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ASSISTED ELECTRONIC COMMUNICATION IN NURSING

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KEY to Common Abbreviations used:

AEC(P) – Assisted Electronic Communication (Project)
A&E – Accident and Emergency department
CCU – Coronary Care Unit
CHD – Coronary Heart Disease
CMC – Computer Mediated Communication
KGH – Kettering General Hospital
MAU – Medical Admissions Unit
NHS – National Health Service
NSF – National Service Framework
Rostra – a News Agent System (not an acronym)
Stadium – a Webcasting System (not an acronym)

Note: Where possible, all individuals quoted in this study have been anonymized.

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Executive Summary

In the Assisted Electronic Communication project we show that given simple, facilitative, innovative technology, which is supported by a positive working culture and guided by effective leadership, nurses and midwives can become 'knowledge workers', creating and sharing knowledge about their work and critically reflecting upon their practice.

This Assisted Electronic Communication research project explored the potential of information technologies to change communication behaviours and facilitate improvements in health care practice and service delivery. A central concern of this work has been the impact of new technology on communication processes and structures within the nursing professions. To explore this issue, we created, administered and evaluated a core document discussion space system supported by the deployment of a multimedia webcasting system. The technology enabled health care professionals within an acute NHS Trust to contribute to threaded, asynchronous discussions and themed information.

The project was located in a general hospital Trust in central England - Kettering General Hospital NHS Trust (henceforth KGH). The project was initially implemented with a discrete group of nursing staff in 4 localities, supported by the provision of dedicated machines. The first stage explored the levels of engagement with national policy documents among specific targeted staff via the digital document discussion forum. The forum was subsequently expanded to encompass all nursing and midwifery staff and forums relating to both local and national documents. In the latter stages, the project was fully integrated into the hospital intranet and additional Computer-Mediated Communication (henceforth CMC) support technologies were explored, such as news agency and webcasting.

This report concludes with a set of 12 recommendations, grouped into four broad themes. Firstly, that organisational culture is highly significant in technology-supported change management. Secondly, that the physical context / setting of technology innovation is very important to its change impact. Thirdly, we note that leadership is a key variable in technology-supported change management. Finally, we found evidence that innovative technology can have a very powerful positive effect in the management of change.

Project Objectives

1. To review, prototype and evaluate an assisted electronic conferencing approach to nursing communication to enable nurses to access and contribute to text based threaded, asynchronous discussions and themes information.
2. To develop an understanding of the key impacts of:
   a. Electronic communication on the effectiveness and efficiency of health care professionals' decision-making processes.
   b. Innovative communication tools on, in the first instance, nursing professionals' patterns of practice. Including an exploration of how the access, use and contribution of nurses to computer mediated communication could improve information management by nurses.
3. To identify the key elements of a training strategy to create acceptance and appropriate uses of electronic communication by nursing staff in an NHS hospital Trust. This will incorporate an account of current organisational structures.
4. To provide an initial indication of the potential impact of new information and communication tools.

Summary of Objective 1 - To review, prototype and evaluate a computer-mediated approach to nursing communication

1.1 The Assisted Electronic Communication project implemented and evaluated a digital discussion forum for nurses and midwives in an Acute NHS Trust. The technology provided a forum for nurses and midwives to use new information and communication technologies to become informed and hold discussions about health care policy, which in turn could lead to change in practice, without ever leaving the ward. The forum technology provided a means for a document to be linked directly (and comment-by-comment) to a public discussion space. This enabled nurses and midwives to send views, ideas and responses about important documents, directly and electronically, to other practitioners. All the messages were available to be read and responded to by any nurse or midwife accessing the system. This technology aimed to incorporate "knowledge work" into the daily practice of nurses and midwives within the hospital context.

The technical system deployed was entirely web-browser based; with users clicking through web pages and submitting forms in all interactions. The system was contained within the hospital intranet, based upon a Windows NT™ web server behind the NHS-Net firewall. The system was studied in use in the hospital from January 2001 to October 2002 using a range of quantitative metrics supported by qualitative instruments.

1.2 The Assisted Electronic Communication project encompassed six implementation phases.

1.2.1 Initial implementation. To begin, the digital discourse forum was linked to the NHS strategic document "The National Service Framework for Coronary Heart Disease" (henceforth NSF CHD). The forum was available to staff in Accident and Emergency, the Coronary Care Unit, a general Medical Assessment Unit and a general Medical Ward. The four initially selected areas covered approximately 100 Nursing staff, with very varied computer experience.

1.2.2 Expansion – national documents. Subsequent National Service Frameworks (for "Older People" and "Mental Health") were included on the system as they were published. Access to the system was then expanded via inclusion on the hospital intranet and promoted to all nursing staff.

1.2.3 Expansion – local documents. In order to respond to a demand for accessible, patient-focused documents that explicitly required decision-making interactions from nurses and midwives, three local patient satisfaction survey forums were created, relating specifically to the following areas: Trauma and Orthopaedics, Obstetrics and Surgery.

1.2.4 Local ownership – the midwifery forum. Following high levels of engagement with system from midwifery staff, the midwifery staff group requested continuation of the discourse forum via a specific midwifery forum linked to local midwifery strategy documents.

1.2.5 Webcasting. A series of experimental webcasts were broadcast to explore the potential and value of computer-mediated communication via live events. Some minor technical issues were noted by participants with respect to the quality of audio in the hospital locations, but overall the webcasts were deemed to be valuable. However, one minor issue was that of finding a stable location for the webcast equipment. Whilst a "studio" is not essential for webcasting, it is still clearly valuable to have a fixed and permanent location for the suitable equipment (camera, microphones, lights, video/audio-encoder computers, etc), which is not interfered with from one event

to the next. The only "studio-like" features that this location would benefit from are a solid colour backdrop – to give a uniform backing to the 'talking head' of the presenter, and good quality lighting (to assist in the best possible picture quality of the image). In the NHS Trust context it seems that whist the hardware and software are relatively easy to allocate, the space can be much harder to find.

1.2.6 Evaluation. Research administered questionnaires and focus groups were employed to evaluate the prototype development. A baseline survey to assess general acceptability amongst staff was undertaken in the target areas. Implementation was then evaluated throughout the study via a series of questionnaires, observations and in-depth interviews and focus groups with users and non-users. All digital participation was logged and coded in the on-going analysis.

Summary of Objective 2 - To develop an understanding of the key impacts of: (a) electronic communication on the effectiveness and efficiency of health care professionals decision-making processes; (b) innovative communication tools on, in the first instance, nursing professionals' patterns of practice.

2.1 Two main functions of the document forums were identified:

2.1.1 the forums functioned as very effective information and knowledge sharing resources. This occurred in a question and answer format, with more senior or experienced staff providing practical or factual answers.

or

2.1.2 the forums functioned to enable decision-making interactions. These interactions comprised discursive and reflective discussions relating to service development issues and leading to change in service delivery.

2.2 Contributing to the discourse forums was perceived to be of value by participants, as usage overcame communication barriers created by shift working and isolation within one clinical area.

2.3 All grades of nursing and midwifery staff perceived the system to be easy to use and techno-fear or the design of the system was not a factor for the overwhelming majority and did not discourage use. However nursing staff were much more likely than midwifery staff to believe that they could not use the system unless they had been explicitly shown how to do so.

2.4 Participating qualified staff and students found access to the NSF documents in an accessible format helpful, as it allowed the rapid development of an understanding of the contents.

2.5 Broad-based regular and routine participation across all grades of nursing staff was not achieved with the National Service Framework forums. The Mental Health National Service Framework in particular attracted very low interest. The following elements of nurses and midwives core professional identity were found to be core factors influencing participation in the discourse forums or webcasts.

2.5.1 Marginalisation. Negative normative organisational and micro professional cultures influenced staff into feeling that they must maintain a visible presence of busyness. Working at the computer was not seen to be credible 'activity' for nurses and might be negatively sanctioned. Participation in decision-making and '*having a voice'* was not generally perceived as an essential component of the job. Instead, task-focused care was often a predominant feature structuring nurses' views of their role. Overall, for these staff the culture of the organisation is understood as unsupportive of change or participation, even if they would desire such a voice, with the consequence that they develop little experience of discursive communication and engagement with policy. Engagement with new communication technologies may happen, but this use is likely to be instrumental (e.g. to prepare for a job interview).

2.5.2 'Only connect'. In a similar way to the process of marginalisation, these staff also lacked experience with discursive and reflective decision-making and primarily focused on task-orientated care. However, unlike those who effectively marginalised such activity, this group of staff failed to perceive any value to engagement. Engagement with the new modernisation agenda and new forms of communicating is defined as irrelevant as any connection to patient care is not understood. Consequently, new communication technologies are identified as being, at best, for an 'elite' group of staff and at worst, as a complete irrelevancy.

2.5.3 Active resistance. This view encompasses those who are actively hostile to either any forms of new communication technologies. This 'techno-phobic' perspective represented a very minor view and was only held by a few individuals.

2.5.4 Active engagement. For this group (as exemplified by the midwifery staff) normative organisational and micro professional cultures influenced staff into feeling that participation in decision-making and policy-making process was a valued component of

their job. In this context new communication technologies, as represented by the project computer mediated communication systems, were engaged with because they were a solution to a widely understood need to communicate more effectively. Moreover, managers with an active engagement position acted to reinforce and facilitate participation with the new communication technologies. Alignment and ownership of new communication strategies in turn lead to increasing participation and experience of discursive communication within the participating community.

Summary of Objective 3 - To identify the key elements of a training strategy to create acceptance and appropriate uses of electronic communication by nursing staff in an NHS hospital Trust.

3.1 All grades of nursing and midwifery staff perceived the system to be easy to use and techno-fear or the design of the system was not a factor for the overwhelming majority and did not discourage use. However, nursing staff were much more likely than midwifery staff to believe that they could not use the system unless they had been explicitly and personally shown how to do so by an 'official' member of the project.

3.2 Participation in the system by midwives encompassed all grades, shifts and even community-based midwifery staff. The system enabled part-time and isolated staff to exercise a voice in decision-making process. The midwifery staff group found the system very easy to use and required little or no demonstration of the system in order to become proficient users.

3.3 Peer demonstration of the system worked well among the midwives because the normative cultural expectations of the group allowed for informal peer diffusion to be acceptable. Among the nursing staff a normative expectation of formal training providing 'permission' to employ a new skill was more entrenched. Consequently, although peer demonstration can work well staff may initially require preparation to adopt the concept.

3.4 The hospital Information Management and Technology department team were heavily engaged in the deployment of a large patient records and administrative system at the time we wanted to deploy the news system aspect of the study. It is clear that they also felt that it overlapped with some features of an existing 'hospital web news' system that they had already invested in, and well understood. One significant element in the acceptance and deployment of any new system is that both the target staff and the support staff fully understand and support the use of the new technology.

Summary of Objective 4 - To provide an initial indication of the potential impact of new information and communication tools.

4.1 Use of the National Service Framework discourse forums enabled core groups of staff to discuss the implications of the National Service Frameworks. There was some evidence that usage of the system had a positive impact on local implementation of the National Service Frameworks.

4.2 The patient survey forums demonstrated a marked distinction between nursing and midwifery specialties in terms of their engagement with the communication of ideas, responsiveness to patient views and expertise in discursive communication. Participation in the project discourse forum enabled midwives to create a broad-based professional community that was able to rapidly discuss, prioritise and actually achieve change in care.

4.3 Usage of the discourse system by midwives stimulated real changes in policy and practice, for example, improvements in the care of women in labour. One of the key problems with patient and public involvement is how to create a culture whereby staff can both access patient views and also respond to them by creating the necessary changes. The experimental discourse system provided an accessible means for the staff group to be responsive to patients' critiques of the service.

4.4 Midwives also used the system to share knowledge about best practice from their experiences of other hospitals and also to re-kindle their motivation. This may have valuable implications for midwifery staff retention strategies.

4.5 One critical facilitator to the achievement of successful usage is likely to be the form of support offered by managers and 'champions' of the technology-based systems, such as Computer Mediated Communication. For example, it is clear that central to the successful implementation of the discussion system among midwifery staff, was the character of input from midwifery managers. Regular supportive participation on the system from midwifery managers facilitated action and staff willingness to prioritise contributing to the system.

Section 1 : The Background of the Study

In the UK, increasing the participation of frontline nursing and midwifery staff in the policy-making, planning and decision-making of their organisation appears as a recurring priority throughout the NHS modernisation agenda (Department of Health 1999, p41; Department of Health 2000; Department of Health 2000; Department of Health 2001). This priority has been reinforced through the modernisation agency's remit to establish routes for the capture and dissemination of knowledge and 'know-how'. In policy terms, a direct link is being made for nursing and midwifery, between enhanced clinical performance and the development of more open and efficient communication systems (Department of Health 1999; CEDSI 2000). The overall result of the UK modernisation agenda is that frontline nurses and midwives are increasingly being expected to perform 'knowledge work'. The 'knowledge worker' functions not only as a consumer, but also as a producer and manager of professional knowledge.

Nursing and knowledge work

Despite the policy demand towards professionals' functioning as knowledge workers, the application of the concept to the UK health system and nursing and midwifery in particular, represents a relatively new phenomenon (Antrobus 1997). Knowledge management theory asserts that the strength of any organisation lies in the knowledge of that organisation's people. The essential idea is that organizations with effective knowledge management processes are able to expand their professional knowledge base, by capturing and sharing the experience of key staff. This knowledge enables organisations to respond to change by giving them a structure to help in assimilating new knowledge from new staff experience (Quintas 2002). In problematizing knowledge as both distinct from information and something that must be effectively communicated within organisations, knowledge management theory may offer a means for nursing to begin to conceptualise new communication structures (Szulanski 2000; Bate and Robert 2002).

As we have already indicated many workers within an organisation may passively 'receive' information, but knowledge workers are those who are able to construct a response to received information by adding personal, theoretical and tacit knowledge acquired from their own experience. For nursing, effective knowledge management will be dependant on the combination of a situated, reflective and experiential or 'tacit' knowledge base gained through clinical practice with scientific or intellectual knowledge (Antrobus 1997). In this context, an important distinction needs

to be made between explicit, formalised knowledge (such as rules, facts and policies that can be simply codified and do not need discussion to be implemented) and experiential, problem solving, more tacit knowledge. In social constructionist theories relating to knowledge management (e.g. McAdam and Reid 2001; Bate and Robert 2002) the communication of tacit knowledge is essential if knowledge is to become actionable and operational. This is simply because knowledge is not only held by individuals, but is both produced and held collectively by groups of people working together in a *community of practice*, as part of a shared understanding (Seeley-Brown and Duguid 1991; Lave and Wenger 1993). Overall, perhaps the greatest value knowledge management theory can offer to nursing is that it may enable an understanding of the critical value to nursing practice of effective communication structures.

The transformation of front-line nursing staff into knowledge workers is likely to be dependant on the following key developments within health service organisations and professional cultures' patterns of communication:

a) Structures that allow the diffusion of the required information to the individual professional will have to be developed, as information will need to become '*primarily person based rather than organization-based'* (Department of Health 1998)

b) Individuals must also be able and prepared to use new information to act as '*critical reflective thinkers'* (Schon 1987), that is be able to generate new knowledge from their experiences and identify how that knowledge can be translated into changes in practice (Brockbank and McGill 1998).

c) To participate in decision-making, nursing will need communication channels that enable the individual nurse or midwives' interpretation of and response to information to be shared with colleagues and diffused throughout the organisation. This requires an ability to employ modes of communication with colleagues that facilitate discussion, feedback and action. Communication may permit nurses and midwives collaborations to produce new and refined knowledge to improve the delivery of care.

The management of change

However, the application of knowledge management theory to nursing immediately highlights a number of tensions for the profession in any attempt to embed knowledge work as a routine component of nursing practice. Midwifery and nursing are both represented by an increasingly

mobile and part-time workforce, with the result that broad-based participation in decision-making or even meeting to discuss policy change constitutes a challenge. Commentators reviewing the role of information technology in the management of change in organizations note that changes in 'roles' and the 'blurring of boundaries' between these roles are often critical issues (Scott Morton 1996). Potentially, it is the hierarchical structures of the profession and the ambivalent position of nursing and midwifery in the health care division of labour that represents the key barrier to the development of broad-based and discursive patterns of communication (Spitzer 1998). Evidence relating to the midwifery profession suggests that the current organisation of care often leaves midwives (especially those who seek to innovate) feeling isolated and marginalised (Kirkham 1999; Stapleton, Kirkham et al. 2002). This process may result in midwives finding it difficult to even envisage changes to current forms of service provision (Hughes, Derry et al. 2002).

Nursing appears to have an underdeveloped appreciation of how to make use of and communicate nurses' tacit' knowledge in order to influence policy and practice (Antrobus 1997). This leaves front-line nurses in an isolated position without routes of access to the synergistic potential of their community of practice and thereby a means to translate their experiences into new knowledge and action. This may, in part, account for nurses' resistance to engagement with other forms of knowledge, including intellectual knowledge (Royle, Blythe et al. 2000). It may also be partly be responsible for a perceived passive, non-critical response to policy-making, (Cheek and Gibson 1997). Connecting with a community practice also faces practical and logistical barriers. In most health care organisations the nursing workforce is spatially isolated within wards (Halford and Leonard 2003), time-constrained and increasingly, part-time. Existing research seems to be highlighting an unresolved set of tensions for nursing in the transition to knowledge work, in terms of both how nursing knowledge is used and valued, but also how individual nurses approach engaging with knowledge and communicating with colleagues. Clearly, solutions need to be found to overcome these practical and professional cultural barriers and manage this change.

Computer mediated communication

One solution to the health care 'communication and information gap' for nursing may lie in the development and application of new information and communication technologies (Nauert 1997; Lacja 1999). This view has been echoed by the Department of Health's support for asynchronous systems as a means to enhance inter-professional collaboration, and '*rebuild co-operation in the NHS*' (NHS Executive 1998). Indeed, *Information for Health: An information Strategy for the Modern NHS 1998-2005* (NHS Executive 1998) highlights that the application of advanced multimedia systems are likely to have a positive impact for the NHS by enabling improved,

communication systems among professionals (NHS Executive 1998, p37) and support for clinical governance via systems that, for example, provide improved access to documents via electronic copy at the desk or bedside.

Evidence to support such a policy emphasis has been found in various educational and business settings. In such settings computer mediated communication has been found to provide staff and organisations with a vehicle that supports, maintains and enhances knowledge work. In particular key characteristics of CMC have been identified as supporting knowledge creation, knowledge capture and knowledge use:

- Among geographically isolated staff, computer mediated discussion groups have enabled staff to access a wide community of practitioners and thereby allowed individuals to draw on a greater reserve of expertise and knowledge (Hightower and Sayeed 1996).
- CMC-based discussion on a specific topic can encourage experimentation, sharing of early ideas, increased and more distributed participation and collaborative thinking (Ruberg, Moore et al. 1996).
- Through having access to information and collaborative thinking CMC can enable staff to successfully participate in decision-making processes (Bishop and Levine 1999).
- CMC as an asynchronous form of communication (as opposed to synchronous face-to-face communication) results in a greater opportunity for reflection on information. This has the result that CMC acts to support knowledge creation and innovation (Milton, Shadbolt et al. 1999).

Existing studies concerned with attitudes to computers and tools such as the Internet suggest that nurses professional use and acceptance of the value of computers to their professional practice is lower than for other professional communities (Kaplan 2000; Timmons and Tredoux 2000). Nursing, it seems, suffers from an absence of appropriate systems targeted to meet their professional needs and at an organisational level may encounter barriers of time, access, workload and attitude to embracing computer use as a medium for knowledge work and knowledge transfer (Royle, Blythe et al. 2000). However, when nursing computer usage has been analysed by type, there is evidence that nurses exhibit strong preferences for computer mediated communication systems that are interactive and support collegial communication (such as email), over purely information resources (such as the Internet) (see e.g. Pereira, Bruera et al. 2001; Estabrooks, O'Leary et al. 2003). The use of interactive computer mediated communication systems in educational contexts by nurses has been found to facilitate critical reflective thinking that

questioned traditional nursing discourses and generated suggestions for improvements in practice (Murray 1996).

Outside educational settings, less empirical attention has been given to investigating how interactive, computer mediated communication might impact on nurses interaction patterns and structures. In particular, a number of questions remain concerning the functioning of computer mediated communication, in either the naturalistic settings of a health care organisation, such as a hospital Trust, or the potential of such systems in routine ward contexts to engage the broad range of front-line nursing and midwifery staff. More significantly, the nature and types of nursing interaction and communication that occurs on participative CMC systems and the degree or character of knowledge sharing that might occur is similarly under explored. Clearly, the potential of CMC to impact on the transformation of nurses into knowledge workers begs further investigation.

In most contexts it seems that the application of information technology among health workers will be high, if implemented in the context of a clear solution to a clinical or professional issue, rather than being technology-driven (Coiera 1995).

Secondly, it seems likely that the development of an understanding of how health care professionals currently (and ideally need to) communicate will prove as important as an exploration of any specialized technological communications infrastructure for health care (McCarthy and Monk 1994). Thirdly, existing information technologies and particularly asynchronous systems (Coiera and Tombs 1998) such as email, Internet communication tools, and text-based conferencing systems that can take advantage of communication that is threaded and themed may hold the potential for rapid, cost-effective advances in the quality of clinical information and communication for health professionals. Asynchronous electronic communication is vital to support mobile and time-constrained professionals to communicate effectively at convenient times. Threaded communication can establish and identify working dialogues within a collection of messages. Themed communication in a conferencing environment allows for the clear organisation of information.

However, above all of the technical features of such systems, the social context of the communication is usually significantly more important for the effective implementation of a meaningful digital discourse (see e.g. Houde, Bellamy et al. 1998).

Section 2 : Methodology

Evaluation Overview

This section provides a brief overview of the methods employed in the evaluation.

The methodological framework consisted of a multi-method case study approach. Case study methodology was employed primarily because of the opportunity such an approach provides for an in-depth investigation and also for a multi-perspective analysis of the interaction (Feagin, Orum et al. 1991). The methodology employed both qualitative and quantitative methods in order to achieve data triangulation (Yin 1994).

The evaluation methodology was designed to consider the totality of the online communication for the duration of the forums operation, that is the usage patterns, complete contributions to the forum, as well as the perceptions and experiences of participants were explored. There is a growing acknowledgement of the need to locate evaluations of human computer interaction within detailed considerations of the practical interactional circumstances structuring the context of deployment (Heath, Luff et al. 2003). For example, Dent (1990) demonstrated how organisational arrangements and professional cultures profoundly influence the response to technological innovation in medicine. A central feature of the evaluation was to provide an empirical study of CMC in use, and to examine the key organisational and professional discourses that might influence the response to innovations in CMC for nursing.

Methods Overview

Research administered questionnaires and focus groups were employed to evaluate the prototype development. A baseline survey to assess general acceptability and attitudes to engagement with policy-making processes was administered to 97 of the 100 staff in the four target areas, yielding a response rate of 78.4% (76 out of 97).

All digital participation was logged and coded for inter-rater reliability by two members of the research team, using HyperResearch™, and analysed using a grounded theory approach. The usage of the system was evaluated via a post implementation follow-up questionnaire to staff in the target areas; fifty-one staff members from the target areas were re-surveyed in a researcher-administered questionnaire. The survey data was then supplemented by 30 in-depth semi-structured interviews with users and non-users from across the Trust and two focus groups with operational team members. The surveys were analysed using SPSS.

The webcasts were evaluated by observation, an exit survey and analysis of participants' questions.

Sample group

The project was located in a general hospital Trust in central England - Kettering General Hospital NHS Trust. The AEC project was initially implemented with a discrete group of nursing staff in 4 localities, supported by the provision of dedicated machines. A core operational group of nursing and midwifery staff assisted with the design and development of the system. The initial implementation was available to staff in Accident and Emergency, the Coronary Care Unit, a general Medical Assessment Unit and a general Medical Ward. The four initially selected areas covered approximately 100 Nursing staff, with very varied computer experience. Following initial implementation access was expanded via inclusion on the hospital intranet and promoted among all nursing and midwifery staff.

Outlined below are the methods that were employed to examine each of the AEC project implementation phases.

Implementation and Development

Prototype development (trial – researcher administered questionnaire, focus group)

Baseline Report: CMC as a pathway to participation in policy decision-making.

Baseline Survey

A questionnaire was employed to address general levels of staff knowledge concerning the NSF for CHD and attitudes towards computer-mediated communication in the 4 target areas, (N=76).

Expansion (Phases 2-5) further NSFs the patient and midwifery forums and webcasting

Usage Survey

A 2nd questionnaire was administered concerned with levels of system usage in the target areas and approaches to the system. This also included a consideration of any impact on the levels of knowledge about the NSF for CHD and engagement with the project systems, (N=51).

Subsequent phases of the evaluation focused on an in-depth primarily qualitative exploration. This encompassed an analysis of all the contributions to the forums, observations of participants' responses to the webcasts and in-depth interviews with both users and non-users of the system.

