44

Institutional consequences of the use of GIS

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The concept that implementation of a GIS is something which can be achieved simply by following 'cookbook' instructions and which will then lead to inevitable success is quite wrong. Indeed, it is contrary to all recent management thinking and successful experience in the implementation and exploitation of information technology generally. Examples can be cited where the same mistakes involving GIS have been repeated across many organisations and even repeated within one organisation.

There are many complexities and ambiguities in terminology related to management of GIS. The author, however, defines three managerial perspectives – technological determinism, managerial rationalism, and social interactionism. It is shown that the first two are the norm in GIS implementation yet are deeply flawed. Adoption of social interactionist approaches seems to ensure greater chances of successful exploitation of GIS but requires much greater focus on the traditions, values, and skill bases of individual organisations and on the views and roles of human individuals within them.

1 INTRODUCTION

The capacity to innovate is generally perceived to be crucial to organisational survival. Moreover, it is implicit within such views that the adoption and use of technological innovations, such as GIS, will deliver the novel approaches which will enhance economic and administrative competitiveness. However, it is evident from the experiences of users in a diverse range of organisational contexts that securing the potential benefits of computer-based technologies, including GIS, can be problematic (see for example, Audit Commission 1994; Dunlop and Kling 1991; Eason 1988; McRae 1993; Moore 1993; South West Thames RHA 1993). It is now recognised that the process of implementing and exploiting technological innovations is not simply a technical matter but is influenced by a diverse range of cultural, institutional, and organisational settings as well as personal values and motivations. These issues are particularly important for the utilisation of an innovation such as GIS since these technologies are generally implemented within

organisations rather than being a personal technology. This chapter therefore focuses on the extent to which the interplay between GIS and the organisational/institutional contexts in which they are located influences GIS use.

Much of the existing literature within the GIS field assumes there to be a relatively straightforward relationship between computer-based technologies and the contexts in which they are expected to be used. In other words, the much publicised benefits associated with GIS of increased levels of spatial data sharing and hence reduced duplication and more informed decision-making will be realised regardless of the organisational context. However, the growing body of user experiences indicates that the institutional consequences of using GIS are neither straightforward nor unproblematic (see for example, Calhoun et al 1987; Campbell and Masser 1995; Lopez and John 1993; Masser and Onsrud 1993; Onsrud and Rushton 1995; Openshaw et al 1990; Peuquet and Bacastow 1991; Sahay and Walsham 1996). Frequently, the way in which GIS are used in practice differs markedly from the

expectations of their designers. Such circumstances should not necessarily be seen as a matter of regret, but rather as an important starting point from which our understanding of the processes influencing the extent and form of GIS utilisation may develop. If the underlying assumptions about the relationship between GIS technologies and the organisational contexts in which they must provide a service are inappropriate, then the future of such systems is likely to be limited.

This chapter explores the relationship between GIS and organisations and the associated implications for use, through three perspectives based on very different sets of assumptions. These perspectives are technological determinism, managerial rationalism, and social interactionism. It is inevitable that these perspectives represent something of a caricature of the underlying debate. Nevertheless they are helpful learning devices to expose assumptions which, although questionable, may have become taken for granted. The heart of the discussion, therefore, focuses on an examination of the nature of the three perspectives. This will be preceded by brief consideration of the terminology used in this discussion and followed by an evaluation of the implications of the underlying assumptions for the development of GIS. The reader is also referred to Maguire (Chapter 25) and Sugarbaker (Chapter 43) for a discussion of the technical and management issues surrounding GIS implementation and use.

2 BACKGROUND

The vast majority of papers reviewing experiences of implementing GIS include reference to an array of non-technical issues. The terminologies employed to refer to these non-technical considerations are many and various, including organisational, contextual, institutional, societal, and personal issues. Sometimes the terms used indicate a particular conceptualisation of the processes involved, on other occasions the words and phrases chosen represent a convenient shorthand for any matter of a non-technical nature. The use of the term institutional in the title of this chapter should be regarded as implying the latter with a couple of qualifications. The first of these is that the focus is on the consequences of the use of GIS within and between organisations and not at the scale of nations or societies. (For work in this area see

Campbell 1996; Wegener and Masser 1996.) The second is the omission of ergonomic considerations from the following discussion (see the work of Davies and Medyckyj-Scott 1996).

