The Three Dimensions of E-Government

Ian McLoughlin
Professor of Management,
KITE Centre - Social and Business Informatics, Newcastle University Business School,
University of Newcastle upon Tyne, Newcastle upon Tyne, UK.

Stream: Organisational Change

Presenter Profile: Ian McLoughlin is Professor of Management and immediate past Director of Newcastle University Business School, UK. He is co-founder of the Newcastle Social and Business Informatics, a multi-disciplinary research grouping of management, social and information scientists, which has conducted a six-year programme on the relationship between technological and organisational change in the design and deployment of e-government. He is author or co-author of numerous books and journal articles most of which explore the relationship between technology and organisation. He has conducted research on a variety of types of technological and organizational change in the UK, Europe and Australia.
The Three Dimensions of E-Government

ABSTRACT

It is claimed that the majority of e-government projects fail. The blame for this is normally attributed to either ‘technology’ – for example inappropriate private sector systems being transferred the rather different organisational and institutional context of public services – or to organisational factors - for example the embedded conservatism of public organisations and their inability to either implement new technologies and/or engage in the required organisational change to use them effectively. This paper presents an alternative ‘three dimensional’ model of e-government that builds upon but which points to an ultimately different approach to what are defined as ‘one’ and ‘two dimensional views’. The paper uses a critique of models of technological and organisational change in public organisations to outline a practice-based approach. In conclusion it is suggested that the answer to the question of why e-government projects fail is neither mainly to do with the nature of the technology, nor mainly a function of the organisational context of its deployment and use. Rather, it is always to do with both.

Keywords: organizational change, technological change, practice-based approaches, e-government, public organizations.

INTRODUCTION

The ‘transformation’ of the modern state through the phenomenon of ‘e-government’ represents a major arena of contemporary change in public organisations in many countries (see e.g. Bellamy and Taylor, 1998; Fountain, 2001: Heeks, 2006) and for some is ushering in a new era of ‘digital governance’ (Dunleavy et al, 2006). Whilst the interest in this paper is primarily to contribute to much needed analytical clarification in an emergent field of study (Heeks and Bailur, 2006), this exercise is also important for practical reasons as well. E-government projects it seems, like many other computing and information technology-based projects in the public sector, have a high propensity to fail (Heeks, 2006: 1). If this is the case, it is important that we move our basis for understanding of why this should be so away from a position which either exonerates the technologies of e-government - the ‘challenge for government is not the implementation of new technologies’ but ‘organizational change’ (e.g. Fountain, 2006:1), or blames a technology largely developed in the private sector as inappropriate to the requirements of public service delivery - for example, because of the inappropriate business models embedded in such systems built around a concept of ‘the customer’ which fits poorly with the ethos and values of public service delivery.
This paper explores the role of e-government in the transformational change of public organisations through the application of a more refined analytical understanding of the relationship between technology and organisation. It draws in particular on Badham (2005) and his discussion of the ‘three dimensions of technology’. Badham’s framework identifies different analytical dimensions, which are oriented towards and capture different aspects of the relations between technology and social agency. These are summarised in figure 1. One-dimensional approaches (Figure 1a) in their strongest form privilege either the technical (e.g. traditional technology impact approaches which see technology shaping society) or the social (e.g. ‘first generation’ social agency approaches which see society shaping technology). For two-dimensional views (figure 1b), technology and organisation are seen either as a form of ‘soft determinism’ or as ‘mutually’ shaping each other. These understandings, especially the latter, are based upon a more complex, iterative and attenuated view of the processes of design and use of technology. Three-dimensional views (figure 1c) go further in their questioning of the nature of the distinction between ‘the technical’ and ‘the social’ and prefer to treat them as more fluid and interpretative ‘sociotechnical’ entities. In three-dimensional analysis the aim is to shift the debate away from a concern over the degree and direction of causality between more or less given categories of ‘the technical’ and ‘the social’. As a consequence, the answer to the question, ‘is it the technology or is it the social?’ becomes, ‘it is always ‘‘both’’.

In what follows examples of what can be regard as key exemplars in the e-government and more generic literatures concerned with the relationship between organisational and technological change are used to illustrate aspects of first and second dimension approaches. A critique of the limitations of these is then used to point towards a more ‘three-dimensional’ understanding of e-government, illustrated with insights from a major research programme concerned with the practice of e-government in the UK.

