4

To Reveal Is to Critique: Actor–Network Theory and Critical Information Systems Research

Bill Doolin and Alan Lowe
University of Waikato Management School, Hamilton, New Zealand

Introduction

This paper examines some of the issues for critical researchers of information systems (IS) arising from the post-modern turn (Lyotard, 1984; Seidman, 1994). The emphasis of the paper is to explore the increased interest and significance of research styles that have been developed within this genre and their application to IS research. The paper will approach this issue by giving particular attention to an examination of the relevance of research informed from an actor–network theory perspective. We see actor–network theory as an important addition to a broader critical research project (Alvesson and Deetz, 2000).

Alvesson and Deetz (2000) suggested that the challenge for critical management research is developing research that is not too easily dismissed as unfair and irrelevant. They argued that this requires a strong emphasis on empirical work as opposed to the conceptual work that has characterized critical scholars in management so far. It is believed that a critical project of the nature proposed by Alvesson and Deetz (2000) would be applicable in the IS literature, where a growing tradition of qualitative empirical inquiry may be particularly suited to such an expanded conception of the critical research agenda. In particular, it is argued that adopting an actor–network theory perspective to researching within organizations is well suited to the generation of such detailed empirical knowledge that is local and contextual.

Reprinted from 'To reveal is to critique: actor-network theory and critical information systems research', by B. Doolin and A. Lowe in *Journal of Information Technology*, 17, 2002, pp. 69–78. With kind permission from the Association for Information Technology Trust.

L. P. Willcocks et al. (eds.), *Enacting Research Methods in Information Systems: Volume 1*

In this sense, actor–network theory can be placed broadly within a post-modern mode of thinking that emphasizes the local and situated nature of all knowledge (Lee and Hassard, 1999). Modern forms of knowledge, whether in positivist, hermeneutic or Marxist guise, claim legitimacy by relying on universal standards and categories, what Lyotard (1984) called an 'incredulity toward grand narratives'. In contrast, postmodern knowledge undermines these traditional conceptions of knowledge and legitimacy in favour of heterogeneity and a decline of ideological hegemony in society. Post-modern knowledge emphasizes 'local, historically contextualised, and pragmatic types of social inquiry' (Seidman, 1994, p. 5).

The paper is structured as follows. The next section presents a discussion of the development of a critical research literature in IS. That section concludes that the definition of 'critical' used thus far in IS research is too limiting. Consequently, a broader definition of critical is pursued in the subsequent section, based on the work of Knights (1995), Alvesson (1999) and other organizational theorists. The paper then briefly reviews the concepts underlying actor–network theory before considering the ontological characteristics of actor–network theory that lend itself to such a broader critical research project. Finally, the paper discusses how IS researchers can use actor–network theory's performative view of social relations in being critical.

The critical turn in information systems research

The presence of a critical stream in IS research is nascent at best. In their seminal review of the mainstream IS research literature, Orlikowski and Baroudi (1991) found no articles they could classify as critical. The criteria they used in their review for defining a study as critical were as follows.

> Evidence of a critical stance towards taken-for-granted assumptions about organizations and information systems, and a dialectical analysis which attempted to reveal the historical, ideological, and contradictory nature of existing social practices (p. 6).

A similar definition of critical research was used by Myers (1997) in his discussion of qualitative research in IS.

> The main task of critical research is seen as being one of social critique, whereby the restrictive and alienating conditions of the

> *status quo* are brought to light. Critical research focuses on the oppositions, conflicts and contradictions in contemporary society, and seeks to be emancipatory i.e. it should help to eliminate the causes of alienation and domination.

The emphasis placed in these definitions of critical on challenging the *status quo* and on uncovering fundamental and alienating structural contradictions in society can be traced to the influence of the work of Jurgen Habermas and the Frankfurt School. Much of the critical research in the IS literature has drawn upon the critical social theory of Habermas (e.g. Ngwenyama, 1991; Lyttinen, 1992; Hirschheim and Klein, 1994; Ngwenyama and Lee, 1997). Indeed, as Ngwenyama and Lee (1997) acknowledged 'his work has had greater impact on the IS discipline than any other CST [critical social theory] school of thought' (p. 151).

Motivating IS researchers working in this tradition is an emancipatory interest in seeking less constraining alternatives to existing social conditions (Ngwenyama, 1991). This is a deliberate attempt to move beyond an interpretation and representation of IS phenomena that implicitly accepts and helps preserve the *status quo* to 'the emancipation of organizational actors from false or unwarranted beliefs, assumptions, and constraints' (Ngwenyama and Lee, 1997, p. 151). For example, Ngwenyama and Lee (1997) emphasized the importance of communication richness in electronic mail in the emancipation of organizational actors from distorted communicative acts. Similarly, Hirschheim and Klein (1994) discussed the potential emancipatory role of participation in IS development methodologies.

Although the critical social theory of Habermas represents a valid approach for the critical interpretation of information technology (IT) in organizations, the relative dominance of this approach in critical IS research is unnecessarily limiting. There exists a continuum of possible critical approaches (Thomas, 1993) and IS researchers can be critical while using other theoretical perspectives. Although not necessarily well represented in the IS research literature, there are alternative critical approaches to IT that draw on other fields of organization studies.