A further area of ambiguity in terminology arises in relation to the process by which GIS are introduced into particular organisational settings. The differences in emphasis and meaning associated with terms such as 'adoption', 'initiation', 'diffusion', 'acquisition', 'implementation', 'routinisation', 'incorporation', 'utilisation', and 'use' reflect differences in underlying assumptions. In this chapter 'use' is not conceptualised as the final end state of a linear process. Rather 'use' is regarded as part of a complex process involving repeated cycles of design, learning, and exploitation with each cycle reflecting changing circumstances, growing understanding, and the vagaries of negotiations between interested parties. In these circumstances, 'use' itself may take a variety of forms; there may even be periods when the system contributes little if anything to the work of the organisation. On the other hand, the multiple functionality of GIS facilitates the development and even the simultaneous use of a variety of applications ranging from display capabilities through to spatial modelling, often carried out by different individuals with different agendas. Those specialising in the field of information technology are careful not to associate 'use' necessarily with user satisfaction (Lyytinen and Hirschheim 1987). This is most obvious where users have no choice but to use the system. Ambiguity also arises as expectations often seem to be confused with outcomes. It is inevitable that few ever fully realise their plans and hopes. These sorts of complications make the analysis of the processes influencing the use of GIS technologies both an important intellectual challenge and a topic of real practical significance.

3 PERSPECTIVES ON THE INSTITUTIONAL CONSEQUENCES OF GIS USE

The GIS literature reveals a series of contradictions with respect to the introduction of such systems into organisations. There are papers enthusing, with near missionary zeal, about the benefits to be gained from the speed with which computers can now manipulate geography; yet user experiences seem, at best, to be mixed. There are discussions proposing that GIS are the missing piece in the decision-making jigsaw such

that senior managers, through spatial modelling and analysis, will be able to rid themselves of human irrationality; yet the greatest use of GIS is for basic display and query functions. There are endless statements about the capacity of GIS to facilitate data sharing; yet duplicate datasets continue to multiply. There are strategies for success in managing your GIS; yet there are reports of systems standing idle. There are lists of factors inhibiting effective implementation; yet the same old follies persist.

The seeming contradictions at the heart of the debate about the process of GIS implementation and the resulting benefits or otherwise can be understood by examining the variations in underlying assumptions. These differences can be summarised in terms of three perspectives, namely: technological determinism, managerial rationalism, and social interactionism. The implementation of a GIS poses two key questions for those involved: first, how to integrate the new working practice into the existing norms and traditions of the organisation; and second, in what ways will the information generated contribute to the decision-making processes? The following discussion in outlining the characteristics of the three perspectives therefore focuses particular attention on presumptions concerning the nature of organisations and the favoured style of decision-making, not just the technology. These assumptions in turn have a profound influence on perceptions as to the likely outcome of GIS implementation and its associated institutional consequences. Table 1 provides a summary of the assumptions. The overview of each perspective is illustrated with reference to work in the GIS field. A similar diversity of views can be seen in

the debates surrounding the introduction of all forms of information technology as well as management more generally. (A much more detailed discussion of the assumptions underlying the three perspectives can be found in Campbell and Masser 1995.)

3.1 Technological determinism

Technological determinism is based on a Utopian view of technological developments (see Feigenbaum and McCorduck 1991; Naisbitt 1984), with stress placed on the inherent technical worth of an innovation. As a result, computer-based technologies such as GIS are defined in terms of items of equipment, often in the form of computing hardware, along with a set of methods embodied within a particular software package. Consequently the chances of securing effective utilisation are dependent upon the inherent sophistication of the technology and the recognition of its merits by members of the organisation. The underlying rationale assumes that the technological advantages of a particular combination of equipment will be so transparent to practitioners that they will readily embrace the new approach. In such circumstances, acquisition is often presumed to imply utilisation. Put more simply: if, for example, someone develops a better washing machine (or method of analysing spatial data) it is bound to sell because it is technically superior to its competitors.

The technological focus of this perspective leads to little concern about the particularities of the organisational contexts within which the system will be required to operate. Organisations tend to

Table 1 Perspectives on GIS implementation and use (developed from Campbell and Masser 1995).