E-GOVERNMENT IN THE FIRST DIMENSION

One-dimensional approaches to e-government focus analytical attention either on how new technologies come from ‘outside’ the organisation or sector and effect the nature of management,
work and organisation within it, or in a contrary view, on the way in which new technology itself is ‘socially shaped’ by the context of its design, development, diffusion, implementation and use.

When the focus is upon ‘technology as an impact’, ‘technology’ is seen as an ‘exogenous’ variable which ‘has effects on’ a range of organisational and related variables. In short, the characteristics and capabilities of a given technology are seen as having more or less determining consequences for ‘the social’. In the context of e-government this is manifested in a primary interest in the manner in which the digital technologies of e-government will ‘impact on’, ‘determine’, ‘effect’, ‘bring about a transformation of’, the organisational and institutional forms of the state. Such conceptions typically of course guide much policy, and some academic thinking, which takes the enabling capacity of new technology as given and seeks to exhort public agencies to use these capabilities to transform themselves (see e.g. Cabinet Office, 2006; AGIMO, 2006).

More common in the academic literature, however, is a preference to show how technologies are socially shaped and this perspective is normally offered as a critique and antidote to ‘technological impact’ understandings (see e.g. Mackenzie and Wajcman, 1999). Heeks (2005) provides an illustration of this kind of argument in relation to the technologies of e-government, which he conceptualises as ‘carriers of context’ (see Figure 2). This idea is particularly relevant given the ‘technology transfer’ aspect of many e-government projects, which involve taking technologies from one domain (e.g. private sector applications and/or developed world suppliers) and implementing them in a new domain (e.g. public sector or governments in the developing world).

The implementation of the technologies of e-government therefore straddles both the contexts of invention, design and deployment and these contexts may be situated in radically different domains. Moreover at each of these points elements of each context are inscribed into the technology in the form of assumptions about such things as organisational processes, structures and the values of users. Critically, many of these inscriptions will not be drawn from the ‘world of the user’ but rather be assumptions about ‘the world of the user’ and therefore be situated in the context of the designer. It follows that the technologies of e-government will be critically shaped by the social context within which their design is situated and that, given the sharp distinctions between domains of design and deployment, there may be ‘dangers of a mismatch between what designers inscribe into an e-government application and the realities of the users’
context’ (2005:57). Unsurprisingly, argues Heeks, high rates of project failure are a likely outcome of such ‘mismatches’.

E-GOVERNMENT IN THE SECOND DIMENSION

Second dimension perspectives seek to move away from relatively fixed notions of technological characteristics and capabilities – be they either seen as an a priori given or an outcome of a socio-economic process of shaping. Such perspectives take the form of either ‘soft determinism’ which points to the enabling and constraining but malleable characteristics of ‘technology’ rather than their ‘determining’ character, or more sophisticated ‘mutual shaping’ models (Badham, 2005).

Bellamy and Taylor (1998) provide an example of ‘soft determinism’ in their study of the deployment and use of information and communication systems (ICTs) in government. They characterise ICTs in terms of their ‘informatization’ - a similar idea to Zuboff’s (1988) notion of the ‘informating’ capabilities of ICTs - and communication and networking capabilities. In particular they highlight the capacity of ICTs to produce information which, ‘enables reflection upon the organization into which it has been introduced, and thereby changes, in intended or unintended ways, human perceptions of the context in which that technology is employed’ (Bellamy and Taylor, 1998: 26 – 28). Moreover, the communicating and networking capabilities of ICTs indicate their, ‘more ambiguous effects’ in that, ‘information systems open up possibilities in contemporary organisations for enhanced forms of self-control by employees and customers alike’, however, ‘the networking of information inevitably permits control by others as well’ (Bellamy and Taylor, 1998: 27). Bellamy and Taylor reveal their ‘soft determinist’ assumptions when they are at pains to point out that these apparent technological possibilities are not inevitably translated into changes in public sector organisations and modes of service delivery. In this sense the influence of ‘technology’ is represented in terms of notions of ‘creating potential’ and for ‘facilitating’ changes which are taken-up or not depending upon specific social conditions in particular circumstances.

