# New socio-technical perspectives of IS innovation in organizations

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# New socio-technical perspectives of IS innovation in organizations

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## INTRODUCTION

In this chapter, I present and discuss the understanding of 'innovation' associated with ICTs at the organizational level that has been formed in the stream of IS research which draws on social theory. I take IS innovation to mean both the process leading to a new technology-mediated organizational practice and the results of such a process, that is, a novel way of technology-mediated practice.

The term innovation is not actually widely used in the IS literature. As a field with the mission to elaborate on the process of accommodating ICT artefacts in the practices of an organization, IS has been preoccupied with the nature and comparative merits of specific activities through which artefacts are produced and organizational practices change, such as 'development', 'implementation' and 'design'. Also, IS research endeavoured to understand the nature of innovation as the outcome of a process of IS development, implementation or design. Thus, from an early stage, a great deal of debate has been directed at shaping the understanding of the result of IS development processes as new socio-technical arrangements for handling information in an organizational context, rather than as a new technology systems. Although no accurate definition of the concept of 'information system' has ever been agreed, there is a discernible tacit agreement in the IS field that it refers to information content and social context, as well as technologies.

This perspective raises several issues regarding the process of ICT innovation in organizations. A major question is about the nature of the inter-relationship between the two constitutive parts of IS innovation: the change of organizational practices and the acquisition or construction of technology artefacts. Can we expect the development or acquisition of new ICT systems to drive, and necessitate the working out of, specific new organizational practices and structures, such as customer-oriented practices or network structures? Is it the other way round, that is, effective take up of ICTs require specific structural characteristics and established modes of work practice? Or is there a different way of understanding the relationship between ICT and organizations that does not assume one is determined by the other? Another related question concerns the kind of effort involved in IS innovation. Is it a matter of methodical and skilful technical tasks, of managerial competences, of political manoeuvring? Can the process of IS innovation be controlled by engineering, management and policy – or should it be seen as an inherently uncertain process of social change?

It is also worth asking how innovation in the local context of an organization is associated with the advent of new technologies and the prevalence of particular organizational practices and structures in the broader context of IT and management-consultancy industries, competitor firms or any other influential organizations. Are organizations in a position to work out new technology-mediated practices or are they, perhaps with the exception of a few 'leaders', merely imitating what has proven to be successful ICT-based practice elsewhere?

I argue in this chapter that the process of IS innovation is not determined by the material properties of the technology or by the structural properties of the social context implicated in the innovation. Nor is it under the control of a team of management and technology professionals. Instead, the construction or the configuration of new technology artefacts and the working out of organizational arrangements unfold by a mix of technical/rational tasks, institutionalized enactments and improvisational action, as people make sense of the potential of ICTs in their work context and seek to appropriate it. IS innovation is inevitably situated in the organization concerned, although most technology components are acquired as standard 'solutions' from the IT industry and many IS implementation efforts are aimed at introducing what are seen as established 'best practice' elsewhere.

The next section explores this further by tracing the changing setting of IS innovation, from the days when all computer-based information systems were constructed 'in-house' to meet an organization's specific predetermined 'requirements' to the situation in the early 21st Century where most information systems are constructed from generic packaged software – often

with the mandate to change radically an organization's structures and practices. The subsequent sections outline and discuss the main types of IS innovation in contemporary organizations and the main theoretical aspects of the current understanding of the socio-technical process of IS innovation. Finally, I discuss the contribution this perspective makes and explain why the socio-theoretical stream of IS studies is crucial for the development of critical professional judgement for interventions at both the organizational and societal levels, although it is neither instrumental by itself nor feeds directly into normative professional practice.

## THE CHANGING SETTINGS OF IS INNOVATION

### Life-cycle Computer Applications Development

From its emergence around the late 1970s as a distinct academic field that studies IT in organizations, IS has had a particular conception of IT innovation centred on the notion of the 'life cycle'. With its roots in engineering, the life cycle played a multifaceted role in the development of the field. Most obviously, it provided a model to structure professional practice for the construction of IS applications in organizations. Beyond this prescriptive role, the life cycle shaped the general discourse on innovation in IS as a series of purposeful actions. These were based heavily on an analysis of both the information-processing requirements an IT application under construction should fulfil and the design of technical components of the application, mainly the data structures and data processing built into software. Consequently, this discourse gave rise to a specific research agenda that crystallized the set of intellectual and practical questions with which the IS community became preoccupied. Prominent among these have been:

- the methodological merits and philosophical basis of alternative analysis and design techniques (Lyytinen, 1987; Avison and Fitzgerald, 1996);
- the relationship between technical professionals (analysts and designers) and 'users' (Kyng and Mathiassen, 1982; Land and Hirschheim, 1983; Suchman, 1994); and
- the relationship of 'before' and 'after' events and actions implied by the cut-off point of implementation in the life cycle of an IT-based system (Land, 1982; Swanson and Beath, 1989).

