Systemic Effector Conceptual Model in Groupware Implementation

by John Hassall

Working Paper Series September 1999

Number **WP 012/99**

ISSN Number **ISSN 1363-6839**

John Hassall
Senior Lecturer
University of Wolverhampton, UK
Tel: +44 (0) 1902 323961
Fax: +44 (0) 1902 323755
Email: J.Hassall@wlv.ac.uk

The Management Research Centre is the co-ordinating centre for research activity within Wolverhampton Business School. This working paper series provides a forum for dissemination and discussion of research in progress within the School. For further information contact:

Management Research Centre
Wolverhampton Business School
Telford, Shropshire TF2 9NT
☎01902 321772 Fax 01902 321777

The Working Paper Series is edited by Kate Gilbert

Abstract

Network software systems and groupware within organizations differ from other information technologies, requiring individuals to 'design' their own use. Users and groups can choose how to engage with these systems (Hassall, 1998), and use is dependent upon existing technological framing (Orlikowski, 1992). Groupware provides opportunities to study interaction between technological and organizational potentials. The action and structure duality of structuration theory (Giddens, 1984) points to the need for systemic understandings. Moreover, deconstructive schemes (e.g. Dudley and Hassall 1995,1996) demonstrate a plurality of overt and ulterior motivations in use. The Systemic Effector Model has been developed based upon longitudinal research in groupware implementation. This abstracted perspective relates choice of facility and design of action to important motivators at the individual and systemic levels. The genesis and explanatory power of the model is explored through survey and case study data.

The author

John Hassall

The author is a Senior Lecturer in Information Management at Wolverhampton Business School and also works as an IT consultant. His research interests span various areas relating to decision making, incorporating soft factors into strategy formulation and measuring effectiveness of information technology.

Systemic Effector Conceptual Model in Groupware Implementation

Introduction

Increasingly, organizations take for granted the benefits of information technologies introduced to provide electronic forms of communication and co-ordination between groups of staff. The assumed benefits of these technologies include more flexible working, the potential to build what are called 'virtual teams' and to improve knowledge management within the organization (Bannon, 1998), (Ciborra & Patriotta, 1996), (Orlikowski, 1992; 1996). At the same time researchers are addressing the need to improve methods of evaluation for information systems and technologies (Hares and Royle, 1994), (Remenyi, Sherwood-Smith & White, 1997), (Willcocks & Lester, 1999) with the implicit rationale that such technologies do not always deliver easily identified returns to the organization.

The approach taken to evaluating the effect of groupware and network technologies naturally reflects an underlying rationale adopted by the worker concerned. So, for example, there is a significant body of research which adopts a socio-technical approach with the implicit assumption that design of the system can be optimized in conjunction with the human activity components to ensure the organization's objectives are achieved. This is the approach adopted by and described in, for example, (Avison & Wood Harper, 1990), (Mumford, 1991), (Kunda & Brooks, 1999). In contrast to this approach there are those researchers who stress an interpretative analysis of information systems, setting them in the context of organizational change and treating them as affectors (potentially generators) of organizational and social potential (Walsham, 1993). To an extent it is felt these workers are interested in describing and interpreting phenomena as a *prelude* to achieving beneficial action in relation to organizational information systems. Whilst this is a useful activity in and of itself, it cannot affect the actual process of information systems implementation and benefits realization directly. Other workers agendas (for example: Orlikowski, Bannon, Ciborra & Patriotta) present as an active attempt to understand how to implement and employ emerging information technologies in an effective manner.

Complementary to these perspectives, a holistic or systems approach may offer a useful view in relation to the effect of new information systems and technology since it might be expected to include both technological and social potentials. However, in recent times the systems movement, particularly within the UK, has become increasingly concerned with critical agendas aiming to firm up the foundations of systems (or systemic) knowledge acquisition; making such an attempt (a priori) problematic. Strands of systems thought have moved towards the post-modernist extreme eschewing formalised modes of enquiry, or towards a maximally inclusive pluralism, retaining an essentially modernist basis. Other researchers, sensitive to the inherent problems with both these foregoing approaches, have attempted to re-frame (or re-emphasize) the debate in terms of learning rather than intervention.

The work reported in this paper seeks to understand the effect created by new information technologies within an organization in terms of the capabilities and potentials introduced to the existing system by the implementation of these technologies. In order to do this some explicit perspectives are adopted, the aim being to understand how capabilities and potentials are changed when technological capacities are added to an appropriately designated 'organizational system'.