Mutual shaping perspectives develop this approach further. One of the more sophisticated attempts in the e-government literature is provided by Fountain (2001) in her theory of ‘technology enactment’. This is outlined in Figure 3. A key part of her model is the assumption that there are ‘objective’ e-technologies such as the internet, networked computer systems and telecommunications, hardware, software and digital devices. However, she also recognizes that
the manner in which this technology is implemented is dependent upon specific organizational and institutional circumstances that shape the form of technology in particular implementation contexts. These contexts comprise all those governmental agencies and inter agency relations that can shape how objective e-technologies are understood, configured selectively developed, operated and improved. It is this process of social shaping in context which she terms ‘technology enactment’. In her words, ‘the perception, design and use of objective technologies’ in the governmental context (Fountain, 2001: 98).

As such the technological and organizational outcomes that are enacted are independent of ‘objective technology’ and mediated by the specific contextual institutional and organizational conditions of public services. It is these mediating factors that influence actual choices and decisions about the deployment and use of technology in particular contexts. In Fountain’s terms, these choices and decisions constitute a ‘reverse arrow’ – an inverted response to the ‘technology-determines-society’ model, by reasserting the key role played by the ‘social’ in understanding the dynamics and effects of technology.

However, her argument moves from a form of ‘soft determinism’ to a more complex analysis of how the shape and consequences of technology are ‘enacted’ in the process of deployment and adoption. As she puts it;

*Information technologies and organizational/institutional arrangements are connected reciprocally. Both function in this framework as dependent and independent variables. Each one has causal effects on the other. Institutions and organizations shape the enactment of information technology. Technology, in turn, may reshape organizations and institutions to better conform to its logic. New information technologies are enacted—made sense of, designed, and used (when they are used)—through the mediation of existing organizational and institutional arrangements with their own internal logics or tendencies. These multiple logics are embedded in operating routines, performance programs, bureaucratic politics, norms, cultural beliefs and social networks. (Fountain, 2002: 12)*

In consequence the outcomes of the application of the technologies of e-government are unpredictable, variable and often unexpected. There is, therefore, no direct and predictable relationship between the characteristics and capabilities of information technology and the
outcomes in terms of organizational/institutional change in public organizations. Choices over its use may reinforce existing ‘organizational, political and institutional logics’, whilst other approaches may lead to fundamental change and transformation. As such concludes Fountain, ‘information technologies are not so much adopted or implemented but enacted by decision-makers.’ (Fountain, 2002: 12).

From this we can see that ‘enactment’, as Fountain (2001) uses the term, is based on two notions: firstly, that environmental stimuli are selectively perceived by actors with ‘bounded rationality’ creating their own subjective ‘definitions of the situation’; and, secondly, the tendency for such subjective perceptions to become routine, taken-for-granted views as part of, ‘the propensity to represent, act out, or enact institutionalized (or routinized) performance processes and standardized organizational arrangements’ (Fountain, 2001: 89). Social life, she argues, is constructed from complementary or competing acted out enactments. However, while recognizing that some, ‘…more entrepreneurial or visionary professionals might use the Internet to develop new networked organizational forms or new capacity typically through a mimetic process that operates within social networks’ (Fountain, 2001: 90), her dominant stress, drawing on institutional theory, is on the conservative functional nature of enactment in governmental institutions. As such, individual action is seen as constrained by conservative and stability oriented sets of institutional structures, norms and practices. Primarily it is, ‘the embeddedness of government actors in cognitive, cultural, social and institutional structures that influences the design, perceptions, and uses of the Internet and related IT.’ (Fountain, 2001: 88). The picture of ‘enacted technology’ advocated by Fountain is also strongly conditioned by an institutionalist view of the context of enactment. The ‘working technology’ of e-government that emerges is one shaped by the interaction between an ‘objective technology’ and embedded institutional patterns. Failed e-government projects are ultimately, therefore, the result of the power of such embedded patterns to prevent to leveraging by government of the transformational potential of the ‘objective technology’ of e-government.