Assumption	Technological determinism	Managerial rationalism	Social interactionism
Perception of technology	Machine and methods	Machine and methods	Machine, methods and knowledge
Perception of organisations	Machine	System	Cultures
Decision-making style	Rational/comprehensive/ optimising	Procedural/rational/orderly	Fluid/confrontational/entailing negotiation and compromise
Style of implementation	Technical process	Guided by rational management strategy	Organisational process
Constraints on implementation	Technical worth of innovation/ stupidity of users	Poor management/technical worth of innovation	Interaction between social and political processes
Likely outcome of implementation	Positive	Positive	Uncertain/probably mixed
Institutional consequences	Greater efficiency/more rational decision-making	Greater efficiency and/or more rational decision-making	Reflection of organisational practices and values

be conceptualised as manifestly rational in nature, both in terms of their general practices and the manner in which all types of decisions are made. Furthermore, few distinctions are made between the values and approaches of different organisations. Rather the image is of an organisation as a machine (Morgan 1986), that is a highly ordered and efficient work environment dominated by clearly defined rules which all staff members are aware of and generally accept. Shared goals, consensus, and stability tend to typify the technological determinist organisation.

Crucially, the decision-making processes on which the life of organisations depend are viewed similarly. Information is assumed to be the determining factor in resolving any problem, leading expectations that the mere availability of more information and increasingly sophisticated forms of information-processing facility must enhance organisational performance. Logically, therefore, the inherent ability of GIS technologies to deliver this information is linked to a presumed optimising goal of organisations.

The transparent advantages of the technology and the unproblematic nature of the organisational context render the process of implementation relatively straightforward. Focus is placed on fine-tuning the equipment, with little consideration given to the human and organisational aspects. The instrumental rationality of the whole enterprise is manifest in the assumption that the motivation for introducing the technology stems purely from a desire to correct an operational weakness. This suggests that the identification of a difficulty prompts the search for a solution which in turn leads to the purchase of an innovation such as a GIS. In these circumstances, the technology would not be introduced into the organisation without a particular task having already been identified. The benefits are usually viewed in terms of the ability of GIS to bring together spatial data from a variety of sources, thereby improving decision-making and decreasing the duplication of datasets. The aim of implementation is to realise these objectives and consequently improve organisational effectiveness and efficiency. It is rare for the outcome of this process to be conceptualised as other than positive for all concerned.

Overall technological determinism is imbued with a sense of fatalism about the inevitable progress of automation and optimism about the impact this trend will have on individual organisations, as well as on society as a whole. Emphasis is placed on a narrow conceptualisation of the technology as a set of equipment and methods, virtually in isolation from the context in which it is located. The sole constraints seem only to be technical inadequacies or the incompetence of users. Such thinking has dominated much of the GIS literature with stress placed on technological developments and improvements in know-how to the virtual exclusion of consideration of broader issues and ramifications. Innes and Simpson's (1993) survey of articles and abstracts concerning GIS in the Proceedings of Urban and Regional Information Systems Association (URISA) conferences points to the nearly all-pervasive view that the design of more advanced and (it is assumed) necessarily better GIS technologies will inevitably result in their adoption and use. They state: 'Often the articles read as if developing more powerful and user-friendly applications will automatically result in the blossoming of GIS in practice' (Innes and Simpson 1993: 230).

A series of case studies undertaken in British local government, backed up by similar experiences in the utility companies, suggest there are very real dangers for users of adopting such a deterministic approach (Campbell and Masser 1995). This study found that, in instances where responsibility for GIS implementation rested entirely with computer specialists, the system failed to be used despite being technically operational. This is not to suggest the technical experts were completely to blame; rather such circumstances were symptomatic of a more general view within the organisation that the introduction of computers is merely a technical matter, not requiring the central involvement of users. As a result, whilst the technological determinist perspective appears to have been implicit in a great deal of work in the GIS field to date, success cannot be guaranteed purely on the basis of the viability of the technology.

3.2 Managerial rationalism

Managerial rationalism departs from the preceding perspective in that the process of introducing an innovation into an organisation is not regarded as solely technological in nature. Although computer technologies are still regarded as essentially items of equipment, the human element is not entirely overlooked. Rather it is assumed that the behaviour

of staff can be controlled and predicted through rational management techniques. Effective implementation is therefore viewed as a combination of good or, perhaps more precisely, rational management and technical competence. Technologies are not simply expected to be utilised because of their inherent potential but rather as a consequence of the strategies laid down by the managers within that environment.