Structuration and 'actor system' perspective

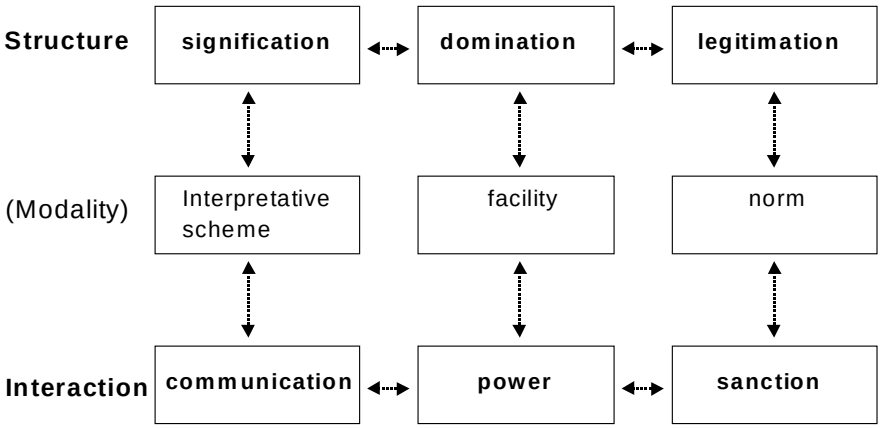
Systems perspectives, methods and systemic analyses are typically based upon an abstracted view of the system of interest. Soft Systems Methodology (SSM) for example emerges from the 'process' world view of hard systems analysis in as much as conceptual models, developed from root definitions, parallel the abstraction processes in engineering design. SSM differs from hard systems analysis by the possibility of developing alternative perspectives through alternative root definitions.

Learning is also incorporated as an important part of SSM, but, in the end, a choice of feasible action needs to be taken.

It is certainly possible to consider the problem of groupware implementation using SSM amongst many systems approaches. Thus, in considering the introduction of new technology a variety of systemic identities could be explored, the potentials introduced by the technology would be incorporated into conceptual models which could lead to the adoption of appropriate technical solutions and practices aimed at bringing about the desired effect. This, implicitly iterative, process could be aimed at a growth in use of the technology towards agreed beneficial outcomes. An alternative might be to adopt a model such as the Viable System Model, employing it as a diagnostic tool to identify areas where technology could facilitate improved variety management and conformation towards improved viable system design (Beer 1979; 1985).

A further approach, still seeking an holistic (systemic) understanding, is to consider the perspective of an individual working within an organization. This individual is an actor involved in bringing about many transformations in SSM terms, thus forming a part in many systems (holons). For the purposes of discussion I refer here to this individual as the 'actor', sometimes 'user/actor'.

In any organization the actor has a choice of what to do but the choice is a constrained one by virtue of the actors participation within the organization (..else how could the actor be considered truly a part of the organization?). However, the organization does not have total power to determine what the choice(s) of an individual actor will be in any particular circumstance; and many commentators consider that the actor and the systems or organizations with which she or he interact should be considered holistically. Most notably Giddens, in the development of structuration theory, insists upon an action/structure duality, the actor by virtue of interaction with the organization being both constrained by and, in a sense, creating the structure(s) of the organization (Giddens, 1984). For Giddens this is bought about by modalities which link particular types of interaction with particular structural elements. The three key types of modality being *interpretative sch*emes, *facilities* and *norms*. This is shown diagrammatically in *Figure 1*.



adapted from Giddens, 1984 p. 29

Figure 1. The three key types of modality

So, for example, the structure element relating to interpretation is signification. Signification has the ability through the modality of an interpretative scheme to affect the way in which communication interactions are performed. But also, communicative actions can through interpretative schemes, change the form of signification. A simple example of this might be the way in which an Email message is interpreted both by the receiver and the sender leading, over time, to development of a protocol for use.

The value of structuration theory in considering information systems in an organizational context has been discussed previously, notably by Walsham (Walsham, 1993). Noting firstly the contextualist approach, which emphasizes the linkage between context and process:

> This linkage is of key importance for understanding the impact of computer-based information systems in organizations, which are both constrained by the context in which they are developed and, in turn, are a factor in maintaining or altering that context.