Discussion Forums

- All the discussion forum logs were downloaded and coded.
- The patterns of usage were analysed using SPSS.
- The content of all the discussion forums were coded and analysed using a qualitative data analysis package designed to work with grounded theory concepts (HyperResearch™). Inter-rater reliability was achieved by coding being undertaken independently by two members of the research team.
- A total of 30 in-depth interviews were undertaken with, key respondents users and non-users of the system. Due to the difference between the midwifery and nursing response to the system it was decided to undertaken a detailed and focussed exploration with the midwives. Consequently, 12 of these interviews were midwifery users of the system. Key respondents included web cast presenters and senior managers within the Trust. The interview data was analysed using a grounded theory approach and coded onto Atlas-ti™. Three members of the team coded the interviews, and coding of a sample of 12 interviews was again double-coded for inter-rater reliability.
- Two focus groups were undertaken with users and members of the operational group. A particular focus was given to the further development and integration of assisted electronic communication within the Trust.

Analysing CMC data

Computer mediated communication represents a relatively new form of data for researchers, consequently methodological strategies for the analysis of such data are still being developed (Herring 1996). This leaves researchers not only with the normal decisions concerning the construction of the thematic analysis of the data but also with decisions concerning what aspects of the communication actually constitutes data to be analysed.

In terms of the latter issue researchers have adopted a number of very different strategies. For instance, Shaw (2000) only used offline interviews. Although this methodology elucidates the respondent's perceptions of the electronic communication, it does not take into account the communication itself. In contrast, Sharf (1997) and Winzelberg (1997) considered the online communication. Winzelberg (1997) used categories to analyse CMC postings based on the premise that the communication patterns of the electronic support group would be similar to that of face-to-face support groups. However, unlike the Assisted Electronic Communication project data

each posting was only analyzed for the primary message that was being conveyed, rather than for more than one category. Winzelberg also only employed a snapshot sample of three months on-line communication. In contrast, our evaluation considered the forums for their duration of operation. Similarly, Rutherford et al (2002) also only considered initial postings

> *"In this study, all initial messages posted on the bulletin board were analyzed carefully. Follow-up messages were not included in the analysis. The initial messages were categorized in terms of reason for post, originator of post (patient, relative, friend etc) and the nature of the question" (Rutherford, Forte et al. 2002)*

Unlike many computer mediated communication studies, our project evaluation aimed to consider the totality of the online communication, the usage patterns, and contributions to the forum for the duration of the forum's operation.

In terms of the thematic analysis of the forums, although researchers have focused on a number of the language aspects of computer mediated communication such as flaming, spamming and acronyms (Herring 1996), for this project we focused on two core characteristics of the medium. Firstly, we aimed to explore the qualitative nature of the discussion, including the character of the communication and contributions to the forum. A core focus of our work has been with the *character of decision-making interactions* (Condon and Cech 1996). For the purposes of the Assisted Electronic Communication project this overarching concept was divided into two forms:

- **Discursive debate** meaning : discussion of an issue that conveyed differing views points or challenging perspectives, as opposed to posting an answer that had a solution (i.e. the protocol is in place). But did not necessarily include an articulation of alternative forms of provision as in *'Critical Reflective Thinking'*.
- **Critical Reflective Thinking** meaning : the ability to reflect upon, or critique, current provision and articulate alternative forms of provision.

The second core issue we aimed to measure in the quality of the 'knowledge work' was that of the evidence of the impact of the forum on (a) community formation, (b) professional culture and finally (c) organisation of care.

All the qualitative excerpts and quotes from our data that have been used in the following evaluative sections are intended to be helpfully illustrative of the quantitative measures agreed by our coders for the knowledge work we have measured.

Section 3 : Specifying the System

Nursing Staff Views on CMC and involvement in decision-making

An initial survey administered in the four target clinical areas at Kettering General Hospital was conducted during the implementation and development phase of the project. The survey was intended to establish a reference standard with respect to the views, expectations and experiences of new communication technologies of nursing staff. The questionnaire collected information concerning; the acceptability and use of information technology, knowledge of policy contexts, including the National Service Frameworks in general and the National Service Framework for Coronary Heart Disease (NSF for CHD) in particular. In addition, perceived levels of involvement in decision-making were also surveyed.

The Initial Survey Methodology

The survey comprised of the following three sections:

- Views and experiences of computer-mediated communication
- Knowledge and views relating to policy documents and NSF for CHD
- Demographic details

Following piloting, the questionnaire was distributed and collected over a period of three months. The research nurse administered and collected the questionnaires whenever possible (68 of the completed questionnaires) and the remaining by internal post (8 of the completed questionnaires). Departments were asked to identify staff changeover times and break times, so that the questionnaires could be administered at a convenient time. All shifts were covered during the data collection period.

The Respondents

All qualified members of the nursing staff in the four clinical areas were given questionnaires to complete. Permanent qualified members of staff were identified using copies of staff rota lists as supplied by the senior staff in each area. These lists showed there to be 100 staff in the selected areas. Three members of staff were excluded due to either maternity leave or long-term sickness. Therefore the target sample was 97 members from the qualified nursing staff group.

The method of data collection appeared to work well in this environment as the final response rate was good. Seventy-six respondents returned completed questionnaires, yielding a response rate of

78.4% (76 out of 97 of the target sample). All shifts were represented in the sample. That the majority of respondents were female, reflected the gender bias in the nursing professions (10 male respondents, 63 female respondents, 3 respondents did not answer). The most frequent age group represented in the sample was 31-40 years old (38.2% of the sample). All grades and levels of nursing staff were represented in the sample. The most frequent member of the nursing profession represented was the staff nurse (N=58, 76.1 %). This reflects the spread of grades amongst the nursing professions as a whole.

Views of Computer-Mediated Communication

This section reports on respondents' views and experiences of computer-mediated communication. In order to assess current patterns of usage and the acceptability of CMC as a discursive forum at work respondents were asked about their access and usability of CMC. Respondents were asked what they felt were the advantages and disadvantages if any of the use of CMC for work purposes. Additionally, to gain a greater understanding of CMC use within nursing respondents reported on their confidence at using email, the Internet and the intranet.

			Access to CMC		
			No Access	Access to CMC	Total
Location	No Access	Count	22		22
		% of Total	28.9%		28.9%
	Home	Count		20	20
		% of Total		26.3%	26.3%
	Home & Work	Count		23	23
		% of Total		30.3%	30.3%
	Home, Work & College	Count		1	1
		% of Total		1.3%	1.3%
	Work	Count		9	9
		% of Total		11.8%	11.8%
	Home & College	Count		1	1
		% of Total		1.3%	1.3%
Total		Count	22	54	76
		% of Total	28.9%	71.1%	100.0%

Table 6 - Access to CMC by Location

Personal access to CMC either at home or work is one indicator of familiarity with new technology. Asking questions concerning usage provides a means to gauge the potential levels of acceptability of new technologies as a medium for discursive communication. Use of computers at home indicates in part usage in a social context and possibly the amenability to transfer this to work. For the purposes of this study, CMC was defined solely as email, the intranet (the internal hospital web) and the public Internet. Just over 70% of the respondents (N=54, 71.1%), reported having CMC

(as defined by the questionnaire) available to them (Table 6). This leaves twenty-two respondents (28.9% of the sample) with no access to CMC, either at work, home or college.

Nearly 60% of the sample (N=46, 58.2% of the sample) reported their home as being one location where CMC is available to them. In comparison less than half of the respondents (N=34, 44.7% of the sample) reported work as being one source of CMC. Home and work combined were the most frequently reported sources of CMC (N=23) (Figure 1).

Interestingly, 20 respondents (26.3%) had access to CMC at home only and a further respondent had access at home and at college (1.3%)(Figure 4). Overall, for nearly 30% of the sample (N=21, 27.9%) CMC is accessed outside of work.

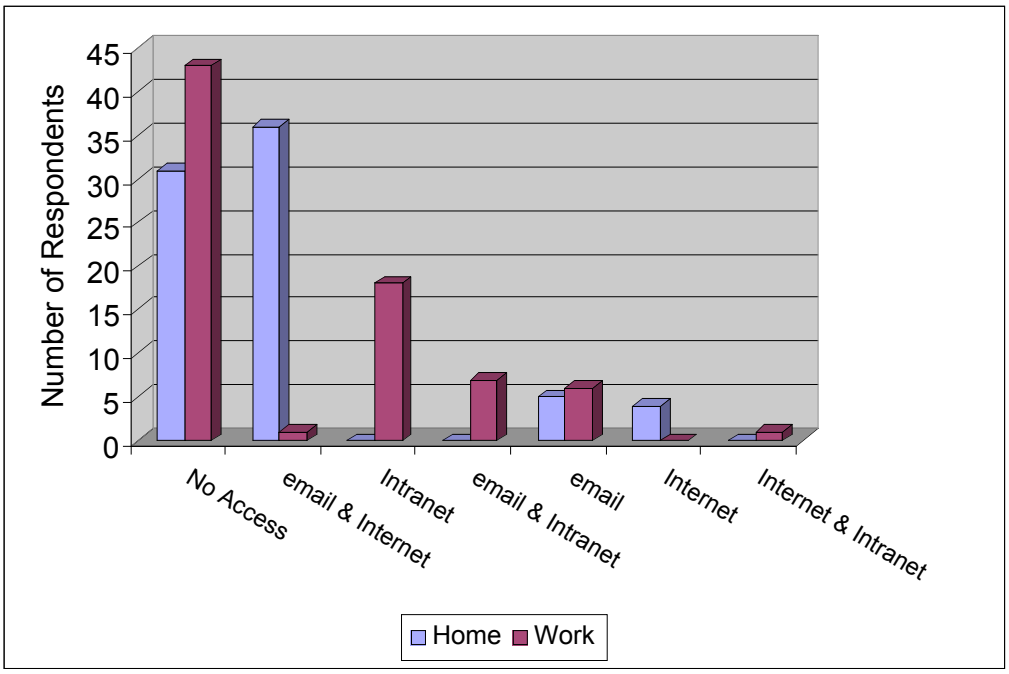


Figure 1 - Type of Computer-Mediated Communication

Over half of the respondents did have access to CMC at work (N=43, 56.6% of the whole sample) (Figure 1). Out of those that do have CMC available at work 18 (23.7% of the whole sample; 54.5% of those with access at work) have access to the intranet only. Internet and email access within the nursing professions studied, varies to some extent according to level of seniority or role in the Trust (Brooks and Bennett 1999). Only fifteen respondents (19.7% of the sample) reported having access to the Internet and/ or email at work. As the majority of our sample are staff nurses (79.5%) comparison of type of CMC at work by grade is very problematic. However, in order to compare availability of CMC by level of seniority, Figure 6 illustrates CMC available at work for staff-nurses and more senior staff (senior staff are members of staff who are not staff nurses with

grade F upwards). Once again, due to the differences in size of the two groups they must be interpreted with care.

Over half of the staff nurses (N=39, 67.2% of staff nurses) and two senior staff (13.3% of senior staff) reported having no access to CMC at work. The intranet was the greatest source of CMC for both staff groups. Out of the fifteen respondents with access to email and/ or the Internet four were staff nurses (13.2% of staff nurses) and ten were more senior members of staff (66.7% of senior staff). Given the large proportion of staff nurses in our sample it was clear that email and Internet access was still limited in less senior members of staff.

The overall level of access to and availability of CMC (71.1% of the respondents) is at first very encouraging. However, when looked at by location and staff group, it appears that only a minority of staff have access to email and/ or the Internet at work. The intranet was the greatest source of CMC at work, however considering that the intranet should be on most computers in the Trust, it seems reasonable to have expected a higher number of respondents with intranet access.

		Type of CMC at Work						
		No Access	email & Internet	email	email & Intranet	Intranet	Internet & Intranet	Total
no answer	Count	2			1			3
Staff Nurse	Count	39	1	1	1	15	1	58
	%	67.2%	1.7%	1.7%	1.7%	25.9%	1.7%	100.0%
Senior Staff	Count	2		5	5	3		15
	%	13.3%		33.3%	33.3%	20.0%		100.0%
Total	Count	43	1	6	7	18	1	76

Table 7 - Type of CMC by Staffing Level

Overall, access to email and the Internet at home was relatively high. This suggests that although current access at this hospital site is limited, staff appear to be familiar with new information and communication technologies. This is important as it illustrates a level of acceptability concerning new information technology by respondents. This may indicate that CMC may be transferable to the work environment. Given that nearly 30% of respondents accessed CMC outside of work, one issue that requires further exploration is whether respondents utilise home and/or college email/Internet access for work-related purposes. This will be discussed in the next section with other issues concerned with actual use of CMC.

The intranet was the most frequent source of CMC at work (N=26, 34.2% of the sample). Not surprisingly then, the intranet was used more frequently at work, by respondents than email and the Internet. However, only 19 respondents (25% of the sample) actually reported using the intranet on a regular basis (at least hourly). Most of these respondents reported using the intranet on a daily basis (N=10, 13.2% of the sample). Eleven of the 14 respondents with a work email account use it regularly (at least hourly). Both of the respondents with Internet access used it on a weekly basis.

These findings highlight that most of the respondents with access to CMC, did actually make use of the resources. However access was a point of contention, particularly for more junior members of staff: as illustrated by the survey respondent who commented that her use of email was dependent on *'When I can get access!!'* Similar patterns of access and usage have also been reported by a study of Australian nurses and midwives computer use {Webster, 2003 #61}. This study not only found that access to computing resources in nursing was allocated by seniority, but also that levels of access was felt by those at the more junior grades to be insufficient to meet their information needs. It appears that one of the main challenges to creating a nursing culture that fully utilises new technology is to provide suitable access to that technology.

Communicating with Colleagues?

Only 16 of the 76 respondents (21% of the sample) reported using CMC to communicate with colleagues. Such a low frequency might be due to low levels of access and availability as in section 5.3.2 respondents reported *'Improved sharing of clinical information'* and *'Increased communication with colleagues'* as two advantages of CMC at work. However, as table 7 illustrates 18 respondents with access to CMC at work did not use it to communicate with colleagues. It must be noted that 12 of these only had access to the intranet.

Count

	Type of CMC at Work						
	No Access	email & Internet	email	email & Intranet	Intranet	Internet & Intranet	Total
not applicable	8						8
yes	3		2	6	4	1	16
no	29	1	4	1	12		47
not sure					1		1
Total	40	1	6	7	17	1	72

Table 8 - Communicating with Colleagues

The fact that individuals with CMC at work do not use it to communicate with colleagues might indicate cultural barriers to CMC. Using CMC to discuss and communicate with colleagues may

not be seen as part of the nurse's role. Many of the respondents reported using information management systems such as "Results Reporting" and such systems come to be seen as an integral part of nurse's duties.

Interestingly, of those that reported using CMC to communicate with colleagues, three respondents did not have access CMC at work. This indicates that some staff were using computers outside of work to communicate with their colleagues. Overall, respondents that used CMC to communicate with colleagues stated that they found it most useful for communicating clinical issues (N=16).

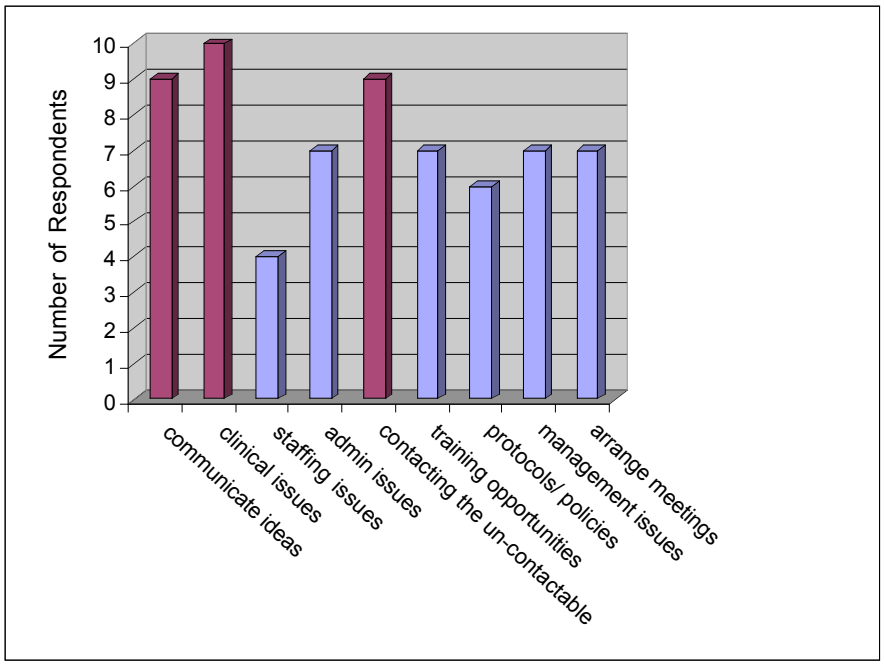


Figure 2 - Usefulness of Computer-Mediated Communication

Communicating ideas and contacting the un-contactable by CMC were also found to be useful.

The Potential of Computer-Mediated Communication

Regardless of whether they had access to or used CMC, 64 respondents felt that CMC could be/ is a useful tool for sharing and accessing work-related information. Some respondents made additional comments to explain this view. Positive comments explained that CMC was convenient, time efficient and was accessible 24-hours, it was felt to be a means of sharing research information and research and a source of up to date information. As one respondent commented CMC is advantageous in the clinical environment especially in highly time constrained multi-disciplinary teams. *CMC could be/is a useful tool for sharing work-related information:*

> *'… in a multi-disciplinary team, when busy the computer based communication gives information to everyone'. (Questionnaire comment)*

Advantages and Disadvantages of Computer-Mediated Communication

The most frequently reported advantage to CMC was *'Improved access to research information'* (N=61, 80.3% of the sample), closely followed by, *'Improved sharing of clinical information'* (N=56, 73.7% of the sample) and *'Increased communication with colleagues'* (N=52, 68.4% of the sample). Only one respondent felt that there were was *'Nothing positive'* about computer communication.

Lack of access to CMC at work and a perceived absence of support to improve confidence levels were the most commonly expressed concerns. By far the most frequently reported disadvantage of computer communication was *'Lack of training'*; (N=54, 71.1% of the sample). A further 26 respondents (34.2% of the sample) were concerned about the possibility of *'losing information'*, which also implies a lack of computer confidence. This reinforces what was found in an earlier study of nurse's communication patterns and needs at KGH (Brooks and Bennett 1999). Although, computer-training opportunities have intensified since then, the current findings indicate that the gap between *'techno-fear'* and computer literacy had not been completely bridged.

Confidence of Using Computer-Based Communication

When asked how confident they were at being able to use email, the Internet, and the intranet to complete specific tasks respondents appeared most confident at being able to use the Internet to support evidence-based practice (N=43, 56.6% of the sample).

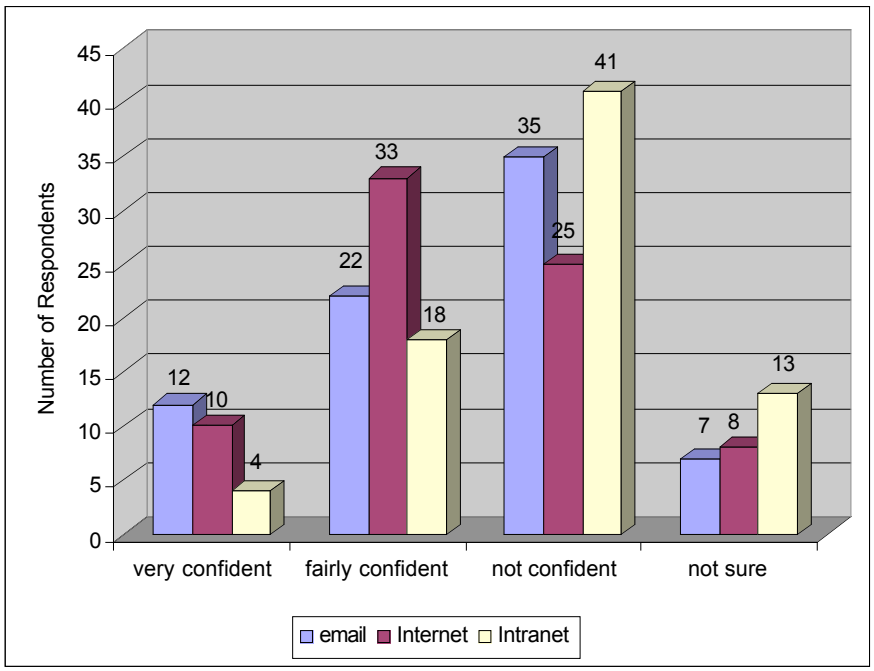


Figure 3 - Confidence of Using Computer-Based Communication

This is encouraging in comparison to the feelings of lack of computer training. Respondents also felt fairly to very confident that they could send an email attachment (N=34, 44.7%). However, they felt less able to look for job vacancies using the intranet (KGH Internal web) (N=22, 28.9%). This may be due to lack of awareness of access to the intranet and subsequently its use.

Policy Documentation and the National Service Framework for Coronary Heart Disease

The survey sampled levels of policy document awareness in general and engagement with the NSF for CHD in particular. In order to gain a baseline measure of these the questionnaire was administered during the developmental stage of the project.

Awareness of Policy Documents

Respondents were asked which of the following they had heard of:

Information for Health
National Service Frameworks
National Health Service Plan
Making a Difference

Out of these the least known was *'Information for Health'*, with 55% of respondents reporting that they had not heard of this document (Figure 4).

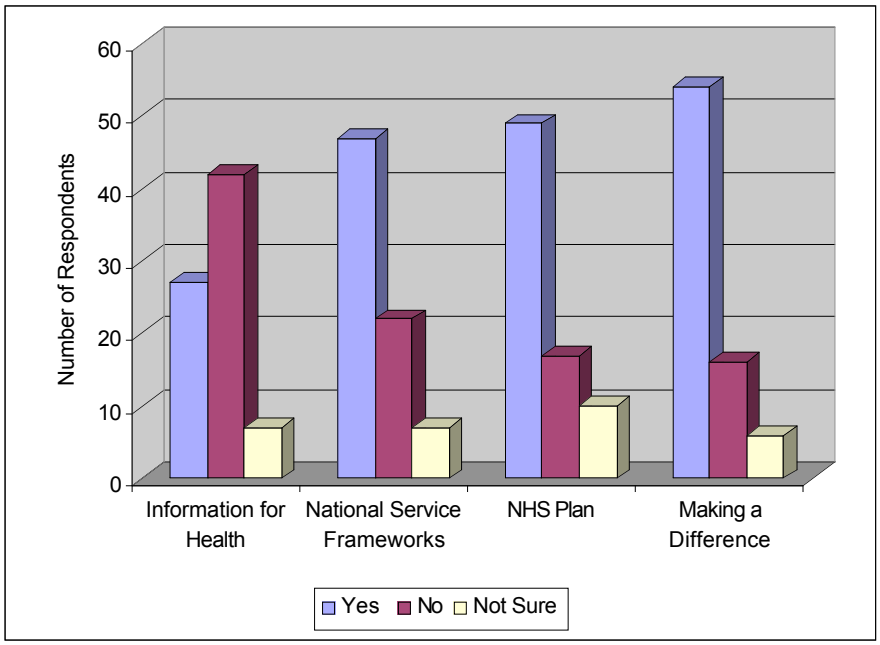


Figure 4 - Knowledge of Policy Documents

However, over 60% of respondents had heard of the *'National Service Frameworks', 'NHS Plan' and 'Making a Difference'* (61.8%, 64.5% and 71.1% respectively). This indicates that the

respondent's were aware of national policy documentation indicating the initial step towards engagement. It must also be noted that, 28 respondents (36.8 % of the sample) were not sure or had not heard of any of the *'National Service Frameworks'*. The levels of awareness and engagement of the base document of the first discussion forum (NSF for CHD) will discussed in the following section.

National Service Framework for Coronary Heart Disease: Levels of Engagement and relevance

Encouragingly, 64 % of the respondents had heard of the NSF for CHD (N=49). However, this left a substantial minority that had no knowledge of the NSF. Out of the respondents that had heard of the NSF only 25 had read the summary (33.9% of the sample) and only a further 9 (11.8 % of the sample) had read the whole document. This indicates that although respondents were aware of policy documents, only a minority (44.7%) were engaging with it. However, it is interesting to note that one respondent said that they had only read specific sections of the NSF, *'I think I have read bits but not whole!'* This might suggest that such lengthy documents can be more tangible when broken down and accessed in sections. This is one of the advantages electronic information, as this medium lends itself to presenting information in sections and searching for specific items of interest. Additionally, the value of informal networks for sharing knowledge was highlighted, such that informal interactions with colleagues i.e. word of mouth were the most frequently reported source for hearing about the NSF for CHD.

