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Hubble Bubble Toil and Trouble: The Special Case of Emergency Services

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Abstract

The author outlines the technological frames strand of social shaping of technology theory and posits that the dimensions used by the major proponents of the theory to not necessarily apply to all situations. The proposal is to use an analogy of a technological bubble rather than a frame to describe in particular the interaction of emergency services personnel in emergency situations. The qualities of the bubble as soft-edged, three dimensional and ephemeral lends well to the correlation between the tasks beliefs and attitudes of emergency workers and their relationships with technological artefacts.

Keywords:- Emergency work, technological frames, social shaping, technological bubbles

Introduction

The work of emergency services and similar tasks in emergency medical situations seems to pose several issues with regard to supporting information systems. This chapter applies the theory of technological frames from the social shaping of technology theory, to the very particular work of the emergency services and those employed in allied types of work. Studies from across the spectrum of those involved in emergency work are consolidated and synergised and common themes are recognized. The particular elements of information systems that apply to this type of work are identified and technological frames theory is then used to explain the views of emergency work professionals towards different types of information systems. The author suggests that Technological Frames are inappropriate to describe emergency situations and proposes a new analogy of the 'technological bubble' which corresponds more closely with those factors particular to emergency services.

Social Shaping of Technology Theoretical Background

Social shaping theorists (Mackenzie and Wajcman 1985; Edge 1988) argue that technologies are socially shaped in that their resulting material form reflects the political, economic and social circumstances of their development. They posit that the practices, assumptions, beliefs and language involved in design and manufacture are built into the technology and have consequences for deployment and implementation.

Relevant Social Groups

The theory of technological frames (Bijker 1993; Orlikowski and Gash 1994) furthers this explanation and brings in the notion of shared technological frames of reference, where members of relevant social groups (Pinch and Bijker 1984) share perceptions, attitudes and approaches to technological artefacts and their usage, and are said to share technological frames of reference. In and across organisations, many such groups are likely to emerge and some individuals may be members of several groups in that for example, they may be both a manager and a user.

Group members may be technical specialists, suppliers, consultants, policymakers, existing users with knowledge of preceding systems, new users with no experience, users with experience of alternative or competing systems, managers, supervisors and other consumers of resultant data, both internal and external to the organisation. Significantly group members may also include those who do not interact directly with the technology, known as secondary users (Ferneley and Light 2006).

It is clear from the diversity of identified relevant social groups across a variety of studies (Iivari and Abrahamsson 2002; McGovern and Hicks 2004) that these groups will have differing understandings of the purpose and utility of the technology; differing views of the usefulness and accuracy of the data produced; and differing views of data ownership[1] and resultant implications.

Review of technological frames theory

The notion of technological frames states that relevant social groups share assumptions, knowledge and expectations expressed through language, visual images, metaphors and stories (Orlikowski & Gash 1994).

Frames are constructed as an interaction around an artefact or process, and comprise shared elements such as tacit knowledge, objectives, organisational constraints, shared methods, and procedures and problems. In this way the relationships between relevant social group members are captured but made fluid and open to change where the elements change. Frames are flexible in structure and content and have variable dimensions that shift in relevance and content over time and according to changing context. According to Orlikowski and Gash (1994), frames typically operate in the background and can be helpful in that they reduce uncertainty of conditions, structure organisational experience and allow common interpretations of ambiguity. They can also have constraining

[1]The issue of data ownership in this instance does not refer to the legal control of information and access rights to it, but rather to the feeling of possession of and responsibility for data generated as a result of one's own work.

effects in that they reinforce established and possibly negative assumptions and knowledge, inhibit creative problem solving and distort information to fit existing cognitive structures (Orlikowski and Gash 1994). Orlikowski and Gash use framework dimensions that are common to most organisations and use three main domains to contrast their case study frames. These are: nature of technology, technology strategy (including motivation and criteria of success); and technology in use (including priorities and resources, training, ease-of use, and security and quality policies).

