when required. All these applications require the user to deliberately access the awareness information. The user is required to initiate a change in their working pattern from interaction with their current task to an awareness accessing task. *Sideshow* [2] provides a user-tailored interrupt application, which users requested: an alert mechanism can be set up so that a box appears next to the sidebar with information about the alert (e.g. when new email has arrived). Applications that allow personalization are a useful tool. However, users that do not use these tools may still require awareness information but do not wish, or are unable, to spend time setting up and accessing these resources. Ultimately it is important to understand awareness application usage within the context of users' work patterns.

Clinical domain and communities of practice

As already mentioned, it is important to identify the work patterns and practices of communities within the organization. A community's culture has a direct impact on community practices that can develop into social norms [18]. Lave and Wenger [19] 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 argue that the emphasis within learning should be on the whole person and is equally comprised of the agent, activity and world. Wenger [5] extends this idea with a framework in which the two basic streams are *Practice* (from collective social norms of practice to accounts of meanings) and *Identity* (from impacts of organizational power and social structures to those of personal subjectivity). It seems evident that, for awareness systems to be effective collaboration and information resources, their design should support communication within communities of practice.

Local communities within a corporate structure, although vital to team cohesion and collaborative developments, can isolate groups from the organisational culture and norms [20]. Some domains encourage more isolated communities than others, segregating users through the language, work practices and communication channels used. The clinical domain has a long history of isolated communities through its social structures and varied professions. Isolated communities, made up of many different professions with their own specific social identifiers, can often produce conflicts between those professions within the diverse organizational culture of the

hospital [21,22,23]. Symon *et al* [24] identify 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. Organisational awareness, as well as local community awareness, is needed to support common goals and create a clear organisational perspective.

The role of rhythms of work, work practices and collaborative networks are of great importance for effective awareness. Cicourel [25] points out how team members on medical ward rounds provide contextualising information to each other. This is confirmed by Reddy and Dourish [6], who found that clinical staff provide the contextual information that cannot usually be provided in a hard copy format. Reddy and Dourish also discuss the implications of work rhythms on cooperative work within the medical domain. In particular, they highlight the importance of cyclic and temporal clinical work patterns, integrating information about not only current actions but also patterns of former activities and expectations about future behaviour. They argue against previous literature which reduces information work to de-contextualised access and retrieval problems for the individual.

Technologies which take a de-contextualised approach run the risk of clashing with communities of practice and their effective implementation, especially within a domain where contextual, collaborative activities are important. When hospital information systems were first introduced, it was found that the greatest difficulties in deployment lay not with technical issues but with the users, through their reactions to systems introduction and the demands of acquiring new skills [26]. Recent health

informatics research also reveals that social and organizational factors can determine the success or failure of healthcare IT developments [27,1,28]. Negative reactions to these systems is often due to inappropriate system design and poor implementation. Symon *et al* [24] have identified, within a hospital scenario, how social structures and work practices can be disrupted by technology implementation. What has not been identified within this domain is how systems which do support and fit with those complex social structures and work practices will be received.

Organisational structure and resources

The organizational structure of the hospital studied is complex, and undergoing dramatic change. Funding restrictions mean facilities are limited and under-resourced. Technology provision varies greatly; however, the majority of clinicians do have access to a computer, even if that computer is shared. Most users have limited computer and searching skills, although abilities can vary quite dramatically. However, all users had a poor awareness of the existence and relevance of digital information resources, both locally and on the Internet. Many clinicians are resistant to change, particularly technological change, because of a poor understanding of how applications can support, rather than hinder, current working patterns.

APPLICATION AND ITERATIVE DESIGN PROCESS

The focus of this paper is on two applications: 'screen saver' and 'traffic lights'. The evolution of these applications into awareness tools was a result of user and organisational needs. Successful development was largely due to the design team's openness to user involvement. The development drives and reactions to user

criticisms highlight the effectiveness of the design team's flexibility and imagination and, as such, are discussed in detail.