According to this conception, IS innovation in organizations resides in the construction of the technical artefacts that are seen to be required by the business circumstances of the organization concerned. The prevailing view

has been that a firm's competitive needs justify the investment in new technology, and its operational particularities determine the information processing functionality of the chosen new technology. The outcome of such an innovation depends on various organizational change processes and technical tasks, involving cooperation and negotiation among management, technical experts and users.

Advances in ICT and changes in the innovation expectations of organizations have lessened the relevance of the life cycle as a model of practice, as a determinant of the discourse of innovation and as a source of research questions for the IS community. IT changed both in terms of what it does (the functionality of the technology) and how it is made available to organizations (the market of products and services). With layers of 'user friendly' systems and application software, and with an abundance of software products and services in the market, a great deal of IT enters organizations in the form of directly usable artefacts. This current state of IT contrasts sharply with that of the time almost all IT applications were developed 'in house', when a software construction process had to be set up to make usable artefacts from the then-available raw materials: compilers and computers (with a rudimentary interface).

In effect, the advent of packaged software and user-friendly computer interfaces has broken the life-cycle model of systems development into two parts, each of which may be seen as comprising its own cyclical pattern of activities. The first is located in software production firms and is concerned with the construction of generic products that address a range of alternative 'requirements', according to standard processes found in modern organizations. The second is located in 'user' organizations and is concerned with the configuration of a purchased generic product for their specific structures and processes. The size and technical sophistication of each of the two parts varies for different types of software applications. In general, the overall process of innovation is more complex than life-cycle-based systems construction, as it is mediated by a plethora of consultancy support services and in-house initiatives and improvisations carried out by technical experts and users.

**Implementation of IS Infrastructure**

The innovation expectations of organizations became both uncertain in terms of target organizational features and mimetic of fast changing fads. According to the IS literature, although the benefits of productivity and efficiency remained strongly associated with IT innovation, expectations shifted to 'enabling' restructuring in search of patterns of practice suitable for the emerging 'new economy'. IT innovation in organizations is seen as

being intertwined with efforts for moving towards new forms and norms of organizing. It should be noted that, in the broad context of contemporary business, various weakly-institutionalized organizational forms coexist and compete for legitimacy, such as the matrix structure, the network organization and the platform organization (Avgerou, 2000). This implies a fundamental change for the process of IT innovation, in so far as new technology artefacts in organizations are not derived as requirements for supporting the information processes of an existing organizational setting; instead, the artefacts are enablers of imaginary new organizational states. For example, packaged enterprise resource planning (ERP) systems are often acquired with the expectation of transferring 'best practice' for integrating a range of typically fragmented functions, such as orders, sales, payments, inventory control and procurement. Such a process of change involves a substantial, often massive, intervention for the redesign of work processes in parallel with the customization of the ERP software.

With such changes, the IS field has been faced with new challenges, both in terms of informing professional practice and of explaining the role of new technology in organizations (for example, see Currie and Galliers, 1999). It became clearer that IS innovation is not confined to the actions concerned with taking up (designing or transferring) new technologies, but is also concerned with issues of information, knowledge and changes of organizational structure and practice, such as changes in the content and structure of work tasks. In the intertwined technical and social processes of IS innovation, therefore, the social context is a constitutive part of innovation itself – not merely the container of technical artefacts and processes (Lea et al., 1999).

In the next section, I trace the main IS innovation practices that have emerged since the early 1990s, and discuss the way they are associated with organizational change. A change of terminology is indicative of a shift of focus in the activities comprising IS innovation. For instance, it has become most likely that an IS project will be called 'implementation' rather than 'development', signifying the importance of the effort involved in fitting a generically-designed software product into an organization.