Another issue regarding technological frames is the concept of congruence and incongruence (Orlikowski and Gash 1994). Congruence of technological frames implies similar expectations around the role of technology in business processes and incongruence implies important differences in expectations or assumptions around key technological aspects. Sobreperez (2008) suggests further preconditions for frame incongruence such as enforced proceduralisation, and cultural issues. A more recent study (Prell 2009) develops a useful alternative method for analyzing technological frames by identifying congruent or differing goals, problems and strategies as well as tacit knowledge and key material resources, reverting back to the original frame dimensions as outlined by Bijker (1993) .

Davidson's (2002) review of technological frames theory suggests that most applications of theory fail to investigate; the process of 'framing'; the cultural and institutional foundations of frames; and the characteristics and consequences of frame structure. She points out that the majority of studies are by their very nature contextually bound as case study scenarios and fail to further the theory, simply recognising their existence in a particular case study setting.

One implication of social shaping of technology theory is that the specific usage of systems in all workplace situations is often not known at the time of design and implementation. This is particularly true in emerging technologies where potential uses and usefulness are often not well understood by suppliers, users, developers or managers (Gasser 1986). To

include and consider these users, both final and intermediate, draws attention to the full range of groups of people included in systems development, implementation and deployment.

Differing attitudes to Data Collection and Usage

Differing attitudes to data collection and usage are often the result of incongruence in technological frames of reference. Often, and across several studies, (Lankshear and Mason 2001; Ferneley and Sobreperez 2006; Sobreperez 2008) there is little understanding at operator level of the usage of information. Operators view this with some acrimony as surveillance leading to personal performance monitoring. The data is often used to calculate bonuses and feeds forward into informal verbal reward and admonishment situations and into formal annual appraisals. However, it is also used by managers to review and plan workflow, site new equipment, and forecast expansion potential. The very hierarchical and adversarial nature of the organisational culture may lead to an ethos of mistrust and misunderstanding, so that each faction or group not only do not understand but do not want to understand the requirements of the others.

This perspective is highlighted by Howcroft and Wilson (2000) who discuss the politics of IS evaluation concluding that the issues, factors, measurements, and benchmarks attended to and studied in evaluations are determined by those with a particular political agenda. They are likely to justify decisions and investments already made, likely to be heavily influenced by those who selected and ordered systems, may be from the same department or may even be the same individuals. They are also unlikely to measure such soft factors as usability, user satisfaction or ease of use. Howcroft and Wilson (2000) argue that despite protestations of objectivity and independence, there are often factors involved in IS evaluation which would be viewed differently by different relevant social groups, and that the evaluation process is distorted by those with the power to legitimize views of systems.

This position is also evident in a Fire Service study (Sobreperez & Ferneley 2006) where visits to the local statistics office of the County force and to the Office of the Deputy Prime Minister revealed quite different attitudes to the information systems including those of acceptance, approval confidence and trust. The very idea of communicating and cooperating with users undermines the status, power and privilege of managers, developers and those that 'know best' how to organise work activity (Markus 1983). The groups involved in the development and usages of information systems often have different priorities and goals and this creates the potential for conflict and controversy.

Although this may be true in a standard organisational setting, the very opposite is true in the emergency situation. The technology is not shared, but the problems priorities and goals are shared and in this way a technological frame's dimensions are better described using these concepts. This position is more in line with the original frame dimensions identified by Bijker(1993) than with those identified by Orlikowski and Gash(1994).

Emergency Services

The complexity of interactions between groups has been highlighted (Fincham, Fleck et al. 1995) as a probable cause of even further problems where complex human action, not necessarily understood in depth by developers and technical specialists, is intended to be supported using information systems. This is particularly true where each incident is different and stakeholders, both individually and as a group, bring a large amount of tacit experience and knowledge to a situation. In emergency services, each incident is extremely idiosyncratic and must be dealt with so dynamically that there can be no 'right answer' to the way it is handled. Although organisations such as police or fire authorities and individual hospital and ambulance services issue risk management policies in an attempt to improve practice and minimise risk, the particular circumstances of each incident render these into guidelines at best.