Two major issues were identified as drivers for the development of the screen saver application; these were problems with individual screen saver variations, and passwords. Firstly, individual screen savers relayed a disjointed organisational image to both employees and patients. Some inappropriate images were also identified, but policing these was becoming difficult:

> *"Because you could go round the trust and there would be half naked George Clooneys and Winnie the Poohs popping up everywhere singing"* **(Screen Saver development team)**

Individual screen saver images were also found to be causing problems with programs, thus increasing IT help-desk calls.

Secondly, screen saver passwords were required for security reasons (as sensitive health data is being used) on all screen savers within the organization. However, many users were not using password protection, and this was growing harder to police. Conversely, the use of personal screen saver passwords inhibited effective hot-desking.:

> *"if a secretary was off sick or went on Annual Leave then when somebody came in if they weren't aware that the screen saver was initiated on the machine it kicked in and all their work behind it was lost because the only thing to do with it was to switch the machine off."* **(Screen Saver development team)**

Screen saver awareness application

As a solution to these problems, a corporate screen saver was developed. This linked on use to an individual's password, with an override password so that users could not get locked out. The application is activated when there has been no input for a period of time. Once activated, the screen saver cycles through a set of screens until the input devices are activated again. Originally, the screen saver image was updated when a new user logged on. However, IT developers realized that many computers on the wards were rarely updated, as ward staff never logged off their systems. The screen-saver development team therefore adapted the system to look back at the server every hour to update images. This meant that timely information could be sent out which would not be deleted and forgotten. Information would continue to appear to remind users of important events (e.g. systems going down), but would not be intrusive, only appearing when the system was inactive.

Initially, the screen saver displayed a help-desk number and the emblem of the hospital, then the developers added several pictures of the hospital that the program would cycle through. User feedback was found by the developers to be higher than that for any other system in the hospital. Users thought the screens were moving too fast and were too bright, and that it was not aesthetically pleasing to view where they worked every day. Developers sought to correct these problems.

To increase application usability, the team put together a staff competition to design the best screen saver. The competition, selection process and prize were coordinated by a hospital working group whose remit was to improve staff working facilities. This was the first time the working group had been involved in any IT development.

A selection of screen savers were then selected and put on the system. However, after a period of time user complaints still arose about these screens, e.g. "what do I want to look at somebody's holiday snap for and what do I want to look at this and that for". It was then decided by the screen saver development team that the resource would become an information board. There was a marked decline in complaints after this point and a dramatic increase in user involvement. Initially the application cycled through IT security advice screens (see fig 1) e.g. securing personal data, incident reporting etc.

**Confidentiality Agreement
for
Third Party Suppliers, Temporary,
Agency Staff**

This agreement has been approved by
Trust Board and should be used by
all departments/wards when engaging
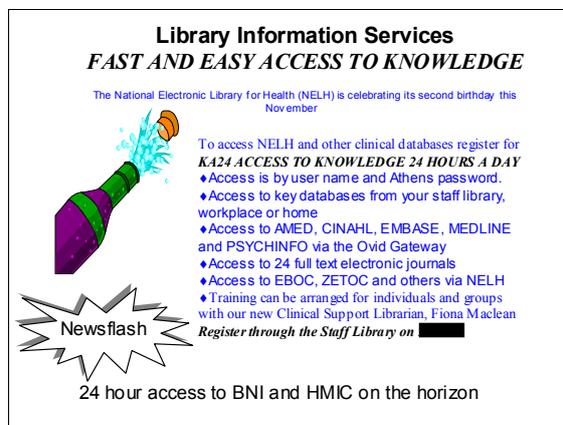any third party services.

Originated by

Figure 1. Privacy screen saver.

Complaints from users who missed screens in the cycling process led to screens being made accessible via the Intranet. This, in turn, led to the development of images highlighting where further information can be obtained (e.g. via telephone, email, on the Intranet).