Relevancy to Clinical Practice and Impact of the NSF on Patient Care

Forty-five of the 49 respondents that had heard of the NSF for CHD felt that it was relevant to their clinical practice (59.2% of the sample). One of the respondents commented that the NSF was relevant to their area of clinical practice, as it would provide *'better care for patients'*. Indeed, the majority of respondents who had heard of the NSF felt it would *'positively'* impact on patient care (N=34, 44.7% of the whole sample). Positive comments about the NSF and patient care were concerned with equality and standardisation of quality evidence based care. None of the respondents felt that it might have a *'negative'* effect. However, 14 were not sure what its impact would be. This uncertainty might be best explained by the concerns about the resources needed to implement the guidelines outlined in the NSF for CHD, as one respondent commented, *"some of the change may initially cause problems until they settle and problems are ironed out"*.

Involvement in Decision-Making

Respondents were also asked about their involvement in decision-making concerned with the implementation of the NSF for CHD at KGH. The aim of this section was to explore whether respondents felt involved in local policy implementation and whether they wanted to be more involved.

Only a small number of respondents were involved in discussions concerned with the implementation of the NSF for CHD at KGH (N=11, 22.5 % of those who had heard of the NSF and 14.5 % of the whole sample) (Figure 5). Interestingly, 8 of the respondents who had heard of the NSF felt that they would like to be involved in such discussions. A very enthusiastic response was *'Yes more so – very interested'*.

In terms of staff perception of their potential to be involved in decision-making interactions over half of the respondents felt *fairly* to *very confident* that they had the ability to participate in discussions concerned with policy implementation (N=39) (Figure 6). Leaving about 50% of the sample, who were *unsure* or were *not confident at all* about being able to participate in discussions concerning local clinical policy.

However of those that did not want to be involved, respondents commented that they were *"Too busy"* or that their managers would *"impact on discussions for nursing and patient benefit"* and therefore advocate for both the needs of the patient and the staff.

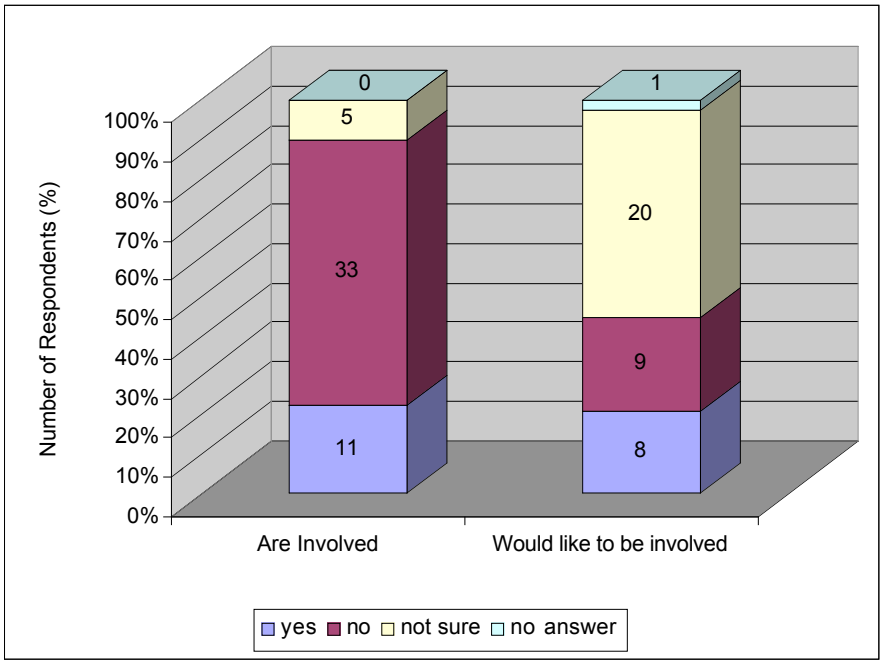


Figure 5 - Involvement in Discussions Concerning the Implementation of the NSF for CHD at KGH

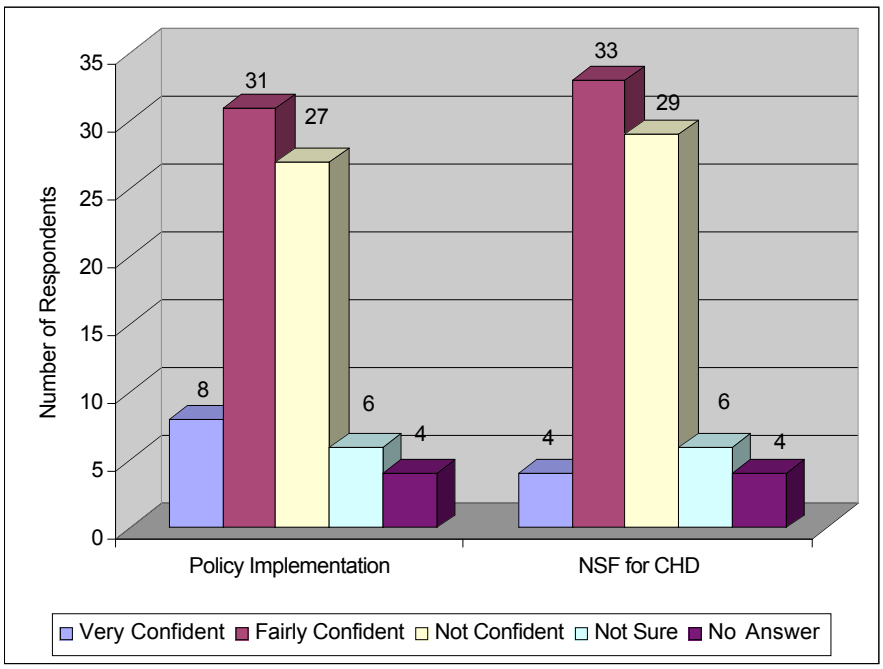


Figure 6 - Confidence in Involvement

As is demonstrated later (see sections on the discourse forums), by nurses actual engagement with the project systems, both the perception of *busyness* and a view that participation in the decision-making processes was not a frontline line nursing task, were both to have a dramatic impact on nursing input.

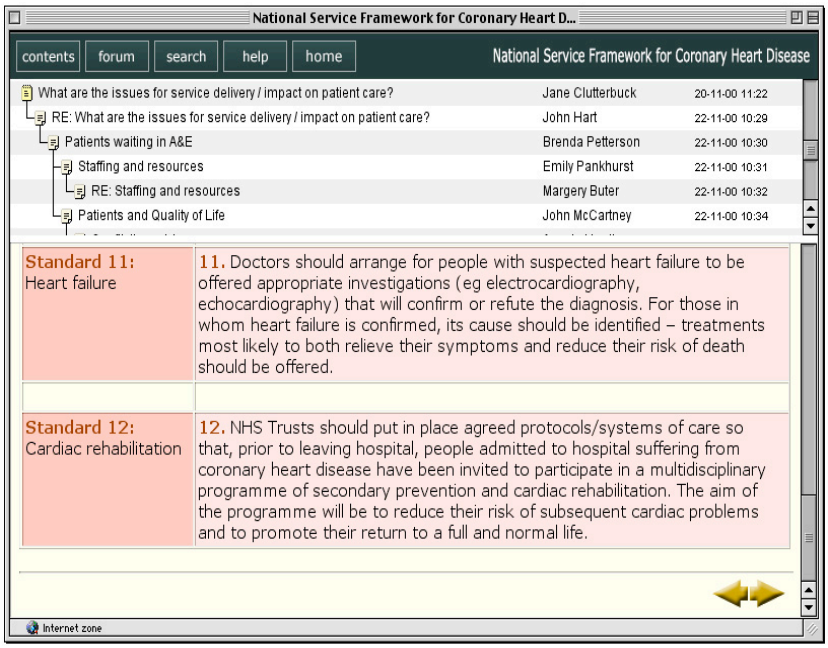
Section 4 : Designing the Discourse Forums

A key objective of the project was concerned with the design and implementation of a discourse system that was both accessible and responsive to professional needs. Furthermore, to design a system that addressed a clear solution to a clinical or professional issue, rather than being technology driven (Coiera 1995). In order to achieve this it was essential that there was professional involvement in the development, and refinement of the system. The prototype development involved staff throughout the decision-making process. Two fundamental elements of this process were the concerned with: the focus of the first discussion forum to be put on the digital discourse system, and the fine-tuning of the system. These elements will be discussed in this section.

The Clinical Problem

The research project's operational group debated the focus of the developmental phase of the project. Several clinical issues were suggested such as shared governance, clinical governance and development of Integrated Care Pathways. Very early on in the planning stages of the project it was suggested that NHS policy documents should be the primary focus of system.

Figure 7 - Screenshot of the NSF for CHD discussion forum



It was felt that the NHS National Service Frameworks (NSFs) were key documents that required timely health professional engagement. The National Service Framework (NSF) for Coronary Heart Disease (CHD) specifically was chosen ahead of the need to implement it locally. Moreover

it addressed a clinical issue that involves multi-disciplinary teams and health professionals throughout the Trust.

It was decided that the NSF for CHD would be the main focus of the first discussion forum. The discussion forum for the NSF for CHD contained the main document and the discussion forum itself. Both the document and the forum discussion can be viewed simultaneously as the screenshot in figure 7 illustrates.

The Clinical Areas

Once the clinical issue and base document for the first discussion forum had been chosen, discussion took place concerning the how the system would be implemented.

Previous findings have reported nurses having limited access to computers for computer-mediated communication (Brooks and Bennett 1999). It was therefore decided that during the implementation phase areas would be given computers, specifically set up for the project, workstations and computer chairs. (It was felt that the Internet links from the NSF for CHD should be live and therefore Internet access was also given). The project computers were not password protected and were placed in easily accessible areas such as coffee rooms, project rooms and the nurses' station chosen by senior staff in each of the clinical areas. The use of each of the areas was discussed with the staff in that area, especially those areas (such as the coffee rooms) where the equipment could have been viewed as 'invasive'.

It was decided that the first phase of the project be implemented in four discrete clinical areas to start with before expanding. This enabled any teething problems to be ironed out, such as publicity, training issues, technical support and a greater understanding to health care professionals communication needs. Overall, this allowed the team to identify and overcome any operational issues and facilitated the evaluation stage of this phase.

The four key areas selected reflect the initial focus of the overall project. All were selected because of their involvement with patients who had a coronary heart disease episode:

(a) The Accident and Emergency (A&E) Department, as the reception area.

(b) The Medical Assessment Unit (MAU), which admits all medical patients for initial assessment (from the A&E).

(c) The Coronary Care Unit (CCU), which receives cardiac patients from A&E or other wards.

(d) A medical ward, that can receive and care for patients with coronary heart disease, these patients may come from the assessment unit, CCU or another ward.

Trial of the prototype Software

Before the implementation of the system in the four areas, it was essential to involve staff members in the development of the software. Senior staff from the target areas were invited to trial the system and inform its refinement. This section reports on the trial: firstly, the methodology employed is described, secondly the feedback and outcomes of the trial are discussed.

Methodology of the Trial

A well designed interface is more likely be rated positively by participants if it is easy to learn, friendly, not frustrating and does not distract participants from communicating by it's own internal mechanics (Hiltz and Johnson 1989). A key objective of the project was concerned with the design and implementation of a discourse system that was both accessible and responsive to professional needs, consequently it was essential that there was professional involvement in the development, and refinement of the system. Six senior members of the nursing staff involved in the project were invited to view and test the software. These staff visited the Knowledge Media Institute at the Open University to see a variety of technologies and software in use. This visit served three purposes, firstly it gave the staff an insight into project, secondly it allowed the staff to try out the equipment and thirdly it ensured the project team and the senior staff had met.

The staff were given a task to complete which enabled them to explore the potential and accessibility of the software. This also ensured that their trial of the system was problem focused and meaningful. This process highlighted common areas where the staff agreed some alterations would improve the software. This resulted in changes to the software.

In order to assess their experience of the system fully the six members of staff were then asked to comment via a researcher-administered questionnaire upon various aspects of the system. The groups' views on the ease of use and visual acceptability of the software were also sought. The research team met and identified key areas from the questionnaire. These were explored further with the Kettering staff in a focus group at the end of the day.

Finally, the formation of working relationships between the participants and the project team was an underlying theme throughout the data collection, which proved to be a valuable and successful aspect of the methodology.

The Feedback

This section discusses the findings from the trial of the software. The methodology adopted ensured that the findings and observations from the researcher-administered questionnaire were fed

into the focus group for further exploration. An overriding feature of the feedback session was their surprise at the ease with which they mastered the discussion forum.

The main emphasis of the researcher-administered questionnaire was concerned with design issues, ease of use and visual acceptability of the software. However, the focus group moved on to explore the discursive features of the system and to discussion of the form of interaction it would promote. For example, staff were very keen to discuss how to include staff across grade and shift patterns.

> *"And I think we need to say that this is something we're all going to share; we're all going to have equal access to; everyone can relate to the same thing." (Focus group comment)*

This discussion was also concerned with promoting clinical networks across the Trust:

> *"I think the aim of the system was to get like [WARD A] and A & E talking to each other … and I think that if you restrict the space you're not going to get that." (Focus group comment)*

Staff expectations of the system highlighted important areas where they felt alterations would improve the software and the discursive nature of the forum for end-users, such as by creating a search facility:

> *"But we thought relating to the documents so you get like 'a key' of issues – like from the document – thrombolysis and perhaps somewhere written on the side of the screen 'discussion to be found in …' … cross referencing … I mean that might be like some key words that we're thinking about" (Focus group comment)*

Subsequently, the issues raised during the trial and feedback were considered and modifications to the software were made to incorporate most of these suggestions. For example, a search facility was added to the system. The search facility enables the user search for keywords in the main document and the discussion itself.

We feel that the trial of the software, feedback and subsequent modifications, ensured that the development of the software was a dynamic process between the nursing staff, operational group and the research team. Finally, the formation of working relationships between the participants and the project team was an underlying theme throughout the data collection. This proved to be a valuable and successful aspect of the methodology.

Section 5 : The Implementation

The Architecture

The Assisted Electronic Communication project systems integrate features from 3 robust systems developed within the Knowledge Media Institute of the Open University. Each system was re-modelled to suit the requirements of the hospital. This section outlines the technical features of each system as they were implemented within KGH Trust.

The overall architecture of the CMC developments is illustrated in figure below – set against the original vision of the role of the system within the Trust.

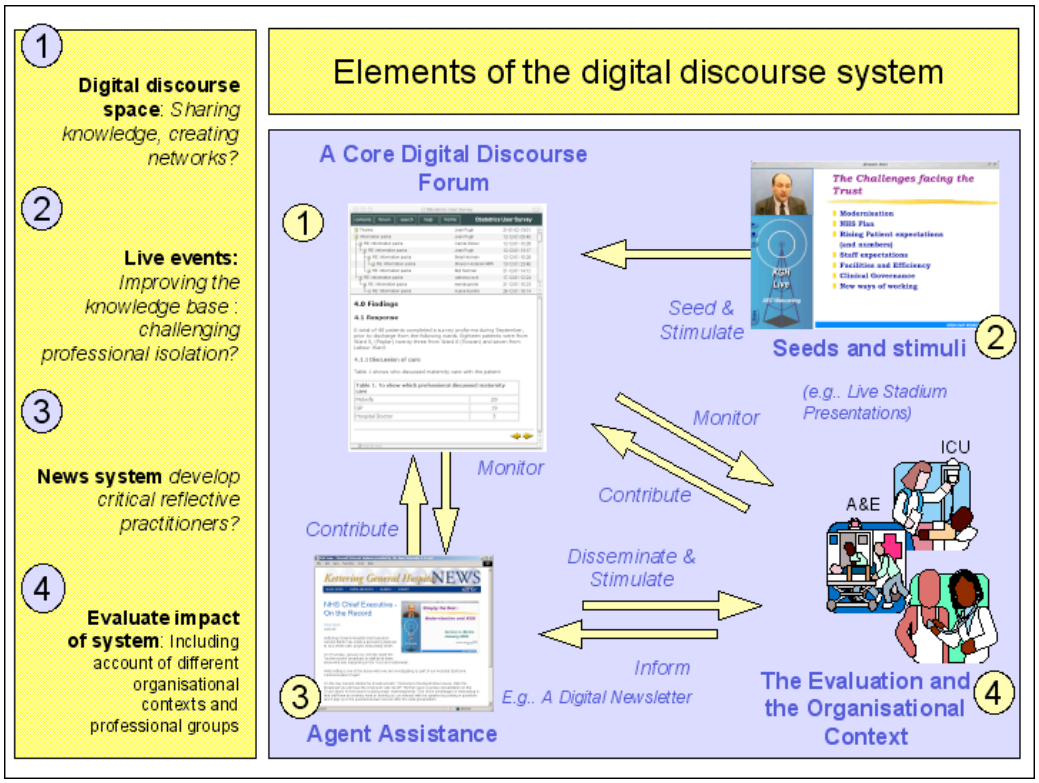


Figure 8 - The CMC architecture for the General Hospital study.

Essentially, the core of the study is a Document Discussion Space system. This is supplemented by experimental deployments of a Webcasting System and Agent Assistance system – here embodied by an online news service.

In the original vision of the use of these systems we saw great potential to integrate the services provided by each into the core areas of Nursing within KGH. In the evaluation and discussion sections we will discuss how these deployments changed in the practical context where they were used. For example, in figure 8 the integration of 1 with 4 (in the figure above, the document

discussion system with the news service) depended critically on the use of electronic mail within the study community. Unfortunately, sufficiently widespread use of email did not reach this community within the scope of this study for this form of assistance to make any sense.

Core System -The Document Discussion Space

The first of the systems developed, aimed to help staff within an acute NHS Hospital Trust to access and contribute to threaded, asynchronous discussions and themed information relating to the implementation of critical health policy documents.

At the centre of each discourse is an artifact, typically a document, which acts as a focus for the discussion. Contributions from participants are solicited via a browser based web forms interface. The contributions are text messages which are themed and threaded, and most importantly, are in the context of the document (Buckingham Shum and Sumner 1998).

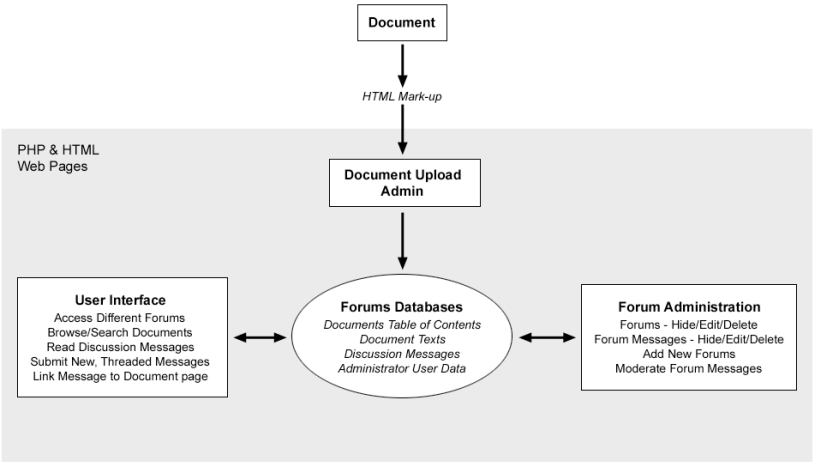


Figure 9 - Document Discussion System structure

The system (see figure 9) is based around using the PHP™ scripting language (http://www.php.net), to dynamically generate web pages, and to read and write data to MySQL™ databases (http://www.mysql.com). The 'discussion' part of the document discussion system is based on the Phorum™ open source discussion software (http://www.phorum.org), and this has significantly changed to suit our project requirements, and the environment in the hospital. The databases for the document discussion system contain document data (contents list, and document text), posted message data, and general forum properties (e.g. appearance, moderation etc).

Document Upload

Creation of new document discussion areas (referred to as 'forums' hereafter), or adding new documents to an existing forum, necessitates uploading the documents into the database. To do this the document must first be converted to a single HTML document, and headings and sub-headings labelled using appropriate 'heading' tags e.g. <H1> for the document title, <H2> for chapter titles, <H3> for top-level section headings.

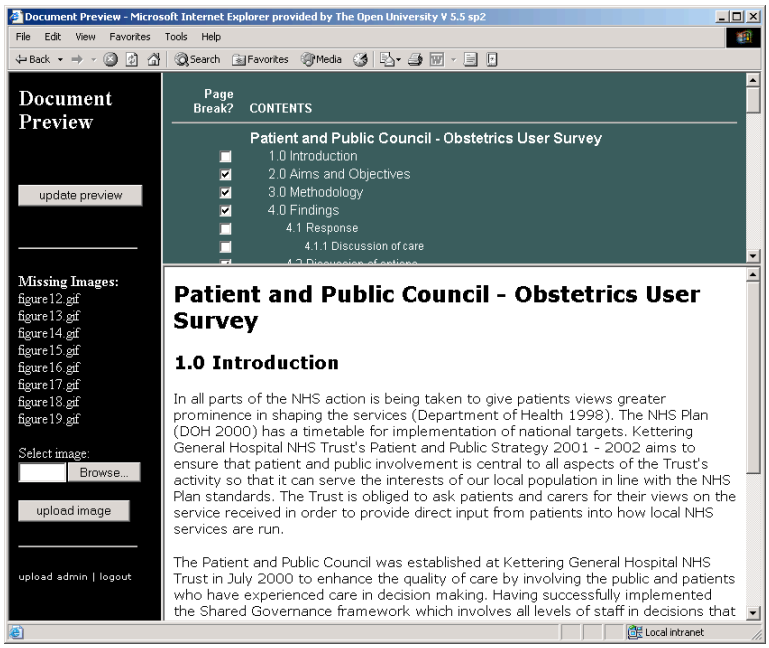


Figure 10 - Document upload

The web based document upload interface allows the user to select a forum, and a html document file to upload. The system then analyses the html, creating a table of contents, and dividing the text up into sections, and presents the user with an interface to preview the uploaded document, change the page breaks, and to upload any images associated with it (see figure 10). Finally, when all the necessary components are present the user can publish the document on to the system.

The Forum's User Interface

In figures 11-13 we see a selection of screenshots, taken from the discussion interfaces to the National Service Framework for Coronary Heart Disease. Users can search for words in the document itself or in the associated forum text and can read and contribute to the discussion via a number of different views.

The web pages that a user sees are divided horizontally into three sections. Firstly, at the very top, is a button bar with links to the various user pages. Secondly, below the button bar, is a frame

containing either the document contents (an expandable/collapsible list providing links to document pages), or, the forum's message-discussion pages. Thirdly, in the bottom portion of the page is a frame containing the document's pages. Users can search either the discussion messages, or the document pages, and with the latter the words searched for are highlighted in the document text (see figure 12). The list of forum messages can be viewed either chronologically, threaded, or, as thread headings. Similarly, the full details of a posting can either be read with an associated thread view, or, as a flat listing of all the messages in a given thread.

Fig 11 - The front-page of the NSF for Coronary Care.

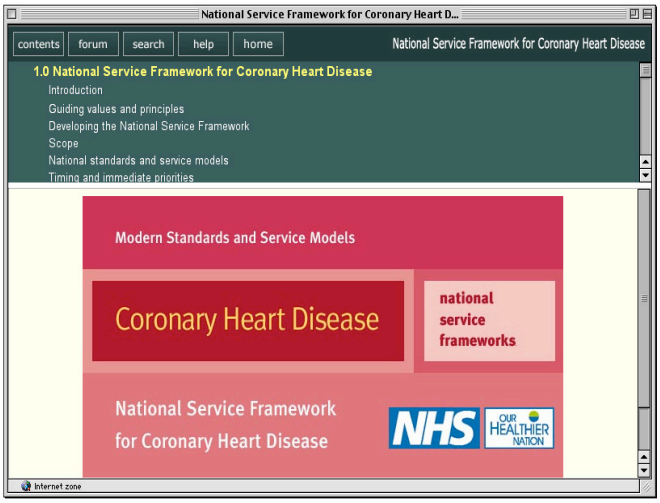


Fig 12 - A document search in the NSF for Coronary Care.