Approaches are and must be contingent on the location and severity of the incident; the speed of occurrences, events and responses; the skills and expertise of those present; and the response of the control centre and senior employees present or not present. As each incident is unique it becomes difficult to draw up and apply rules and guidelines and it may be that what superficially appear to be similar incidents are dealt with entirely differently in response to a variety of factors which will be complex and problematic to identify. In view of this it becomes increasingly challenging to create information systems to match and support workforce action or to manage knowledge across an organisation involved in highly complex individualistic, distinctive incidents which need to be grouped and consolidated in a variety of ways to be presented to policy makers and managers.

Emergency situations

Recent studies which involve workplaces associated with the public sector and in particular health services, emergency services and social work highlight situations which seem unique to emergency situations. These include papers covering issues of acceptance and resistance in the fire service (Xiaodong, Chen et al. 2004; Ferneley, Sobreperez et al. 2005; Ferneley and Sobreperez 2006); papers covering workarounds and success or failure perceptions in the UK NHS including surgeons, nurses and midwives (Lankshear and Mason 2001; Timmons 2003; Kobayashi, Fussell et al. 2005; Lankshear, Ettorre et al. 2005; Blegind Jensen and Aanestad 2007), in the ambulance service (Beynon-Davies 1999) and in social work, (Broadhurst, Wastell et al. 2010). This chapter is not confined to the recognised 'classic' emergency services of police, fire, and ambulance, but also extends to include emergency situations in social work and in hospital wards. In this case then emergency then can be defined as situations where there is immediate threat to life, health, property or the environment.

Analysis of emergency situations covering literally life and death situations reveals that the work is highly complex and involves judgement and decision making and continuous dynamic risk assessment. In emergency decision making, there is often incomplete information and

uncertainty; there may be a variety of 'expert views' on the assumptions that can possibly be made and the most appropriate way forward in the light of incomplete and constantly changing information.

An emergency incident or medical situation is likely to include many professionals and specialists with in depth knowledge and expertise of a single aspect of the emergency situation. For example a road traffic accident may include police, fire and ambulance workers, and within these specialists in traffic management, chemical and fuel spillage, particular types of injuries, paramedics, trauma specialists, helicopter pilots, extrication specialists and a myriad of other skills and professions. An emergency in a hospital will include doctors, nurses of various levels, and again specialists such as midwives, anaesthetists, and various technicians. Several have criticised technological frame theory for ignoring workplace hierarchies and assuming equality across groups (Russell 1986; Winner 1993), whereas in reality the hierarchy changes according to the unfolding subcomponents of the event. The traditional hierarchy is often not available and contingent decisions must be made.

Emergency Decision making

Decision making in emergency circumstances is not an individual issue based on expertise and judgement, instead decisions are made in interactions among various members and categories of staff in relation to various risks. Individual decisions are often open to dispute, negotiation and occasionally the pulling of rank. This leads to difficulty in determining responsibility for and attribution of decision making. Often decisions emerge from a range of informal and tacit invisible consultations and conversations (Lankshear, Ettorre et al. 2005).

A study of birth delivery suites (Cioffi 2000) highlights the hierarchies involved in emergency decision making. When birthing situations hit complications, midwives, although they know well what should be done, and often have many more years experience than an individual doctor, often bring in doctors for 'formal' decision-making. Despite this, midwives are involved in continuous informal decision- making activities

through constant monitoring and often pool this information leading to a 'joint competence' (Hn Tjore 2000) by calling on the experience of a variety of colleagues and thus providing reassurance by legitimising decisions. Clearly the decision to involve a doctor as a formal decision maker is one of the most important decisions. The minimising of risk in delivery suites occurred in this study when decisions regarding particular at risk patients were collective. In this way then, it seems clear that, in practice, decision-making in emergency situations is a socially negotiated activity (Horlick-Jones et al 2001).

Formal methods of record keeping present decision-making as individual, in that only an individual can log into information system under their personally allocated user name and password and thus the recording of a decision becomes attributable to them. Recognition that there may be a variety of expert opinions and views has led NHS administrators in an attempt to regulate decision-making, to minimise risk and improve practice through policy. This has led to regular clinical audit and increased support for technological interventions, and most importantly the issue of accountability. Typically public information systems serve multiple users and users crossing political jurisdictions (Newcomer and Caudle 1991). This includes policy and practice on primary purpose of the data, freedom of information requirements, privacy and confidentiality safeguards, data sharing, and attribution of data entry.