The logic of managerial rationalism in many ways mirrors Taylor's (1947) views of scientific management and later developments which applied open systems thinking to the operation of organisations (see also Weber 1947 on bureaucracies). Organisations are therefore conceptualised as systems through which the rational application of rules and procedures ensures that human frailties can be overcome and, in turn, uncertainty can be predicted and effectively controlled. The decision-making process is viewed similarly. Instrumental rationality is again assumed to lie at the very heart of effective decision-making but it is acknowledged that human limitations and inadequate information will lead to suboptimal outcomes. (See Simon (1952) on so-called 'bounded rationality'.) Given these assumptions, computer-based systems which can assist in combating these failings are regarded as essential to optimal organisational performance. As a result, the introduction of a GIS is perceived to be inevitable if it has the potential to enhance efficiency or overcome human limitations in decision-making. The acquisition of a new technology naturally follows on from the identification of a weakness in the daily operations of the organisation or, more profoundly, in strategic decision-making activities. In the case of the latter, concern is likely to centre on the feeling that senior managers lack sufficient information with which to select the optimal course of action. This is reflected in much of the GIS literature and is typified in a statement by Gault and Peutherer (1989: 2) based on their experience of British local government which suggests GIS technologies to be an important prerequisite to '. . . more rational decision-making procedures'. (See also Wulfsohn's (1994) review of work on South Africa or Sahay and Walsham (1996) on India).

Implicit within managerial rationalism is the notion of implementation as linear in nature, involving a series of logical stages based on pre-planning and strategy formulation. The process is often represented as a sequence of stages which are presumed inevitably to lead towards utilisation. This is exemplified by what Eason (1988) describes as the traditional data-processing model consisting of eight separate phases: project selection; feasibility study; systems analysis; requirements specification; systems design; construction; trials; and implementation. Later adaptations of this model acknowledge the need to incorporate users into the overall structure through a review at the end of each stage. However, the role of users is highly constrained, with the focus remaining on the technical aspects of system design and the specification of the appropriate organisational structure. The inevitable outcome of the introduction of a system such as GIS is perceived to be widespread operational benefits in the managerial and strategic domains. The personal aspirations of individual staff members are regarded as synonymous with those of the organisation. Consequently, they are expected to contribute fully to any scheme which furthers these ends.

The key difference between technological determinism and managerial rationalism is that the latter acknowledges that new technologies like GIS need to be managed and controlled to yield their full potential. However, in both cases the basic underlying philosophy centres on rationality, whether this is simply conceived as the way the world operates or as a guiding management style. For managerial rationalists, unless the strategy is faulty or the technology inadequate it is simply a matter of course to achieve utilisation and the associated benefits. Consequently, this approach is often referred to as the 'cookbook method' of system implementation, implying that if you have all the ingredients and follow the recipe, then a well utilised GIS will result.

A review of the literature concerned with the implementation of GIS reveals a tendency to favour managerial rationalist-type assumptions. The proceedings of the main GIS conferences indicate numerous recipes for success, all based on an essentially rational understanding of the workings of organisations (see, for example, Bromley and Coulson 1989; Ezigbalike et al 1988; Gault and Peutherer 1989; Mahoney and McLaren 1993; McAusland and Summerside 1993). More systematic analyses of constraints also tend to be set within the same framework, with the focus placed on the generation of lists of factors rather than developing understanding of the underlying processes or causal

mechanisms (see Croswell 1991; Onsrud and Pinto 1991). It is perhaps inevitable that textbooks seeking to offer prescriptions for success will lapse into propositions which suggest universal remedies to the problematic process of system implementation (see also Obermeyer, Chapter 42; Barr 1991; Huxhold 1991, 1993; Huxhold and Levinsohn 1995; Obermeyer and Pinto 1994). A common element in all these prescriptions is the recommendation that the most effective strategy for GIS implementation is one based on a corporate approach or, in the case of Barr (1991), a federal structure.