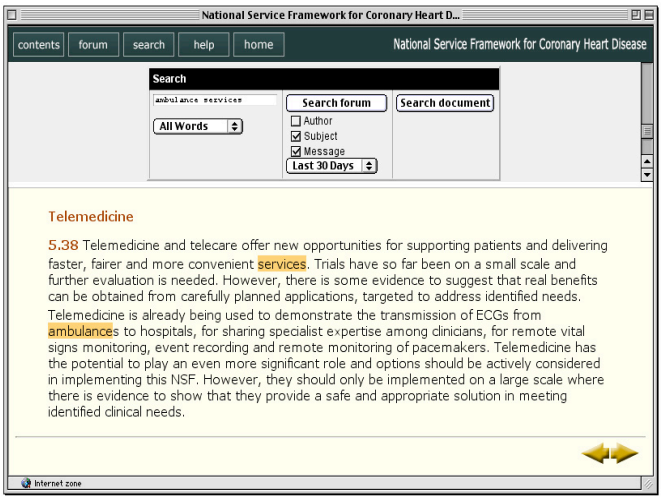
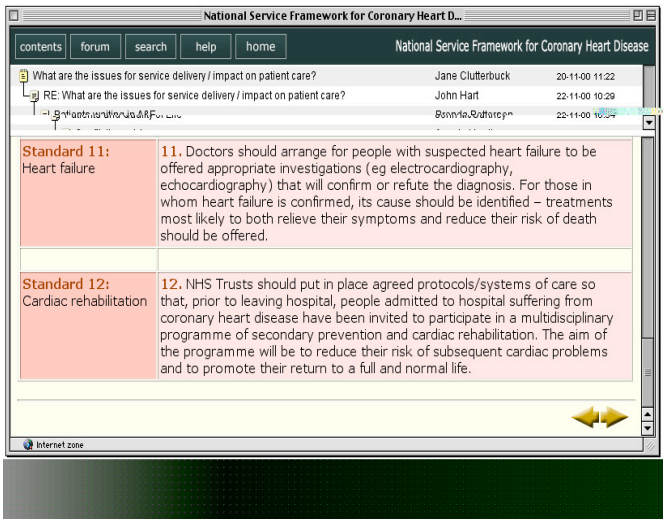


Fig 13 - A thread in the NSF for Coronary Care.



When users submit a message to the forum, they can choose to link their message to the page of the document they are looking at. Someone reading such a message is provided with a link to take them

to the associated document page. Additionally, if a person is just browsing through the document, links are inserted in the document pages to any associated forum messages.

Forum Administration

The administration of the forums is based on that provided through the "Phorum" system (see above), with additions made to create the necessary database tables, folders, and files for the documents associated with each discussion. Sample screenshots from some of the administration pages are shown in figures 14-16.

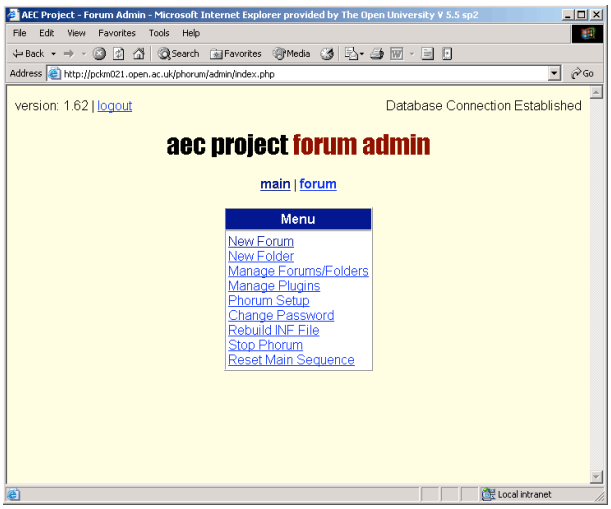


Figure 14 – Document Discussion System main administration page

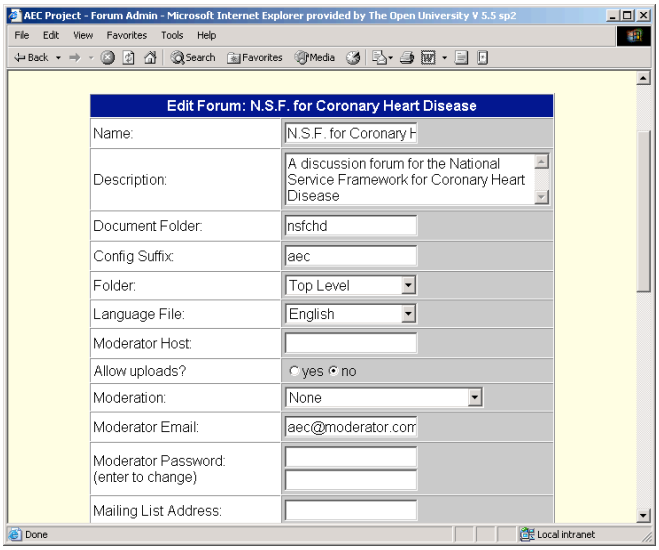


Figure 15 - Editing the Forum properties

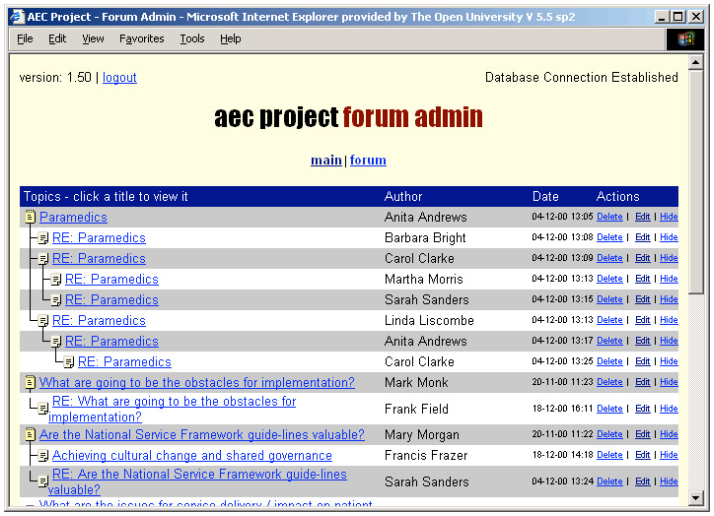


Figure 16 - Managing Forum Messages

Access to the administration pages is via a password logging-in form. The discussion system has two levels of password, namely, a 'forum level' password, which allows access to functions specifically related to a particular forum e.g. moderation and management of messages posted to that forum, and secondly a master password which allows complete access to all the administration functions including creating new forums on the document discussion system.

Within the context of this research, a number of specific features were built into the system. Firstly, because most of the people using the interfaces did not have email accounts, and therefore simplicity of use was a prime concern, it was decided that when posting messages, all that was required from the submitter was for them to type in a name, subject and the message (no user-verification was enabled in this version). Secondly, because the usage of the computers tended to be shared amongst many people, no user specific cookies e.g. unread message flags etc were employed.

Adjunct System – Webcast Technologies

The Webcast System Deployed

The second system explored briefly in this study was webcasting (Scott and Eisenstadt 1998). This has been based on the technologies developed for the Stadium project at the Knowledge Media Institute of the Open University (http://kmi.open.ac.uk/projects/stadium). The original intention with this set of technologies was to explore the impact of the innovative use of the webcast to support nursing communication in an acute NHS Trust as a way to stimulate the use and effectiveness of the other systems.

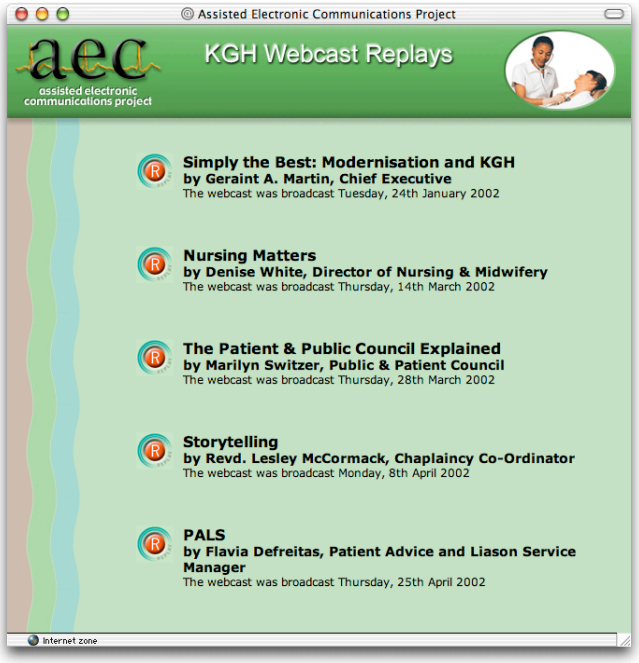


Figure 17 - The replay listing page from the KGH Stadium

A short series of webcasts were produced at Kettering General Hospital, starting with a test transmission in November 2001, and followed by five further broadcasts, approximately two weeks apart starting at the end of January 2002. The topics of the broadcasts (see figure 17) were chosen to be of direct relevance to the nursing staff, and included the Chief Executive, Head of Nursing, and the Hospital Chaplain etc. Each presenter was briefed on the demand characteristics of the webcast medium and how to manage interaction with the staff who were likely to attend.

The basic architecture of the Stadium system deployed is illustrated in figure 18. The stadium architecture used in the Trust required 3 desktop computers and two servers: one desktop was used by the presenter; one by an event administrator; and one further machine (actually a laptop, for simplicity, mobility and space) for the audio/video encoder. No audio/video server was required for the live events – as these were multicast (see below). The two servers, one synchronising events between all clients and the other serving up the pages and application, were both run on a single physical machine located in the KGH server room.

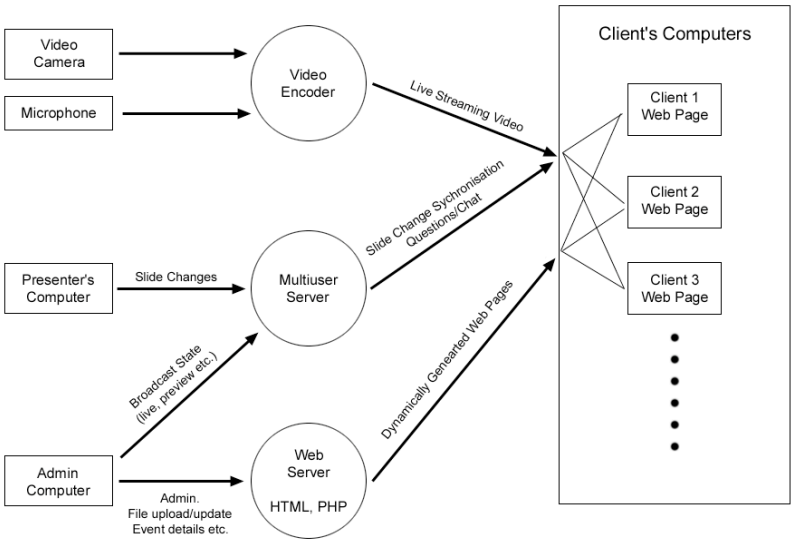


Figure 18 - Stadium Technologies Webcasting Architecture

The client computers access the webcast via a Macromedia Shockwave™ applet (http://www.macromedia.com) embedded in a web page. They receive the streaming video and audio, together with the presenter's slides (see figure 20). Additionally, they can send text messages via the shockwave application to all connected computers, including the presenter.

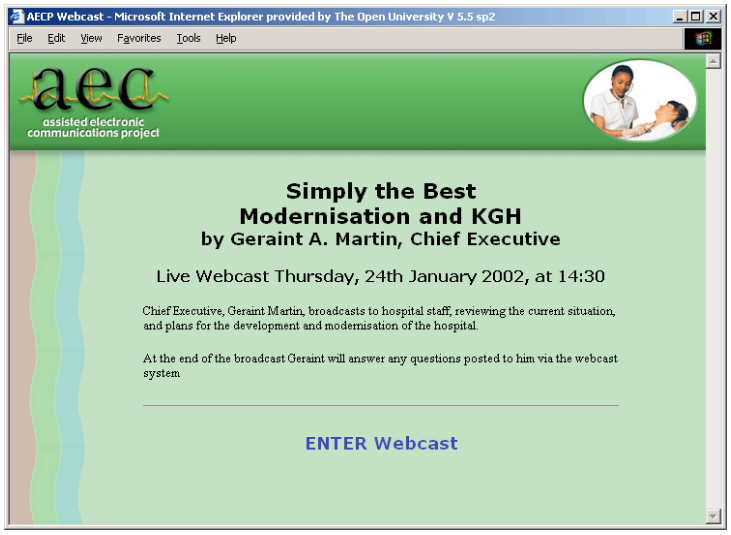


Figure 19 - The single LIVE point of entry for the KGH Stadium

Within the shockwave movie, used for the hospital webcasts, the video used was a streaming QuickTime movie (http://www.apple.com/quicktime/) and the slides are presented via a Macromedia Flash™ movie (http://www.macromedia.com). This architecture is well documented and discussed elsewhere (http://kmi.open.ac.uk/projects/stadium) and represents a deployment of a

set of systems that has been developed at the Open University since 1995, and which is in regular use in a range of contexts, including within the University.

All KGH Stadium users (primarily the nurses in the study spaces) were directed to a local URL on the project web server (see figure 19). The Live Event page gave them some details of the timing and nature of the scheduled event. Near to the time of the event they could click a link on this page to get access to the webcast client application.

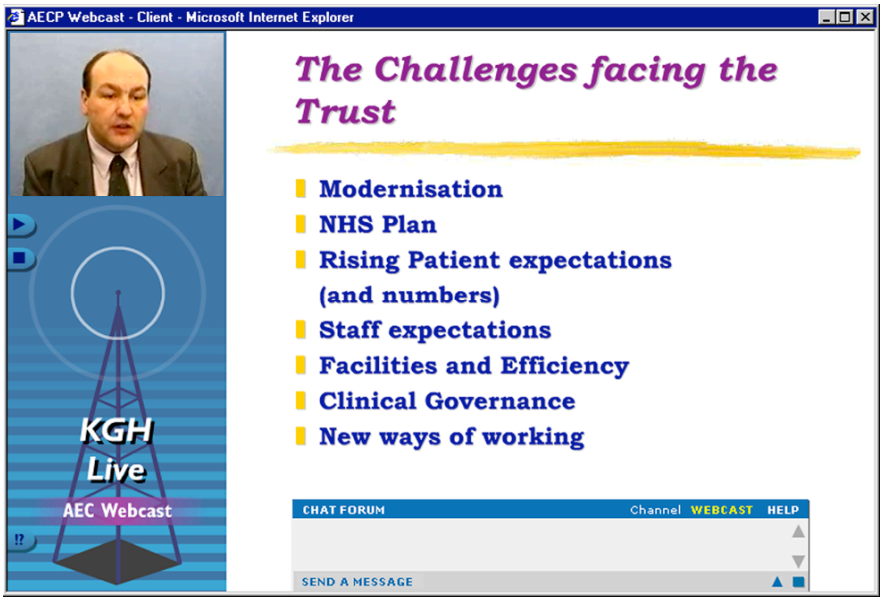


Figure 20 - A user view of the first webcast live interface

The client application (a Macromedia Shockwave web page plug in) gives users a single window view which brought together (and fully integrated) controls, slides, text chat etc. Users can talk to each other and send in questions to the presenter or support team via the chat form window shown in grey at the bottom of the figure. The input field only appears when 'send a message' is clicked upon. Dragging on its title bar can expand the chat window. It can also be made semi-transparent to allow users to view the side beneath whilst typing. (This is an advanced feature that was not used by any of the users in this study).

The presenter used a 'standard' hospital desktop computer with web access, and like the clients, connects to the same shockwave application, but does so as a 'presenter' (via the admin system discussed below), this enables additional functionality, allowing the presenter to control the slides currently being seen by all the other clients. In addition to the 'presenter' and clients, an 'administrator' connects via the shockwave application in an 'admin' mode. This gives the administrator the ability to change the state of the broadcast e.g. preview, live, intermission etc. (See the Admin Systems discussion below).

For the broadcasts at the hospital we used a low cost web-cam and a tie-clip microphone. The audio and video from these was encoded using the Sorenson Broadcaster™ encoder (http://www.sorenson.com) running on a laptop computer. The 'studio' room used was simply an office in the Information Management and Technology department large enough to accommodate a few computers, some bright lights and a backdrop (a large sheet of plain blue paper, attached to a poster display stand, behind the speakers head). Audio quality is the most important feature of such webcasts – so a good quality, powered, tie-clip mike was purchased. Lighting is the next most important feature – so the Information Management and Technology department team invested in some large, diffusing up-lighters for this office.

The live events were 'multicast' over the hospital network. A multicast involves a single stream of network packets sent to all subscribing computers on the same network segment (as opposed to a 'broadcast' in which a separate stream is sent to each connecting client). This technical feature of the event ensured that however many remote users connect to the event, it consumed only a fixed bandwidth of the hospital intranet. The multicast did not require the use of a streaming server.

During the broadcast the video was also recorded to file, together with the timing of slide changes, and any text chat that occurs. (A backup tape copy was also taken from a backup camera). Subsequently, a replay QuickTime movie was created, which can be launched by visiting an appropriate web page (see figure 17 above), and can therefore be viewed by people unable to attend the original live broadcast, or, used as a resource for future training and education etc. Feedback from the staff indicated that these are particularly valuable for staff who normally feel excluded from such interactions and find it difficult to engage with opportunities for clinical and practice development– e.g. those who tend to work predominantly on a night shift (Webster et al 2002).

Initially, the format for a broadcast was for the presenter to give their talk, and at the same time the remote participants could submit any questions they had via the chat interface. At the end, the presenter would scan through the text in the chat window, and reply to the questions. It became obvious that there were some problems with this, as the viewers found it distracting to have to compose and type in question during the presentation. Also, the presenter found it difficult to scan and answer questions whilst still broadcasting. In previous deployments of the webcasting software (see http://kmi.open.ac.uk/stadium), the chat interface had been used extensively for general discussion purposes by remote users rather than for asking questions of the presenter, whereas, within the context of the hospital webcasts is was being used almost exclusively for questions.

As a result, the format of the broadcasts was changed, so that at the end of the presentation there was an intermission of several minutes, during which period the presenter could review any questions that had been asked, and the viewers had a period in which they could type in questions without missing the broadcast. At the end of the intermission, the live video and audio would resume, and the presenter would then start to reply to the posted questions, picking up on further ones as they came in.

The Admin Interface

For quick and simple event-to-event administration a series of dynamic web pages were created, so that the events could (in principle) be continued after the research team withdrew from the study. Whilst it is still the case that Multimedia Webcasting (implemented in the Stadium technologies which we use) is still quite complex, it is possible for a simple interface to assist in the presentation of a set of simple events.

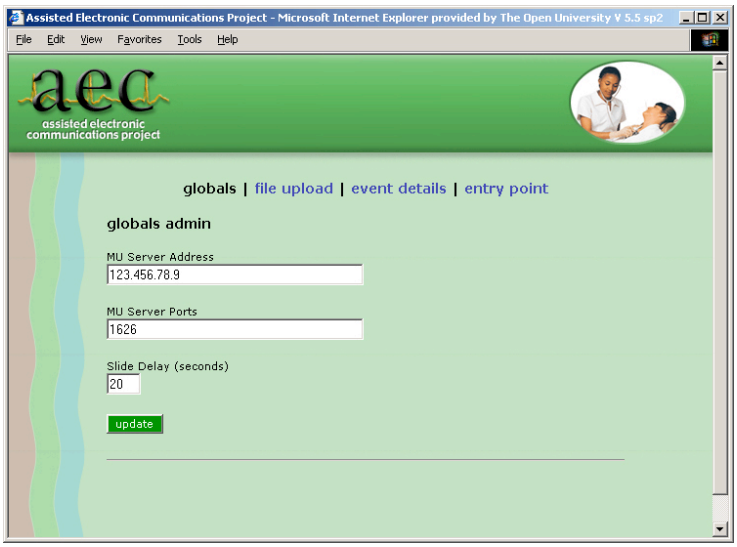


Figure 21 - Changing Global features of the KGH Stadium

The page shown in figure 21 defined the global parameters required by the Shockwave webcast presentation clients. These parameters were passed to the Shockwave via the launching html pages. The parameters include critical network admin details such as the location and port settings for the Multi-User Server and the slide delay time. A side delay feature is used to allow for video buffering. It is usual in Internet broadcasting to allow remote clients to "buffer" some amount of any live stream, 8 seconds for example. This means that the remote client is actually playing the video 8 seconds AFTER its live time. This time delay is only noticeable via synchronous activity such as for multi-party audio (not used here) or slide changes. Its huge advantage is that it lets the remote client play the video smoothly, at better quality and without error (despite network

fluctuations). If the slide transition delay is set to match the video-streaming buffer, then the user will see the slides change when they hear the presenter's mouse click and the presenter start to speak about the new slide!

Another admin page provides an interface to allow the support staff to upload the latest files needed for a given presentation. The page also provides direct html links to these files so that they can be checked and previewed in the administration process.

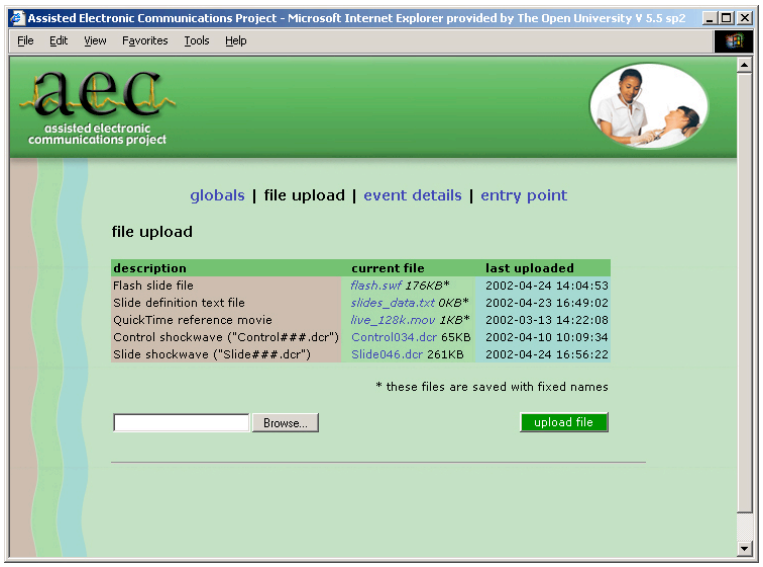


Figure 22 - The uploading of new files in the KGH Stadium

To avoid the need for the hospital Information Management and Technology department support staff to write new web pages for each event, we provided a database architecture (a simplified form of that used in other Stadium technologies systems), which allows for the management of a single point of entry to the event. This uses a form to change the details that appear on the single public access page used for a hospital webcast event. The page which is generated from this form is shown above as figure 19.

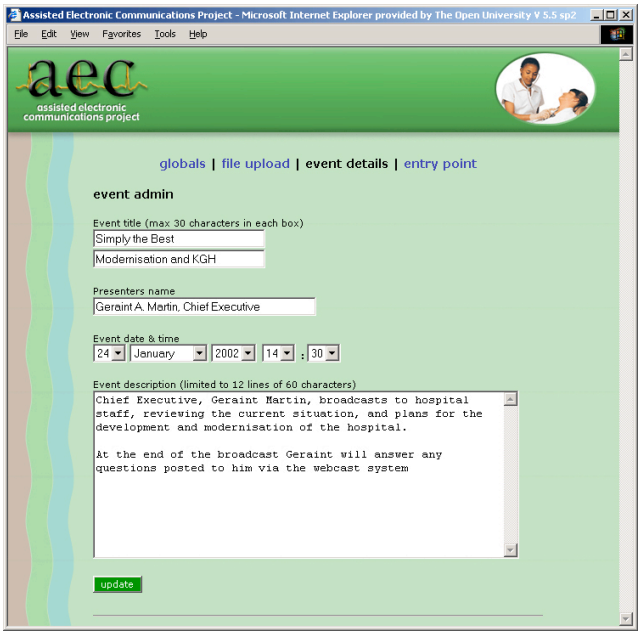


Figure 23 - Updating the Live Event page via an Admin Form

Once the event is prepared (using the Admin interface) it is accessible to administrators and the presenter via a single admin page from which one can launch the webcast in its various different modes. This lets them enter as the general public user will (to test that all is as it should be); to enter as "crew" (this is a special setting used for Information Management and Technology department staff who have a public interface but with some extra communicative features); a preview client (which allows an administrator or presenter to preview the slides etc in the presentation regardless of the webcast 'state'); presenter client (which is the one used to control the slides in the live event); or as administrator.