Accountability and information recording

The increasingly litigious and 'heads will roll' accountability of the public sector in the light of errors, omissions and oversights makes the fear of litigation paramount in the minds of professionals in emergency situations. Several authors (Symonds 1987; Clements 1991; Symonds 1993; Symon 1998) have concluded that risks are avoided in order to prevent litigation (James 1993). In the NHS, within this risk avoidance culture, strategies are developed to ensure any patient's accusation that the provision of care was less than satisfactory cannot be 'blamed' on individuals or teams and this has been entitled 'defensive medicine' (Kessler and McClellan 1996).

These two issues; fear of litigation and enforced individual data entry, can lead to distrust of and resistance to information systems in emergency settings. For example consider Lankshear and Mason's (2001) study of situations in a maternity ward where midwifes and practitioner users did not appreciate the ramifications to the dataset of circumventing various data capture processes. So, whilst from the user's perspective the system hindered their working practices, from a management perspective the workarounds had negative ramifications as they destroyed the information system's data integrity. This ties in with the concept of technological frames from the Social Shaping of Technology theoretical framework (Orlikowski and Gash 1994) in that the differing 'relevant social groups' have differing technological frames for perceiving, understanding and accepting the information systems within their organisations.

Technological frames theory suggests that a process of action and interaction involving communication and collaboration between relevant social groups form and shape the technology (Van Maanen and Schein 1979; Porac, Thomas et al. 1989). The different levels and areas of expertise in many overlapping fields, and the different objectives, priorities and concerns of these groups suggests that there is considerable potential for poor communication, discord and conflict. This is particularly true of professionals working in the emergency services.

Emergency workers

It seems clear that the public sector is different from the private sector in that many public sector workers recognise a vocational element to their work, and to their identity. This may be particularly true in the case of education, health and social care, and in emergency services in that these occupations are intrinsically different from the clerical, administrative and managerial public sector occupations that support rather than deliver the primary function. Many public sector organisations have a largely administrative function, such as local councils, government departments and their local and regional functions, but a large number also include this vocational element which might be characterised by a desire to support and assist those who are in need, either temporarily or permanently, of assistance and help. This is a very loose definition and can be traced to the

work of Blum (1993) who describes a personal identification and personal engagement with values and ideals which engender a moral pull. Vocational professions are motivated by care and the specific needs of specific patients/pupils/people in danger in specific situations and employees respond to values external to themselves and appropriate to the occupation (White 2002). Blum identifies a transcendence of the personal in the name of the vocation.

Emergency services workers then are likely to have these vocational attitudes to their profession, but in addition they must have the personal resources to deal with dangerous and perilous situations often involving death and serious injury and the highly distressed individuals associated with such encounters. There has been some inconclusive work on the notion of the 'rescue personality' where Mitchell and Bray (1990) suggest that in order to effectively implement information systems, professionals must have knowledge of the unique personalities of emergency personnel and the specialized jobs they perform in extreme environments.

Could it be then that there are issues particular to these emergency professions that do not apply for example to production or banking scenarios? This is not to say that resistance is more usual, common or typical in these types of case study, but it may be useful to identity the particular factors present in these types of situations which make it difficult for information systems to be supportive and useful.

The suggestion of the author is that the view of identifying relevant social groups by their job title oversimplifies the idea of technological frames in two ways. Firstly there is the assumption that people fall into groups and that each group has a particular unchanging view or frame of reference when considering technology. Secondly there is an underlying assumption that group members already in a group identified socially, or in a work context, will share technological frames. For example, Ferneley and Sobreperez (2006) identify managers, firefighters and statisticians, Lankshear, Ettorre and Mason (2005) identify nurses and doctors and Prell (2009) identifies academics and professors, youth service workers, and students.