The rationale behind the corporate approach is that, through increased levels of data sharing, organisations will be able to reduce duplication and develop more informed decisions. What is meant by a corporate approach is often ill-defined but implies the involvement of all the departments or subsections into which an organisation is divided, centrally coordinated, and managed. The coordinating department would be expected to set the standards for data exchange and to establish appropriate procedures for adoption, implementation, and maintenance of the system. The level of control exerted by the central coordinating department varies in degree between the different prescriptions but a top-down management style is a consistent theme. Loss of independence by subsections is not an issue because the benefits of the technology will outweigh any reduction in autonomy. This concept has also been applied to multi-agency projects. Overall corporate implementation has been regarded by many as the only strategy that will yield the strategic gains and efficiency improvements embedded within GIS. This is part of a management science tradition which assumes organisations are arenas of rational activity where logical strategies are turned into action.

Studies of user experiences, however, cast doubt on such assumptions, questioning the appropriateness and effectiveness of corporate approaches. This is exemplified in work undertaken in 38 military establishments in the USA (Cullis 1996). This study questions the extent to which there is a latent demand for data sharing within organisations. Staff within the contexts investigated saw little benefit to be gained from sharing information and some were actively antagonistic to it. Moreover, such attitudes made a corporate approach to implementation extremely problematic and in many ways a waste of effort. Findings such as

these raise fundamental questions about the appropriateness of the assumptions underlying the managerial rationalist perspective.

3.3 Social interactionism

In contrast to the preceding perspectives, the social interactionist approach starts from a conceptualisation of how individual organisations work in practice rather than how they ought to operate. As Handy has put it: 'We used to think that we knew how to run organisations. Now we know better' (1994: 37). There are 'no sure-fire recipes for success'. Empirical investigations have shown that it is often difficult to identify cause and effect relationships with respect to the implementation of computer-based systems (Kling 1980; Markus and Robey 1988; Rule and Attewell 1991). For example, it has been found that the same combination of GIS equipment, implemented using similar managerial strategies, can be introduced into two apparently similar organisations yet the outcomes are very different (Campbell 1992; Campbell and Masser 1995). This suggests that implementation should be viewed as a process of social interaction between the technology and the particular organisational context into which it is to be embedded. Given this perception, technology is defined not only as items of equipment and sets of methods but additionally as existing knowledge about the role and value of these facilities (Sproull and Goodman 1990). This knowledge is perceived to result from a combination of direct personal experience and, perhaps more importantly, accepted professional or folk wisdom. Consequently, individual perceptions of the nature and utility of a particular technology are likely to vary considerably according to personal, organisational, and cultural circumstances. Technologies such as GIS are not seen, therefore, as neutral configurations of equipment; rather they are socially constructed within each organisational context and are likely to be continuously reinvented by their users (Rogers 1993).

An important element of the social interactionist perspective is the conception of organisations as unique social systems or cultures in which individuals become socialised in a particular set of norms, beliefs, and values (see Deal and Kennedy 1982; Handy 1993; Morgan 1986, 1989; Schein 1980, 1985). However, this process is not necessarily assumed to lead to a unity of purpose. It is accepted

that individuals may have diverse goals and motivations, resulting inevitably in disputes over objectives and priorities. Such circumstances are regarded as the very essence of organisational life. Moreover, the manner in which conflicts are handled reflect the rituals, values, and power relationships of the particular context. Paradoxically therefore, the behaviour of members of staff or coalitions is perceived to be unpredictable yet, at the same time, influenced by the underlying culture of the organisation. In most cases the values and norms of the environment are not specified but are just part of the procedures, rituals, and exercise of power. Hirschheim states that organisations 'are not rational and manifestly rule-following, they are social arenas where power, ritual, and myth predominate' (1985: 279).

The conceptualisation of an organisation as a culture suggests that decision-making is a more complex process than the preceding perspectives implied. Decision-making is assumed to be an interactive and ever-changing process. Negotiation, compromise and even conflict are common, with the initial problem likely to be poorly defined and the available options heavily constrained. Information is, therefore, viewed as ammunition. It may be used within the bargaining process to justify the final compromise but other forms of knowledge such as experience, precedent, beliefs, values, and rumours are likely to be equally important. In such circumstances, moral, ethical, and even tactical considerations may be more significant than traditional notions of rationality and logic (Habermas 1984). The symbolic association of a dataset with a computer-based system may give it additional credibility but winning the argument is about deploying the appropriate consideration at the right moment. Furthermore, sharing data might not always be the most sensible course of action. Consequently, better decisions or enhanced efficiency cannot be assumed to be the logical outcomes of introducing a GIS.