As distribution increased, more user groups requested that their information be displayed on the system (see fig 2). There are 112 user groups across the organization that have been specifically told they can contribute towards the screen saver project, and many have. There were so many user requests that the developers

decided to specify that no image could be displayed for longer than a month, and to refuse requests from external bodies.

Library Information Services
FAST AND EASY ACCESS TO KNOWLEDGE

The National Electronic Library for Health (NELH) is celebrating its second birthday this November

To access NELH and other clinical databases register for
KA24 ACCESS TO KNOWLEDGE 24 HOURS A DAY
♦ Access is by user name and Athens password.
♦ Access to key databases from your staff library, workplace or home
♦ Access to AMED, CINAHL, EMBASE, MEDLINE and PSYCHINFO via the Ovid Gateway
♦ Access to 24 full text electronic journals
♦ Access to EBOC, ZETOC and others via NELH
♦ Training can be arranged for individuals and groups with our new Clinical Support Librarian, Fiona Maclean
Register through the Staff Library on ▉▉▉▉

Newsflash

24 hour access to BNI and HMIC on the horizon

Figure 2. Digital library screen saver.

The developers also placed guidelines on the Intranet for successful / usable screen saver construction (see table. 1).

No.	Screen Saver Guideline
1	Font should be no smaller than size 18
2	Originator's name must be put in lower right hand corner
3	Background colour should be used BUT NO LIGHT COLOURS.
4	Keep it clear and concise
5	Make it interesting
6	The Screensaver should be saved in a Word (if saved in Word DO NOT use Wordart), Powerpoint or Image file
7	Must be in landscape not portrait
8	When completed they should be sent to **** ***** for approval.
9	Date to commence
10	Date to be withdrawn

Table 1. Screen saver construction guidelines.

Traffic lights application

As user group interest developed in the screen saver awareness application, there was a request from an administrative department for an 'urgent' screen saver that could interrupt users' activities. As this was not simple to achieve through the current screen saver application program it was decided that a separate program would be developed to support this need. This 'traffic lights' system makes it possible for a message to be sent out which will immediately be displayed in front of the user's current work. The message remains until the user actively cancels it, thus acknowledging that they have received it.

> *"you can't disregard it, you can't get rid of it until you've read it because you actually have to click it off which I suppose is really good in the way that when, with the consultants attack, we needed to get a message out urgently, with his description, we could do that… So it's a way of getting something out there if you want them to know within minutes."* **(Screen-Saver development team)**

As the level of disturbance this message provides is very high, it was vital to restrict the use of this application to very important messages. The system has two purposes:

1. Daily reports on hospital bed status. (see fig. 3)
2. Urgent messages e.g. details of a staff attack.

Daily hospital bed status reports took the form of 'green', 'amber', 'red' or 'divert' alerts, indicating the pressure on patient flow through the hospital.

The application was described by the developers as being a little like Windows' 'Net-send', but providing the designers with more control over colour, format and user destination (messages can be sent to all or specific users).
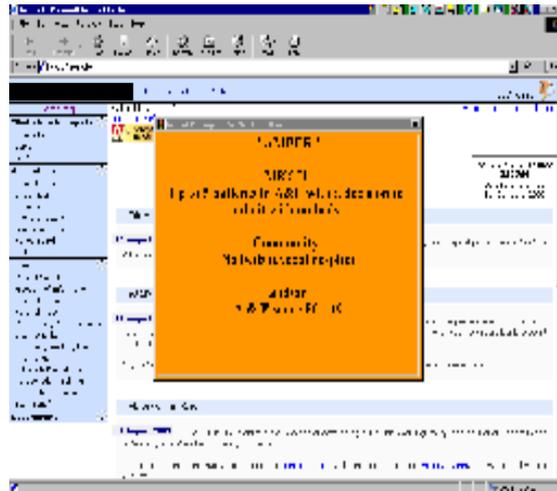
Figure 3. Traffic lights application.