This assumption is over simplistic, there may be many senior managers in any organisation who feel that systems are imposed from above, that they have no ownership of the data, and that there are significant differences between what actually happened and the recorded version. In this way then, members of a particular relevant social group, who share attitudes, opinions and points of view over their interaction with technologies, may cut across management hierarchies, job titles and salary scales. It may also be pointed out that management takes many forms from supervisor to managing director and that rather than viewing a polarity between managers and workforces, there is a continuum which includes many different levels of management, with all but the top level subordinate and answerable to the level above.

Emergency workers and technological frames

In addition, members of relevant social groups may have different attitudes to different types of technologies. An example is that in the fire service a working class, masculine culture prevails. Firefighters see themselves as brave men and heroes, unconcerned with the 'paperwork' of recording systems and emphasize their 'proper' work is facing danger to save lives and property. In the UK they are strongly unionised, protective of their masculine role as 'breadwinner' and resistant to the introduction of female firefighters(Sobreperez 2008). Firefighters hold differing attitudes to different categories of technology, as did nurses and medical staff in the Lankshear (2005) study. The workforce seems to separate technologies into those which support their primary role, i.e nursing or firefighting, and those which are seen as bureaucratic. A study of surgeons acceptance of EPR systems (Blegind Jensen and Aanestad 2007) found that surgeons were happy to use patient health monitoring technology to check vital signs during surgery and to facilitate the surgery, such as imaging, X rays, and scanning. However resistance was met when surgeons were required to undertake tasks previously done by others such as creating prescriptions, rather than leaving this to an administrator, and resistance to the keyboard and screen in the operating theatre was vocal, where such artefacts are seen to belong to other groups of workers, variously described as secretaries or administrators. The introduction of performance management techniques

in the UK public sector in the 1980's has become entrenched and the associated determination of performance targets and the link to resource allocation is now widespread. This has been termed New Public management (NPM) and includes financial monitoring and accountability, the establishment of 'internal markets' between service providers and within organisations, and the development of a range of performance measures and benchmarking techniques by which individuals, units, departments, sections, divisions and entire organisations are compared and judged by their managers, by service receivers and by the taxpayer and politicians through the media (Hood 1991; Osbourne and Gaebler 1992; Hoggett 1996; Pollitt 1997; Hood, James et al. 1999; Thomas and Davies 2005). It is the information overhead imposed by this development that ensure professionals at all levels must micro-record much of their activity and compare it to national and local benchmarks, league tables, and performance monitoring systems. Often emergency professionals must undertake this, as the only personnel 'in situ' at an emergency, and this often causes resentment due to incongruent technological frames between administrators and emergency workers.

Information users in emergency healthcare or blue-light emergency services are often highly trained professionals in firefighting, healthcare or social work and crucially do not see record keeping as part of their job. They are frustrated and annoyed at having to keep records which may be seen to undermine their professional autonomy. They see computer use and record keeping as someone else's job; they often do not have ownership of information and consider it 'nothing to do with me'. Their 'real' job is nursing, putting out fires, or assisting vulnerable children or adults from dysfunctional families which may include emergency crises arising from mental health and drug abuse issues (Lankshear, Ettorre et al. 2005; Sobreperez 2008; Broadhurst, Wastell et al. 2010).

Relevant Social Groups and Frame Dimensions

With reference to information technology in organisations, there are generally a number of social groups critical to the development of technological change (Kling and Gerson 1978). These include at least

managers, systems developers and users, and of course several categories of each may share or overlap frames. The different groups of users then, are open to amendment and an individual may belong to several groups at anyone time. This implies that technological frames are fluid and individual and may appear to negate and subvert the idea of shared technological frames. However if we use the goals, problems and strategies structure identified by Prell (2009) and taken from Bijker (1993), we can see that the notion of congruence can be underpinned by the notion that where these three structural items are shared, the technological frame can be shared, across professions, agencies, and specialisms. During the ephemeral time period of the emergency incident, sharing of frames is given great relevance, however once the danger is past, those who need to use technology to make records, or to monitor stability, will be left to their own particular specialisms.