Walsham goes on to discuss the application of structuration theory to the field of information systems within organizations. Walsham's approach is largely interpretivist, but commentators with a more socio-technical or systems based approach also accept the validity of this agenda. For example Sutton (1998) in "Matching Technology with Organizational Needs is a Two-Way Process" provides the following conclusion to his paper:

> The classical. view of IT/IS as a supporter and follower of organisational objectives and needs is shown to be unduly conservative. Rather, at its most effective, IT/IS is an equal contributor to the identification of overall organisational goals and exploitation of strategic opportunities. We must guard against forms of words and institutionalisation of procedures which, however subtly, limit our thinking to the former viewpoint. Those responsible for 'technology' and those responsible for any other aspect of an enterprise must be in constant dialogue. Frameworks relevant to the process of IT/IS development and utilisation have been found which help to emphasise the interdependency of organisational and technical needs and opportunities.

Other commentators have stressed the action/structure duality in relation to technology introduction from a critical perspective. Dudley and Hassall have proposed and applied a deconstructive scheme which aims to reveal both explicit and implicit capabilities of the both introduced technology and the organization to which it is being introduced (Dudley & Hassall, 1995). In effect 'action' of the technology is constrained by the structures within the organization and, at the same time, can provide capabilities which can fundamentally change the structure. Thus, the introduction of a marketing database within an organization is described where the capabilities of the technology to reveal overlaps in departmental activities contends with departmental desires to keep control of their own data (Dudley & Hassall, 1996). Accepting the action/structure duality means accepting a structural dynamic rather than a simple linear view of capability and objective and a difficulty with this situation is that it can be problematical to know where to start in analyzing a particular configuration of interactions between an actor/system and the 'embedding' organization.

Experiences with new information systems and technology - systemic view

If the individual actor is viewed as a system in interaction with an organization in which they are embedded, structuration theory suggests that we can consider this is accomplished via the modalities of interpretive scheme, facility and norm. Therefore, when new technology is introduced to the organization, we might expect adjustments to occur to the modalities experienced by the actor; and in turn for the organization to be affected by adjustments in the nature of interactions of the actor. So, a way of seeking an insights into the process of adoption of and adaptation to new technology is to look for evidence of adjustments in these modalities.

Considering this approach in more detail it seems clear that new technology is most easily associated with the *facilities* modality. Facilities, as has been seen, are processes, procedures and physical capabilities available to actors that are concerned with domination on the part of the organization and the exercise of power on the part of the actor. Indeed, we could say that power is exercised most often by actors within organizations through physical means to produce effects. In information systems for example, a facility may represent the way in which, on the one hand, individual users of a system are able to perform particular tasks (for example create an order for a product or service) and, on the other hand, the organization is enabled to constrain the capabilities of individual users to create more than a certain size of order without the intervention of another more privileged user. Most organizations explicitly split responsibilities for the commitment of physical resources and money between many different people; and the technological facilities which enable this are the specific information systems and technology employed. The technology provides, and increasingly is, the physical manifestation of facilities which enable the balance between power for the individual and domination (regulation) by the organization. But what of the other modalities? interpretative schemes

and norms? Can we show how information technology affects these? It is perhaps less immediately easy to provide a concrete example of how particular technologies might have an effect upon the modalities of interpretative schemes and norms.

During the period 1996 to 1998 a longitudinal study was conducted covering the introduction of Novell GroupWise (Rogers & McTague, 1996) within an English County Council. A number of surveys were conducted during the process of data gathering, including data from a variety of departments across the council. The main objective of the longitudinal study was to evaluate the effectiveness of the groupware technology in changing the patterns of working and methods of performing particular business linked tasks. In the current paper selected results are now examined to see whether evidence can be found for adjustments to modalities as suggested within the scheme of structuration.

Facilities

As already suggested, it is fairly easy to find evidence within the case studied of changes to facilities introduced by the new groupware system. We have only to look at the business tasks for which the system was judged most useful by various respondents within the Social Services and Health department. (A single department has been selected based upon its high proportion of respondents, over 50%. However, conclusions from the surveys across all departments mirror those which are being drawn here).

The impact of the groupware system in terms of providing access to others diaries together with the ability to schedule meetings is seen as important by both non managers and managers. In general it was found that the highest impact was felt in use of the system for those function where an explicit *designed* feature of the software was being employed. This was in contrasts to (again generally) disappointing use of the system for new and creative applications of the technology such as managing teams or organising shared work on reports and projects.