ETHNOGRAPHIC AND QUALITATIVE EVALUATIONS

The ethnographic study took place over a 6 month period within a provincial hospital. The first author had ethical clearance and research staff status within the hospital. Apart from observational studies and informal meetings, initial interviews and focus groups were conducted with 20 participants across the hospital setting. The participants were from a variety of professions and social status within the hospital:

- o Health service managers and administration,
- o Library staff,
- o Technical personnel,
- o Nurses,
- o Doctors and Consultants,

The research aimed to review information needs and practices, technology support and the impacts of technology on social and organisational norms. Another

perspective of the research was to identify barriers and forces for change within the organisational culture.

An in-depth analysis of the qualitative data collected was conducted using the Grounded Theory method. Grounded Theory [29] is an 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 analyzed in a standard Grounded Theory format (i.e. open, axial and selective coding and identification of process effects). 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.

RESULTS

It was found that, as an additional form of communication, these applications overcame the limitations of other media and increased user communication and awareness across the organisation, whilst minimising interruptions with user work practices. In the detailed discussion below, many points are illustrated with verbatim extracts from participants who are identified by role, but not as an individual (so, for instance, multiple excerpts from a 'Librarian' are not necessarily from the same individual).

Limitations of other media
The results highlighted an overriding need for these applications, as users perceived serious limitations of other communication and awareness media. Other forms of

communication within the hospital, such as paper notices and publications and email, were considered ineffective because of clinicians' time restrictions:

"We put things in key news, we put notices up but nobody reads notices ..."

(Librarian)

"I mean the idea is that everyone will have their own email, but will they have

access and will they have time?" **(Administrator)**

Issues of information overload and problems on developing organisational practices on how much information to distribute via current email systems were noted:

"We used to have an Acute email so then you could email everyone in the Acute

area but so many people got fed up with you know 'I've got a spare car' and

'I've got this'. I mean some of them have so much email and so little time, so

that has actually been taken away so that is only really used for emergency type

information now." **(Librarian)**

Many clinicians (particularly those who only had computer access on the ward) were found to simply avoid computers because they did not fit with their current work patterns or because of lack of time to become familiar with their capabilities:

"There are also major misunderstandings or failures to grasp what the

technology is now capable of, the power of the machinery involved."

(Consultant)

"most people at the clinical interface when faced with a difficulty or a

knowledge lack, a knowledge gap you might call it, don't yet reach for the

computer." **(Consultant)**

These issues are common to any large organisation, but exacerbated in the hospital situation because of the heavy time pressures, particularly on some clinicians, and the difficulty for many of them to access computers within the course of the working day – whether to access information or to gain basic competency in computer use.

Increased communications

In this working context, many users reported that their awareness of specific issues had greatly increased since messages were being delivered through the screen saver application:

> *"Well my clinical group said something about something that had been put on the screen saver and they'd all seen it because it had been put on the screen saver.* **(IT management)**

The cyclic, poster-style delivery of the application was considered to be key in gaining users attention:

> *"Certainly with things like the screen saver messages in short bursts."* **(Nurse)**

Both applications were considered to be "powerful" by the majority of people who referred to them. High response rates to information advertised was noted by those who had information displayed via the screensaver:

> *"But we've had quite a lot of people email us and phone us and say 'Oh what is this, I'm really interested'."* **(Librarian)**

A dramatic increase in communication between users and the IT department was also identified, as well as the instigation of new collaboration between IT and other departments (e.g. human resources).

Improved organisational awareness

While the improved interdepartmental communications were valued, it was the overall change in organisational culture which was noted by most users, as well as an increased awareness of the role of IT and information within the organization:

> *"It's about making sure that we work as a community and that we work well together… it is about using IT to make systems work"* **(Management)**

> *"I think that the use of information needs to be much better coordinated with an organisational vision of how information should be used."* **(Nurse)**

The traffic light system was cited by many as a controversial yet positive application throughout the hospital. This application was perceived to increase awareness across the hospital trust by keeping people in contact with the organisational status:

> *"People on the management corridor were unaware of anything untoward going on and it can be like a war zone in A&E with like 20 patients waiting. There was no feedback, no feedback loop."* **(IT / Admin)**

One person described the traffic lights system as:

> *"a stress barometer for an organization."* **(Management)**

Ultimately, this application was seen as supporting collective focus on the consumer (patient), helping staff to work together to improve patient care. However, there were

questions about how appropriate this intrusion was for all users, as some felt that knowledge of the organization as a whole was not relevant to them. This tension is one that remains to be resolved.