## KEY TYPES OF IS INNOVATION IN ORGANIZATIONS

Three types of technologies have been most prevalent in the IS literature since the early 1990s: computer supported collaborative work (CSCW), ERP and intranets[1] or Internet-based network systems. There is a great deal of literature on a variety of other, often more specific, information systems, such as business-to-business (B2B) and business-to-customer (B2C) e-

commerce infrastructures. However, in terms of their construction efforts, these comprise – or are combinations of – the three categories of ERP, CSCW and network-based information systems. Each of these requires a different course of effort for its implementation.

**Computer Supported Collaborative Work**

CSCW systems are technology infrastructures intended to support cooperative work arrangements (Bannon, 1998). Most of them use generic packaged software application products, which require relatively minor technical work to install in order to begin operations. The most demanding part of the CSCW innovation process in an organization is the taking up of the technical system in an organization's practices, through the shaping of new processes of work in teams of co-workers.

Orlikowski (1996) analyses the way a CSCW application comes to bear on an organization's task as a process of emergent organizational change. A number of aspects of her analysis are important to highlight. The implementation of a CSCW technology, such as Lotus Notes, does not imply a particular work practice. Whether it leads to changes of practice, and whether the benefits generally associated with these technologies are achieved, depend on whether an organization's actors are interested in changing the way they work by exploiting CSCW's technical features and the capacity they have to take initiatives to transform their work. Capacity for such action varies in different organizational contexts. For example, organizations with a collaborative culture are more likely to accommodate CSCW technology keenly, making it a platform for reorganizing communication for the sharing of knowledge and the provision of mutual support to co-workers. In Orlikowski's research sample, employees in organizations with an individualistic and adversarial culture showed little interest in exploiting the possibilities for new ways of sharing and collaboration that such technical tools provide (Orlikowski, 2000).

Nevertheless, studies elaborating on the shaping of information systems through practice may be misleading with regard to the extent to which the flexibility of the technology can be taken for granted, and consequently the extent to which the initial design and configuration of the software system matters. Other studies show that the technical features of CSCW systems have constraining effects. Although they are intended to be flexible, it is not always possible to shape the systems to support the preferred practices of a team. Initial assumptions about desirable team performance may lead to technical properties that restrict team practice. For example, Sach's (1995) study of a computerized dispatching system intended to increase efficiency of a team of co-workers showed that the way the system was configured to improve the efficiency of individual tasks created problems for the overall

and long-term performance of the team. Such problems could not be overcome by adjusting work arrangements; it required the redesign of the technical components of the system.

**Enterprise Resource Planning**

The question of the possibilities opened up for shaping technology and technology-mediated practice according to the particularities of an organization is more pressing in cases of technologies that are not built to be flexible. One of the most rigid of more recent IT applications is ERP. As described in the literature, the processes of implementing such systems and changing organizational practice to accommodate them differ significantly from those that involve CSCW systems.

ERP is understood as 'an integrated IT-based system that supports the management of all enterprise resources including information, people, money products and services, materials and equipment' (Howcroft and Truex, 2001: 14). Such systems almost always make use of packaged software; they are not purpose-built for a specific organization. ERP software packages are complex, generic, typically modular products that require a substantial technical effort to configure for the circumstances of a particular organization. Three contentious issues about such systems are of interest to our analysis in this chapter.

First, to the extent that they require a major technical effort for 'customizing' the software product to the specifics of an organization's practice, ERP systems involve many of the technology-construction problems highlighted in the life-cycle-centred discourse of information systems development. The configuration of ERP packages bears many of the features of planned and methodical systems development familiar in purpose-designed information systems (Bancroft et al., 1998; Markus et al., 2000; Markus and Tanis, 2000; Kawalek and Wood-Harper, 2002). For example, according to Bancroft et al. (1998), the implementation of an ERP system involves four phases[2]:

1. 'As is' covers a detailed analysis of current business processes, the installation of the package, mapping of the business processes on to the ERP functions and training of the project team.
2. 'To be' concerns the design of the new system, including interactive prototyping to reach approval for the detailed features of the new system and the new business processes.
3. 'Construction and testing' deals with the development of a comprehensive configuration for the system and testing with real data.