Emergency Incidents and Technology

In an emergency situation the problems might be exemplified as extricating trapped people, managing traffic flow around the incident, putting out fire or managing individual injuries. The goals might be to solve these issues while at the same time preserving life and property, reducing damage to people and property, minimising disruption to traffic flow etc. The strategies will include the assessment and prioritisation of necessary action and communication with additional support systems such as air ambulance or additional specialist equipment. This brief outline gives very general scenarios where problems, goals and strategies are shared which is important for the next stage of the analysis.

Firefighters are willing to use sensors to check toxicity, temperatures and location, and medical staff are happy and willing to use all kinds of technologies to monitor and check patient progress. However when it comes to the record-keeping and the compilation of statistics for benchmarking, performance monitoring or comparison, a marked lack of compliance is evident. Thus actors are members of several differing technological frames, which may conflict or overlap. It seems clear that resistance displayed is not resistance to the technology, but to the task.

Many emergency workers are very well aware of and protective of their professional discretion and thoroughly reject managerial standardisation, regulation, bureaucratisation and monitoring of their role.

The cultural and institutional foundations of differing frames (Davidson 2006) can be distinguished by the differing educational backgrounds, career paths, workplace and data usage of the relevant social groups which may account for incompatible attitudes to data collection and utilisation. Understandings, interpretations and expectations of information systems are framed and reframed through the exercise of power (Lin and Silva 2005) thus in the context of data collection and usage, emergency workers are in the least powerful position. In the exercise of their skill in emergency situations however, they are in the most powerful position, through the tacit knowledge and skills they have and through the professional autonomy they hold.

Technological frame theory suggests a fixed view by individuals who work as a group. These groups are identified as such in that they share elements of knowledge, agree over meanings, have a set of beliefs in common, and share assumptions and expectations. They are referred to, and in many ways behave in some situations, as a unit. The emergency situation though, includes the following

- Life and death situations
- Dynamic fast changing situations
- The need for immediate and robust decision making

Technological bubbles

The author presents an alternative notion; that of the technological bubble – an attitude to technology shared by groups of individuals who only temporarily share the beliefs, requirements, trust and knowledge of a certain technology. Once the moment has passed, the shared belief is no longer required and the bubble is burst. Rather than viewing attitudes and approaches to technology as framebound, it may be more appropriate to look at a less rigid model. The notion of the technological bubble arises as

an analogy which may be more appropriate. Particularly in circumstances which involve factors such as dynamic decision making, fast changing situations with far-reaching consequences, and a mixture of professionals and specialists with individual technological knowledge and skills. The work of emergency services is an extreme example of this type of situation.

Bubbles are soft edged, they sometimes arise in numbers and sometimes the edges between them blend so that two or more bubbles become one. In an emergency situation then technological bubbles arise around a particular event or component of the situation, e.g. freeing someone trapped, or dealing with chemical spillage. Those working on that component of the situation will share the technical bubble, such as sensors, monitors or cutting equipment, and although they do not all deal with the technology, they share an attitude to it, in that they give it priority, as a strategy to solve the shared problem and reach the shared goal.

Bubbles are ephemeral, they last only as long as the surface tension is sufficient to hold them in place. This matches the emergency service technological bubble as the goals and priorities will merge and shift as different components of the incident take priority but the bubble will be over when the goal is reached. Technological bubbles then will also blend, merge and burst as different technologies are used an supported by sets and subsets of people involved in the incident. In some emergency situations people come together from different agencies and from across regions, they may be complete strangers and never meet again, however for a brief time period, they share a technological bubble. There will often be multiple bubbles, indeed a foam of bubbles, present at the same incident and in a constant state of emerging, merging, dividing and bursting.

Technological bubbles are three dimensional and can include many factors, underlying dynamics and structures such as targets and benchmarks, and the complex relationships between differing professions, specialists and agencies present at an emergency incident.

Conclusion

To conclude, technological frames theory is a well used model which may be entirely appropriate for many standard organisational situations. However there are many situations for which it is not a suitable and appropriate tool. The work of emergency services is an extreme example of the type of work that does not lend itself to the notion of technological frames and the author suggests that the notion of the technological bubble is a more appropriate analogy due to the properties of dimension, transience and shape changing.