Table 1. Business Tasks for which Groupware System *Most Useful*

Task description	Non Managers		Managers	
	No.	%	No.	%
To inspect others diaries/own diary management	44	66	11	52
Message management	7	10	1	5
Sending documents as attachments	9	13	6	29
Accessing or sending broadcast information	3	4	1	5
Scheduling meetings	34	51	13	62
Informal communications	39	58	6	29
Task list management	20	30	5	24

adapted from Hassall, 1999 p. 167

Interpretative Schemes

An example from the study in which the interpretative schemes may be discerned is the way in which the use of Email is viewed as a complement to, or in place of, other methods of communication. Part of the research study involved interviews with a total of 22 subjects covering a variety of points in relation to the implemented groupware technology. Several people in the interviews expressed the opinion that Email offered a means of communication which was, (to paraphrase), "…more formal than a conversation but less formal than a paper memo…". And several more, particularly managers, cited the ability to have a record that some piece of information had been communicated.

If a novel form of communication is introduced and made available to people within an organization they must, in the absence of explicit instructions for use, determine for themselves when and for what to employ the communications medium. In the absence of prior experience, such a determination will be governed, partly at least, by the *anticipated* effect upon the receiver. So, the sender of email must make judgements which inevitably lead to a evolving interpretative scheme which will, in time, be shared by other users within the organization. Wider experiences also suggest that such interpretative schemes can lead to widely differing Email cultures with the same technologies and within the same or similar types of organization. As an example, the author recently participated in an on-line conference group where the issue of whether contributions to the forum should be considered 'copyright' of the creator was raised. Some members of the group took up this issue and debated it in earnest… others (including the author) were perplexed by this issue, believing that the conference group was simply an electronically mediated 'virtual' discussion and the contributions, effectively, speech acts subject to a much more informal interpretation.

Norms

The evolution of norms of behaviours in relation to technical facilities provided, like the interpretative scheme, can be complex. When deciding to implement a system comprising groupware technology, managers within an organisation may typically express a variety of aspirational objectives to be obtained. The aspirations for groupware products may be expressed as a desire to develop new and more flexible ways of working, ways of sharing knowledge and developing 'virtual' teams (Orlikowski, 1992; 1996), (Hassall, 1998; 1999). In effect this represents an aim relating to the 'norming' or 're-norming' of behaviours around the new technological paradigm. But, as structuration would suggest, such an aim is far from easy to pursue in the light of the action/structure duality. In much the same way as different communications cultures will emerge around different interpretative schemes, so the development of the norm modality will exhibit a dynamic nature.

The dynamic shifts in the norm modality may be illustrated with further reference to Table 1 and the differences in the responses of managers and non managers. Whereas 58% of non managers list informal communications as a most useful task, only 29% of managers do so. Moreover, the situation is reversed in the case of the use of document attachments, 29% of managers listing this as a most useful task and only 13% of non managers. The latter result undoubtedly reflects, at least in part, differences in the nature of managers and non managers jobs. However, it is also possible that these two items taken together are suggestive of dialectic between the two groups. Possibly managers are more likely to articulate the use of GroupWise in a business connected and formal way, they seek to sanction its use for purposes directly linked to business functions. Non managers by contrast, are not thinking of the use of the technology in as focused a fashion, but articulate its use and function in relation to a more social rather than business context.