Fitting with work patterns

Probably the most important feature of the screen saver is that it fits well with users' work. Both types of computer access (individual office or via a shared machine) were supported in different ways by this application. Observations of office-based meetings (often held with the screen saver operating in the background) showed that they often serendipitously drifted into discussion about the screens. Frequent interruptions (e.g. telephone calls, physical interruptions) left other meeting attendees free to read posters in the office and on the computer screen saver.

The screen saver application was identified as reducing problems of communication and organizational awareness. It was noted that this was particularly due to the passive quality of the application:

> *"The thing that is good about this is even if people don't use the PCs they'll walk past the PCs and see them."* **(IT manager)**

DISCUSSION

Current awareness technologies have aimed to support individual users within a local community in obtaining awareness of that community. Awareness interfaces therefore often support awareness within specific, often small, homogenous communities. Awareness applications also seek to support users' needs by

personalizing those applications. Although users gain usable personal interaction with these applications, and are provided with local awareness, they also require more generic information which helps establish an understanding of organizational norms as well as providing particular information. Some awareness applications provide access to information which gives them broader awareness of their organization and its context (e.g. local traffic news, organizational events) [2]. However, in many organisations, there is also a need for a standardized top-down resource that provides all users with a uniform awareness of the organization to help develop organizationally accepted norms, perceptions and practices. Although users interviewed for this paper may well benefit from a more personalized application for increasing their awareness of their immediate community, they were also found to benefit from an awareness of the larger organization through the applications described.

An important issue highlighted by this research is the role of contextual factors in system design and implementation. Applications which fit with users' working patterns and community practices increase the likelihood of acceptance within the communities. Reddy and Dourish [6] highlight the importance of work patterns within the clinical domain and in awareness technology design. Awareness technologies have attempted to fit into users' working patterns by reducing how much they distract users from their primary work tasks. However, users are still very often required to actively install, personalize, search and interact with these applications. The actions that users take in the physical world to increase community awareness have not been fully understood.

Zhao [3] compares these awareness mechanisms with physical world artefacts such as posters and bulletin boards. Peripheral awareness interfaces rely on the distinction that these information resources are peripheral until the user decides to view them. The important design drive for these resources is therefore interface real-estate, with decreasing levels of distraction. However, in the case of the poster or bulletin board, the user action is far more passive, with serendipity playing an important role. Often, the user's goal is to break from computer work in order to interact with colleagues, get a beverage or look out of the window. The poster designer's main aim and design drive is to attract attention with key pieces of information and a way to access more information (e.g. phone no, email / web address). Using displays other than the primary workstation enables the sort of interaction facilitated by posters and bulletin boards, but such displays are expensive and, with growing organizations, often leave new groups without screens, and consequently isolated. The simple '*screen saver*' application, described here, fits seamlessly with users' work patterns by only activating when users break from their primary tasks. Within the clinical domain this is especially important as clinicians' time constraints are critical and their willingness to spend time interacting with software limited. Clinicians also often use their offices for meetings with colleagues, and the automatic cyclic activation of this information on their desktops was identified by the study as provoking collaborative discussions around the screens presented. Even the '*traffic lights*' alert system, which aggressively interrupts the user's primary task, was considered by most users as a useful tool. However, it was noted that the limited use of this tool for urgent and simple timely awareness feedback was key in its acceptability. A surprising result from the study was the degree of ownership that users feel for the applications, especially as they are centrally managed. Users consider the system's credibility to

be closely related to the central management and quality control for the application. Previous research has identified similar findings to this in other domains [20].