This conceptualisation of technology and organisations inevitably has important implications for the process of implementation. The social interactionist perspective views it as ultimately fruitless to divorce the implementation of computing technologies from the jigsaw of conflict and cooperation within which these operate (Pfeffer 1981, 1992). Implementation is a process of learning, where not all the participants derive the

same conclusions from events, learn at the same speed, nor even feel sufficiently motivated to become involved. The key assumption of the social interactionist perspective is that technologies must be seen as part of the environments in which they are located, only gaining meaning through interaction with individual members of staff within a particular cultural and organisational context (Giddens 1984). Moreover, the introduction of a new computer-based technology will yield an uneven distribution of benefits. Potential losers are unlikely to remain passive, leading to the evolution of what Keen (1981) terms 'counter-implementation strategies'. It is therefore assumed that the consequences of the introduction of a computer technology such as GIS will be mixed and outcomes very different from initial expectations. In many ways such circumstances are not properly regarded as a matter of regret but simply as a reflection of the results of the interaction between the technology and sociopolitical processes at the heart of organisational life.

The limited extent to which debates based on a social interactionist framework have entered the discussion about GIS is striking. Eason has commented in relation to the implementation of computer-based systems in general:

'The description of the design process as a political process with implementation and counter-implementation forces at work will accord with the experience of many people engaged in the process, if not with the textbooks on system design, which rarely mention these realities of organisational life. It is clearly dysfunctional for the organisations to proceed in this way.' (1988: 33)

The social interactionist style of implementation therefore places stress on obtaining organisational and user acceptance of the technology, not simply the technical operation of the system. This implies that organisational learning must proceed alongside technical design and not behind it. Early consideration must be given to the impact of the technology on job content, lines of responsibility, status, and remuneration. It is assumed that routine use will not take place unless the system meets the fundamental needs and capabilities of users *and* has obtained their commitment and support. As a result, emphasis is placed on participatory and iterative approaches to implementation typified by user-centred design philosophies (Eason 1988) which

regard the introduction of computing technologies as part of a process of organisational learning (Hirschheim 1985; Pettigrew 1985, 1988).

In short, the whole process of technological innovation is viewed not in isolation from the organisation but as part of a process of strategic change; a process which, if it is to yield benefit, must acquire legitimacy amongst all staff members. More specifically, the introduction of a computer-based technology such as a GIS will not change the fundamental ways in which an organisation operates. Such systems can contribute to existing ways of working and in some cases an ongoing programme of change, but the difficulties associated with managing change should not be underestimated. It is a process which has to be nurtured and cajoled over many years, and perhaps decades; it cannot be imposed or controlled. The same applies to the introduction of GIS. Consequently, the social interactionist perspective offers no 'cookbook recipes'. In the end what is appropriate depends on the particular needs and capabilities of the individuals within the organisation. Implementation under this perspective is regarded as a matter of organisational politics not managerial rationalism.

4 IMPLICATIONS OF THE DIFFERENT PERSPECTIVES

The perspectives outlined above highlight very different conceptualisations of the consequences of GIS implementation within organisations. The apparent contradictions in the GIS literature posed at the start of the last section reflect these profound differences in approach. Variations in explanatory frameworks inevitably have implications for the prescriptive advice proposed. Overall, each perspective undoubtedly contributes to the totality of understanding. However, experience has shown that technological 'know-how' and the ability to formulate a rational strategy are by themselves insufficient to guarantee effective use of GIS.

The analytical framework provided by the social interactionist perspective alters the whole focus of the debate concerning the relationship between computing technologies and organisations. Instead of the focus being on the likely impact of GIS on organisations, concern centres on how individual organisations mould technologies to meet their needs. Consequently, this perspective has important practical and theoretical implications for potential users, managers, and academics. GIS technologies are *not* divorced from the interplay of organisational life: rather they are subject to its vagaries and power relationships. It is therefore difficult to envisage a single approach to implementation which will be universally successful or result in a standard set of outcomes. This does *not* suggest an 'anything goes' approach in which those responsible for the implementation are blown around in the perennial organisational storms. However, it is clearly folly to ignore the prevailing weather conditions as the other perspectives tend to do.