For example, Doolin (1998) argued that researchers need consciously to adopt a critical and reflective stance in relation to the role that the ITs that they describe play in maintaining social orders and power relations in organizations. He suggested that using a perspective drawn from the work of Michel Foucault on power is one way of accomplishing this. IT is both a condition and a consequence of power relations in

organizations and society (Knights, 1995) and, in order for IS research to be critical, the practices that surround and involve IT need to be analysed in the context of a wider set of social and political relations. Doing so requires opening up the 'black box' of IT and scrutinizing the power relations inscribed within it that may repress or constrain (Thomas, 1993; Knights and Murray, 1994).

Concern over the alienating potential of IT in the workplace, which has been voiced by some critical IS scholars working in a Habermasian tradition, is echoed by other academics using a Marxist perspective. For instance, Tinker (1998) criticized recent ethnographic research on IS for what he perceived as its uncritical appreciation of the social and historical context of technological developments. He suggested that this unreflective accommodation with IT reflects an equivocation that inadvertently helps legitimate (and accelerate) technological changes that degrade the quality and quantity of work.

The revitalized labour process theory that emerged following the publication of Braverman's (1974) monograph on the deskilling and alienating tendencies of technology has provided a significant critique of the managerial deployment of ITs in organizations (e.g. Knights and Willmott, 1988). Labour process theorists continue to provide a critique of how IT is implicated in the labour process in various IT-intensive contexts such as software development (e.g. Beirne *et al.*, 1998), business process re-engineering (e.g. Knights and McCabe, 1998) and call centres (e.g. Mulholland, 1999).

Another important source of critical research related to IS has grown out of a feminist critique of gendered assumptions about technology (e.g. Wajcman, 1991). Feminist scholars have been concerned with gender issues in the design of IS and IT (e.g. Green *et al.*, 1993) and with the gendered division of labour (Webster, 1996). In many cases their work connects with a political and emancipatory project for developing gender–technology relations that liberate (Gill and Grint, 1995).

The question this paper addresses is whether actor–network theory provides another suitable vehicle for critical theorizing in IS research. Before doing so, the paper will revisit the definition of critical research, constructing the meaning of critical in a different and more encompassing way to that of critical social theory.

Critical research as the intellectualization of method

Sayer (1992) argued that, in an orthodox conception, the 'basic aims of social science are taken for granted as the development of a "scientific"

objective, propositional knowledge which provides a coherent description and explanation of the way the social world is' (p. 233). However, Sayer (1992) argued that, if we are to address the 'difficult' questions of social science research, the orthodox conception generates 'unreasonable and contradictory expectations' (p. 233). Instead, he argued for an alternative critical theory conception. However, the open nature of social systems compared to those that are the concern of the natural sciences makes such a project difficult. Putnam (1978) described the objects of interest to the social sciences as being a 'structured mess', but perhaps the most apparent difficulty lies in the 'internality of social science to its object which makes the latter susceptible to change by the former' (Sayer, 1992, p. 234).

In responding to such doubts in regard to case study research into organizationally embedded IS, Knights (1995) recommended that the researcher dispel the illusion of neutrality that many academics and particularly positivists seek to cultivate around their activities. He argued that a more reflexive approach to both the self and other is necessary. Knights (1995) suggested that the contribution of case research lies in adding depth to more conventional approaches, but also that in-depth analysis facilitates the disruption of existing assumptions and certainties. However, the disruption of one set of representations involves the elevation of another that, in its turn, remains to be disrupted. Thus, case research sets in motion continual possibilities of the production, transformation and reproduction of representation. Positivism draws its appeal in part from its determination to ignore 'the ontological discontinuity between natural and social phenomena [and] leave its representations unreflexive and unproblematical' (Knights, 1995, p. 248). Knights (1995) suggested that case research ought not to concern itself with generalizability, but instead should seek to emphasize its strengths. These include the telling of convincing stories and the ability to express the uncertainty and undecidability of organizational life.

Alvesson and Skoldberg (2000) argued that good qualitative research is not so much a technical project as an intellectual one. They attempted to raise the level of empirically based qualitative social science through an eclectic 'intellectualization of method'. They sought to demystify a variety of post-structuralist ideas by treating them pragmatically as sensitizing devices for the qualitative researcher. In doing so, they abstracted 'principles and ideals from hermeneutics, critical theory and postmodernism, with a view to endowing qualitative research with a more reflexive character' (Alvesson and Skoldberg, 2000, p. 8).

In particular, Alvesson and Deetz (2000) identified three very broadly cast elements that make up the intellectual role of the critical researcher and which may have different emphases on critical research: insight, critique and transformative redefinition. Insight is associated with hermeneutic understanding in the critical tradition, while critique is regarded as illustrated by the genealogy of Foucault or the deconstruction of the post-structuralists. Those authors suggested that interpretive work aiming for insight may be complemented by limited elements of critique and transformative redefinition. They acknowledged that critique may also take a central place, but suggested that use of the empirical case study is typically more limited in such research. Alvesson and Deetz (2000) still wished to provide space for transformative redefinition, although wanting to avoid 'hyper-critique' and argued that it should not dominate empirical research.