4. ‘Actual implementation’ involves tasks similar to those of the implementation stage in the life-cycle model: putting in place the network infrastructure, installing the necessary technology components, training users and ‘going live’.

This kind of approach seeks to determine information processing requirements accurately, once and for all at the very beginning of the innovation process. That confronts analysts with difficulties in trying to resolve the clashes of meaning and interest among technical professionals, managers and ‘users’, as well as the restrictions that rigid information systems infrastructures impose on organization practice for years to come.

A second contentious ERP issue is that this innovation is further complicated by the linking of the configuration and implementation of the selected technology with the design and enactment of desirable organizational changes (Besson and Rowe, 2001). Thus, an ERP implementation tends to combine two design activities: the redesign of organizational structure and practice, and the design for the configuration of technology infrastructure to support the intended new structure and practice. There are practical issues here regarding the linking of the two processes and the containment of the entailed risks.

ERP implementation has been closely associated with business process re-engineering (BPR), a management practice expected to lead to the radical re-shaping of the way an organization conducts its business and aimed at major gains of efficiency and effectiveness in achieving an organization’s output. Despite the criticism that BPR-type interventions attracted throughout the 1990s (Jones, 1994; Galliers and Swan, 1999), such organizational re-engineering is often included in ERP projects – either before, or in parallel with, the software configuration. In some cases, the re-engineering of the organization is intended to fit the organizational processes to those inscribed in the ERP software package, either as a way of transferring ‘best practice’ or because it is considered much more complex and risky to change the software package to fit the particular way a company organizes its processes (Kawalek and Wood-Harper, 2002). In other cases, re-engineering is seen as necessary to work out improvements in the processes of the organization before these are fixed through an inflexible technical infrastructure (Besson and Rowe, 2001).

The third significant issue concerns the extent to which ERP implementation allows for the search for novel technology-mediated organizational structures and practices. The question is whether the designed-in functionality of the technology leaves scope for working out new socio-technical arrangements, or takes organizations towards standard routes of arranging and performing work processes. Indeed, in many cases, this is

the reason organizations embark on ERP projects: they expect to be driven to emulate ways of organizing and acting that are generally considered efficient, effective and 'modern'. This shift of attention to ERP implementation in the 1990s actually marked a turning in the IS literature from the discourse that emphasized innovative thinking for purposes of competitive advantage – the 'strategic IS' literature – to a discourse that sought the tidying up of core business processes for purposes of efficiency gains, albeit with a radical rhetoric such as BPR.

Thus, the hallmarks of ERP innovation are the adjustment of organizational structures and processes to prevalent norms, and the following of prevailing standards of organizing business firms by making use of technologies that are proven robust market leaders in a worldwide software market. Moreover, ERP technology infrastructure is understood to be rigid once it is put into organizational practice. It binds and controls organizational actors to comply with its functionality. There may be some leeway of manoeuvring and manipulation by the users to accommodate their own meanings and tasks within the complex software system. Overall, however, the controlling, restrictive, binding character of this kind of system is highlighted by both the message from the vendors and consultants through which ERP systems are diffused and the empirical evidence from research studies**.**

**Intranets and Internet-Based Systems**

The way intranets and Internet-based information systems are implemented and associated with organizational change has attracted relatively little attention. The few accounts of the activities involved in setting up and using these technologies suggest an unstructured and largely improvisational process of prototyping (Beynon-Davies et al., 2000; Damsgaard and Scheepers, 2000). No normative frameworks have been proposed for the methodical steering towards specific structures and practices, despite the general association of such technologies with radically new organizational forms, such as the 'virtual' organization. The deployment of network infrastructures can be contrasted to the rigid implementation of ERP systems in terms of the scope provided for diversity and local creativity.

This contrast is shown in Ciborra's (1996b; 2000) studies of the efforts pursued in a large pharmaceutical company, Hoffmann–La Roche, to develop an information infrastructure for its 'Strategic Marketing' function. This started with the development of MedNet, a corporate network with a portfolio of common applications to support the consulting of literature and access to data on clinical trials, as well as to enable office automation. MedNet was a centralized effort intended to integrate, standardize and unify

the marketing activities of the various national affiliates of the company, which enjoyed a great deal of autonomy due to the nature of the nationally regulated pharmaceutical industry. The implementation of MedNet was discontinued, according to Ciborra's (1996b) analysis, partly because its aim of overcoming the autonomous national feuds through global networking met with resistance, and partly because of its high cost and technical competence requirements.