It seems then that where technology is seen to support the primary function of the emergency worker in an emergency situation, it will be seen with one lens and will fall into a technological frame which views this as acceptable and adoptable. Where the technology is perceived to support an organisational function not accepted as part of the emergency workers tasks, i.e. when the bubble bursts and routine bureaucratic tasks retake priority, it will fall into a different technological frame and will be resisted or rejected.

Several previous studies involving emergency situations have been referred to in this analysis, but currently the notion of technological bubbles is not supported by empirical primary data collection. An empirical study is necessary to observe and substantiate the notion and amend or adapt the suggested bubble representation.

Although the emergency services are used here this may be a useful model for examining other ephemeral situations such as sports events, theatrical and arts based events, conferences and sales fairs and other similar situations.

Acronyms

NHS – National Health Service
EPR – Enterprise Resource Planning

References

Beynon-Davies, P. (1999). "Human error and information systems failure: the case of the London ambulance service computer-aided despatch system project." Interacting with Computers 11: 699-720.

Bijker, W. (1993). "Do not despair, there is life after Constructivism." Science, Technology, & Human Values 18: 113-138.

Blegind Jensen, T. and M. Aanestad (2007). "Hospitality and hostility in hospitals: a case study of EPR adoption among surgeons." European Journal of Information Systems 16: 672-680.

Blum, L. (1993). Vocation, friendship, and community: limitations of the personal–impersonal framework. Identity, character, and morality: essays in moral psychology. R. A. e. Flanagan O. Cambridge, MA, MIT Press: 173-97.

Broadhurst, K., D. Wastell, et al. (2010). "Performing 'Initial Assessment': Identifying the latent Conditions for Error at the Front-Door of Local Authority Children's Services." British Journal of Social Work 40: 352-370.

Cioffi, J. (2000). "Nurses' experiences of making decisions to call emergency assistance to their patients." Journal of Advanced Nursing 32: 108-114.

Clements, R. V. (1991). "Litigation in Obstetrics and Gynaecology." British Journal of Obstetrics and Gynaecology 98: 423-426.

Davidson, E. (2002). "Technology Frames and Framing: A socio-cognitive investigation of requirements." MIS Quarterly 26: 329-358.

Edge, D. (1988). The Social Shaping of Technology. Edinburgh PICT Working PaperNo 1. Edinburgh.

Ferneley, E. and B. Light (2006). "Secondary user relations in emerging mobile computing environments." European Journal of Information Systems 15: 301-306.

Ferneley, E. and P. Sobreperez (2006). "Resist, Comply or Workaround: An examination of different facets of user engagement with information systems." European Journal of Information Systems 15(4): 345-356.

Ferneley, E., P. Sobreperez, et al. (2005). Tricks or Trompe L'Oeil? An Examination of Workplace Resistance in an Information Rich Managerial Environment. 13th European Conference on Information Systems, Regensberg, Germany.

Fincham, R., J. Fleck, et al. (1995). Expertise and Innovation:Information Strategies in the Financial Services Sector. Oxford, Oxford University Press.

Hn Tjore, A. (2000). "A technological mediation of the nursing-medical boundary." Sociology of Health and Illness 22(721-741).

Hoggett, P. (1996). "New modes of control in the public service." Public Administration 74: 9-32.

Hood, C. (1991). "A public management for all seasons." Public Administration 69: 3-19.

Hood, C., O. James, et al. (1999). Regulation inside government: waste watchers, quality police and sleaze busters. Oxford, Oxford University press.

Iivari, N. and P. Abrahamsson (2002). The interaction between organisational subcultures and user-centred design - a case study of an implementation effort. 35th Annual Hawaii International Conference on Systems Science, Los Alamitos, IEEE Computer Society Press.

James, C. E. (1993). The consequences of legal issues that face the obstetrician. Intrapartum Fetal Surveillance. J. A. Spencer and R. H. T. Ward. London, RCOG Press.

Kessler, D. and M. McClellan (1996). "Do Doctors practice Defensive Medicine?" The Quarterly Journal of Economics 111(2): 353-390.

Kling, R. and E. Gerson (1978). "Patterns of segmentations and intersections in the computing world." Symbolic Interaction 1(1): 24-43.