For Alvesson and Skoldberg (2000) research was premised on access to empirical material and involved a belief that qualitative enquiry must have a value as a source of subjective meaning and insight into participants' experiences of a complex social world. This is a stream of thinking that Alvesson (1999) advanced strongly, arguing that we must 'give some space in research for knowledgeable subjects to say something that is well-informed . . . about their experiences and social practices' (p. 19).

Alvesson and Deetz (2000) argued that critical studies should offer images that counter the dominant ideals and understandings spread by dominant groups and mainstream management thinking through 'drawing attention to hidden aspects and offering *alternative readings*' (p. 17, emphasis added). This is seen as a way of involving the same issues and qualities in critical research that are important for organizations themselves. However, Alvesson and Deetz (2000) cautioned that care needs to be taken in order to avoid simply replacing the ideas present in existing hierarchies and undemocratic social relations with equally naïve Utopian ideals.

This leads us to the contribution of actor–network theory to a broader critical project. This paper suggests that actor–network theory offers a particularly effective 'alternative reading' of social interactions within organizations through its emphasis on empirical enquiry and its lack of constraining structure and ontology. In its early years actor–network theory was involved with sociological studies of science. Callon (1986a) and Latour (1987) wrote about scientists and scientific laboratories, 'strategic loci' that are representative of key institutions through which society and social values are moulded. This paper will argue for the

extension of such conceptions to IS. These systems are implicated within organizations as sociotechnologies of calculation and control. As such, they might reasonably be depicted as strategic loci, as perhaps suggested by Callon *et al*. (1986):

> And may we expect further revolutions in the means of translation, possibly in relation to what is sometimes called the information society? . . . This approach implies that such control is not monolithic. Rather, there is a wide range of struggling actors and there are periodic changes in both the means of control and the strategic loci (p. 229).

What is this thing called actor–network theory?

There are dangers in naming and labelling – particularly in the construction of 'actor–network theory' and its abbreviation ANT (Latour, 1999; Law, 1999). In using the term actor–network theory we are speaking of what the initial work on actor–networks and the sociology of translation (Callon, 1986a,b; Latour, 1987; Law, 1987) has become and at the same time contributing to its 'black boxing'. This simplification has meant that actor–network theory has become easily transportable and translated into many different arenas of academic research. However, it has also tended to reduce some of its power in apprehending complexity (Law, 1999) and to lead to normative pronouncements of 'what is' actor–network theory and 'what is not'. As Law (1999) reminded us, that which has been labelled actor–network theory is not a fixed theoretical position (performed in part through the act of its naming), but rather a 'heterogeneous work in progress' (p. 9).

Nevertheless, for those who are not familiar with actor–network theory, the paper attempts here a brief representation of some of the concepts associated with it. Actor–network theory perceives contemporary society as constituted by heterogeneous collectivities of people, but always together with technology, machines and objects. It is the intricate inter-relations among the heterogeneous elements of technoscience that make up our society and organizations (Knorr-Cetina, 1997). These interrelationships are theorized as networks of human and non-human actors, each of which is itself the effect of a network of heterogeneous elements – hence 'actor–network' theory, for an actor is also a network (Callon, 1991).

A fundamental aspect of actor–network is their relationality. Actors, both individual and collective, are defined and interactively constituted

in their relationships with other actors in the actor–network (Law, 2000). An actor, in the (semiotic) sense used here, is something that acts or to which activity is granted by others. Actor is accepted to be the source of an action, regardless of its status as a human or non-human. Differences in agency and size between actors are the result or outcome of some process of negotiation involving power relations (Callon and Latour, 1981). All are relational achievements, that is uncertain effects generated by an actor–network and its mode of interaction. Such actors are constituted as objects only to the extent that the actor–network stays in place (Law, 1992).

The relative durability of actor–networks is a consequence of their heterogeneity. Actor–networks come in a variety of material forms, such as people, texts, machines and architectures. Actor–networks are made relatively cohesive and stable by the way they are intimately bound up with the material and the technical (Latour, 1991; Joerges and Czarniawska, 1998). The ordering of the social is never purely social, but rather sociotechnical in that the social and the technical mutually define one another (Law, 1991; Knights and Murray, 1994). The corollary is that society and technology cannot be conceptualized as ontologically separate (though interrelated) entities (Latour, 1994).

Entities establish themselves as agents, building a network of alliances by defining, mobilizing and juxtaposing a set of materially heterogeneous actors, obliging them to enact particular roles and fitting them together to form a working whole (Law, 1988). The agent becomes the spokesperson of the actors constituted in this translation (Callon, 1986b; Law 1992). This 'enrolment' of allies in a network involves persuading other actors that they share a common interest or problem. The agent seeks to enrol other actors into a network by a process of 'problematization' (Latour, 1987), presenting a problem of the latter in terms of a solution belonging to the former. However, resistance is possible and translation is only achieved when actors accept the roles defined and attributed to them. If an actor resists enrolment and defines itself differently it becomes complex, possibly leading to the modification or disintegration of the actor–network system (Callon, 1986a,b).