The second phase of Hoffmann–La Roche's efforts to create an IS infrastructure in Strategic Marketing abandoned MedNet's objective of unifying and standardizing, and allowed the formation of a networking infrastructure through decentralization, autonomy and loose coupling. Ciborra (2000) describes the emergence in this phase of a multiplicity of Web sites for internal and external communication in the company's headquarters and affiliates. Multiple initiatives with little coordination created network systems with different technical features, content and functionality. Interestingly, despite the significance of confidentiality in the pharmaceutical industry, the picture presented in Ciborra's analysis is one of highly improvisational innovation in a very decentralized, loosely-coupled knowledge community that spans organizational boundaries and involves outside stakeholders, such as the scientific community, the public, national health services and medical doctors.

Ciborra's studies suggest that the implementation of intranets and Internet-based information systems shifts attention away from data processing to issues of networking and information content. The matter of central concern becomes neither the design of technology per se nor the design of organizational practice, but the fostering and harnessing of the communication potential and the information content. Key issues include the design of information content, the policy of access to external and internal information sources, the mechanisms of safeguarding the integrity of information and transactions, and the management of the dynamics of networking and information communication.

### Inter-organizational systems

Inter-organizational information systems, such as industrial networks and B2B and B2C e-commerce systems, combine and extend the functionality of the three types of systems outlined above. The implementation and operation of such systems are often overseen by a dominant company (Sydow, 1992). The new IS may be an extension of the dominant company's ERP, in which case the implementation of the technical system is methodically organized, aiming at establishing a long-lasting basis for standardized inter-organizational series of activities – and thus often accompanied by the

redesign of cross-organizational processes of business activities (Kumar and Christiaanse, 1999).

Sometimes, the development of inter-organizational information systems involves more radical organizational interventions, such as the development of intermediary organizations charged with the tasks of operating and managing the new technical infrastructure as a common collaborative resource for the competing firms of an industry (Knights et al., 1997). Inter-organizational information systems, therefore, also involve combinations of technology configurations and organizational interventions, which may be organized either in strict formal technical mode, or as open-ended processes of the formation of new patterns of interactions.

## THE NEW SOCIO-TECHNICAL DISCOURSE ON IS INNOVATION

The concerns of IS innovation seen as designing systems aimed at fitting technology to an organizational context continue to be relevant in the types of innovation discussed in the previous section, particularly in ERP projects. However, these more recent types of IS innovation established a new discourse that became prevalent in the IS field. IS innovation is explicitly linked in this new discourse with the organizational search for characteristics suitable for the changing broad socio-economic context and the harnessing of networking capabilities for the creation and exploitation of information content.

As already mentioned, the association of the development of technology-based information systems with organizational change is not new. The accounts of even the earliest computer applications in organizations suggest that technology innovation was understood to bring about business benefits by enabling new organizational processes, rather than by automating existing ones (Land, 1999). Enid Mumford's efforts to associate technical design with the redesign of work arrangements (Mumford and Weir, 1979) was central in the socio-technical design tradition of IS development of the 1970s and early 1980s. Similarly, issues of information content and communication were always part of the pragmatic and theoretical concerns of the IS field (Ackoff, 1967; Stamper, 1973). However, on the whole, IS research and practice paid lip service to organizational questions, and only in the 1990s IS innovation became directly linked with the search for new organizational forms that preoccupied business and management practitioners and scholars (Drucker, 1988; Applegate, 1994; Ciborra, 1996a; DeSanctis and Fulk, 1999).

During the 1990s, IS research continued to address itself to vocational considerations of business management and the IS consultancy industry,

directing a great deal of effort towards predicting trends and suggesting appropriate courses of technical and managerial activities (Davenport and Short, 1990; Scott Morton, 1991; Hammer and Champy, 1993; Galliers and Baets, 1998). But in that period, a stream of publications marked the emergence of theoretical perspectives that examine the IS and organizational change relationship through conceptual lenses drawn from the social sciences (Baskerville et al., 1994; Orlikowski et al., 1996; Bloomfield et al., 1997; DeSanctis and Fulk, 1999). In effect, IS research became engaged in the broader theoretical debate about the relationship of technology and society, the character of ICT-mediated socio-economic forms and the role of IS innovation in contemporary globalization trends.