The question this then raises is the one traditionally confronted in the face of the stronger institutionalist analyses - where does change come from? For Fountain this can occur in the following three ways. First, through the impact of the objective technology where, in the face of taken for granted stability, external shifts, shocks and crises help undermine this stability and make ‘less resistant to change’. E-technologies are an ‘enabler’ and ‘strong catalysts’ for change because of their ‘dramatic potential efficiency gains’. However, as in first dimension ‘weak’
technological determinist accounts of innovation, these technical capabilities and potential efficiencies exert pressure or create tensions that have transformative potential (rather than guaranteeing such transformations in the face of recalcitrant social forces). Second, embedded institutional structures and patterns of behavior may involve – and in the case of the multi-agency governmental field definitely do involve – competing acted out enactments i.e. there are different task and institutionally structured ‘interests’. The enactment of what Fountain calls ‘deep institutions’ may involve established patterns of inter-institutional conflict. Indeed, much of what Fountain describes as the institutional influences on enacted technology in the governmental environment is the analysis of the effect of such competing ‘political logics’. Presumably, although not stated explicitly by Fountain, these tensions or forms of competition within the institutional environment intertwine with the shocks brought about by the introduction of technologies that shift calculations of efficiency to create what she sees as ‘unintended consequences’ or ‘unintended outcomes’. Third, in attempting to use technologies in a manner that conforms with embedded practices and structures, government agencies also create minor changes and improvements that may accumulate and have consequences that were not initially understood or predicted by the organizational actors but which overtime come to represent significant innovation.

Thus, in Fountain’s enactment theory new technologies coming into the government domain will by-and-large be developed, configured, and used in ways that fit with established routines and practices. By the same token, enacted technologies will also in the main presumably be structured and used in highly regular and routinized fashions. It follows that there is little place in such an analysis for the design, development, deployment and use of e-government technologies in a way that transforms (or potentially transforms) established institutional patterns. As a result, it is not surprising that the pressures for change are seen as coming ‘externally’, beyond ‘enacted technology’ and from ‘objective technology’. Similarly the dynamics of enacted technology are perceived as being strongly dominated by established social routines, whilst the dynamics of objective technology are seen as significantly influencing social conditions and yet themselves are understood as an apparently non-social phenomenon.

In sum, Fountain provides a deeper insight into the way in which the institutions of the state act to limit the scope for change and to shape the form and use of enacted technology in ways that tend to support existing power structures and organizational arrangements. However, we want to suggest that her analysis does not deal convincingly with the manner in which ‘technical’ factors
‘reciprocally’ shape their ‘social’ counterparts. In many respects her ‘mutual shaping’ approach has similar characteristics to the ‘structuration’ model developed from Giddens (1984) by Orlikowski (1992) and which has gained particular popularity in some areas of research on information systems (see e.g. Walsham, 1993). We will now use Orlikowski’s own critique of this approach to mutual shaping to attempt to move beyond the two-dimensional approaches such as that represented by the technology enactment model.

**TOWARDS E-GOVERNMENT IN THE THIRD DIMENSION**

The structuration approach postulates a notion of technology that through its design has ‘embodied structures’ (rules and resources inscribed during design within technical systems) which are then ‘appropriated’ (‘enacted’ in Fountaine’s terms) by users in particular circumstances and in different ways with varying consequences (Orlikowski, 2000: 405). However, as argued by Orlikowski, the ideas of ‘embodied structures’ and their ‘appropriation’ assume a static and fixed notion of ‘technology’. At the same time the structural boundaries of user action, in so far as these are embodied in a given technology, are viewed as thereby being limited by fixed or ‘objective’ technical capabilities, which in turn reflect directly the intentions of the designer (see also Stewart and Williams, 2005). In short, there is considerable residual ‘one dimensional’ determinism in the model where ‘objective technology’ has a significant role in the structuration process (something which Orlikowski notes is inconsistent with Giddens’ original formulations which view structure as something which cannot be ‘outside’ or ‘external’ to human action – Orlikowski, 2000: 406, citing Giddens, 1989: 256). In particular, the idea of a ‘static technology’ takes insufficient account of the iterative capacity of social actors to shape and reshape technology in practice, for example through improvisation and innovation in use (Orlikowski, 2000: 408).