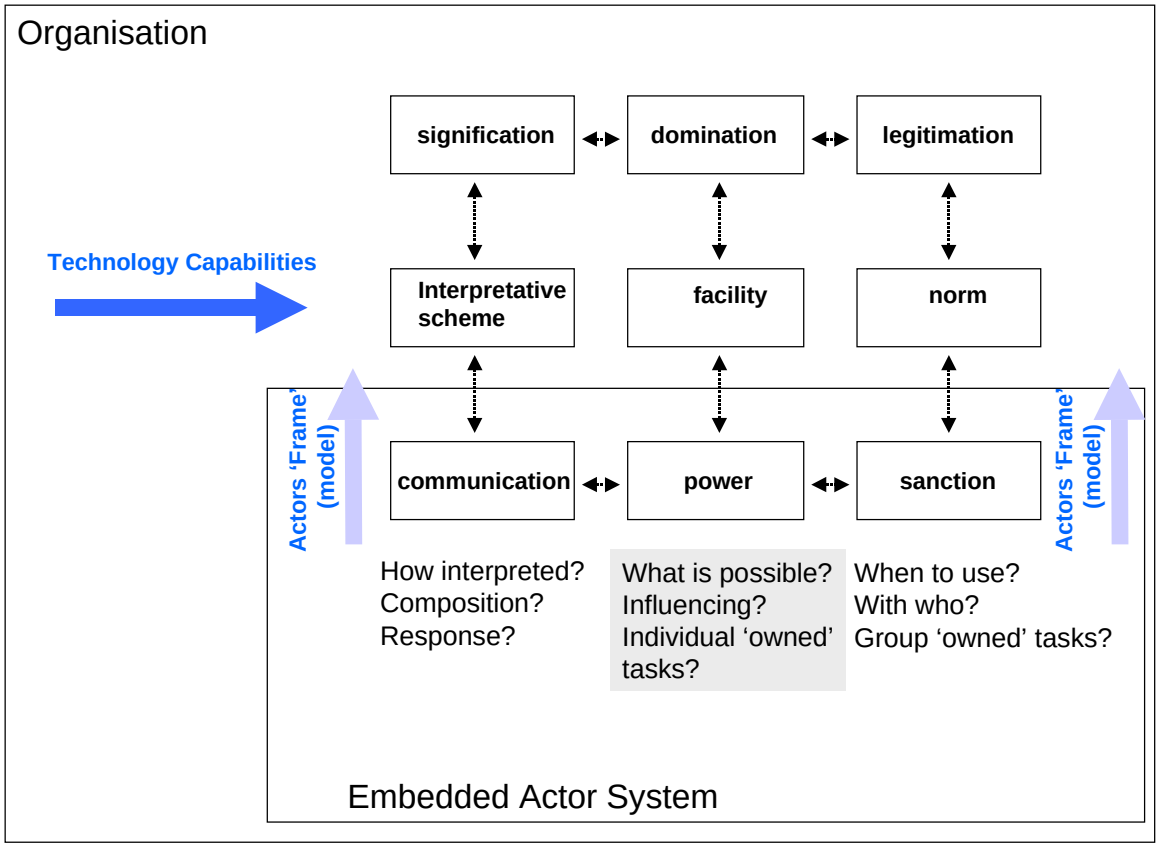


Figure 2. Systemic effectors in groupware implementation

Conceptual model and implications for practice

Based upon considerations of structuration theory, earlier work on systemic refocusing (Dudley & Hassall, 1995; 1996), and results of surveys and case studies within various organisations (Hassall, 1999), high level systemic effectors are conceptualised to be, firstly, the technological capabilities and, secondly, the actor system 'Frame' (Orlikowski, 1993; 1996). Moreover, because when implementing groupware systems the aim is to affect those very modalities which dynamically determine the balance between interactions (work?) and structure(s) of organisations, planning for successful implementation must recognise the power of this dynamic between the effectors. But how should this problem be approached?

In the main development of technical and technological functions and applications will present little difficulty once requirements have been defined. The problem with groupware and related products (including those now emerging on the Internet) is that (on the whole) they present technical *capabilities* rather than functions and applications directly to the end user actor, requiring he or she to model their working world in order to use them. The analysis carried out in this paper suggests that attention needs to be paid to this modelling process.

Conclusion

If we gave a flintlock rifle to a person from a culture with no knowledge of explosives or firearms and told them it was weapon, we should not be surprised if they hefted it and wielded it like a club. Of course they would develop the ability to use the new tool as it was designed to be used and later conceptualise new combinations and applications of the basic technologies involved, but it would take time, and some people would never get far beyond the 'club' stage (and, remember, a flintlock rifle is not even the best club that could be made). By introducing user/actors to groupware technology and telling them it is an information system we are doing much the same thing, particularly when they are presented (usually) with training on a limited number of basic functions. It will take time for the more active and creative users to develop their models of the new situation, enabling them to consider more creative uses of the tools and technology available. Moreover, experience suggests many users will never do this (Hassall, 1999). Therefore, organisations seeking to gain the benefits of introducing flexible information tools such as groupware might consider addressing a proportion of training and resources to helping the users to develop their modelling skills rather than simply attaining technical competence in a range of software products.