**Structuration and Social Constructionist Theories**

Two major theoretical influences have dominated debates on the IS and organizational change relationship: structuration theory (Giddens 1984) and the social constructionist theories of the sociology of technology (Law, 1991; Bijker and Law, 1992; Grint and Woolgar, 1997)[3]. There are ongoing debates on the merits of the analytical perspectives each of these affords to IS research and the particular theoretical arguments derived from each theory (Walsham, 1997; Jones, 1999; Monteiro, 2000; Orlikowski, 2000). Nevertheless, structurational and social-constructionist analyses have together contributed to the elaboration of an understanding of IS innovation as a socio-technical process that implicates three constitutive elements (Barley, 1986; Orlikowski, 1992; Walsham, 1993; Orlikowski, 1996; Orlikowski, 2000):

1. organizational structure and culture (i.e. the institutionalized ways of going about the tasks organizational actors perform);
2. organizational actors' initiatives to appropriate the technical capabilities within the enactment of their jobs (i.e. the agency of the organizational participants); and
3. structural/material properties of the technologies used in the innovation process (i.e. the technical features that enable certain organizational conditions while constraining others).

Thus, new IS innovation theory attaches significance to the material properties of ICTs, for example in debates on the differences of communication afforded by alternative media, such as conversation in co-presence, conversation via telephone, or email (Lee, 1994; Markus, 1994). But it avoids forming cause-and-effect relationships between technology properties and organizational outcomes. Instead, the development and use of

ICT artefacts are understood to be embedded in particular social contexts. ICT-based information systems are formed by the cultural setting of a social environment while at the same time they contribute to its change by means of their technical properties (Mitev, 1996; Monteiro and Hanseth, 1996; Walsham, 1997; Monteiro, 2000). Consequently, research oriented to exploring this dynamic simultaneous shaping of technologies and re-shaping of social context suggests the following picture of the innovation process.

IS innovation results from the mobilization of networks of actors, either in formal design activities or in informal adjustments of existing artefacts. Furthermore, it involves the appropriation of artefacts in enactments of work practices, that is, in routine organizational roles and in the capacities of understanding and acting when confronted by unexpected events. Action for the shaping of technology artefacts and the transformation of work practices encompasses much more than the technical/rational activities of formal IS projects. In fact, the central effort of the IS field to develop methods for steering the innovation process towards predetermined goals was intensely critiqued by several authors, who pointed out the situated and emergent nature of action in organizations in general, and more specifically of action comprising innovation (Suchman, 1987; Orlikowski, 1996; Ciborra, 1999; Ciborra and Associates., 2000).

**The Significance of Improvisation**

Ciborra (1999) uses the notion of improvisation to highlight those decisions and actions that are not formally/rationally pre-planned, but that are taken spontaneously – on the spur of the moment – just as an actor experiences the situation confronting the course of an innovation. In this sense, improvisation is not 'irrational', but relies on an actor's past experience and ability to comprehend the situation and deploy spontaneously relevant competent behaviour. From such a phenomenological perspective, Ciborra argues that the general models for rationally-calculated action and methodical organization of systems development rarely works. Instead, IS innovation involves a great deal of spontaneous action and idiosyncratic decisions. Rather than resulting from preconceived views of successful outcomes, managerial control activities and methodical tasks of supervision, such innovation is inherently a process that addresses the unknown and requires the ability to respond to unforeseen circumstances. It also needs empathy and caring for the technologies that are put together to form new information systems.

Moreover, action in organizations has political dimensions. For example, Knights et al. (1997) discuss IT strategy in organizations as a political process. They see the 'discourse on strategy' – the ideas and methodical

ways according to which IS innovation is an activity that should be pre-planned and systematically performed – as a mechanism for managers to secure discipline and compliance to their own authority. In their words: 'IT-strategy is involved in the constitution of what is meaningful, becomes part of the internal self-discipline of subjects, provides a sense of security and confidence, and demonstrates managerial competence internally and externally' (Knights et al., 1997: 29). This view reverses the common logic: that the formulation of an IT strategy is the rational way to find out what is needed, and to plan for executing what needs to be done to meet that requirement. It suggests IT strategy does not just capture and model what is required for an unambiguously understood area of business but, in contributing to a particular way of understanding what an information systems should be, the strategy contributes to 'the constitution of what is meaningful'. Political behaviour is not an incidental dysfunctional behaviour, but a fundamental mechanism for holding the organization together as a social entity. In particular, it is a mechanism through which managers secure the legitimacy of their authority inside and outside the organization.