Figure 24 - Admin entry page for different webcast clients

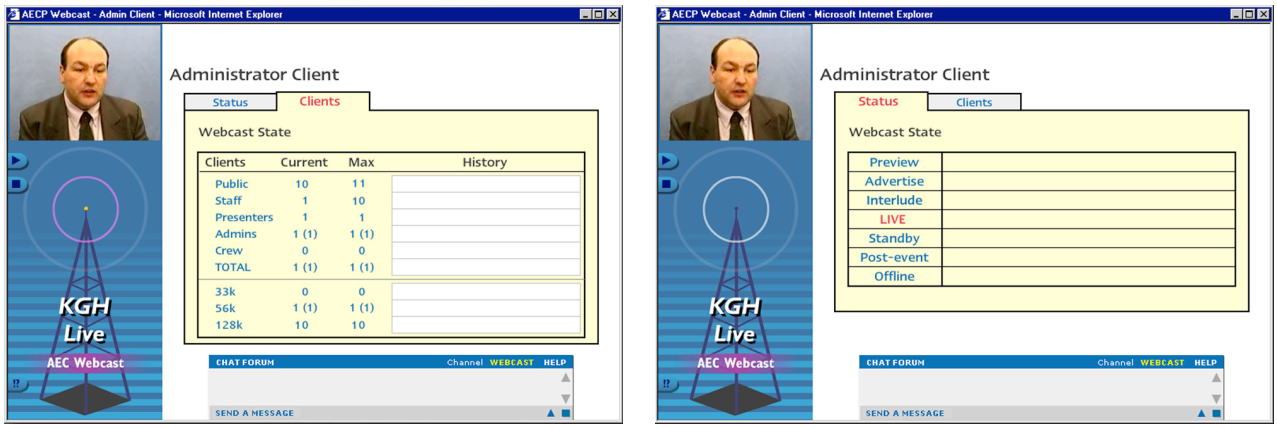


Figure 25 - Two admin views in the Webcast Client

In the screenshots in figure 25 we can see two of the different views of the administrator client. In one interface we can see that the administrator can check the number of clients of each type connected and which stream is being used (assuming multiple rates are offered – this 'Stadium' feature was not deployed in this study). In the other view we can see how the administrator client can change the 'state' of the live application. This is designed for a professional context in which video is not shown in the client until the administrator clicks 'LIVE'. The presenter is not on-screen until they are ready and can be switched off smoothly (under web-page-app control). All these features are standard in the 'Stadium Technologies toolbox' and were deployed and used effectively in KGH. One additional state (noted earlier) that was added in this study, was the 'interlude state'. Most 'standard' Stadium deployments use 'a facilitator' or moderator to filter questions to the presenter. In this setting, it was felt that having an extra person in this role would be unsustainable for the Trust, so the presenter was required to field the questions without assistance. The interlude state allows the solo presenter to 'go off camera' smoothly, removing slides and inserting a 'bespoke' message along the lines of "the presenter is having a short break – back momentarily". They can then review the discussion in the chat room, select those questions/issues that they want to address and then return to LIVE 'on-camera' to do so.

Adjunct System - News

Overview

Rostra is a versatile, configurable, web-based news dissemination system which has been used widely within the Open University and a range of clients for some years (Buckingham Shum and Sumner 1998). The system has many intelligent features, which count as "agency" (where the software carries out its role autonomously on the user's behalf). In this context we wanted to briefly explore the potential of such as system to augment the use of the document discussion system within the nursing context. A very simple version of the server (v1.0) was installed in the Trust in Spring 2002.

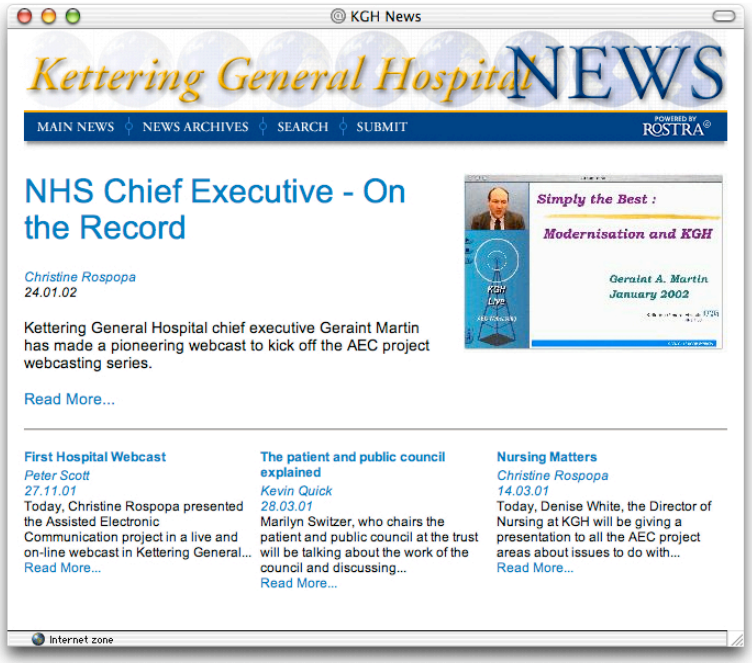


Figure 26 - A Rostra generated news page

The use of the system was advertised to our target group on a number of occasions (via posters, flyers and presentations) – and numerous critical users were given demonstrations of its potential and invited to try it out. Despite our efforts however, the use of the system in the target community or any other area of the Trust was negligible. Nevertheless, a technical description of the system deployed is presented here for completeness.

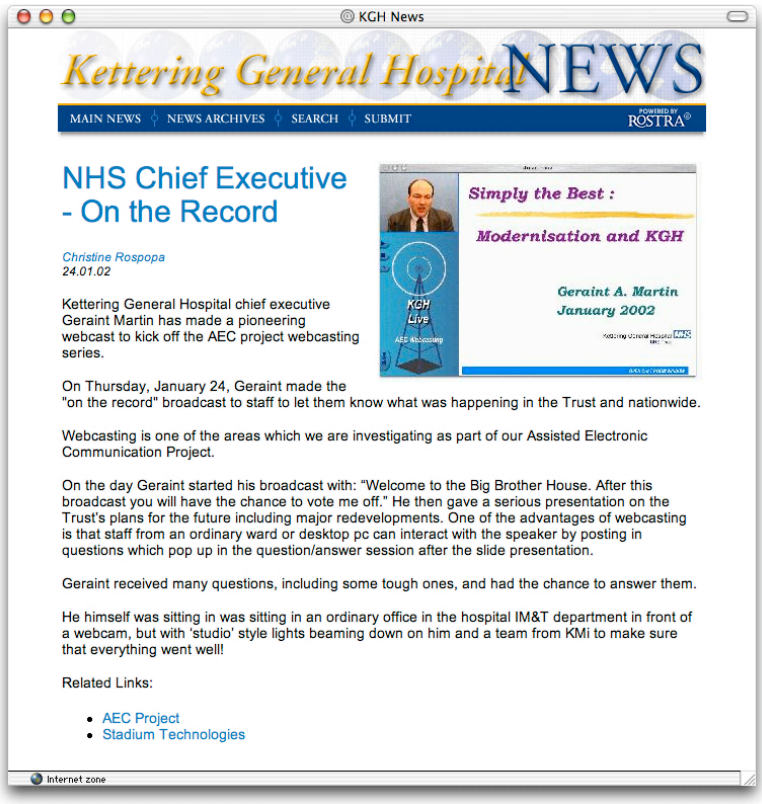


Figure 27 - The detail of a Rostra story

Each Rostra server installation is capable of supporting **multiple, independent news systems**, each with its own customisable set of story categories or **topics**. Rostra can also be configured such that stories from a number of newsletters feed into another, so that sub-departments can each have their own news pages which in turn feed in to a central newsletter. Client IP address range can restrict access to any individual newsletter.

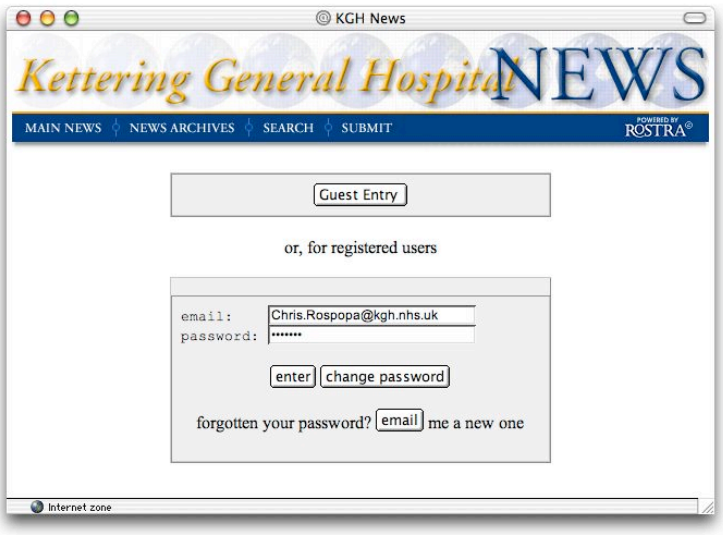


Figure 28 - Users may log in to the system to submit a story

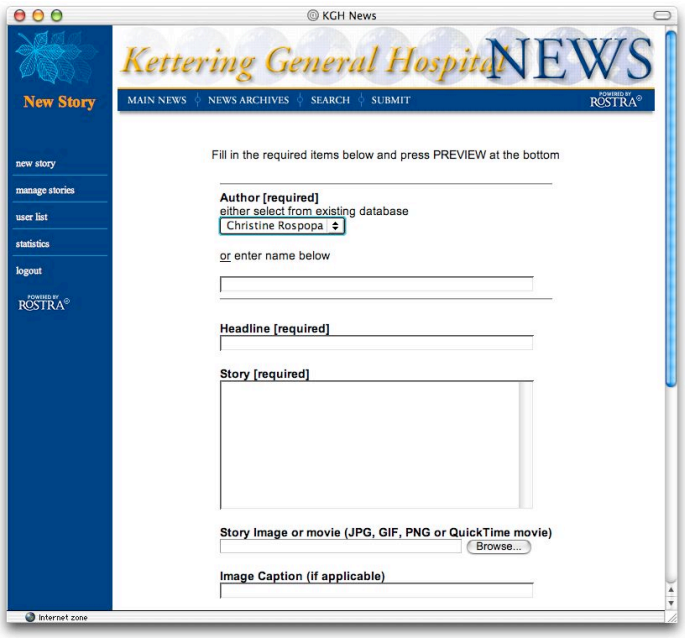


Figure 29 - Users can submit a story via a simple form

Using a web page form, authors submit stories to the system and they are displayed in a variety of ways described using **templates**. The submission form itself is also a template. All templates can be modified to a certain extent, allowing the appearance of any particular newsletter to be customised.

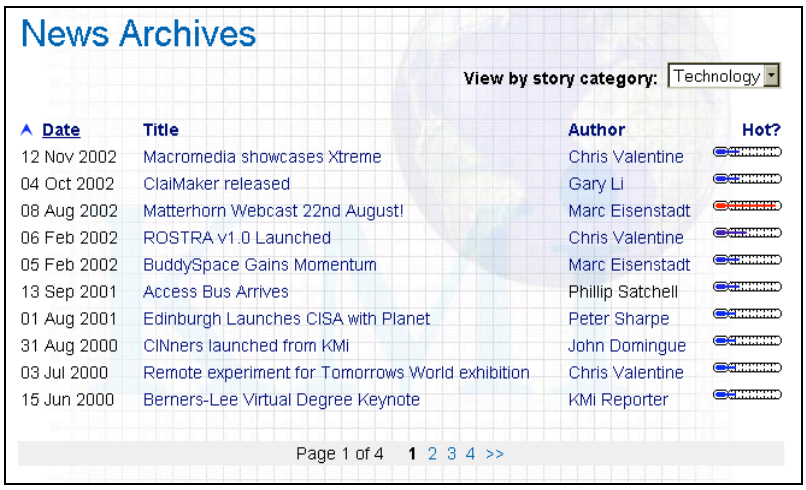


Figure 30 - A view of a news archive (not KGH)

Stories can be submitted via a simple form, including images or web page addresses etc (see figure 29), or they can be emailed to the Rostra email account. The form submitted story can be previewed after the submission is complete, so the author has a chance to view the story before it becomes public and make any necessary changes. All stories are date-stamped with the date and time of submission, plus a date can be set to make a story expire. Stories can also be made

temporarily hidden, so they can be hidden from view but still stored on the system for later use. Stories can have any number of associated web links. The text body of stories can contain HTML coding, to allow authors to apply text formatting, to insert bulleted lists, and so on.

The story archive – (including all those not shown in one of the main interface templates) allows you to sort stories by all relevant features, including a view of what the server log says that all users are reading (those listed as hot to cold in the figure; NB. This figure is not of the KGH system).

It is possible to upload **media files** associated with a story: Rostra release 1.0 can currently support GIF, PNG and JPG images and QuickTime movie files. Each author can have an associated image (perhaps a portrait of them), which can be substituted automatically if a story is submitted without any attached media. When a movie file is uploaded, a specially written program extracts a poster frame for static display with the story. Choosing to the read the story then gives a reader the opportunity to view the whole movie in a popup window. Uploaded images are resized on the fly to save bandwidth, so authors do not need to know the finished sized nor need the ability to crop them before submission.

The Admin System

The version of the ROSTRA system implemented in KGH provided a range of simple administrative features to the staff tasked with running it. A web-page interface was provided for all the core administrative functions. At the highest level, an administrator can add a new 'newsletter' to the system – should the Trust wish to run multiple interfaces to its news, (e.g. internal, external or even for a specific department or user group). An administrator level user can edit any of the stories in the story database, including "live" ones. A moderator level user can edit stories which are posted by guest users (ie. not registered with the system – via their email account). In this version we chose to insist that stories from un-registered users are moderated before becoming "live". An author-level user can submit stories which become live immediately. The system can be configured to allow no guests, guests who can post freely, or guests whose messages are moderated by a moderator or group thereof. In the KGH Rostra system a guest-level user may submit stories, which need to be moderated (ie. a moderator is alerted by email, and must check and confirm the story before it becomes "live").

Figure 31 - A user-details page in the ROSTRA admin system (administrator view)

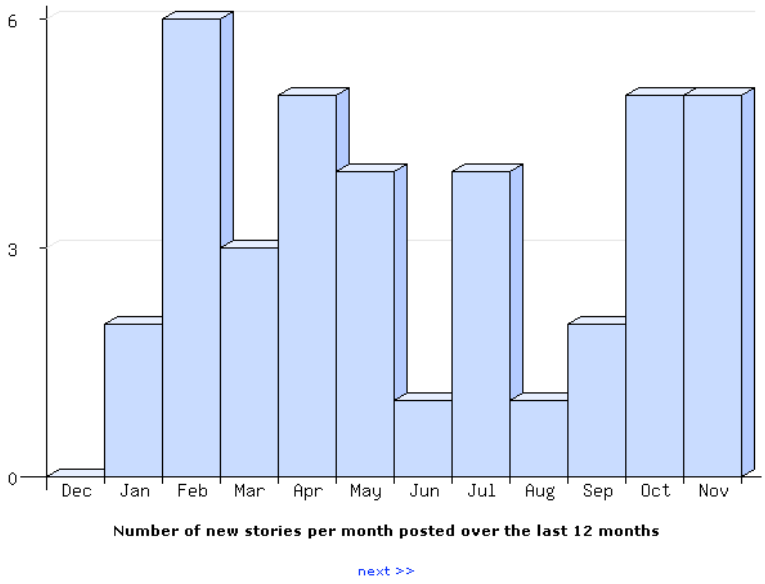


Figure 32 - A statistics page in the ROSTRA system (not this study)

There is a core database of named users, who can have differing permission to act within the set of newsletters. An administrator is responsible for reading/deleting or changing details about a named user. The system stores the names and email addresses of all its registered users in a table unique to each separate newsletter, so unrelated newsletters can have entirely separate sets of **authors and moderators**.

The story archive (list) view allows the stories to be displayed in date, title, author, topic and 'hotness' (a count of the story's popularity). The system is also designed to provide generated-on-the-fly access **statistics** graphs of the use and impact of the system. Log files are kept of all administrative actions for observational purposes. Note: this figure does not reflect the use of the KGH Rostra system and is presented for illustration only.

System requirements for KGH Project Software

The document discussion system and Rostra news systems require the following server base:

PHP version 4 or later – (the server-side scripting language)

Zend™ optimizer – (PHP script compiler)

MS Windows NT, 2000 or XP

MySQL 3.23.23 or later - SQL database software which is used to contain all the data

Apache - industry standard web server

All of this software (except MS Windows) is public, open-source and royalty-free.

The Stadium Webcasting architecture used Apple QuickTime™ Video. The audio and video from these was encoded using a commercial licence for Sorenson Broadcaster (http://www.sorenson.com) and multicast. A number of public servers (open-source and royalty-free) are available.

The webcasting hardware required was low-cost web cam and a tie-clip microphone.

Section 6 : Evaluating the Discourse Forums

In general, the potential of computer mediated communication to offer real solutions to real clinical and health care delivery issues was clearly demonstrated by nursing and midwifery staff in this study. Many of them engaged well with the technical systems, which we embedded in their working spaces. There is also clear evidence that the systems have had substantial and measurable policy effects in the hospital in areas as diverse as bringing the Chief Executive to serve a night shift on a medical ward and facilitating change in the organisation and delivery of maternity care.

The decision to offer minimal training was essential to test the real take up of such an innovation – i.e. a system requiring extensive training would be a problematic technology to implement in the nursing context. Moreover it has been suggested that for nurses and midwives, short 'hands on approach training' in the locality is likely to enable skill retention and transfer to a critical mass of peers (Webster, Davies et al. 2003).

Use of the Digital Discourse Forums

The digital discourse forum was the first component of the project to be set up. In order to overcome one of the core problems with health care information technology, that of 'irrelevant alienating design' (Fennessy 1999), the forum was designed with the active participation of nursing staff.

For the first phase of the forums, following advice from the operational groups as to the most relevant policy documents, the National Service Frameworks were chosen as the first documents to be included on the system. The National Service Framework for Coronary Heart Disease (NSF for CHD) was the first added to the system and as each NSF was published a new forum was subsequently created, at the end of the fieldwork, three NSF forums had been included on the system CHD, Older People and Mental Health. In the next phase, forums linked to local surveys of patients views were set up to provide additional comparisons between engagement with national policy documents and that of local patient-centred documents. This section provides a discussion of the evaluation of the discourse forums including:

- An analysis of the usage of each forum.
- An account of the evolution of the forums.
- A critical discussion of the nature and character of the communication on each forum.

- An assessment of the impact on the professional communities within nursing and midwifery.
- An assessment of the outcomes arising from participation in the system.

Table 9 presents a view of the messages posted on the forums. For instance, in the period from 21/01/01 to 08/03/02 on the CHD forum, 71 messages were posted discussing 20 different threads. The number of authors was 26 (one of which was anonymous), the number of messages from each author ranged from 1 – 5 (excluding the forum champion who posted 21 messages). The modal number of message posted from each author was one (N=13). The content and outcomes of the forums are discussed below. Note that the totals of authors in the forums refer to unique individuals, and that some individuals contributed to more than one forum.

Table 9 - Discussion Forum Summary

Forum	*Number of Authors*	*Number of Messages*	*Number of Threads*	*Duration months*
NSF for CHD	**26**	**71**	**21**	**15**
NSF for Mental Health	**11**	**18**	**6**	**7.5**
NSF for Older People	**13**	**51**	**13**	**6.5**
NSF Totals	**35**	**140**	**40**	**29**
Obstetrics User Survey	**29**	**70**	**11**	**1.5**
Surgery User Survey	**9**	**25**	**9**	**1**
Trauma & Orthopaedics	**7**	**15**	**7**	**1.5**
Patient Survey Totals	**42**	**110**	**27**	**4**
Midwifery chat forum (linked to shared governance docs)	**38**	**128**	**31**	**2**
Overall	**115**	**378**	**98**	**35**

The NSF for Mental Health was the second forum to be installed, of all the forums it attracted the lowest level of engagement being used the least. During the period of 15/5/01 to 20/12/01 only 18 messages were posted. Although there were six discussion threads, there was only one major

thread, (concerned with Mental Health wards). This thread consisted of 9 messages, 50% of the forum. There were eight individual authors and one group posting. The number of messages from each author ranged from 1 – 4 (including the forum champion, who only posted 1 message). The modal number of messages was one and two (both with N=3). There were two authors who contributed most to this forum each posted four messages, thus their contribution was nearly 50% of the forum. This level of usage occurred despite the NSF for Mental Health initially being perceived by interview respondents and the operational group as having a high degree of general relevance to all staff.

> *"Everybody should be interested in that one as patients with mental health issues cut across all our work". (Operational group member)*

Engagement with the Mental Health NSF was felt to be outside the specific remit of any particular staff group or area. Consequently, this NSF occupied a low priority in terms of attracting commitment to engage with local implementation.

The majority of messages for these forums (30% in the case of the NSF for CHD and 70% in for the Mental Health NSF) were posted between 12.00 and 14.00. Overall, the time between 10.00 and 16.00 was used most to post messages to the forums. This represented an average of over 70% of the total messages posted.

In the case of the forum for the NSF for Older People, the core participants almost exclusively comprised members on the day shift as no contributions were made between the hours of 22:00 and 06:00. In the main, this forum contained a very high quality discussion but was primarily used by senior and experienced staff with a direct responsibility for implementing the NSF for Older People (see discussion below).

Contributing to the NSF Forums

The pattern of contributions to the NSF for CHD forum was predominantly in the form of a *question and answe*r format. The forum functioned as a practical and focused information resource. For example, 17 of the 21 threads were initially posted by staff who were requesting very focused factual information, (either on the details of the NSF, or on details of its local implementation). In the majority of cases (16 of the 17 threads) these initial questions received a direct answer from senior staff or from the local NSF co-ordinator. The longer threads consisted of further elaborations of the answer, typically from the same 'answering member of staff'. The following example represents a typical exchange on the forum.

Example - TG-CC-19	*Thread - **thrombolysis***
Anne Smith *21 Feb 15:27*	*where are the policies which dictate when to give particular drugs?*
Mark Richards *25 Feb 07:52*	*There is a policy on CCU (April 1998)which states when tPA should be used rather than streptokinase for acute MI:* *(1) for patients under 65 years with anterior MI presenting within 6 hours.* *(2) patient has had strep 5 days to 5 years ago* *(3) patient is severely hypotensive (<70mmHg)* *(4) patient has severe allergic disease* *(5) patient has strep throat infection.*
Diane Green *27 Feb 08:36*	*is this policy avialable in a&e,mau and the wards?*
Melanie Green *28 Feb 11:15*	*Protocols for all cardiac conditions including when to give thrombpolysis are in all admitting areas* *All doctors within medicine are given the protocols on induction,with regular teaching sessions on treatment* *If you cannot find the policies please let me know*
Barbara Cooke *21 May 10:49*	*The NSF states "increasing to at least 75% the proportion of A&E departments able to provide thrombolysis leading to 75% of eligible patients receiving thrombolysis within 30 minutes of hospital arrival by April 2002 and within 20 minutes by April 2003"* *Clinical performance indicators for KGH July 2000- 30 Sept 2000* *A&E 59% RECIEVED THROMBOLYSIS <40MINS* *CCU 100% RECIEVED THROMBOLYSIS <40MINS* *MAU 75% RECIEVED THROMBOLYSIS <40MINS* *Unacceptible delays* *REASONS FOR DELAYS INCLUDED TRANSFERING PATIENTS BEFORE THROMBOLYSIS* *Acceptible delays* *BP TO HIGH / LOW* *HOWEVER THE MEAN TIME FOR ALL PATIENTS HAS REMAINED UNDER 40 MINS RANGE 27MINS* *How can we improve to meet the targets?*

Overall, there were five contributions in as many threads that included discursive debate[1] on an issue. Posted questions that required a discussion relating to service development or organisational change in the majority of cases remained unanswered, (such as the one at end of the example thread above -*"How can we improve to meet the targets?"*). Moreover, in only one instance was a resolution of an issue suggested (i.e. the creation of a working party).

In order to explore how staff experienced the system and some of the underlying reasons for the type of contributions to the system, fifty-one staff members from the target areas were surveyed in a researcher-administered questionnaire. The aim of the questionnaire was to obtain a follow-up view of usage patterns and level of acceptance of the system. This data was collected after the NSF for CHD discussion forum had been implemented and before the launch of the NSF for Mental Health and subsequent forums. The respondents were in the majority staff nurses (N=40, 78.4%) and their ages and grades were broadly consistent with the demographic profile of staff at the hospital.

The majority of staff surveyed had used the system at least once (N=31, 60.8%). However only ten respondents reported that they had actually posted a message to the discussion forum (19.6% of those surveyed). Eighteen of those that used the system said that they liked it, five said that they liked it a lot. In the main, respondents valued the information resource aspect of the system. Being able to *"see other people's opinions"* was highly valued. In addition, respondents also valued the potential for 'broad-based' communication.

> *"Chance for people to talk to people in other areas".*
>
> *"Communicate with a lot of people in other departments".*
>
> *(Staff nurses, second questionnaire)*

Only one respondent stated that they disliked the system because it gave too much opportunity for unstructured thought and opinions. A further single respondent stated that they had not participated on the forum, because they were intimidated and felt they did not have any ideas to contribute. Overall, a perceived lack of expertise in using the system or in having a voice did not appear to be factors effecting usage of the forum.

[1] Discursive debate = discussion of an issue that conveyed differing views points or challenging perspectives, as opposed to posting an answer that had a solution (i.e. the protocol is in place). But did not necessarily include an articulation of alternative forms of provision as in Critical Reflective Thinking.

The findings from the survey suggest that the majority of users were actually using the system as an information resource rather than a communication medium. 'Looking' rather than 'contributing' seemed to be a common pattern of usage. 'Lurking' in this way does not necessarily represent a negative phenomenon or even passive rejection of the online forum, but instead needs to be considered as a typical dimension of membership of an online community. Surprisingly perhaps, lurking as a dominant pattern of usage is highly typical among on-line communities, with the estimated ratio of lurkers to contributors considered to be 100:1 or even higher (Nonnecke and Preece 1999). In line with the perspective of lurking being equated with a form of participation, a 'lurking' pattern of usage was perceived by the nurses to be a valuable. In particular the *lurking* respondents used the forum for two main purposes; engagement with the NSF and being able to view other nurses' opinions.