References

Avison, D. E. & Wood-Harper, A. T. (1990) *Multiview - An Exploration in Information Systems Development* Blackwell Scientific Publications.

Bannon, L. J. (1998) Computer Supported Collaborative Working: challenging perspectives on work and technology, *Information Technology and Organizational Transformation - Innovation for the 21st Century Organization*, R. Galliers & W. Baets (Eds) Chichester, John Wiley & Sons Ltd Chapter 2.

Beer, S. (1979) *The Heart of Enterprise* Chichester, John Wiley & Sons Ltd UK.

Beer, S. (1985) *Diagnosing the System for Organizations* Chichester, John Wiley & Sons Ltd.

Checkland, P. (1981) *Systems Thinking Systems Practice* Chichester, John Wiley & Sons.

Checkland, P. & Scholes, J. (1990) *Soft Systems Methodology in Action* Chichester, John Wiley & Sons.

Ciborra, C. U. & Patriotta, G. (1996) Groupware and Teamwork in New product Development: the case of a consumer goods multinational, in: C. U. Ciborra *Groupware and Teamwork, Invisible Aid or Technical Hindrance?* Chichester, John Wiley & pp. 23-60.

Dudley, P. & Hassall, J. C. (1995) Systemic Refocusing Strategy, An Emancipatory Approach To Intervention, in: K. Ellis, A. Gregory, B. R. Mears-Young, & G. Ragsdell (Eds) *Critical Issues in Systems Theory and Practice* London, Plenum pp. 465-478.

Dudley, P. & Hassall, J. C. (1996) Applying Systemic Refocusing Strategy to Information Systems Innovation, In: R. M. Mason, L. A. Lefebvre, & T. M. Khalil (Eds) *Technology Management in a Changing World* Oxford, Elsevier Advanced Technology pp. 41-50.

Giddens, A. (1984) *The Constitution of Society* Oxford, Polity Press.

Hares, J. & Royle, D. (1994) *Measuring the Value of Information Technolog*, Chichester, John Wiley & Sons.

Hassall, J. C. (1999) *Developing Performance Models for Co-operative Information Systems in an Orgnisational Context* Unpublished thesis submitted for the degree of Doctor of Philosophy, Aston University, July.

Hassall, J. C. (1998) Evaluating Co-operative Information Technologies Using Fuzzy Measures, In: D. Avison & D. Edgar-Nevill (Eds) *Matching Technology With Organisational Needs* Proceedings of the 3rd UKAIS Conference, Lincoln University, 15th-17th April, Maidenhead, McGraw-Hill.

Kunda, B. & Brooks, L. (1999) Applying Socio-Technical Approach for COTS Selection, In: L. Brooks & C. Kimble (Eds) *Information Systems - The Next Generation* Proceedings of the 4th UKAIS Conference, York University, 7th-9th April Maidenhead, McGraw-Hill pp. 552-565.

Mumford, E. (1991) Participation in Systems Design - What can it offer? In: B. Shakel & S. Richardson (Eds) *Human Factors for Informatics Usability* Cambridge, Cambridge University Press pp. 267-290.

Orlikowski, W. J. (1992) Learning from Notes: organizational issues in groupware implementation *Proceedings of Computer Supported Co-operative Work* pp. 362-369.

Orlikowski, W. J. (1996) Evolving with Notes: organizational change around groupware technology, In: C. U. Ciborra *Groupware and Teamwork, Invisible Aid or Technical Hindrance,* Chichester, John Wiley & Sons pp. 23-60.

Remenyi, D., Sherwood-Smith, M. & White, T. (1997) *Achieving Maximum Value From Information Systems: a process approach* Chichester, John Wiley & Sons Ltd.

Rogers, S. & McTague, R. (1996) *Novell's GroupWise 5 User's Handbook* San Jose CA, Novell Press.

Sutton, D. (1998) Matching Technology with Organizational Needs is a Two Way Process, In: D. Avison & D. Edgar-Nevill (Eds) *Matching Technology With Organisational Needs* Proceedings of the 3rd UKAIS Conference, Lincoln University, 15th-17th April, . Maidenhead, McGraw-Hill.

Walsham, G. (1993) *Interpreting Information Systems in Organisations* Chichester, John Wiley & Sons Ltd UK.