Kobayashi, M., S. Fussell, et al. (2005). "Work Co-ordination, Workflow and workarounds in a Medical Context." CHI: 1561-1564.

Lankshear, G., E. Ettorre, et al. (2005). "Decision-making, uncertainty and risk: Exploring the complexity of work processes in NHS delivery suites." Health, Risk and Society 7(4): 361-377.

Lankshear, G. and D. Mason (2001). "Technology and Ethical Dilemmas in a Medical Setting: Privacy, Professional Autonomy, Life and Death." Ethics and Information Technology 3(3): 225-235.

Lin, A. and L. Silva (2005). "The Social and Political construction of technological frames." European Journal of Information Systems 14: 49-59.

Mackenzie, D. and J. Wajcman (1985). The Social Shaping of Technology: How the Refrigerator got its hum. Milton Keynes, Open University Press.

Markus, M., L. (1983). "Power, Politics, and MIS Implementation." Communications of the ACM 26(6): 430-444.

McGovern, T. and C. Hicks (2004). "How political processes shaped the IT adoption by a small make to order company: A Case study in the insulated wire and cable industry." Information and Management 42: 243-257.

Newcomer, K. and S. Caudle (1991). "Evaluating Public Sector Information Systems: More than meets the eye." Public Administration review 51(5): 377-384.

Orlikowski, W. J. and D. C. Gash (1994). "Technological Frames:Making Sense of Information Technology in Organizations." ACM Transactions on Information Systems 12(2): 669-702.

Osbourne, D. and T. Gaebler (1992). Re-inventing government. Reading MA, Addison-Wesley.

Pinch, T. F. and W. E. Bijker (1984). "The Social Construction of Facts and Artifacts:Or How the Sociology of Science and Technology might benefit each other." Social Studies of Science 14: 399-441.

Pollitt, C. (1997). Public Management Reform: A comparative analysis. Oxford, Oxford University Press.

Porac, J. F., H. Thomas, et al. (1989). "Competitive Groups as cognitive communities:The case of Scottish Knitwear manufacturers." Journal of Management Studies 26(4): 397-416.

Prell, C. (2009). "Rethinking the Social Construction of Technology through 'Following the Actors': A reappraisal of Technological Frames." Sociological Research Online 14(2): 1-17.

Russell, S. (1986). "The social construction of artefacts: a response to Pinch and Bijker." Social Studies of science 16: 331-346.

Sobreperez, P. (2008). Technological Frame Incongruence, Diffusion and Noncompliance. Open IT-Based Innovation: Moving towards cooperative IT Transfer and Knowledge diffusion, held at University of Madrid, Madrid, Spain, from Madrid Springer, New York.

Symon, A. (1998). Litigation: The views of Midwives and Obstetricians. Who's Accountable? Who's to Blame? London, Hochland & Hochland.

Symonds, E. M. (1987). "Defensive Obstetrics." Hospital Update: 846-848.

Symonds, E. M. (1993). Legal issues of fetal monitoring. Intrapartum Fetal Surveillance. J. A. Spencer and R. H. T. Ward. London, RCOG Press.

Thomas, R. and A. Davies (2005). "Theorizing the micro-politics of Resistance: New Public Management and Managerial identities in the UK Public Services." Organization Studies 26(5): 683-706.

Timmons, S. (2003). "A failed panopticon: surveillance of nursing practice via new technology." New Technology Work and Employment 18(2): 143-153.

Van Maanen, J. and E. Schein (1979). "Towards a theory of Organisational Socialisation." Research in Organisational Behaviour 1: 209-264.

White, K. (2002). "Nursing as vocation." Nursing Ethics 9(3): 279-290.

Wilson, M. and D. Howcroft (2000). The politics of IS Evaluation: A social shaping perspective. International Conference on Information Systems, Queensland, Austrailia.

Winner, L. (1993). "Upon opening the black box and finding it empty: Social constructivism and the philosophy of technology." Science, Technology, & Human Values 18: 362-378.

Xiaodong, J., N. Chen, et al. (2004). Siren: Context aware computing for firefighting. Lecture Notes in Computer Science. Berlin, Springer. 6: 87-105.