"See and access the NSF".

"Interested in the NSF. So looked at the forum".

"To look at what relevance the NSF has to A&E".

(Staff nurses, second questionnaire)

In terms of the online discussion in the forum being able to *"share ideas with colleagues"* was seen as the most valuable strength of the forum (constructed by respondents in an open choice list, see table 10). In communities of practice occupying a position on the periphery as an observer, has been termed 'legitimate peripheral participation' in so far as it enables members to learn by observing skilled practice (Lave and Wenger 1993). It appears that respondents valued the visibility of other professionals' views and the *potential* for broad-based communication even if they were simply observing such interaction and not participating.

"Chance for people to talk to people in other areas".

"Communicate with a lot of people in other departments".

(Staff nurses, second questionnaire)

Table 10 - Perceived strengths of the system

Perceived Strengths of the system	N	%
Share Ideas With Colleagues	39	76.5
Clinical Development	36	70.6
Access To Research Info	36	70.6
Increased Communication With Colleagues	33	64.7
Professional Development	32	62.7
Sharing Clinical Information	31	60.8
Can Ask Colleagues Questions	28	54.9
Improved Access To Policy Documents	27	52.9
Find Out About Different Views	26	51
Improved Patient Care	24	47.1
Improved Computer Skills	23	45.1
Improved Quality Of Care	21	41.2
Empowerment Of Nurses	20	39.2
Easier To Read Policy Documents	19	37.3
Easier To Engage With Policy Documents	18	35.3
Professional Autonomy	15	29.4
Communication With Managers/ Senior Staff	15	29.4
Saves Time	13	25.5
Increased Accountability	9	17.6
Only Involves Nursing Staff	6	11.8

In terms of the strengths and weaknesses of the system, only one person said that they did not want to read policy documents and only one person stated there was nothing positive about the forum.

In line with our earlier note, that the content of the forum consisted largely of a question and answer exploration of details of the NSF, it is not surprising that the main *impact* of the system was perceived to be increased knowledge of the content of the NSF.

"Go to certain section – search".

"Have picked up quite a lot".

"Interesting way of looking at a document".

"NSF easy to read, easy to pick up areas you needed to know. Interesting to see what other people thought".

"Finding out".

"Obviously enlightening - easy if use it - if given 1 hour to come in and browse - now have long day".

"Wanted to print of some of the guideline - own copy".

(Staff nurses, second questionnaire)

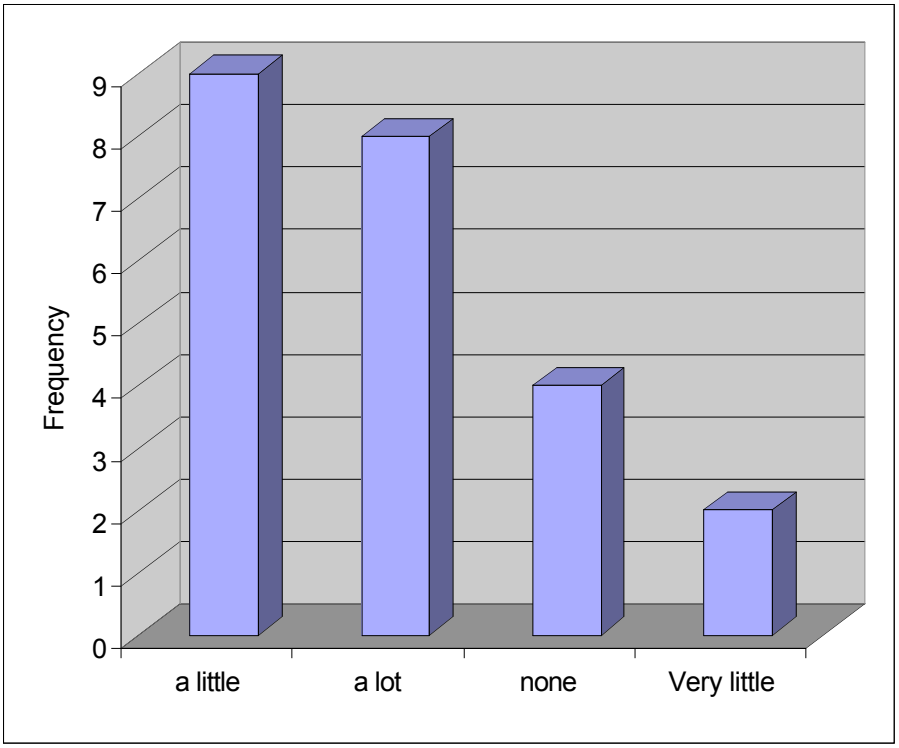


Figure 33 - How much has this added to your knowledge of the NSF for CHD?

As some of the above comments illustrate, the electronic nature of system evaluated positively, twenty-five respondents expressed a very strong preference for the electronic version of the NSF over a paper version. Comments suggested that this positive preference was due to the online version being perceived as easier to access, both physically and in terms of an increased ability to access the contents.

> *"Easier to read - scroll to specific areas that you wanted to look, search, contents".*
>
> *"Take in more in this way".*
>
> *"Paper gets filed".*
>
> *(Staff nurses, second questionnaire)*

The online version and specific features of the system that allowed searching the document evaluated positively. Twenty five respondents expressed a strong preference for the online version and the majority also found the forum *easy* or *very easy* to navigate (only four stated that it was *not easy* to navigate). Comments tended to suggest that a positive preference for the online over the paper version was because staff felt that the features of the system (especially search and scroll) allowed rapid development of an understanding of the contents and enabled nurses to increase their

level of engagement with the specific details of the NSF. As was noted earlier (first questionnaire), prior to the forum being available staff often knew 'about' policy documents, but had not engaged with them – or even had the opportunity to read them. As one non-author (lurker) respondent commented:

> *"Knew of document, but didn't previously know what it consisted of". (Staff nurse, MAU)*

Overall, it seems that for those that used the forum the increased accessibility and user friendliness provided by the electronic version of NSF document enabled the digital forum to act as a useful information resource. In addition, the visibility of professional discussion also enabled some staff to broaden their engagement with their community of practice.

Training and contributing

Despite being perceived as easy to use, the findings from the nurses' survey suggest an underlying reluctance to use the system without formal training. Overall, 20 nurse respondents to the 2nd questionnaire had not used the system. The main reason that respondents gave (in an open list) for not using the system was because they were "too busy or lacked the time" (N=10). However, this was closely followed by "not been shown or no training" (N=8). Evidence from other studies indicates that the demand for training is likely to be linked with levels of personal confidence rather than an actual need for formal training to use specific software or databases (Sinclair and Gardner 1999; Webster, Davies et al. 2003). Similarly, nurse respondents to both the 2nd survey and interviews felt that they required training in order to 'gain permission' to use the system rather than explicitly 'how' to use the system. Interestingly, these feelings in the nurses were in marked contrast to those of the midwives, who without any help from the project research team, used the system and created their own discursive digital community. The midwives actively promoted peer learning approaches to the use of the system by demonstrating the system to other staff[2]. In addition, senior midwives' postings to the system included contributions designed to promote peer learning and thereby expand the critical mass of participants.

Example: TG-MWF-12	*Thread - **Chat Room***
Sandra Jones *11 Aug 19:59*	*If you have looked at this site or posted a message then you know how to use it. Could you please pass this information on to your colleagues. USE IT OR LOSE IT!!!!!!!!!*

[2] For additional discussion of the difference between nursing and midwifery see later sections concerned with the midwifery and obstetric forums.

The NSF for Older People Forum: Elite participation

Analysis of the forum for the NSF for Older People revealed a usage pattern that was also repeated in the later, nursing specific, patient survey forums. Primarily there was a marked shift away from broad-based participation, with the majority of respondents being senior staff or specialist staff (including non-nurses such as the Chaplin) with a specific interest or expertise in policy development relating to the care of older people. The exclusive presence of a core, senior staff/specialist group as authors on the forum was raised by several interview respondents as an area for concern, but also one that they felt relatively powerless to address**.**

> *"If all you have are the confident ones, talking to each other then you get decisions and quality discussion sure, but what about the rest of them? You aren't getting the views of everyone, what they think. It's a hearts and minds thing. How do you get them to be confident and take part?" (Operational group member and participant on Older People NSF forum)*

Contributions to the Older People NSF forum, unlike the CHD forum were not predominately concerned with information about the NSF. Instead, the majority of threads were concerned with the discursive debate of both local implementation and critical debate relating to the organisation of care. Two of the 13 threads contained extensive and in-depth critical reflective debate, concerning how to improve service provision in relation to falls and how to address age discrimination. The final thread on the forum (age discrimination) demonstrates attempts by staff to engage with the character of age discrimination and how this may operate at the local level.

Example - TG-OPF-13	*Thread – **RE: Age Discrimination***
Jackie Brown *10 Aug 15.55*	*Inactive and sometimes unintentional discrimination happens when older people are unable (due to confusion / dementia) to articulate their needs verbally. It is easier to respond to the louder, more verbal younger patient and to recognise their needs than it is to the quiet elderly patient whose needs may be just as valid or even more urgent.* *> Do you feel that your area actively or inactively discriminates against the older person*
T. Bowen *14 Aug 18:03*	*Is the answer to go back to wards which specialise in the care of the older person. Or is this a form of discrimination in its own right.* *Perhaps we need nurses who are able to articulate their patients needs for them. Specialist nurses! Rather than special wards?*
Cath Todd *20 Aug 16:21*	*I agree that specialist nurses are ideally the answer. Given the relative unpopularity of elderly care nursing, would specialist wards lead to an even bigger problem of recruitment and retention than already exists in other areas - thereby disadvantaging the elderly patients by good intentions? Is the answer to tackle the issue of the unpopularity of elderly care nursing at student level?*

The presence of critical reflective thinking in the latter threads on the forum suggest that nursing staff may require focussed opportunities and time to develop the ability to critically reflect on policy or practice and debate with colleagues.

Usage did result in the resolution of issues raised in two instances and resolutions were discussed in 4 of the 15 threads, with potential improvement in either the direct delivery of care or in terms of policies relating to the organisation of care.

Example - TG-OPF-01	*Thread - **Older Person's Laundry***
Jane Wilson *08 Jan 16:17*	*I recently looked after a patient from a residential home and when I rang the home to ask them to collect the patient's laundry they refused saying that as she was in hospital it was not their job to do. When I pointed out that she was their resident and they were providing her care (at a cost although I didn't say that!!) they became quite difficult and said that we would be asking them next to come in and do her nursing care / medication as well! In the end they told an elderly relative of this patient that he had to do the laundry and he arrived to collect it all. Has this happened elsewhere? Who is actually responsible for the laundry of a nursing home resident in hospital? Is there anything official I could have quoted? I felt very uncomfortable to be arguing over a patients personal washing - where was the privacy and dignity for the patient in all this? I'd be interested in other people's experiences or comments.* *Happy new year everyone! Jane.*

Evolution of the Forums

Towards broad based participation: the patient surveys

At a review focus-group with the operational group, respondents argued that some of the reasons for lack of a broad based level of participation among the nursing staff was that staff found the NSF's difficult to engage with because they were government level policy documents. The belief was that nurses who were inexperienced in policy related decision-making found the notion of commenting on a National Service Framework particularly intimidating.

> *"I think a lot feel that it isn't for them, an NSF is something from the government, nothing that they contribute to."*
>
> *"Well it ought to be."*
>
> *(Operational group members, focus group)*

It was felt that forums linked to either documents that explicitly required comments and action from staff might engender broad-based participation and local documents might be of greater interest to local staff and managers.

Consequently the research team expanded the document forums to include recent locally produced patient satisfaction surveys. These surveys covered the specialities of:

1. Obstetrics and Midwifery
2. Trauma and Orthopaedics
3. Surgery

The surveys had all been undertaken in the preceding couple of months and all required the development of action plans by the Trust.

All the patient survey forums were allocated a forum champion whose role was to seed the system, with some initial issues that arose from the findings of the surveys. The champion was the same person for each of the forums, that is the Trust research nurse who had assisted with the surveys, but who was unconnected with the project. The champion was also ultimately responsible for producing a report for the Trust on each of the surveys.

Example - TG-PSS-03	*Thread - **Patient's expectations***
Anita Jones *12 Dec 09:41*	*There seemed to be some confusion over the process at booking as to whether they would see a consultant when in hospital. One patient commented "Not much contact with Consultant"* *Do we need to make this clearer?* *How can this be done?*

The contributions from the champion were in the form of one-off questions, that linked back to the document attached to the forum. These on the whole constituted between 8-10 contributions. However, the champion did not post any other contributions to the forums. A typical contribution consisted of a reference to the survey and a couple of questions that aimed to elicit staff to discuss potential changes to the service.

Active Participation: The Midwifery Forum

> *"It's a good way of getting people's opinions and loads of people have taken part." (Staff midwife)*

The midwifery forum, as part of the second phase of the project, was linked to a local survey of patients' views of obstetric and midwifery services and became live in December 2001. Due to the need within the Trust to generate an action strategy resulting from patient surveys staff were made aware that the forum would be available for a period of one month. Subsequently, the midwives

requested that the forum be continued and a specific midwifery forum be created linked to local shared governance documents. At the time of producing the report this latter forum was still active and over a period of 8 weeks the forum had 27 live threads containing over 117 responses from 38 different participants. In addition, several issues have been carried forward from the original discussion forum, thereby allowing them to be developed further and resolution achieved.

The level of participation and outcomes resulting from usage of the system by the midwives stand in a dramatic juxtaposition to the usage and application of the system by staff from general nursing. The continued use of the system, the actions arising from the system and the subsequent creation of a midwifery forum provided a means to explore positive system performance.

In the following sections of this report the reasons for the difference in usage of the system and the overall type of communication and impacts, between nursing and midwifery is explored (this issue is discussed in more detail later).

How midwives used the obstetric forum

The speed and level of uptake for the obstetrics forum was dramatic, between the 12/12/01 and the 21/01/02 seventy messages were posted, with usage beginning within 1 hour of the briefing meeting. Twenty-nine authors (of which two were group responses, five were anonymous and the remainder were named individuals) discussed 11 discussion threads and all comments received at least one response from other participants.

All participants accessed the system via the hospital intranet from existing ward machines. This staff group being located in a separate wing of the hospital had no direct or easy means of accessing the project computers and no participants used the forum from those machines.

Who participated?

The Obstetric forum achieved broad-based participation and included all grades of midwives. Moreover, in contrast to the other forums both night and day-staff were active participants. Contributions to the forum were also made by community midwives, who on several occasions came into the hospital to specifically contribute to the system, although issues of participation and linkage with primary health care staff was not within the remit of this current project and no attempt had been made to facilitate their participation.

> *"We want to keep this facility as it aids communication between all grades of staff" (Midwife sister; speaking about Midwifery Forum)*

Table 11 – Midwifery Forum level of participation by staff groups

Job Title	Number of Posts	%	Number of Staff	%
Midwife	36	51.4	18	62.07
Community Midwife	5	7.14	3	10.34
Midwifery Sister	6	8.57	2	6.9
Manager	13	18.57	4	13.79
Other (Includes the forum champion)	10	14.2	2	6.9
Total	70	100	29	100

Training and use of the system

An initial meeting to discuss the project forum was held for midwifery staff, which was well attended by 6 midwifery representatives. Immediately following the meeting, 4 individuals posted 6 messages and in total, 13 named individuals and 4 anonymous midwives felt sufficiently confident to post a message on the forum prior to being taught how to use the system by any member of the research team. Subsequently, a member of the project research team demonstrated the use of the system to 4 midwives, including two senior managers. The remaining participants were shown how to contribute to the forum by their peers. Interestingly, demonstrating how to use the system was not solely the province of computer literate staff.

> *"I showed about 4 people and they've obviously gone on and shown other people. So it's quite easy to use and it's easy to get into isn't it?"*
>
> *Question: Do you see yourself as computer literate?*
>
> *"Not very well; I can get by, I can use what things I've been shown how to use, mostly I prefer to hand write things". (Staff midwife)*

This experience suggests that the system had been designed in an accessible manner and that usage need not be primarily dependent upon training or even having a detailed demonstration. It was only until one week (due to holidays) after the forum became live that a member of the research team was able to show any of the midwives how to use the system. In common with participants across the system the 'interface' and design of the system was perceived positively, corresponding to the key characteristics of a well-designed system (Hiltz and Johnson 1989).

It was noted above that '*busyness*' featured strongly in the accounts from the NSF participants; consequently, the potential impact of time poverty was explored in detail with the midwives. A time pressured working environment was reported by the overwhelming majority of midwifery respondents.

> *"Well it would have taken me about probably about 10 minutes, but on ward you're being interrupted every 2 seconds with the door being opened and telephones and things so it did take me sort of 30/35 minutes to actually get it down properly." (Staff midwife)*

However, in contrast to the nursing staff, '*busyness*' was not perceived by midwifery respondents to be an overriding constraint to contribution.

> *No, I didn't think it was time consuming, even when rushed you make the time, if you want to have a say. (Staff midwife)*

> *Well we are busy, mad busy, but it only took a minute to send it in and what I do is keep coming back, a minute here and a quick look there. (Student midwife)*

Overall, it seems that midwives, like their nursing colleagues, felt highly pressured by lack of time and a very demanding workload. However, a strong additional feature of the midwifery accounts was a commitment to prioritise participation, even in an intensely time-poor environment.

Is CMC a valuable form of communication?

One of the areas for the evaluation was to explore if communication via a digital discourse forum could impact positively on the professional culture of the organisation and to identify the form of that communication.

There is considerable debate in the literature on computer-mediated communication concerning the value of CMC to organisations. In particular a hotly debated point is how far CMC represents a form of communication that can facilitate positive change within organisations and participating communities. CMC, it is argued, either fails to have the strengths of face-to-face embodied interaction or it embraces the strengths of informal discussion while allowing a structured and measured approach to the participant's communication. In terms of forum users perceptions, the midwives appeared to be advocates of the latter perspective, they felt CMC provided an opportunity to discuss issues unconstrained by more traditional memo formats and as we explore later without the problematic hierarchal nature of many face to face interactions. In particular they reported finding the informality of communications on the system as functioning to provide a space for thinking about service development.

> *"I like it being chatty and gossipy, because that then engenders a professional development discussion. Please don't take it away! (Laughs)" (Senior midwife/manager)*

Positive CMC system performance has been strongly linked to the process of contributing being perceived as a stimulating and interesting process (Hiltz and Johnson 1989). In fact from the majority of midwifery interview respondents there was a real sense of excitement about CMC as a form of communication.

> *"It was really exciting to go in and see if any-one had added anything – I would sit there and think, I wonder what is going on now and then have to have a look." (Staff midwife)*

There is also evidence that the way the system visibly organised information, by threading the contributions, had a positive impact. In particular, by being able to view the structure of an argument, threading, was perceived as enabling respondents to identify where they could contribute to the discussion.

> *"It's good to see what people think about things and it's an area that's a point for discussion isn't it, somebody broaches one subject then other people follow." (Senior midwife/manager)*

The impact of participation in the system

Contribution to the system was clearly seen as a means to obtain a voice in the decision-making processes and to create a change in the character of the delivery of care. For the midwives interviewed without exception they felt this level of participation was an essential aspect of their role, even if it had been a previously unachieved aspect.

> *"I thought it was really good; it's a good way of making your views known." (Staff midwife)*

> *"I think all midwives should have a say in whatever is going on, in the way they're organised, or the way, you know, certain aspects of care. I think we should have a big input into that, definitely, for every midwife." (Staff midwife)*

However without the system the respondents felt that they did not have a clearly defined means within the organisation of 'having a say'.

> *"Just to express an opinion really, just say what you think, instead of just sitting at the back and doing your job and not being heard really." (Staff midwife)*

In particular the forums were felt to provide a means to express previously *unvoiced* ideas because within current modes of communication available in the Trust there was an absence of established routes for innovative or discursive ideas to even be raised.

> *Question: How would you have raised these issues normally?*

> *"You probably wouldn't; it's something that you can actually put something down whereas, I mean you could write a letter to the manager but probably the subject wouldn't even be brought up really." (Staff midwife)*

Analysis of the discussion topics supports the notion that the system enabled previously internal thinking, in the shape of untapped ideas for change, to be aired in a public arena. In particular, the contributions reveal a process of day-to-day experiences, problems and options being discussed both supportively and openly. Consequently, the forum bridged the organizational communication void by providing a channel for midwives to function in a reflective way about service provision. The following example, taken from 3 of 7 responses from a thread concerned with privacy, is typical of such interchanges. A problem in the organization of care is openly acknowledged and then contributors put potential real-world solutions forward.

Example - TG-PSS-05	*Thread - **RE: Privacy***
Kerry James *14 Dec 21:50*	*I agree that privacy is a problem; maybe this could be addressed by setting aside an area of the ward that the visitors could go to, to allow the ward area to remain quiet and promote privacy. The dayroom between 4/5 could be used more for this purpose.*
Angela Franks *16 Dec 17:56*	*Unfortunately, privacy will always be a problem in four bedded bays,and it will never be feasible to have single rooms only. We need to make the most of what we have got. The side room on ward 4 could be utilised further. If some curtains and a few chairs were added, staff could use the room with women if any particulary sensitive issues needed to be discussed, this could also maintain confidentiality. Would this also benefit women on ward 6?*
Melissa Keyne *17 Dec 17:26*	*We do find that the dayroom is often used for parentcraft during the day and in the evening, and this ties the room up for visitors and patients. Could parentcraft not be moved to a more suitable area?*

An evaluation of shared governance, a form network management in nursing, identified that one of the key barriers to participation in decision-making by nursing staff was the difficulty shift workers faced in attending meetings and the expectation that nurses would attend in their off-duty time (Brooks, Mitchell et al. 1998). Interview respondents expressed the view that the ability to overcome such barriers and participate without loss of valuable off-duty time, was one of the key strengths of the system.

> *"I thought it was a useful tool for us to use, for those of us who work unsocial hours because we can actually get our point across without actually having to come in for meetings that clash with our sleep time." (Staff midwife)*

Kirkham (1999) has identified how within the current organization of care midwives who seek to innovate often feel isolated and marginalized and therefore either leave the profession or cease to act as critical reflective thinkers. The notion that the system produced one means to breakdown such marginalisation and isolation, through the creation of an effective, collective midwifery voice, was a central theme in staff views on the value of the forum.

> *"It helps you communicate with your peers that you might not necessarily see on a regular basis; but if you use it regularly it helps you communicate in a more complete way." (Staff midwife)*

> *"So it is nice to see and if everybody feels like that it sort of makes you think well if everybody's feeling like that why don't we discuss that and try and influence something else." (Staff midwife)*

By providing midwives with a means to establish new relationships with colleagues based on a discursive dialogue, participation was found to enhance their sense of a being part of professional community. The establishment of a community of staff, that realised by virtue of their usage of system, that they shared common goals for improvement and modernisation of the service was felt to have been a very tangible outcome of the forum.

> *"It opens your eyes and you think well people do care you know they still care about midwifery and are quite passionate about it in some cases." (Staff midwife)*

Moreover, by creating and reinforcing individual participants sense of belonging to a professional community, the system was also felt to have had a positive impact on staff motivation and morale. An improvement in morale/motivation may indicate the potential of computer based discourse systems to form a useful part of staff retention strategies.

> *"It is just so great to know that people still care about midwifery and don't just come in and do their job and go. It really re-motivated me." (Staff midwife)*

The role of the digital discourse forum in the creation of a professional community was also evidenced in the form of communication on the system.

Communicating new visions: Critical reflective thinking

Research on the culture of midwifery in the UK has indicated that midwives found it very difficult to envision alternatives to current forms of service provision and particularly to articulate how services might be developed (Hughes, Derry et al. 2002).

However, within the major threads of both the midwifery forum and the chat forum there was considerable evidence of discussion of new forms of service provision. These ideas for creating change in service provision fell into two main types.

Firstly, there was evidence of immediately applicable ideas within current forms of service provision. For example, this 'early morning' segment is taken from a thread of 13 contributions.