**Actor Network Theory**

Several authors have used actor network theory (ANT) to discuss IS innovation as a process involving the mobilization of actors with diverse interests towards a particular powerful actor's view of what the problem is, and what solution should be pursued (see, for example, Mitev, 1996; Bloomfield et al., 1997a; Hanseth and Monteiro, 1998). Whether a process of innovation actually gets launched, the extent to which it is pursued and whether it produces the outcomes intended by the actors who conceived it, depends on the power relations of this network of actors and on the influence of other networks that might erode or support it. A particular aspect of ANT is that technologies themselves are seen as powerful actors that may be mobilized to enforce a network.

An example suffices to demonstrate the difference of such thinking from the traditional technical rationality. ANT's socio-technical perspective sees a systems development methodology or a set of automated tools to support systems development activities as an actor that is mobilized by the analysts in a systems development project to strengthen their role and assist in leading the project towards what they consider is important: typically, a reliable and efficient technology-based information system. This view does not take for granted either the value of the goal of the innovation process or the role of the technologies involved. Both are contestable. No assumption is made about the de facto desirability of a reliable and efficient system. And rather than being neutral instruments, technical artefacts – such as the automated

tools used by systems analysts – take part in the innovation process as allies in networks of interests and power; they are constructed to carry inscriptions of organizational practice that privilege certain actors and constrain others.

The new socio-technical perspective sheds a different light on the issue of innovation diffusion too. As discussed by Madon in Chapter **4**, IS innovation is always shaped within specific, historically-formed social circumstances. Technology artefacts and practice extracted from the particular organizational setting within which they were designed or emerged may take the form of products or 'best practice' guidelines and methods, thus being transferable – or diffusible – to other settings. Yet, such 'immutable mobiles'[4] are not just adopted and then fitted into the information systems of another social context. They trigger a situated process for the construction of locally-meaningful technical tools and practices, thus involving the negotiation of their meaning and role by local participants. Such a situated process re-shapes the transferred artefacts and methods and de-scribes (reconstructs) their original social inscriptions, thus forming new socio-technical networks – which is the essence of IS innovation. In other words, IS innovation is the perpetual re-making of ICT artefacts and organizational practice in specific social settings.

## CONCLUSIONS

The theoretical perspectives of IS innovation outlined in this chapter do not result in knowledge that informs action in a direct and instrumental way, but they do identify the ingredients of successful IS innovation. Indeed, they reveal the significance of actions other than technical/rational in the course of innovation, such as sense-making of a situation in hand, improvisation, power alliances, mimetic behaviour, or unquestioned performance of taken-for-granted tasks rather than strategic analyses, market-oriented decision processes and engineering activities.

For example, while structurational analysis points out the significance of agency in exploiting the potential afforded by particular technologies, it deliberately avoids a functionalistic orientation towards reaching conclusions as to what action might contribute to desirable innovation (Orlikowski, 1996). No a priori assumption of a universally desirable innovation process is made. Innovation results from the enactment of roles that are meaningful and possible within the historically-shaped circumstances of an organizational context. This does not deny the utility of technical/rational activities, such as the processes of strategy making, or the use of techniques for carrying out engineering tasks – but it associates an organization's capacity to enact such activities with the social conditions of its existence.

Similarly, ANT's view of innovation as a process of 'translation' of a particular actor's interests and perceptions into a durable heterogeneous network of humans and technology artefacts does not tell us what kind of new socio-technical networks are desirable, or what action brings about such networks successfully.

Current research in the socio-technical perspective of IS innovation tends to combine interpretivist and critical approaches. Both recognize that the instrumental orientation which has historically dominated IS research has severe limitations. In many situations, it is not clear what the problems or the necessary 'improvements' are, and possible solutions and improvements are not a matter to be decided and executed on the basis of technical expertise alone. According to the interpretivist approach, what the problem is, what might be an improvement of a situation and how an improvement may be worked out are subject to the interpretation of various participants and observers. Typically, analysts and managers should expect to find multiple interpretations of a situation, and they should be aware that their views are also interpretations according to their professional knowledge and personal life experience. Thus, at best, they can act as facilitators for organizational change and processes of IS innovation, but cannot control the decisions and actions involved. A good example of this perspective is the role Checkland's (1981) 'soft systems' approach assigns to professional analysts.