Another surprising outcome, relating to the screen saver design cycle, was the increased collaboration reported between users, user groups and designers, and an understanding of each others' needs. Users and user groups increased their understanding of and input into IT system development and maintenance. At various stages through the development of the system, user input and discussions ensued which led to further developments of the system. It is interesting to note that this application instigated new collaborations between staff bodies and the IT employees within the organization. Various communities debated issues around the technology and, in turn, debated the boundaries of their organization and the technology within it. The issue of a corporate screen-saver evolved a consensual meaning of 'corporate' which best fits with the technology and the communities of practice. The application designers also developed a keen interest in supporting user needs and increasing the perceived quality of applications. Through collaboration with users, the application designers identified a need for screen saver design guidelines, and developed acceptable information classifications for the various dissemination procedures now available to them.

CONCLUSIONS

One challenge for information management is to update all users of new resources and features, as well as providing timely information on changes within an organization. The hospital being studied for this research has found a novel, but

highly effective, set of techniques for addressing this difficulty. A simple *screen saver* application, initially designed to increase privacy and security, has developed into a new communication medium that has improved corporate communication across the organization.

This paper highlights how continued user involvement in the iterative design process positively influenced users' perceptions of, involvement in and ownership of the application and further IT developments. User and designer collaborations also increased the importance, for the designers, of application usability, quality and aesthetics. An ethnographic study of the application within the hospital context identified 4 important issues with regard to the *'screen-saver'* and *'traffic lights'* designs and implementations: the limitations of other media, increased communications, improved organisational awareness, and fitting with work patterns. The ethnographic analysis also highlighted the breadth of information available on the Intranet and clinical users' poor awareness and utilization of these resources. It was realised that this application could further be developed as an Hospital Intranet awareness tool, highlighting what resources are currently available on the Intranet.

Reddy and Dourish [6] identify limitations in awareness research with regard to its de-contextualising of tasks into searching and retrieval activities. The results of this study have also highlight the need to understand users' work practices and the relevance of these to their communities of practice. The screen saver awareness application has become a key part of organizational communication within the hospital studied. It was noted that many working groups, when discussing dissemination or advertising procedures, would specifically state that 'I can feel a

screen saver coming on' or 'we need to get a screen saver for that'. The quality of

experience provided for users by a sense of belonging to the greater corporate whole,

with a joint perspective on organizational goals, should not be under-estimated.

Added quality for users is also provided by simply identifying when users are resting

from their current primary tasks and may be willing, in a conscious or unconscious

manner, to view awareness material. The simple yet elegant usability of this

application lies in the user obtaining value without too much conscious input.

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REFERENCES

[1] Heathfield, H. (1999) The rise and fall of expert systems in medicine. In *Expert Systems*, Vol. 16, No.3. 183 – 188.

[2] Cadiz, J., Venolia, G., Jancke, G. & Gupta, A. (2002) Designing and Deploying an Information Awareness Interface, In *Proceedings of CSCW 2002*, 314-323.

[3] Zhao, Q. A., and Stasko, J.T. (2000) What's Happening? The Community Awareness Application. *CHI 2000 Extended Abstracts,* ACM Press, 253-254

[4] Cadiz, J., Czerwinski, M., McCrickard, S. & Stasko, J. (2003) Providing Elegant Peripheral Awareness. In *Proceedings of CHI 2003: Summaries.* 1066-1067.

[5] Wenger, E. (1999) *Communities of practice: Learning, meaning and identity*. Cambridge: Cambridge University Press.

[6] Reddy, M. & Dourish, P. (2002) A finger on the Pulse: Temporal Rhythms and information seeking in medical work. In *Proceedings of ACM CSCW'02*. ACM Press. 344-353.

[7] Blandford, A., Stelmaszewska, H. & Bryan-Kinns, N. (2001) Use of multiple digital libraries: a case study. *Proceedings of JCDL'01*, ACM Press. 179-188.