Example – TM-MF-22	*Thread - **RE: Information packs***
Jean Grey *01 Jan 02:39*	*Surely the majority of these mentioned topics could and should be addressed at the unit tour at the weekends. Possibly an information leaflet then given out containing meal times, visiting, phone numbers etc, would be helpful?*
Sarah Smith *02 Jan 00:22*	*What an excellent idea; an A5 flyer containing information for women and their families on subjects such as visiting policy, amenity room charges [...]*
Mary Moore *02 Jan 02:51*	*Sarah's suggestion of an A5 flyer is excellent. I wonder about the percentage of women that attend the ward tour, perhaps it would be better to hand the leaflet out at the 34 weeks ante-natal check. A supply on all the wards for those who deliver prematurely would be useful.* *Do the ante-natal ladies need their own information leaflet?*

Secondly, there was discussion of more critical perspectives that related to the strategic levels of decision-making and the need for a re-organisation of current forms of service delivery. These often involved hotly contended issues relating to the philosophy of midwifery care. Overall, contributions that met the evaluation criteria for critical reflective thinking, that is, where midwives demonstrated both the ability to critique current provision and relate that critique to principles underpinning a new vision of care, occurred in 23 of the contributions and in eight of the main threads. Discursive debate also enabled staff to discuss the nature and organisation of care at a policy level rather than just on immediate activity.

Take this example from the thread on Labour needs:

> *"I agree with [X's] comments re; introducing ways of encouraging the natural process of labour. Where appropriate many women would benefit from the use of complementary therapies such as massage in labour, also the main focus of a bed in the room can't help motivating women to adopt more upright and effective positions in labour […] Options for normal labour seem limited."*

Within a number of the threads this lead to the articulation of diverse views on the best way to develop and organise maternity services. Although in the majority of cases the contribution to the discussion developed and extended contributions from other staff in a supportive manner. As the forum developed and expanded into the subsequent midwifery chat forum the extent of such critical

reflective thinking increased with midwives increasingly debating fundamental issues concerned with the organization of care and user participation. (Note, in reading the following example that, whilst commenting on a named individual's contribution, both responses have used the anonymous 'midwife').

Example - TG-MF-07	*Thread - **RE: Fathers visiting***
Midwife *17 Dec 13:14*	*I think fathers should be accomodated at night on the postnatal wards, especially when their partner has had a difficult time. Giving birth is and should be a family event unique to each woman and if the woman wants her children to be at the delivery or visit when she is still on labour ward then this should be allowed. If the needs of the family are considered and accomodated there is less likeyhood of aggressive behaviour. Francis Marks wrote:* *> *> There are no adequate facilities for visitors to stay overnight* *> even in single rooms it can cause a problem. Though I* *> appreciate the support that relatives can offer this is not* *> always the case many partners at night have been drinking* *> alcohol/drugs and can become quite abusive towards staff.* *> Staff safety must come first! If staff feel threatened by* *> working at night looking after the women plus their relatives* *> then stress levels will rise, sickness increase as we are* *> already extremely short staffed. The one midwife on the ward* *> will feel very vulnerable with an increased number of men in* *> the vicinity, they are not all sweetness and light. We do our* *> best to accommodate relatives in exceptional cases with the* *> limited resources and facilities available.*
Midwife *17 Dec 13:22*	*In reply to Francis Marks' comment and midwife's reply facilities are inadequate but this is something we must address to bring us into the 21st century ! Womens choices are paramount even if the midwife has different views.*

This apparent ability to articulate innovative ideas as noted above marks a contrast with other recent research that suggested midwives find it difficult to express visions for service development (Hughes, Derry et al. 2002). The explanation for our project findings may lie in the *electronic* nature of the communication on the project forum. Hughes study employed focus-group discussions as a means to attempt to elicit ideas for service change from midwives. However, it was precisely the absence of a physical meeting that the midwives in our study felt enabled them to articulate diverse and innovative ideas. For a workforce that traditionally has a hierarchical structure (Davies 1995), (Kirkham and Stapleton 2000) and without an embedded culture of participation in decision-making, it may be that CMC can offer a more acceptable communication

medium than physical meetings. Midwifery respondents perceived the medium of CMC to be valuable for several key reasons. Firstly, it offered a less pressured environment to contribute than face-to-face communication offering time for reflection and composition of a response.

> *"I think it was really good actually. […] it's good to be able to read what somebody has written without sitting in front of them knowing that they're telling you what they want you to hear or not. There's no pressure on, so you're hopefully getting exactly what people are thinking, instead of what they think you want to hear or the hidden agendas." (Staff midwife)*

Secondly, for a professional group that feels marginalised and unfamiliar with contributing new or critical ideas, the opportunity to participate in an environment that was perceived as somewhat more free from normal hierarchical barriers was felt to be a positive aspect of CMC, one that facilitated midwives to voice their ideas.

> *Question: Why did you say that it was worthwhile?*
>
> *"Because it's an opportunity for us to say what we actually think about issues that possibly aren't taken into consideration normally and it's a free atmosphere to be able to do it without any comeback."*
>
> *Question: Do you think in other forms of communication there is a comeback?*
>
> *"I think definitely, yes there is, because if you're in a meeting and you say things, you become labelled. Well, not labelled, but seen as if you have something that's maybe not positive or maybe that's against what is expected or wanted or whatever. But in the forum, you raise the issue and then you see what people think about it." (Staff midwife)*

Sharing best practice

How to ensure that knowledge concerning *best practice* is diffused to all levels of staff, is a challenge for the new modernisation agenda, particularly, when significant aspects of information, knowledge or skills are held by diverse professional groups, in often very different locations. In the usage of the forum there were five instances of midwives sharing knowledge and experiences from outside the Trust. Although this form of information sharing was a small aspect of the forum content in KGH, potentially such types of communication could have a higher level of incidence in a larger Trust with a more mobile workforce.

Example - TG-PSS-10	*Thread - **RE: Drinks***
Anita Plath *02 Jan 02:19*	*In Plymouth the wards had machines in the day rooms which would accept both cash and swipe cards. The swipe cards were issued to the ladies - these cards allowed them to draw a preset amount of drinks in a twenty four hour period. ?* *the setting on cards could be determined locally by staff. The cash option meant that visitors could easily obtain drinks. Maggie Bell may remember more about this system.*

Facilitating factors: Managers and champions

Studies concerned with the managerial impact on CMC and new media use indicate that managerial support for and prioritisation of use are key factors in the development of commitment to use electronic communication in communities of practice (Camino, Milewski et al. 1998). In the midwifery forum the level and type of input from midwifery managers was found to have a predominately positive effect on both participation rates and the character of the postings.

Initially, there was some discussion prior to implementation of the discourse forum that staff might be unwilling to assign their name to a comment on the forum, particularly if they felt that their manager would also have access to the forum. Moreover, when presenting about the project the research team found that members of the audience also invariably raised the issue of staff confidentiality, suggesting that surveillance by managers is an obvious concern prior to implementation of a digital discourse forum. However, the effect of managers on the usage of the system appeared to function somewhat differently.

It was noted in the discussion of the CHD forum that certain types input from senior staff can easily block discursive debate and prevent further contribution from more junior staff simply by appearing to provide an answer to an issue without referring the issue back to the general community, even when the contribution is intended to be affirming and supportive.

Midwifery managers had access to these findings at the development of the obstetric forum via feedback from the research team. In the midwifery forum contributions from managers were frequent, with input on each of the main threads. Postings from senior midwifery staff primarily supported and added to discursive debate introducing new issues and stimulating further discussion.

For example the following contribution early on stimulated a detailed examination of the nature of debriefing.

Example - TG-PSS-04	*Thread - **RE: Labour needs***
Catherine Brooks *12 Dec 15:33*	*I was going on to say - except that i pressed the wrong button- that maybe the midwife responsible for the discharge of the client could 'go over' the notes with the client while completing the letter and ask any outstanding queries.*

In some instances senior staff actively promoted usage of the system, by explicitly requesting that staff use the forums.

> *"I hope all members of staff take this opportunity to make their voices heard in this unique opportunity." (From midwifery chat forum)*

In interview more junior members of staff reported that they valued such contributions as it added to the sense that contributing to the forum was a valuable means to have an influential voice in the decision making process. Consequently, unlike many of the nursing participants, none of the midwives expressed the view that they were concerned about confidentiality or felt too intimidated to use the system.

> *"I noticed that very senior members of staff have used it and obviously then they can see how we feel about various things and perhaps implement change, or discuss change." (Staff midwife)*

Midwifery managers also promoted the value of contributing by setting tasks and supporting suggested resolutions of an issue. For some midwifery managers this was a conscious strategy to create change and stimulate service development.

> *"I think maybe picking up on issues and giving people that made the comment a bit of work to do on their comments, not just say and let someone else do the work, because if they're saying it they really ought to be thinking how to achieve what they're asking for." (Midwifery manager)*

Resolution contributions from managers focused around specific issues. In some cases, this also involved the commitment of resources or the prioritisation of the issue for ward meetings.

Example - TG-PSS-10	*Thread - **RE: Drinks***
Mary Nelson *17 Dec 11:59*	*I agree we ought to investigate re-introduction of drinks machine There will I presume be a cost implication but can overcome this. We need to discuss location and communicate SUGGEST to be discussed at ward meetings as a matter of urgency*

The overall level of resolution within the forum is discussed in the next section.

Resolution: changing practice

Identification of the exact extent of final resolution of issues raised on the forum is problematic, simply because ultimately the majority of issues will be practically resolved off line. However, follow-up interviews with key respondents provided additional supportive evidence that concrete changes in the organisation and delivery of care have taken place as a result of the discussion forum. Overall, in the obstetric forum 30 contributions (in 9 threads) contained a suggested means to achieve a resolution of this issue. The following forms of resolution were identified as occurring:

- Direct resolution on-line, usually with a senior manager agreeing to a change in provision and allocating resources. Senior midwifery managers allocated specific resources in two of the threads (three contributions), with the result that, for example, fans were installed on labour ward.
- Working parties, or off-line groups were explicitly suggested in four contributions so that staff could physically meet and resolve the issue. One of the purported strengths of CMC discussed above is that it can offer a means to make physical meetings more efficient as much of the discussion and allocation of work is likely to have occurred on-line. This form of resolution was frequently linked to an on-line discussion of the need to develop new strategies or policies.

On-going discussion occurred in 16 of the contributions. Staff had suggested a resolution but continued discussion was still occurring at the time the forum was shut down (one month after going on-line). However, some issues were carried forward into the midwifery chat forum.

The Other Patient Surveys: Trauma and Orthopaedics and Surgery

Following the broad-based participation achieved with the obstetric forum and the midwifery chat forum, the next two completed patient surveys were included on the system with their own discussion forums. Staff were informed of the existence of the surveys in an identical manner to that of the midwifery forum briefing and the same forum champion seeded advertising and the forums with initial questions for discussion.

Usage of the Trauma/ Orthopaedics and Surgery Patient Survey Forums

In comparison to the obstetrics patient survey, the Trauma and Orthopaedics survey and the Surgery patient survey forums were used much less.

Overall, only 15 messages were posted on the Trauma and Orthopaedics patient survey [3]forum, by a total of nine authors (one of which was anonymous). There were seven threads, only three of which were discussed, with the exception of the forum champion who posted seven messages. The individual contributors only posted one message each**.**

A similar story occurred in the usage of the Surgery forum. At the one-month closure point, a total of 25 messages had been posted on this forum[4]. There were 8 authors from individuals and two groups of people. Nine threads were discussed. Excluding the forum champion, who posted 9 messages (36% of the messages on the forum), the range of contributions by the same author was between 1 and 4, with 2 messages being the most frequent number of messages posted by the same author.

The most frequent time used to post messages to this forum was between 14:00 and 16:00. Four different authors posted 52% of the messages to this forum during this time period. Those authors who posted more than one message posted all of their messages in one go, i.e. during the same time period on the same day. This suggests that the authors of this forum visited the forum on one occasion and did not contribute again. Consequently, the excitement and broad based participation generated among midwifery staff by having a means of collective communication was not replicated among the nursing staff.

[3] From the 7th May until the 19th May 2002.
[4] From the 4th February 2002 until the 3rd March 2002.

Content of the Surgery forum and the Trauma and Orthopaedics forums

In terms of factors identified as success factors for the evaluation of the content and contributions to the digital discourse forums across all the indicators, both the Surgery forum and particularly the Trauma and Orthopaedics forum constituted a marked contrast to the midwifery forums. The next few sections provide an overview of the content of the contributions to these two forums.

Communicating Visions and critical reflective thinking

Within the two forums there was some evidence of critical reflective thinking albeit of a lower proportion than in the midwifery and obstetric forums. Note that the measure of critical reflective thinking used in this context was demonstrated by the ability to reflect on or critique current provision and articulate alternative forms of provision. Overall, 6 contributions in the Surgery forum met the criteria for critical reflective thinking, although in the Trauma and Orthopaedics forum there was only one such contribution.

Example - TG-PSS-02	*Thread - **RE: Food***
Melanie T. *12 May 16:19*	*the pureed diet needs to be varied. We have a patient who has been with us for several months and is on a pureed diet. The menu sheet has not changed in that time and we find she is now getting bored with the choice she is offered. The ethnic meals which I have served patients in the past have been similar at both mealtimes and have been very hot as in spicy hot.*

Analysis of the threads reveals a difference in the types of issue that staff discussed between these forums and the midwife led ones. Overall, there was also almost no discussion in the two forums of any issue that would require the development or contribution to strategic or policy levels planning and decision-making. Moreover, topics that were critical of the organisation of care were poorly responded to, if at all. For example, there were four threads in the forums (1 in Surgery and 3 in Trauma and Orthopaedics) relating to critical comments from patients (about poor or very poor provision of information and discussion of treatment options), but none of these received any comment at all. This lack of engagement with patient communication issues is a little surprising, given that the provision of health information and discussing options with them is not only rated highly by patients, but has also consistently been argued as intrinsic to good quality nursing skills.

In both of the forums there was a low level of responsiveness to patients' critical views of service provision, the content of the forums revealed a tendency to negate patient criticism of service

delivery. This negation was achieved in three ways. Firstly, contributions were made that opposed the patients view – indicating that the criticism was unfounded.

Example : TG-PSS-02	*Thread - **RE: Food***
Angie *10 May 12:56*	*the food is much improved to how it used to be and patients have a good choice.*

Secondly, criticisms from patients concerning policies relating to the organisation and management of care were largely responded to with justifications for the policies and an explanation of why change could not occur.

Example : TG-PSS-08	*Thread - **waiting for operation***
Jennifer Sands *04 Feb 09:32*	*Patient stated that they had been nil by mouth from midnight, expecting to go to theatre the next morning. In reality they waited all day then were sent home.* *Are there ways that this can be prevented? Do we need to keep patients starved all day? Could they be allowed fluids until a theatre time is secured for them?*
Samantha and Jo *04 Feb 16:28*	*Since we are both elective and emergency cover, priority needs to be given to emergency patients. Also changes very rarely alter on the elective list. problems must be happening with the emergency list, which will be affected by the severity of each case, which could account for the delay. Also with governmental guidelines regarding staffing elective lists have to finish within a certain time. In answer to the fluids being given until a theatre time secured, this affects anesthetic guidelines as theatre lists are changed to accomodate other problems or cancellations.*
Rae Simmonds *16 Feb 16:46*	*As working on an emergencey admissions unit unpredicatable theatre time is the problem. Patients admitted here are mainly NBM until reviewed by senior medics, due to other commitements this can be many hours.*

This apparent acceptance of the status quo may explain why, although suggestions for resolution did occur on the forums, there was little evidence of supportive agreement from other staff and no evidence of linkage to action, such as the setting up of working parties to achieve change. In addition, there was a low level of contributions that could be identified as decision-making contributions. Critical reflective thinking was evidenced in only 1 contribution in the Trauma and Orthopaedics forum and in 4 threads (5 contributions) in the Surgery forum. This absence of what could be termed decision-making contributions is interesting, as there were also no supportive

comments on the forums from senior nursing managers that either thanked people for their input or explicitly supported action for change.

Finally, in a minority of instances patients were 'othered' by contributions that belittled and trivialised user critiques of services.

Example TG-OF-03	*Thread - **Boredom***
Jennifer Sands *07 May 09:26*	*Patients requested that they should have some form of entertainment / occupational therapy to relieve the boredom. How could this be achieved?*
Anonymous *10 May 12:22*	*Only boring people get bored!*

Although such extreme 'othering' occurred in only a very small minority of contributions it is nevertheless still surprising that user views would be responded to so negatively, particularly in the light of current policy imperatives towards user participation in health care decision-making.

Overall, despite being linked to local documents that were directly related to patient care, the Surgery and the Trauma and Orthopaedic forums achieved only low levels of participation, few discursive discussions and low resolution of issues while also demonstrating a tendency for the negation of patient perspectives.

The next section seeks to explore some of the barriers to achieving broad-based, discursive participation, among nursing professionals.

Exploring the cultural barriers to engagement: the difference between nurses and midwives.

The findings from the project demonstrate a difference in the levels of engagement in knowledge management between specialities within general nursing and between that of midwifery and nursing. Although the project did not set out to provide a focused exploration of the difference in professional cultures in the NHS, the findings from the project do indicate some of the core issues preventing nurses from functioning as critical reflective practitioners. Moreover in the case of midwifery usage of the discourse forums also demonstrates the value of engaging in knowledge management when such barriers are overcome.

Overall is seems that within the nursing professions the differential levels of engagement between the specialties can be in part explained by differences in professional and managerial discourses towards participation in decision-making. Moreover, for some of the specialities the negative nature of engagement, when it did occur, particularly in the patient survey forums, could in part be due to lack of experience with health care policy such as public involvement strategies.

The staff groups of midwives and nurses all identified themselves as highly busy, and functioning in a time poor environment. However, the midwifery respondents, without exception, all strongly held the position that a core aspect of their job was participation in decision-making. In particular midwifery respondents felt that all grades of midwife should have a voice in the development of policies concerning the organisation of care, working practices and quality issues.

> *"I think its really important that everyone should have a say and make some contribution to important matters, you know matters that concern the care of the women and also how we work." (Staff midwife, part-time member of staff)*

For the midwives participation in decision-making processes was identified as not only something that they could make a valuable contribution to, but also a 'core component' of effective job performance

> *"I think it's very important, because its my job, and its my service, and I ought to be able to improve it for the people who are using it." (Staff midwife, part-time member of staff)*

Among general nursing staff interviewed, both from within the core targeted areas and non-targeted areas, lower levels of usage were not associated with techno-fear or a perception that the system was difficult to use or inappropriately designed. Instead respondents suggested that for nurses,

engagement in broader health policy and quality improvement issues were not perceived as an integral or essential component of their work. Moreover, communication with other professionals or even discussion within a community of nursing did not have a high priority. In contrast, the focus of nursing staff was solely on tasks associated with immediate and direct care, as the following staff nurse illustrates:

> *Q: Did you find helpful having the NSF on the site?*
>
> *"I think it would be good for staff that had no idea about the national health, you know, the (inaudible) that may ask questions from people that do. But I think, in general, nurses tend to concentrate on the area that they're interested in and the patients that they're working on. And so I never really saw any use that I could make of it." (Coronary care nurse)*

Others have found similar findings. For example, in a study of multi-professional team working (Cott 2000) argued that the structural position of nursing resulted in an approach to team work that focused only on direct care, but importantly excluded notions of improving the quality of the work. Moreover engagement with a broader multidisciplinary team was viewed with ambivalence, as it was "*not essential to helping them complete their work tasks*." (Cott 2000).

> Respondent 1*:"I am really disheartened with my colleagues on the ward, I tell them to go on it and all about the webcasts and they just weren't interested. I just couldn't make them look at it. The students do, they are motivated…*
> Respondent 2*: That will soon be knocked out of them."*
>
> *(Operational group member and senior nurse. Focus groups)*

Similarly, it appears that this exclusive focus on immediate task orientated care, impacts negatively on the levels of engagement by general nurses with policy changes and on their commitment to have a voice in the decision-making process.

> *"What they are saying on there, is not going to make any difference to the way I treat my pateints on that shift you know so it is not a priority." (Staff nurse)*

In fact, nursing staff perceived updating as constituting an activity that would engender guilt if undertaken, as they should be 'seen' to be not actively engaging in task-focused activity on the ward. Consequently, updating was undertaken only if a specific question needed answering and

only then in absolute need, a finding that is also possibly reflected in the question and answer format of the content of the contributions.

> *"You're too busy looking after the patients to, you know, find out what's happening a lot of the time. But then, all of a sudden you're faced with an interview or something like that, or you see something in the foyer that's got Patient and Public Council or Clinical governance on and you think "what on earth's going on here?" and it would be nice to have somewhere to look that up." (Staff nurse)*

'Busyness' was frequently presented as blocking engagement with updating, and policy related decision-making.

> *"We have just been too busy. Too busy." (Staff nurse, Surgery)*

> *"Don't even talk to me about it. I am too busy." (Staff nurse, Trauma and Orthopedics)*

The obstetrics and midwifery forums provided examples of ways that senior staff and champions of Computer Mediated Communication can facilitate further growth of electronic communication. Although it was noted that within the nursing forums this form of support did not occur to the same level, there was also support from interview respondents that engagement in updating or contributing to the system was a low priority in the hierarchy of valued nursing tasks.

> *"Our colleagues […] don't always help, I am sad to say. There was a nurse using the project the other day, and a senior member of staff who should know better, looked at her and said 'hasn't she got something better to do?' That's the attitude we have to deal with." (Operational group member)*

However, it also suggests that the willingness to engage with decision-making processes and quality improvement also varied by specialty within general nursing, as well as across the nursing and midwifery professions. Although the exploration of this issue requires further study, it appears that if 'having a say' was perceived as core work and to be prioritized, then the discourse forum provided a means to achieve that voice. Information technology, in the shape of the systems we deployed, became the means to overcome barriers of time (by not requiring a meeting) of distance (by enabling for example shift workers to communicate) and finally that of isolation and marginalisation (by enabling all grades of staff to develop a discursive community of colleagues).

It seems that systems such as the digital discourse forum can make a difference to the decision-making and communication structures in the NHS if the professional and organisation cultural context is supportive. Moreover, this can be a difference that stimulates both change in the delivery of care and impacts positively on staff morale. However the existing professional and organisation culture needs to have in place a commitment to discursive communication and a willingness by staff to prioritise such activities.

Conclusions

Overall, the notion that an important aspect of nurses and midwives work is knowledge and information management (as opposed to just direct care delivery) is now embedded into health policy. This section set out to critically explore how far the use of a digital discourse system supported nurses and midwives in the development of their role as knowledge workers. One key finding is that information and communications technology can assist in the process of cultural change in developing staff as critical reflective practitioners. The findings from the project highlight the value of computer mediated communication to develop supportive networks among isolated and time constrained health workers such as the midwives.

The patient survey forums have demonstrated a marked distinction between nursing and midwifery specialties in terms of their current capacity to communicate ideas, be responsive to patient views and their overall levels of expertise in discursive communication. The findings indicate that implementation of new information and communication technologies will achieve limited results, unless they are embedded into an organisational and professional culture that is supportive of discursive communication.

Our findings suggest that where the health professional culture and the organisation have both accepted a need for discursive communication then Information and Communication Technologies can provide the solution to achieving it. This project has begun to unpack not only the importance of such support, but to identify some of the necessary organisational and cultural components that need to be in place within the NHS.

Section 7 : The Webcast Technologies: Value and Impact

There was one test webcast in 2001. This was followed by five more full webcasts at the start of 2002. Each webcast was by a different KGH presenter on a different topic. In order of presentation, these were the Trust's Chief Executive, the Director of Nursing, a non-executive member of the Trust board, the Trust chaplain and the Patient Advisory Liaison officer.

Attendance at each webcast varied, the largest audience attended the chief executive's webcast with 50 individuals. Exact attendance was recorded through observations in key areas and through completion of an exit survey by attendees. The interactive questions and answer sessions between presenters and audience were also analysed. Additionally, at interview respondents were asked whether they had attended and asked to describe their experiences. The webcasts were primarily aimed at the small target groups in the clinical areas, however attendees were from across the hospital, not just from the preliminary target areas and included nursing and non-nursing staff. Most of the staff were full-time, a minority of part-time staff were able to participate (N=9, 17%). The most common location to view the webcasts were in the lecture or seminar rooms (N=16, 30.2%), this was followed by A&E (N=11, 20.8%).

The webcast constituted primarily a pilot for the technology, as they were only made available to a minority of staff. Broad-based participation was difficult to achieve, as the majority of personal computers within the Trust were not enabled to either received the webcast (i.e. not accessible to the intranet) or the sound facilities had been removed (such as speakers). This was despite the hardware in the majority of the Trust being of the required standard to receive the cast. This highlights the need for Information Management and Technology department staff to support and maintain the high specification of machines that the Trust purchases in order to ensure full and effective use of the technology. Although the webcasts were positively viewed by participants and speakers as potentially a very successful means of communication for health care professionals the attendance means that conclusions of the value from this study must be tentative. Consequently, in order to evaluate the impact of webcasting technologies on professional communication patterns a larger trial would required, with all local machines in the Trust enabled to participate.

Technical Support

The majority of staff who were able to watch from the comfort of their own computers were in the Information Management and Technology department (8 out of 10). As already noted above, not

being able to access the webcast from ward and office computers was a re-occurring problem throughout the webcast series. This issue was not satisfactorily addressed in the pilot site context.