Actor–network theory's theoretical constructs place great reliance on the tracing of intricate networks and associations among human and non-human actors (Whitley, 1999). While powerful, these networks and alliances place constraints and limits on technoscience and its systems. We are continually reminded by Latour (1987, 1993, 1999) of the dependence of technoscience upon its networks of relations, of the significance of centres of calculation, of enormous volumes of mundane

inscriptions and of the importance of the enrolment of people and objects into the technoscience project. Without substantial resources and effort, ideas do not travel, prototypes do not become commonplace and knowledge does not produce centres of calculation that become 'obligatory points of passage'. It is only after all these resources have been successfully assembled and brought to bear that controversies are settled and black boxes are produced (Preston *et al.*, 1992).

Ontological considerations

This paper will now focus on the ontological aspects of actor–network theory, which are at one and the same time the reason for a substantial critique and the source of its explanatory power. Drawing on Callon (1986b), Michael (1996) summarized these as (1) an agnosticism or impartiality towards the nature of the actors involved in a controversy, (2) a generalized symmetry in treating human and non-human actors with the same analytic framework and vocabulary and (3) a repudiation of a priori distinctions between the social and the natural or technical.

Lee and Hassard (1999) argued that what actor–network theory can offer to our understanding of sociotechnical relations is essentially consequent on an acceptance of a relativist view of the nature of society. Yet, actor–network theory gains much of its notoriety from the way in which human and non-human, the social and the technical, are brought together in the same analytic view (Hassard *et al.*, 1999). Walsham (1997) outlined a number of criticisms of actor–network theory that arise from the organizational theory literature, including an inadequate consideration of social structures, the symmetric treatment of humans and non-humans and moral relativism. Although Walsham (1997) did not explicitly mention them as such, these criticisms constitute a major obstacle to operating under the received view of critical theory as described in an earlier section of this paper.

The first criticism relates to actor–network theory's emphasis on the local and the contingent and how these contribute to the production of social order. Critics of actor–network theory argue that this emphasis neglects the reverse role that institutionalized social structures play in influencing the local process of social interaction (Walsham, 1997). Traditional critical theory tends to assume the inevitable presence of conflict brought about through predetermined and pre-existing social structures. Yet, in actor–network theory social structures are themselves the relational achievements. Whether entities are kings, countries or classes, they are as much an effect, the outcome of the interaction

between networks of forces, as a cause of subsequent events (Callon and Latour, 1981; Law, 1992; Law and Mol, 1995). As Latour (1991) put it 'the macro-structure of society is made of the same stuff as the micro-structure' (p. 118).

This emphasis on 'relational materiality' (Law, 1999), i.e. that entities achieve their form and attributes as a consequence of their relations with other entities, reflects an unwillingness to accept a priori the pre-existence of social structures and differences as somehow inherently given in the order of things. This enables actor–network theory to explore how particular social relations are translated and performed in different localized contexts. For, as Law (1999) observed, entities are performed in, through and by the very relations that define them. This is not to say that differences do not occur (Callon and Latour, 1992) or that some network effects are not relatively stable and enduring (Gill and Grint, 1995). What actor–network theory is interested in is how it is that this durability is achieved: 'How is it that things get performed (and perform themselves) into relations that are relatively stable and stay in place' (Law, 1999, p. 4).

Actor–network theory avoids the tendency to reify social relations as given entities that are 'constructed as macro-actors and shut away into black boxes' (Ormrod, 1995, p. 44) focusing instead on how they are actively enrolled as resources in sustaining an actor–network system. The aim is to open up these black boxes, these simplifications that we take for granted all too often and expose the way that translations occur and associations are generated (Somerville, 1999) and, in doing so, explore how social relations are ordered so as to 'generate effects like organizations, inequality, and power' (Law, 1992, p. 381).

Similarly, actor–network theory does not assume the pre-existence of interests attributed to various actors. Rather than modes of domination obscuring or distorting the 'real interests' of organizational participants (subject to a 'false consciousness'), interests (and domination) are treated as relational effects, which are the 'temporarily stabilized outcomes of previous processes of enrolment' (Callon and Law, 1982, p. 622).

A consequence of relational materiality is the symmetric treatment of humans and non-humans. The implication is that what is an actor is an empirical matter. As Callon (1991) observed, 'in this ontology actors have both variable content and variable geometry' (p. 140). Both human and non-human actors should be treated with the same analytical framework and vocabulary (Callon, 1986b; Latour, 1987, 1993; Law, 1987), that is all should be considered as actors who may play a role in the patterning of sociotechnical networks. This refusal to privilege the human

has caused some controversy in sociology, such as in the exchange between Callon and Latour (1992) and Collins and Yearley (1992).