As such no account of subsequent changes in both technologies themselves and the manner in which they are used, which may go beyond, or be completely different to what the system designer intended – a phenomenon that is particularly prevalent in the case of reconfigurable digital technologies and the internet. For Orlikowski, in any alternative approach, ‘technological artifacts’ in the sense of embodied technology must be distinguished analytically from a more emergent concept of ‘technology-in-practice’ (see Figure 4). The former is, ‘an identifiable, relatively durable entity, a physically, economically, politically, and socially organized phenomenon in space-time’ which, ‘has material and cultural properties that transcend the
experience of individuals and particular settings’ and ‘which appears in our lives as a specific machine, technique, appliance, device, or gadget….constructed with particular materials and inscribed with developers assumptions and knowledge about the world at a point in time,’ (Orlikowski, 2000: 408). ‘Technologies-in-practice’, in contrast, are not a direct reading of such inscriptions by users. Rather, they are the ‘edited versions’ of these artifacts that users interact with on a daily basis (for example users rarely use more than 25% of the functionality of word processing software packages or explore all the isles of a supermarket and it is these edited context bound and selective interpretations which constitute technology-in-practice). In short, it is not technological artifacts that people regularly interact with but rather their own (and other’s) selective enactment of such technologies. Moreover, the ‘use of the technology involves a repeatedly experienced, personally ordered and edited version of the technological artifact, being experienced differently by different individuals and differently by the same individuals depending on the time or circumstance’ (Orlikowski, 2000: 408).

Critically, in terms of the structuration model, it is this characteristic that defines the structural component of technology i.e. ‘the specific structure routinely enacted as we use the specific machine, technique, appliance, device, or gadget in recurrent ways in our everyday situated activities. Some properties provided by the artifact do not exist for us as part of our technology-in-practice, while other properties are rich in detailed possibilities’ (Orlikowski, 2000: 408). Thus, while technical artifacts provide ‘boundary conditions’ for technology-in-practice, they are not the structure that enables and constrains agency – the latter is the arena of ‘enacted technology-in-practice’. Thus, Orlikowski’s notion of enactment focuses upon the context bound interpretations, meanings and working definitions applied to technology by users in the context of use. In her words, ‘rather than starting with the technology and examine how actors appropriate its embodied structures’ (the approach taken for example by Fountain and in the past Orlikowski) this new perspective ‘…starts with human action and examines how it enacts emergent structures through recurrent interaction with the technology at hand’ (Orlikowski, 2000:407).

In sum, Fountain and Orlikowski clearly present us with two different accounts of technology enactment. The first posits a largely given although potentially socially shaped ‘objective technology’ whose organizational outcomes are decisively shaped and influenced by the enactment of the technology in the context of its deployment and use. The second views ‘objective technology’ as no more than a ‘boundary condition’ through which enactment construed as ‘design in use’ creates an ‘edited’ version of technology which as an ‘emergent
structure’ subsequently enables and constrains social action. What we now want to argue is that – albeit with some reservations – this latter approach, when integrated within a three-dimensional understanding, opens-up the possibility of conceptualizing the interaction between the technology of e-government and public organizations in new ways.

**DISCUSSION – DEVELOPING A PRACTICE-BASED MODEL OF E-GOVERNMENT**

To review the argument so far, we can ask, ‘what might a three dimensional view of e-government look like in analytical terms’? *First*, the digital technology of e-government would not be seen as analytically external and exogenous to public agencies - an ‘objective technology’ of ‘the internet’ – but rather as itself already an emergent set of sociotechnical relations – or as Heeks (2004) terms it these configurations are ‘carriers of context’. *Second*, public organizations should themselves be seen as made up of existing complex configurations of both technical and social elements. ‘Enactment models’ such as Fountain’s provide a basis for understanding both how existing contexts act to shape actual organisational outcomes in particular institutional circumstances but how these outcomes can themselves feedback and influence future trajectories of technological and organisational development. *Third*, explaining e-government phenomenon is not just a question of how organisational and institutional forms mediate technological outcomes, nor how they’re organisational consequences are shaped by the specific context of their development. Rather the, ‘interaction is one between sociotechnologies created and mobilised by one set of sociotechnical networks and the dynamics of sociotechnical configurations present in different workplaces’ (Badham, 2005: 131).

As such, innovation is a complex emergent *endeavour* resulting from the interaction between the sociotechnical constellations and networks responsible for the development and diffusion of the sociotechnologies of e-government on the one hand and, networks and constellations responsible for the operation and development of the public service sociotechnical configurations on the other. In this latter respect the notion of ‘technology’ as an emergent practice provides us with a clearer and more nuanced understanding of human creativity and agency in the interpretation, configuration, deployment and use of technologies in a ‘context of use’. Moreover, because the meaning and value of a technology is not taken to be embedded in the artifact at the point of design/development but open to substantial ‘re-invention’, ‘reverse adaptation’, ‘innofusion’, ‘domestication’ and ‘configuration’ in the context of implementation and use, then new
possibilities are opened-up with regard to how the trajectories of development of e-government might be shaped.