It is unfortunate that much of the work on the consequences of GIS implementation and use is partial or anecdotal in nature. Despite this, studies undertaken in a diverse range of contexts including India, Italy, the USA, and Great Britain suggest that social interactionist explanations have considerable merit (Campbell and Masser 1995; Craglia 1994; Cullis 1996; Sahay and Walsham 1996). A detailed analysis of the experiences of GIS users in British local government indicates that those encountering the greatest difficulties in realising a return on their investment had devised approaches based on inappropriate and unrealistic assumptions about the organisational context. It was as if they were designing the GIS to fit a textbook organisation, staffed by robots, rather than the situation with which they were confronted. In contrast, the systems were being used in those organisations where there was a clear understanding of the social and political processes at work and how the GIS could be incorporated into the existing traditions and practices. The consequences of introducing the GIS were rarely spectacular and, in technical terms, the widely used automated mapping and search and query type applications may seem very dull. But for users, technical elegance will always remain secondary to the huge challenge of achieving effective utilisation. There is little point in installing a GIS which assumes a radical change in organisational practices if it is to be located in an organisational context which tends to be resistant to change. In many ways it takes far greater powers of insight to acknowledge the limitations of a particular organisation and act accordingly, than blindly to hope circumstances might be different.

There are no 'quick fixes' which can guarantee the effective implementation of GIS. Users should be wary of those who suggest there are instantaneous simple solutions. Each organisation is unique, possessing its own values and practices which influence the most appropriate actions to be taken. Nevertheless, in seeking to understand the key aspects of organisational cultures for GIS implementation, those who have been most successful have focused on four issues. First, they identify simple applications producing information which is critical to the work of users. Daily pressures mean that systems generating information which, for example, is merely 'nice to have' or easily available from another source are likely never to be used. Similarly, systems dependent on information which is politically sensitive or incurs considerable staff time to input without any return to those particular individuals often become difficult to sustain. Information must be viewed in terms of its social and political implications, not as value neutral units of data. Second, successful practitioners demonstrate awareness of the limitations of the organisation in terms of accepted practices and available resources, most particularly the skills and attitudes of staff towards technology. Third – and perhaps most important – understanding of the capacity of the organisation to cope with and sustain change is vital to lasting success. The introduction of a new working practice such as a GIS implies change and, if this change is to be effected, it will have to overcome the ups and downs inherent to any process of implementation. The level of change which can be sustained is highly dependent on the culture of the organisation, as innovative individuals tend to select, or perhaps more accurately are selected by, organisations in their own image. Lastly, the identification of key users and the giving to them of responsibility for directing system development is a crucial factor. Commitment tends to be enhanced by involving staff throughout the organisation in the implementation process.

I recently found myself at an international conference listening to yet another paper recounting the mixed experiences of a GIS implementation. The authors' analysis pointed to organisational issues as largely responsible for this outcome yet in the ensuing discussion it became evident that the same comments were made in a paper published 25 years earlier about the very same organisation. Why do academics and users still seem surprised when we find that non-technical issues affect the ease of implementation? Why do we continue to ignore everyday experience that tells us that organisations are complicated collections of people which are not amenable to rapid manipulation for the sake of the operation of a GIS? GIS may be able to unlock vast reserves of spatial data but for what purpose and do such needs accord with those of particular organisations and the individuals within them?

It is now long overdue for those interested in GIS to follow trends within management and the subfield of information technology and start from an understanding of how the world *is*, rather than idealised assumptions of *how it ought to be*. This should not be seen as a matter of intellectual compromise, for the creativity and inventiveness required to extract an everyday use from a technology is often immense. It is not enough for inventors of new computer applications to argue that the outcome of the use of their system is not a matter for them and they cannot be blamed if an organisation spends a million pounds on a system that yields few tangible benefits. Legally, they may be correct but users and societies judge such systems by their outcomes. In the end, technological fashions come and go but if the waste of considerable resources is to be avoided, much greater understanding is needed about the sociopolitical processes which underpin the use and abuse of technological innovations.

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