The focus in critical social theory tends to be on questions of human agency (Whitley, 1999). Technology is often ignored or relegated to a role as a tool of oppression, domination and control. However, it is important to realize that actor–network theory does not seek to diminish the importance of humans, but instead to highlight the role of what Latour (1992) called the 'missing masses' in stabilizing the heterogeneous actor–networks that make up organizations and society. As Walsham (1997) noted, in this age of (sociotechnical) hybrids challenging the rigid separation of human and non-human seems valuable, particularly where the boundaries between the social and the technical are continually negotiated and defined, such as in IS (Bloomfield and Vurdubakis, 1994).

Finally, actor–network theory is frequently grouped with social constructivism, which attracts charges of apoliticism or moral relativism. The agnosticism inherent in actor–network theory (Ormrod, 1995) derives from the position that the various perspectives, interpretations and identities of actors implicated in the actor–network should not be presumed or fixed by an observer when they are subject to negotiation (Callon, 1986b). However, Latour (1991) argued that actor–network theory is not indifferent to the possibility of moral judgement, but rather rejects judgements that transcend the network, somehow originating from outside the empirical events and relationships that actor–network theory describes. In this sense, actor–network theory is similar to Foucault's rejection of the possibility of normative justification in that the imposition of moral consequences from beyond the actor–network is itself an operation of power (cf. Ormrod, 1995) in which one form of domination is exchanged for another.

To reveal is to critique

Walsham (1997) concluded that, for actor–network theory to examine ethical and moral implications related to IS, there is a need to include political, ethical and moral theories from outside the actor–network. He is not alone. For instance, Whitley (1999) attempted to combine Habermas with actor–network theory in proposing a critical theory for a new collective of humans and non-humans. Ciborra and Hanseth (1998) invoked Heidegger alongside actor–network theory in their work on information infrastructures. Knights *et al*. (1997) drew on Foucault in their study of computer networks in the financial services industry,

as did Brigham and Corbett (1997) in their discussion of how electronic mail is implicated in organizational power relations and control at a distance. Even Latour (1996) seemed to hint that something else needs to be added to the network when asked to provide policy or pass judgement. Hull (1999) picked up the hint in his examination of knowledge management, where he attempted to show how a focus on 'conduct' (drawing on the work of Gillian Rose) 'provide[s] an example of a form of critical activity that can complement ANT, that can add a "something else" to network-tracing activity' (p. 415).

This is one possible route open to researchers working with actor–network theory and this paper does not wish to deny the value of insights gained through social theorizing of this nature. However, the paper is concerned with the idea that the introduction of such theories to actor–network theory studies of IS reflects an assumption that the network-tracing activity (Hull, 1999) of actor–network theory is unreflexive and acritical. This paper has already discussed the claims and critiques of actor–network theory in relation to agnosticism and it is important to remind ourselves that most of the research performed under the rubric of actor–network theory is concerned with the empirical description of the actor–network systems that have stabilized around various ITs, whether hospital IS (Bloomfield *et al.*, 1997), electronic data interchange standards (Hanseth and Monteiro, 1997) or software (Baxter, 2000).

The present authors do not accept that the agnosticism and ontological relativism of actor–network theory precludes critique. Instead, the paper will argue that the very act of tracing the network and the actions of its constituents, combined with a refusal to a priori make distinctions or grant status, enables a critical light to be shone on the assumed, the mundane and the status quo. While this paper supports the view that actor–network theory has offered new ways of understanding the socio-technical nature of IS (cf. Walsham, 1997), the authors believe that IS researchers need to move beyond this understanding and explore how distinctions are produced, status is constructed and social relations are stabilized. Actor–network theory is a useful way of defamiliarizing the taken for granted (Calas and Smircich, 1999). As Ormrod (1995) suggested 'If we are to successfully challenge the relations . . . we think are worse, unfair, wrong, then we need to be able to discuss them in all their specificity and difference' (p. 45).

Returning to the paper's earlier discussion of a broader critical project advocated by Alvesson and Deetz (2000), it is the reflexive and empirical inquiry that actor–network theory offers which makes it effective

as a critical research perspective. Actor–network theory is concerned with unravelling the heterogeneous materials and processes in which networks and actors are shaped and stabilized. It makes no a priori assumptions about the nature or character and the similarity or difference of the relations it describes (Law, 1999). These are not determined, permanent or universal (Wise, 1997). Instead, they are treated as matters of historical contingency (Michael, 1996), the outcome of processes of translation and negotiation.

This agnosticism means that it is able to 'record the discriminations that are performed and the boundaries that are constructed in the activities it studies' (Lee and Hassard, 1999, p. 392). There are differences between 'the powerful and the wretched', but these are 'differences in the methods and materials that they deploy to generate themselves' (Law, 1992, p. 390, emphasis removed). As Michael (1996) observed, it is through exposing this contingency that critique derives. In doing so, actor–network theory reveals how things could have been otherwise (Law, 1992; Michael, 1996).