Indeed the research findings from our research programme on the practice of e-government conducted by the social informatics group at Newcastle University suggests that users (be they public policy makers, professionals, managers or citizens) can and do play the role of ‘co-producers’ of new socio-technical systems alongside system developers and other parties engaged in e-government projects (McLoughlin et al, 2004a). When e-government projects based on this assumption are attempted, the question becomes what kind of new technology (if any) can best support the existing or newly envisioned practices. Our research suggests that frequently the result, in line with Orlikowski’s technology-in-practice model, is that it is the simple ‘technology at hand’, which those seeking to share information or work more collaboratively naturally draw upon. By the same token, they see little meaning or value in ‘business solutions’, frequently pushed by supplier/developers, policy-makers and service commissioners. In particular, the language of the system supplier/developer, based on standard system development techniques of ‘requirements capture’ ‘use cases’ and ‘process mapping’, aimed at the embodiment of working and organizational arrangements in a systematized solution, is more often than not experienced as alienating and irrelevant to the needs of service providers and users. By the same token, the idea that the solution to service integration is always best achieved by the capture and storage of information in centralized data banks is often interpreted as a challenge to professional autonomy and as devoid of any meaningful understanding of the complexities surrounding such things as the ‘identity’ of the service user and their needs and rights in relation to what information about them is made available, to whom and in what context and with what consents.

What this suggests is the need to develop some capability to assist e-government projects to develop a new discourse that can escape the constraints of the ‘technical’ and ‘systematizing’ language of system suppliers and designers that can so confound the user in public (and indeed most other) organizations. At the same time such an approach needs to grasp the possibilities for design by doing where the boundaries between technology design and implementation are as

---

This seven year UK-based programme has involved studies of the sociotechnical architectures involved in the integration of public service delivery in a variety of domains and, inter alia, the development of generic sociotechnical frameworks and tools to support public professionals and managers in the transformation of local service delivery. This work has been funded variously by the UK research councils, European Commission and the UK Central Government - see http://www.ncl.ac.uk/kite/research/informatics/; http://www.fame-uk.org/.
blurred as they are in complex information technology projects applied to unfamiliar and equally complex settings (precisely the situation in many e-government projects). Moreover, it suggests that this discourse needs to be co-produced by the users in public organizations alongside system developers and other partners. In our more recent work we have engaged in a variety of e-government projects where the aim has been to create a ‘social learning space’ (Williams et al, 2005) that will support such co-production. Our approach, unlike more conventional system development tools and methods, starts from a position that initial interactions between ‘developers’ and ‘users’ should be grounded in the ‘realities’ of the practice context in which new sociotechnical arrangements are to be determined. As such, initial material presented in the ‘social learning space’ should meet the following criteria. First, it is recognizable by the participants as relevant and realistic in their worlds; second, it reflects and raises issues about the relevant scope, boundary conditions and capacity constraints of policy, resource, technology as well as the legal/ethical conditions; and third, it provides a starting point that participants can adopt and appropriate in the process of internalizing and sharing an emerging set of models, plans and designs. What we have found is that the discourse and associated boundary objects that emerge then become the basis for considering new scenarios (e.g. the possibilities for information sharing, how joint working might work, what role information systems might play in supporting this) and provide a way in which the different constituencies involved can articulate their own world views but also, critically, start to understand those of others and to jointly create a new ‘big and rich picture’ of alternative possibilities. In the language of the previous discussion, they are thus starting, in a supported and reflexive manner, to engage in the ‘editing’ process seen as central in the ‘technology-in-practice’ perspective.