> *Question: … Do you think there is a place for the webcasts?*
>
> *"Yes. I now think it is more to do with getting information to people, but also about, you know, sharing ideas – I do. … As long as the technology is good enough, you know. I mean we, as a group of co-ordinators, have asked information technology help desk to send us some speakers, just one set of speakers between us on how many occasions, probably four, not one speaker has arrived let alone a pair." (Project manager)*

Interview, survey and focus group respondents agreed that technical issues were a drawback of the webcasts – sound, in particular is hard to get right as the above comment illustrates. Indeed, this sort of multimedia technology is bound to be challenging to any busy Information Management and Technology department and it can be difficult to prioritize the support issues alongside other demands.

> *"…I mean, certainly, it opened my eyes that, you know, [X] is our Head of Information Technology and yet he hasn't logged on…" (Project manager)*

Publicity

Publicity about the project was a re-occurring issue. Publicity was done in a number of ways throughout the project and both the project team and the operational group within the Trust worked diligently to ensure that the target groups be aware of the status of the project. Despite this some staff members maintained that they did not really know about the project! For example, some of the webcast attendees stated that they were unaware of the live broadcast until it *"Suddenly blasted out at us!"* The attendees in A&E for one of the later webcasts accidentally caught the webcasts because they were in their coffee room having their break when the broadcast began.

> *"Just happened that I was in the coffee room having my break otherwise, unfortunately would not have been able to attend." (Charge nurse)*

The majority of those that had heard about the webcast and had chosen to attend stated that they had found out via a colleague (N=25, 47.17%).

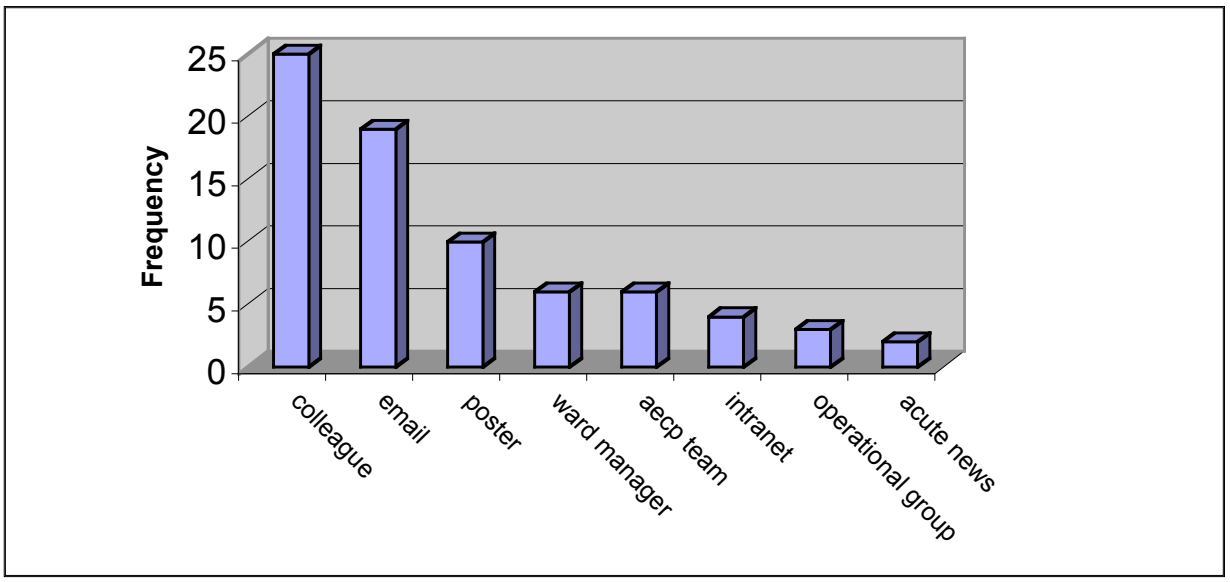


Figure 34 - How staff found out about the webcast

Reasons for Attending

One of the problems with these types of events is getting people to attend in the first place. This is a significant issue for the success of the webcast medium - especially in considering that those that did attend were committed to attending in the future! Indeed, 50 of those surveyed said that they would attend future webcasts (94.3%). The most frequently rated reason given for attendance was interest in the speaker (N=30, 56.60%). Figure 35 Illustrates the stated reason for attendance.

At interview respondents expressed a very low tolerance for 'kinks' or 'hitches' in the delivery system, the expectation was of a totally robust technology and consequently any technical problems were viewed with intolerance. The high number who attended out of curiosity illustrates the need to ensure that technical issues are fully ironed out prior to any implementation of such technology, as curiosity needs to be translated into commitment and ownership.

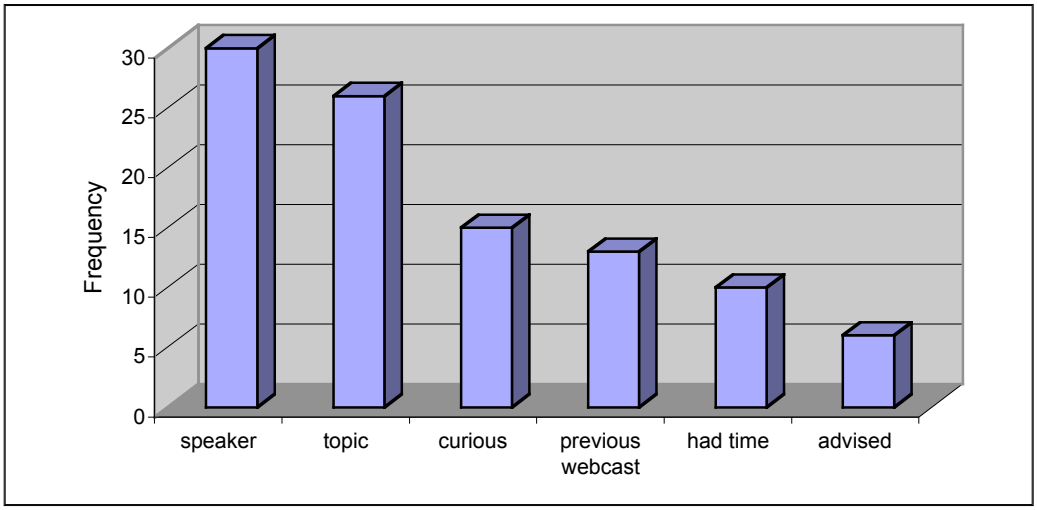


Figure 35 - Why staff attended

'Time issues' were often used as a reason for not being able to engage with the project or updating. However, only a small minority of attendees felt that it was very difficult to find time to attend the webcasts (N=7, 13.21% see figure 36). This might be due to the high number of attendees who were in charge of their own diaries rather than those on the wards. The actual timing of the webcasts were discussed with the operational group and set to apparently suit the potential audience, although as one respondent commented choosing a time to suit everyone would be impossible. However when to time events while staff are still at their work locations is clearly and issue for a mobile and shift-based workforce.

> *"… so I suppose if it could be sort of timed better. I think timing is the most important thing for the webcasts, if you can, sort of, vary the times that you get, you know, the overlap of staff, the night staff, you know, the evening shifts, that would be better." (Staff nurse)*

However, the potential offered by the technology was seen overall as a means to enable some form of engagement by staff that normally would have found it difficult to attend a traditional seminar or talk and chalk session.

> *"That it doesn't take people away from their area! When I was on [X Ward] people were sort of popping in when they'd got a few minutes, just to have a look." (Staff nurse)*

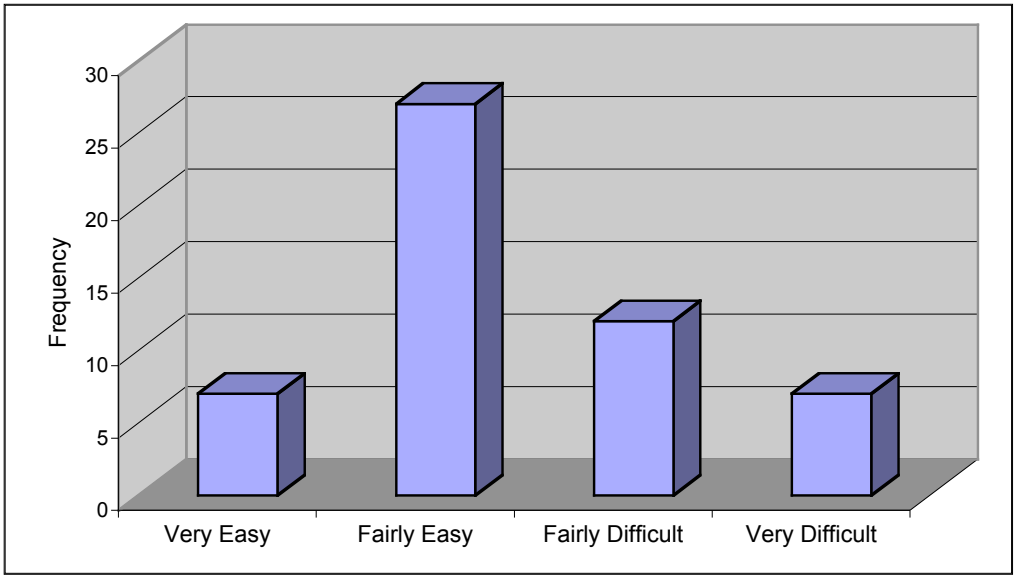


Figure 36 - How easy was it for you to find time to attend the webcast?

Operational team members were committed to the project and felt that were obliged to attend the webcasts and encourage others to attend. Respondents commented on the poor attendance:

> *"Felt let down that other members of staff do not attempt to support the project." (Operational Team Member)*

Issues such as timing and location may not be the critical issue in terms of increasing acceptance and usage of an innovative communication technology. Indeed, 'busyness', as with the discourse forums, is a complex discourse. It is likely that those who were committed to attend were the most actively aligned with developments such as the new modernisation agenda (see earlier sections on the discourse forums). Moreover, among those who had attended, the majority of respondents were positive about the potential timesaving impact of webcasting technologies as an effective medium for communication in a time pressured environment.

> *"I think it is good, that you can come and have meetings, and share information, without pulling people out of clinical areas. I mean, if you go to a meeting that say lasts for quarter of an hour, you are 10 minutes getting there and 10 minutes back - that's three quarters of an hour out of the clinical area. Whereas, with the webcast, you are only taking up the 15 minutes. And if it is not a dire emergency, you can say 'just a minute' ..." (Sister).*

The issue of prioritization of attendance by staff is likely to have been not only indicated by levels of commitment to innovation and new communication technologies, staff but also to the organizational and professionals approached to updating and engaging with policy and practice

developments as a whole. In particular factors such as the 'failure to make connections' between daily nursing tasks and with the webcast contents were strong indicators of non-attendance.

> *"I don't know why – what is the value / purpose of this! How is hearing about the Strategic 5 Year Plan going to help me care for patients?" (Sister, Non-attendee)*

In a similar situation as with the forums for Orthopedics and Surgery, locally relevant issues that were apparently directly associated with the delivery of nursing care at the Trust were poorly attended. This was particularly true of the later webcasts, concerned with patient and public involvement, and responding to the emotional needs of the dying. These latter webcasts unlike those by the chief executive and senior nurse attracted smaller numbers of participants (30 in total).

Value of Webcasting

Staff involved in the webcast events were generally positive about the potential of webcast technology, when compared to conventional communication technologies such as OHP/PowerPoint presentations to groups of staff taken off the ward for a physical meeting. There was a widespread feeling that this was a much more powerful medium than the conventional chalk and talk sessions.

> *"I think we'd be very naïve to think we can just all go back to standing up with some acetates and doing a presentation". (Sister)*

The perceived value of webcasting was that it offered a potential to overcome the inherent difficulties in communication with the mass of staff in a large district hospital. Consequently, as expected, staff were positive about the ability to see offline replays of the events, and the ability to take part in the events without leaving the workplace.

> *"I think it's around using a different form of communication and it's more accessible to staff at different times, and I was interested in the way that it c*ould be recorded and played back ... *To use it to keep up to date, professional update, so that it's readily accessible, and then the night staff can play it back - I think it's got real potential and to supplement that I've got a web page where I try to do the same. But it's useful to be able to take the questions of people afterwards, so that it's just another way of people being able to raise some issues with you". (Sister)*

The live question and answer sessions of each webcast generated an average of between 8-12 responses from attendees; these were answered in an interactive session lasting between 15-20

minutes. The chief executive received the most responses from the audience with 18 questions, 5 of which were supplementary or follow-ups to a first response to a question from the presentation. The majority of audience input consisted of open-ended questions designed to generate further elaboration and clarification on an issue raised by the presenter.

> *You have talked about 'working together'. How do you see patients and the public fitting in to this 'working together'?*
> *(Live webcast chat message from [X Wing] - Mar 14 @ 2:19)*

Or the questions raised a new topic that fitted with the theme of the presentation

> *Do you agree that as a Trust we should value continuing education more, particularly at ward level, encouraging research and change initiatives at this level to underpin the intoduction of more & more evidence based practice.*
> *(Live webcast chat message from [Y Wing] - Mar 14 @ 2:15)*

Throughout the webcasts there was an almost total absence of closed statements and no overtly hostile responses, although the Chief Executive was challenged to join a shift, a challenge that, for the record, we should note that he rose to!

> *Why dont you visit [Z Ward] and work with us then you will really have insight into our busy working day.*
> *(Live webcast chat message from [Z Ward] - Jan 24 @ 2:20)*

The interactive feature of the webcast communication was from the staff point of view one of the major strengths of the technology. In particular, the ability to engage directly with senior staff was positively viewed by staff. When asked what was the most significant feature of the event, *"the direct questioning of senior staff"* was a frequently cited reason. In a similar way to the discourse forums it seems that the interactive features of webcasting offers a means to overcome an organisational communication gap. Just as the forums offered a route for the expression of previously unvoiced ideas, the webcast presentations from senior staff offered a further means for ground level staff to gain a voice in the organisation by creating a process of reaching out to staff, who do not normally get close enough to engage with a senior manager.

> *"The good thing about it was likes of us being able to ask questions of the likes of him". (Charge nurse, commenting on the Chief Exec webcast).*

Many participants additionally commented that the ability to ask questions and probe issues from behind the security of the computer screen was enabling. The perception that engagement with

decision-making is a potentially threatening process for nursing staff was also an obstacle to the usage of the discourse forums and highlights the continuing pervasiveness of traditional hierarchies in the health care professions. In the context of the webcast the anonymity of the online question and answer format, offered staff a vehicle for communication that by-passed any perceived threat from such hierarchical relationships.

> *"Oh, and the interactive bit and it was anonymous, so if you've got something contentious people can put their point of view over without feeling that they're being singled out or that they're being labelled as a trouble-maker. That's certainly a strength of it." (Staff nurse)*

A major topic for the modernisation agenda of the NHS is the empowerment of staff and the integration of them into the decision-making processes. In any modern organisation effective channels of communication back from staff are an essential component of effective decision-making processes, interactive webcasting appears to offer staff with one means to feed-back in a manner that is non-threatening.

However, as the opening joke from the Chief executive illustrates (below), despite being enthusiastic to embrace the opportunities presented by online technologies to engage with staff in an open format such a strategy is not without its anxieties for senior staff. In some ways it is clear that the webcast event did feel to him, more like a challenging game show format than anything he had done to lead the organisation to that date.

> *"Well good afternoon to the 'Big Brother House'. At the end of this presentation you will be given the opportunity to vote as to whether I stay, or not". (Chief Exec, webcast 1)*

The complement of workforce enthusiasm for increased engagement in decision-making processes, is a leadership enthusiastic for increased accountability with a desire to reach out to staff. Consequently the delivery and implementation of webcast communication technologies is highly dependant on a management structure that is ready to embrace such an innovation.

> *"I'm really passionate about that, about people being able to access me and ask questions and do it in the way they want to, and for some people face-to-face isn't something they're confident with. So I mean (inaudible) anonymously (inaudible) it's fine and it's another opportunity to be able to say 'this is what I'm trying to do here, I need you to work with me'. So, as far as I'm concerned, it's just another way; it's not going to be the only way, but*

> *it's just another way of being able to sell a message and get some interaction". (Senior nurse, webcast presenter)*

Moreover the webcast itself was identified as a clear opportunity for managers to make visible their commitment to an empowered workforce. For the chief executive the perceived value of the webcast was that it offered an additional format that enabled him to underline, in a powerful context, that he was prepared to give attention to issues that the staff felt were important.

> *"It is about being open to challenge and then prepared to do something – committed to do something about it. Because its, you know, it would be quite easy to sit there and go 'oh that's terrible, yes, maybe we should have a look at that', and then actually not doing anything; I talk to staff, which I try and do as regularly as I can, you know it's about finding another way to do – so that you reach everyone". (Chief Exec).*

Summary of Use of the Webcast system

Overall, attendance at the webcasts was small given that it was actively promoted in only 4 key areas of a small hospital (covering a maximum of 100 nurses). However, it is clear that the staff who did attend found the context to be a powerful one and that overall, it was perceived to be a technology with future potential.

> *"It certainly gathered people's imagination, because there were certainly a lot of people watching it that I have never seen make comment on the project!" (Sister, commenting on the Chief Exec webcast).*

The critical factor for non-attendance seems to have been "time". Not necessarily that the participant had no time available, but that (even more so, for a 'necessarily synchronous' activity) it is hard to get staff to commit to time for a new activity unless they can clearly understand how it relates to the other, more conventional, demands upon them. As with the forums, the cultural context within the organisation and staff group must be one that has been constructed as ripe for such new forms of communicating. The strengths of webcasting appear to be that:

1. It offers an additional means for strategy and management and particularly for senior staff to be more visible and relevant to their staff.
2. It can offer a means for staff to communicate with senior staff in a non-threatening manner.
3. It is a valuable way of communicating issues that does not require consistent or complete attendance at the session by the target audiences.

Overall (albeit with a small sample of staff) it appears that webcasting offers the potential to be a supportive technology in NHS organisations where a commitment to a more discursive and participative communication structure has been explicitly made and reinforced.

Section 8 : Recommendations

In this final section we provide a summary of the key themes in our findings to help structure the key recommendations, which we draw from the outcomes of this project. The Assisted Electronic Communication project research programme was aimed at exploring the role of nurses as 'knowledge workers' by providing them with the means to effectively engage with the knowledge embedded in the documents critical to their work.

The research was not directly predicated on exploring the role of culture in nursing and midwifery with respect to technology and innovation - yet it is this which arises as the most powerful generic theme from this work.

Theme 1 - Organisational culture is highly significant in technology-supported change management.

> *"Nurses have been told 'this is what you are doing, and this is how it is changing' and … nurses are being asked 'what do you think', well they are not used to that. It's getting them used to being able to express an opinion, without having any come-back". (Sister).*

A key finding from this research was that new communication technologies could provide a pathway for both new communities of practice, positive impacts on retention and morale and improvements in service delivery. However, there is also a strong indication in this study that these positive outcomes only occur if the cultural and organisational context is already supportive. It seems that hospital-based nursing can engender a professional and organisational culture that marginalises 'engagement with policy' against narrowly 'task focused' activities. Where enthusiastic and innovative staff struggle against the prevailing culture – then the technology can help 'knowledge work' to flower for a while. We have documented some of these flowers, excellent in their own right, in this study. Alas, it is neither the passionate enthusiasts nor the technology alone that can permanently move organizational mountains.

Recommendation 1 Attention needs to be given within professional and organisational development strategies to the creation of new critical and reflective working practices. Serious consideration within such strategies needs to be given to the acceptance of new professional identities that construct health professionals as information and knowledge workers. Particular

attention needs to be given to the legitimisation of such new roles within the nursing and midwifery professions.

Recommendation 2 Nurses and midwives will engage with new communication technologies as a means to obtain a voice in the policy and decision-making processes if the value of communication is clearly understood. Consideration needs to be given to how the rationale for change and new policy agendas can be conveyed more effectively.

Recommendation 3 In order for the modernisation agenda to be of relevance to nurses emphasis in new policy directives and national guidance needs to be strongly placed on ensuring that local activity relating to implementation is concerned with effective dissemination strategies. Greater attention needs to be placed on engagement by local practitioners.

Recommendation 4 Innovative communication technologies can support the management of change. However, it is also clear that they need to be directly incorporated into strategies for the implementation of the new modernisation agenda. Discussion systems, and their embedded use, need to be an explicit part of that agenda.

Theme 2 - The importance of the physical context / setting of technology innovation

We provided additional equipment for this study. This equipment was not in any way special – being a very 'standard' (even 'domestic') level personal computer. We had intended to ensure that we put additional resource into the hospital context to help motivate engagement and avoid any feeling that we were 'taking away' from any existing resources. However, there is some evidence that this deployment of additional equipment can lead to it being considered as 'special' and 'unusual'. No additional resources of this sort were deployed in the extension of this work (e.g. in Midwifery, where the participants all used their conventional systems and machines to access the project).

Recommendation 5 The successful implementation of new communication technologies is not dependant upon investment in new hardware, indeed new hardware must be introduced sensitively to avoid becoming part of the problem.

Theme 3 - Leadership is highly significant in technology-supported change management

The Assisted Electronic Communication project has highlighted the significance of management leadership in change. The role of the managers could support or prevent engagement with new communication technologies.

Recommendation 6 Performance management systems need to clearly reward leaders who facilitate communicative and discursive organizational cultures.

Recommendation 7 The role of managers to facilitate and nurture change needs to be embedded into the implementation of new communication technologies. Managers need to learn how to both support broad based participative decision-making and facilitate the nursing voice in policy implementation. Nursing managers and senior staff need to be provided with opportunities to enhance their skills and awareness of how to facilitate discursive communication within their profession.

Recommendation 8 Webcasting and other broadcast-to-workplace communicative technologies should be incorporated as a means for senior staff to construct themselves as more visible and publicly interactive with junior staff. Such communicative technology also offers a means for senior staff to access staff views across the organisation.

Theme 4 - Innovative technology can have a very powerful positive effect in change management

The Assisted Electronic Communication study shows how new communication technologies can offer a means to support organisational and cultural change. Findings from the project suggest that the implementation of combinations of new communication technologies in an integrated strategy (exemplified by the discourse forums and webcasting) can have very positive effects. There was an indication that webcasts and the discourse forums also offered a potential means to overcome some of the traditional hierarchical barriers to participation in decision-making for more junior members of the nursing and midwifery professions. Webcasting and the discourse forums were able to function as enabling technologies. For example, they can act to reduce the fear that there would be a negative sanction, or 'comeback' for expressing an opinion.

The discourse forums not only offered a means for staff to engage with policy documents but also had far reaching implications for the creation of supportive reflective professional communities that then via the forums engendered innovative service developments.

Recommendation 9 The deployment of computer mediated communication technologies such as those used experimentally here into other Trusts within the NHS should be explored. However, consistent with our earlier recommendations, such a process would need to be grounded in broad process of cultural change.

The 'demand characteristics' of a technology must match up with the 'requirement characteristics' of the social and professional culture in which it must work. High quality technology is merely a facilitator to the requirements of any profession and should be as 'invisible' and 'transparent' as possible. Where users "see" systems is where those systems have already failed. Visible systems are barriers to their natural flow of work.

Recommendation 10 It is important to identify ways to embed new technology into everyday working practice. It is essential to normalise and fully embed 'natural' systems into working practices, e.g. 5 minutes at the beginning and end of a normal shift may be allocated to some "knowledge work" activity. In this way a nurse could come to be "normally expected" to access some aspect of an embedded IT system and "contribute" to it. In most businesses a baseline of knowledge work is achieved with the ritual of "checking email". As person-to-person email communication increases within hospitals, this may help to normalize this work, however as we have seen, the effective use of more public forms of communication has other powerful features.

It is also clear from this work that appropriate technical support is a powerful tool in change management and can have a significant impact on the impact of any innovation.

Recommendation 11 It is important to better understand the role of technical support in the innovation process, as sustainable change must be supported and nurtured by local technicians. An Information Management and Technology department must be at the front of innovation and change and cannot have a culture that provides any incentives to delay or prevent change. Indeed, how technology and its support is 'charged for' and allocated will be very

significant. 'Knowledge workers' start with a significant role for technology and network support – they do not tack it on at the end.

The Information Management and Technology department have a duty to be concerned about innovation with respect to support costs and security issues. However, concerns about 'the learning cost' of a new system can be very serious.

Recommendation 12 More work needs to be done to explore effective training methods such as peer diffusion in a technical innovation context. Sharing skills relating to the usage of new communication technologies via peer diffusion was demonstrated to work effectively in the midwifery context. Emphasis on peer diffusion and sharing basic communication and IT skills among colleagues in nursing professional communities needs to be explicitly encouraged as part of staff development strategies.

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Appendix - AEC Publications

The team has produced a number of publications over the life of this project. These publications reflect the multidisciplinary nature of the work resulting in dissemination of the project findings to a wide audience of academics and health service professionals. Copies of all publications are available from the AEC project website (http://kmi.open.ac.uk/projects/aec/).

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