For example, Walsham and Sahay (1999) provided some critical insights into an actor–network analysis of geographic IS in India. Their initial choice of exploring IT use in a developing country suggests some empathy with a critical agenda and in tracing the networks implicated in their case studies they questioned the desirability of global pressures and influences in these contexts. In particular, by providing an analysis situated in the social, political and cultural context of India, they were able to demonstrate how the inscription of Western values in the geographic IS technology reflected assumptions about rational decision making, spatial thinking and coordinated action, assumptions that to some extent conflicted with Indian values in the implementation of the geographic IS there.

Part of revealing how things could have been otherwise involves attempting to represent more than one point of view within an actor–network, addressing what Star (1991) called the 'distribution of the conventional' (p. 43). This is the heterogeneity of actor–networks: a sense of the multiplicity of humans and non-humans, an understanding of the work that keeps networks stable and an acknowledgement that networks are not necessarily stable for all. For instance, consider who an automatic door closer might discriminate against (Latour, 1988) or the plight of someone allergic to onions ordering a burger at McDonalds (Star, 1991).

> A stabilized network is only stable for some, and that is for those who are members of the community of practice who form/use/maintain

> it. And part of the public stability of a standardized network often involves the private suffering of those who are not standard – who must use the standard network, but who are also non-members of the community of practice (Star, 1991, p. 43).

As Star (1991) observed, we are all members of more than one social world or actor–network and, in this sense, we are all marginal to some extent through the differing degrees of our various memberships. Multiple memberships and multiple marginalities need to be incorporated into actor–network theory (Michael, 1996).

Conclusion

Actor–network theory, with its central concern being the understanding and theorization of the role of technology and technological objects within society, is an attractive candidate for researchers of IS and their implications within organizations. IS, but, even more directly, software packages, standards, rules, methods and conventions are particularly apt examples of technology or knowledge systems that together represent influential sociotechnologies of management. Research studies informed by actor–network theory might reasonably look to provide understandings and explanations of these phenomena in organizations. Walsham (1997) emphasized the potential contribution of actor–network theory in enabling us to think about the increasing hybridization of humans and IT. As Latour (1996) observed,

> It is no longer clear if a computer system is a limited form [of] organization or if an organization is an expanded form of computer system. Not because, as in the engineering dreams and the sociologists' nightmares, complete rationalization would have taken place, but because, on the opposite, the two monstrous hybrids are now coextensive (p. 302).

Lee and Hassard (1999) argued that actor–network theory is '*ontologically relativist* in that it allows that the world may be organized in many different ways, but also *empirically realist* in that it finds no insurmountable difficulty in producing descriptions of organizational processes' (p. 392, emphasis in original). Such a categorization provides a useful framework for those unfamiliar with the philosophical rhetoric that Latour (1993), in particular, has erected around his theoretic constructs. Lee and Hassard (1999) contended that actor–network theory has much

to commend it in the investigation of key contemporary developments in organizational thinking, practice and form.

Using actor–network theory as a research strategy puts a strong emphasis on empirical inquiry, despite actor–network theory's relativist ontology. This empirical aspect is in part composed of the careful tracing and recording of heterogeneous relational networks. What actor–network theory offers is a clear way of seeing these relations for what they are. They are powerful because of the relatively sophisticated combinations of resources and people that they mobilize. By using approaches such as actor–network theory we can seek to demystify the facts and data that they produce. Actor–network theory enables us to analyse the interrelationships that comprise actor–networks and show just how ordinary and mundane they often are. In doing this, actor–network theory offers the hope of a more fundamental appreciation and critique of the underlying relationships that pervade contemporary society. It is precisely these sociotechnical relations that we need to explicate in order to come to terms with a world where ITs are 'part of our everyday mode of existence, and our interactions with machines incrementally define our life experiences' (Calas and Smircich, 1999, p. 664).

Acknowledgement

A previous version of this paper was presented at the (Re-)Defining Critical Research in Information Systems Workshop, University of Salford, UK, 9–10 July 2001.

References

Alvesson, M. (1999) *Beyond Neo-positivists, Romantics and Localists: A Reflexive Approach to Organizational Research*, working paper (Lund Institute of Economic Research).

Alvesson, M. and Deetz, S. (2000) *Doing Critical Management* Research (Sage, London).

Alvesson, M. and Skoldberg, K. (2000) *Reflexive Methodology: New Vistas for Qualitative Research* (Sage, London).

Baxter, L. (2000) Bugged: the software development process. In *Managing Knowledge*, Prichard, C., Hull, R., Chumer, M. and Wilmott, H. (eds) (Macmillan, Basingstoke), pp. 37–48.

Beirne, M., Ramsay, H. and Panteli, A. (1998) Developments in computing work: control and contradiction in the software labour process. In *Workplaces of the Future*, Thompson, P. and Warhurst, C. (eds) (Macmillan, Basingstoke), pp. 142–62.

Bloomfield, B.P. and Vurdubakis, T. (1994) Boundary disputes: negotiating the boundary between the technical and the social in the development of IT systems. *Information Technology and People*, **7**(1), 9–24.

Bloomfield, B.P., Coombs, R., Owen, J. and Taylor, P. (1997) Doctors as managers: constructing systems and users in the National Health Service. In *Information Technology and Organizations: Strategies, Networks and Integration*, Bloomfield, B.P., Coombs, R., Knights, D. and Littler, D. (eds) (Oxford University Press, Oxford), pp. 112–34.