We would suggest therefore that the technology-in-practice approach is useful in highlighting the context specific dimensions of the sociotechnical dynamic in change and innovation represented by e-government. In particular, the manner in which this arises from the interaction between sociotechnical features of the context of deployment and use and the interpretative processes that shape change and innovation during implementation, are brought to the fore. At the same time technology is not seen as a ‘given’ or fixed’ feature acting on this context but one that can and invariably does arise as a ‘working system’ as users give meaning and value to its use in practice. Having said this, the approach does not deal adequately with the manner in which externally derived sociotechnical phenomenon ‘carry’ or attempt to ‘carry’ embedded meaning into new contexts and thereby into this interaction. In seeking to avoid deterministic notions of ‘objective technology’ or to give causal powers to ‘technological artifacts’, Orlikowski talks in general
about enabling and constraining ‘boundary conditions’, and the influence of the rhetoric of technology promoters. However, her insistence on a sharp conceptual distinction between technological artifacts and technologies-in-practice means the interrelationship between the two is not fully articulated. In particular, the idea that technologies-in-practice are entirely a product of the ‘editing’ carried out by users in specific contexts provides little understanding of either the sociotechnical constitution of the artifacts being so ‘edited’, or the power of the rhetorical means by which their promoters and supporters may enable or constrain the shaping of technologies-in-practice.

For example, the infrastructural properties of ICTs have increasingly been highlighted as an alternative to the more conventional view that stresses their utility only as an application resource (Hanseth and Montiero, 1998). Such, infrastructures can become embedded in existing social arrangements; they assume a transparency in use for the user and only become visible when the resource ceases to function properly; and membership of a user community can come to be marked by familiarity with and the ‘taken for granted’ nature of infrastructures (see Starr and Rhudler, 1996). What may not be so apparent in empirical observations which focus solely on users and their making of technology-in-practice may be the less obvious and by definition more implicit and tacit influences of the infrastructural properties underpinning the context of interpretation (to use one of Orlikowski’s examples, we may be able to ‘edit’ a practice-based view of the supermarket but store designers put considerable effort into influencing this – not least by periodically ‘re-shuffling’ all of the isles to force us to go into new areas). Indeed, it is evident from our research that only by getting technology suppliers and developers to think of their activity in terms of the provision of infrastructures, rather than the supply of applications to be used in a pre-determined way, that new opportunities for ‘editing’ technology by users in their practice are made possible (see McLoughlin et al, 2004b).

CONCLUSION

In sum, the purpose of advocating a three dimensional approach to e-government is to add to the insights of the one and two-dimensional approaches not to supplant them. A characterisation of both technologies and social contexts remains central, as is a study of their mutual influence and interpenetration. However, at the same time, what effects change in public organizations are complex combinations of the ‘sociotechnical’, and the nature, causes and consequences of such configurations is something that is not only significant in their own right but provides the context
for integrating and focusing the one and two dimensional analyses. Finally, if instead of blaming the failure of ‘e-government’ projects on either the ‘technology of e-government’ on the one hand or the ‘lack of innovativeness of public services’ on the other, we can instead start to define such problems and their potential solutions in more sociotechnical terms - i.e. it is always a question of both the technical and the social - then we will have made some practical progress as well in thinking through problems such as service integration, joined-up working and information sharing which lie at the core of the e-government project.

REFERENCES


Figure 1: The Three Dimensions of Technology (source Badham, 2005: 132-133)

1a: One-dimensional views

Structural impact

Social impact

1b: Two-dimensional views

Soft Determinism

Mutual Shaping

1c: Three-dimensional view
Figure 2: Stages of interaction between e-government and context (source: Heeks, 2005:55)

E-government technology

<table>
<thead>
<tr>
<th>Invented</th>
<th>Designed</th>
<th>Deployed</th>
</tr>
</thead>
</table>

Invention context

Design context

Deployment context

E-government context
Figure 3: Fountain’s Technology-Enactment Model (source Fountain, 2002)

**Organizational Forms**
- Bureaucracy
  - Hierarchy
  - Jurisdiction
  - Standardization
  - Rules, files
  - Stability
- Networks
  - Trust vs exchange
  - Social capital
  - Interoperability
  - Pooled resources
  - Access to knowledge

**Objective IT**
- Internet
- Other digital telecommunications
- Hardware
- Software

**Institutional arrangements**
- Cognitive
- Cultural
- Socio-structural
- Legal and formal

**Enacted technology**
- Perception
- Design
- Implementation
- Use

**Outcomes**
- Indeterminate
- Multiple
- Unanticipated
- Influenced by rational, social, and political logics
Figure 4: Orlikowski’s Technology-in-Practice Model