Critical approaches, on the other hand, challenge the alleged facilitator's role of experts. Technology experts and management professionals, involved in an inherently political organizational context, have their own interests (Bloomfield and Danieli, 1995: 23-46; Avgerou, 2002). Negative as this may sound, such theoretical perspectives are very important – not only because they contribute to avoiding mistakes by over-reliance on the ability of professionals to be in control of innovations, but also because they build the analytical ability to see more fundamentally what IS innovation in organizations means within modern society.

Direct consequences for professional practice arise from the shifting of the theoretical perspective of innovation from analysing the relative merits of methodical technical/rational activities for the construction of artefacts and the design of organizational practice to studying the situated action through which technical artefacts and organizational practice are shaped. This shift positions conscious design activities in a broader context, where technological capabilities are interpreted and appropriated by actors in the organization enacting their roles.

From such a broader perspective, attention to improve planned and methodical action (either in carrying out the IS innovation process itself, or in creating effective organizations through it) does not necessarily have positive effects. Method-driven innovation may frustrate actors' sense-

making, improvisational and creative capabilities; planned courses of action towards predetermined technology-mediated practice are often intolerant to slow and uncertain processes of cultivating the capacity to accommodate the newcomer technologies in the social fabric of the organization; and information systems that seek to control the performance of an organization may deprive it of its vital capacity to cope with the messy and complex circumstances of contemporary organizing.

Seen in relation to the general socio-economic theories of technology innovation, the research literature I drew from in this chapter re-enforces the understanding that IS innovation is not just diffused from the setting within which ICT artefacts first emerged to other settings by means of the competent execution of technical activities such as the making of 'correct' estimates of the competitiveness of a business firm, the acquiring of software with advanced functionality, the redesigning of business processes. The literature puts forward a view of IS innovation as a process of purposive action situated within organizations, or alliances of organizations, the outcomes of which depend on the negotiations of values, meanings and competences of actors in the organizational setting concerned.

This has implications for development policy. In much of the economic development literature, ICT is seen instrumentally as a factor for improving economic performance and major national and international institutions have been engaged in promoting 'technology transfer', dedicating resources to the diffusion of computers, the Internet, etc. The socio-theoretical perspective put forward here does not deny that these technologies are rightly considered as potential enablers of developmental benefits. But the actual economic value achieved (or not) from their acquisition, results from socio-technical processes of innovation situated in the organizations of the countries importing the technologies and/or the new management ideas. Certain capabilities for such an innovation process may be created by appropriate policy interventions. Nevertheless, the socio-technical analysis suggests that the innovation process depends on the situated actors' capacity to make sense of the value of the new artefacts and organizing techniques, and to accommodate them in their historically formed enactments. The risk – all too visible in the widespread 'failures' of IS projects in developing countries – is that technology-diffusion policies which push specific technologies as 'drivers' to desirable 'impacts' or business 'best practice' distort local economic activities and frustrate, rather than enable, improved performance.

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# NOTES

1 Intranets are systems that use internet technologies for internal communication and co-ordination in organisations. Typically intranets are developed in large organisations with multiple sites and functional departments. By using internet technologies (communications protocols and standards) intranets allow communication across 'proprietary' systems of the various departments of the organisation, in the same way that the internet at large allows communication across the variety of computer systems.

2. Other authors describe different phases, but indicate similar tasks. For example, Markus and Tanis (2000) describe three phases: building a case for an enterprise system (chartering); getting the system up and running in one or more organizational units (project); and the period from 'going live' until 'normal operations' are achieved (shakedown).

3 For other efforts in theorizing the relationship between IS and organizational change, see Zuboff (1988), Kallinikos (1996) and Introna (1997).

4. Immutable mobile is a term suggested by Latour (1987) to make the point that technology artefacts inscribe particular social relations and practices, thus constituting actors in their own right, who subsequently circulate and take part in further efforts of shaping socio-technical networks.