Braverman, H. (1974) *Labour and Monopoly Capital: The Degradation of Work in the Twentieth Century* (Monthly Review Press, New York).

Brigham, M. and Corbett, M. (1997) E-mail, power and the constitution of organisational reality. *New Technology, Work and Employment*, **12**(1), 25–35.

Calas, M.B. and Smircich, L. (1999) Past postmodernism? Reflections and tentative directions. *Academy of Management Review*, **24**(4), 649–71.

Callon, M. (1986a) The sociology of an actor–network: the case of the electric vehicle. In *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World*, Callon, M., Law, J. and Rip, A. (eds) (Macmillan, London), pp. 19–34.

Callon, M. (1986b) Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In *Power, Action and Belief: A New Sociology of Knowledge?*, Law, J. (ed.) (Routledge and Kegan Paul, London), pp. 196–233.

Callon, M. (1991) Techno-economic networks and irreversibility. In *A Sociology of Monsters: Essays on Power, Technology and Domination*, Law, J. (ed.) (Routledge, London), pp. 132–61.

Callon, M. and Latour, B. (1981) Unscrewing the big Leviathan: how actors macro-structure reality and how sociologists help them to do so. In *Advances in Social Theory and Methodology: Toward an Integration of Micro- and Macro-sociologies*, Knorr-Cetina, K. and Cicourel, A.V. (eds) (Routledge and Kegan Paul, Boston), pp. 277–303.

Callon, M. and Latour, B. (1992) Don't throw the baby out with the bath school! A reply to Collins and Yearley. In *Science as Practice and Culture*, Pickering, A. (ed.) (University of Chicago Press, Chicago), pp. 343–68.

Callon, M. and Law, J. (1982) On interests and their transformation: enrolment and counter-enrolment. *Social Studies of Science*, **12**, 615–25.

Callon, M., Law, J. and Rip, A. (1986) Putting texts in their place. In *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World*, Callon, M., Law, J. and Rip, A. (eds) (Macmillan, London), pp. 221–230.

Ciborra, C.U. and Hanseth, O. (1998) From tool to *Gestell*: agendas for managing the information infrastructure. *Information Technology and People*, **11**(4), 305–27.

Collins, H. and Yearley, S. (1992) Epistemological chicken. In *Science as Practice and Culture*, Pickering, A. (ed.) (University of Chicago Press, Chicago), pp. 301–26.

Doolin, B. (1998) Information technology as disciplinary technology: being critical in interpretive research on information systems. *Journal of Information Technology*, **13**(4), 301–11.

Gill, R. and Grint, K. (1995) Introduction. In *The Gender–Technology Relation: Contemporary Theory and Research*, Grint, K. and Gill, R. (eds) (Taylor & Francis, London), pp. 1–28.

Green, E., Owen, J. and Pain, D. (1993) *Gendered by Design? Information Technology and Office Systems* (Taylor & Francis, London).

Hanseth, O. and Monteiro, E. (1997) Inscribing behavior in information infrastructure standards. *Accounting, Management and Information Technologies*, **7**(4), 183–211.

Hassard, J., Law, J. and Lee, N. (1999) Preface. *Organization*, **6**(3), 387–90.

Hirschheim, R. and Klein, H.K. (1994) Realizing emancipatory principles in information systems development: the case for ETHICS. *MIS Quarterly*, **18**(1), 83–109.

Hull, R. (1999) Actor network and conduct: the discipline and practices of knowledge management. *Organization*, **6**(3), 405–28.

Joerges, B. and Czarniawska, B. (1998) The question of technology, or how organizations inscribe the world. *Organization Studies*, **19**(3), 363–85.

Knights, D. (1995) Refocusing the case study: the politics of research and researching politics in IT management. *Technology Studies*, **2**(2), 230–54.

Knights, D. and McCabe, D. (1998) 'What happens when the phone goes wild?' Staff, stress and spaces for escape in a BPR telephone banking work regime. *Journal of Management Studies*, **35**(2), 163–94.

Knights, D. and Murray, F. (1994) *Managers Divided: Organisation Politics and Information Technology Management* (Wiley, Chichester).

Knights, D. and Willmott, H. (1988) *New Technology and the Labour Process* (Macmillan, Basingstoke).

Knights, D., Murray, F. and Willmott, H. (1997) Networking as knowledge work: a study of strategic inter-organizational development in the financial services industry. In *Information Technology and Organizations: Strategies, Networks and Integration*, Bloomfield, B.P., Coombs, R., Knights, D. and Littler, D. (eds) (Oxford University Press, Oxford), pp. 137–59.

Knorr-Cetina, K. (1997) Sociality with objects: social relations in postsocial knowledge societies. *Theory, Culture and Society*, **14**(4), 1–30.

Latour, B. (1987) *Science in Action: How to Follow Scientists and Engineers Through Society* (Harvard University Press, Cambridge, MA).