[8] Adams, A and Blandford, A (forthcoming) The unseen and unacceptable face of digital libraries. To appear in *Journal of Digital Libraries*. Preprint available from www.uclic.ucl.ac.uk/annb/ClinicalDL.html

[9] Bishop, A. P. (1999) Making digital libraries go: Comparing use across genres. In *Proceedings of ACM DL'99*. ACM Press. 94 -103.

[10] Dourish, P. & Bly, S. (1992) Portholes: Supporting awareness in a distributed work group. In *Proceedings of the ACM Conference on Human Factors in Computing Systems,* 541-547.

[11] Dourish, P., & Bellotti, V. (1992) Awareness and co-ordination in shared workspaces. *Proceedings of the ACM Conference on Computer supported Cooperative work (CSCW 1992),* 107-114.

[12] Gaver, W. Moran, T., MacLean, A., Lovstrand, L., Dourish, P., Carter, K., and Buxton, W. (1992) Realising a Video Environment: Europarc's RAVE system, in *Proceedings of CHI'92*, ACM Press, 27-35.

[13] Gutwin, C., Greenberg, S., & Roseman, M. (1996) Supporting Awareness of Others in Groupware. in *CHI'96 Conference Companion*. ACM Press, 205.

[14] Tang, J.C. & Rua, M. (1994). "Montage: Providing teleproximity for distributed groups." *Proceedings of Human Factors in Computing Systems*, Boston, MA, ACM Press, 37- 43.

[15] Fitzpatrick, G., Parsowith, S., Segall, B., & Kaplan, S. (1998) Tickertape: Awareness in a Single Line. In *CHI'98 Summary*, 281-282. ACM Press.

[16] Fitzpatrick, G., Kaplan, S., Mansfield, T., Arnold, D., & Segal, B. (2000). Supporting Public Availability and Accessibility with Elvin: Experiences and Reflections. *Computer Supported Cooperative Work: the Journal of Collaborative Computing.*

[17] Greenberg, S., & Rounding, M. (2001) The Notification Collage. In *Proceedings CHI 2001*, ACM Press, 514-521

[18] Schein, E. (1990) Organizational culture. *American Psychologist*, 45, 109-119.

[19] Lave, J. & Wenger, E. (1991). *Situated learning: legitimate peripheral participation*. Cambridge: Cambridge University Press

[20] Covi, L. & Kling, R. (1997) Organisational dimensions of effective digital library use: Closed rational and open natural systems model. In S. Kiesler, (Ed.) *Culture of the Internet*. Lawrence Erlbaum Associates, New Jersey 343-360.

[21] Morgan, G. (1991) *Images of organization*. London: Sage.

[22] Richman, J. (1987) *Medicine and Health*. London: Longman.

[23] Turner, B. (1987) *Medical Power and Social Knowledge. London*: Sage.

[24] Symon, G., Long, K & Ellis, J. (1996) The Coordination of work activities: co-operation and conflict in a hospital context. *Computer supported cooperative work*. 5,1:1-31.

[25] Cicourel, A.V. (1990) The Integration of Distributed Knowledge in Collaborative Medical diagnosis. In J. Galegher, R.E. Draut & C. Egido (Eds.). *Intellectual Teamwork*, Hillsdale, NJ: Lawrence Erlbaum Associates. 221-242.

[26] Harrison, G. S. (1991) The Winchester experience with the TDS hospital information system. *British Journal of Urology*, 67,5: 532-535.

[27] Gremy, F. and Bonnin, M. (1995) Evaluation of automatic health information systems: what and how: Assessment and evaluation of information

technologies. In Gennip, E. and Talmon, J.L. (eds.) *medicine van*. Amsterdam, IOS Press. 9-20

[28] Heathfield, H., Pitty, D. & Hanka, R. (1998) Evaluating information technology in health care: barriers and challenges. *BMJ*, 316, 1959 –1961.

[29] Strauss, A. & Corbin, J. (1990) Basics of qualitative research: grounded theory procedures and techniques. Sage, Newbury Park.