Latour, B. (1988) Mixing humans and nonhumans together: the sociology of a door-closer. *Social Problems*, **35**(3), 298–310.

Latour, B. (1991) Technology is society made durable. In *A Sociology of Monsters: Essays on Power, Technology and Domination*, Law, J. (ed.) (Routledge, London), pp. 103–31.

Latour, B. (1992) Where are the missing masses? The sociology of a few mundane artifacts. In *Shaping Technology/Building Society: Studies in Sociotechnical Change*, Bijker, W.E. and Law, J. (eds) (MIT Press, Cambridge, MA), pp. 225–58.

Latour, B. (1993) *We Have Never Been Modern* (Harvard University Press, Cambridge, MA).

Latour, B. (1994) On technical mediation – philosophy, sociology, genealogy. *Common Knowledge*, **3**(2): 29–64.

Latour, B. (1996) Social theory and the study of computerized work sites. In *Information Technology and Changes in Organizational Work*, Orlikowski, W.J., Walsham, G., Jones, M.R. and DeGross, J.I. (eds) (Chapman & Hall, London), pp. 295–307.

Latour, B. (1999) On recalling ANT. In *Actor Network Theory and After*, Law, J. and Hassard, J. (eds) (Blackwell, Oxford), pp. 15–25.

Law, J. (1987) Technology and heterogeneous engineering: the case of Portuguese expansion. In *The Social Construction of Technological Systems: New Directions in*

the Sociology and History of Technology, Bijker, W.E., Hughes, T.P. and Pinch, T.J. (eds) (MIT Press, Cambridge, MA), pp. 111–34.
Law, J. (1988) The anatomy of a socio-technical struggle: the design of the TSR2. In *Technology and Social Process*, Elliott, B. (ed.) (Edinburgh University Press, Edinburgh), pp. 44–69.
Law, J. (1991) Introduction: monsters, machines and sociotechnical relations. In *A Sociology of Monsters: Essays on Power, Technology and Domination*, Law, J. (ed.) (Routledge, London), pp. 1–23.
Law, J. (1992) Notes on the theory of the actor–network: ordering, strategy, and heterogeneity. *Systems Practice*, **5**(4), 379–93.
Law, J. (1999) After ANT: complexity, naming and topology. In *Actor Network Theory and After*, Law, J. and Hassard, J. (eds) (Blackwell, Oxford), pp. 1–14.
Law, J. (2000) *Networks, Relations, Cyborgs: On the Social Study of Technology* (Centre for Science Studies and the Department of Sociology, Lancaster University, Lancaster. Available at http://www.comp.lancs.ac.uk/sociology/soc042jl.html).
Law, J. and Mol, A. (1995) Notes on materiality and sociality. *Sociological Review*, **43**(2), 274–94.
Lee, N. and Hassard, J. (1999) Organization unbound: actor–network theory, research strategy and institutional flexibility. *Organization*, **6**(3), 391–404.
Lyotard, J. (1984) *The Postmodern Condition: A Report on Knowledge* (University of Minnesota Press, Minneapolis).
Lyttinen, K. (1992) Information systems and critical theory. In *Critical Management Studies*, Alvesson, M. and Willmott, H. (eds) (Sage, London), pp. 159–80.
Michael, M. (1996) *Constructing Identities: The Social, the Nonhuman and Change* (Sage, London).
Mulholland, K. (1999) Back to the future: a call centre and new forms of direct control. In *17th Annual International Labour Process Conference*, Royal Holloway, University of London.
Myers, M.D. (1997) Qualitative research in information systems. Paper presented at the MISQ Discovery, June 1997, at http://www.misq.org/misqd961/isworld/index.html.
Ngwenyama, O.K. (1991) The critical social theory approach to information systems: problems and challenges. In *Information Systems Research: Contemporary Approaches & Emergent Traditions*, Nissen, H.-E., Klein, H.K. and Hirschheim, R. (eds) (North-Holland, Amsterdam), pp. 267–80.
Ngwenyama, O.K. and Lee, A.S. (1997) Communication richness in electronic mail: critical social theory and the contextuality of meaning. *MIS Quarterly*, **21**(2), 145–67.
Orlikowski, W.J. and Baroudi, J.J. (1991) Studying information technology in organizations: research approaches and assumptions. *Information Systems Research*, **2**(1), 1–28.
Ormrod, S. (1995) Feminist sociology and methodology: leaky black boxes in gender/technology relations. In *The Gender–Technology Relation: Contemporary Theory and Research*, Grint, K. and Gill, R. (eds) (Taylor & Francis, London), pp. 31–47.
Preston, A.M., Cooper, D.J. and Coombs, R.W. (1992) Fabricating budgets: a study of the production of management budgeting in the National Health Service. *Accounting, Organizations and Society*, **17**(6), 561–93.

Putnam, H. (1978) *Meaning and the Moral Sciences* (Routledge and Kegan Paul, London).
Sayer, A. (1992) *Method in Social Science: A Realist Approach* (Routledge, London).
Seidman, S. (1994) *The Postmodern Turn: New Perspectives on Social Theory* (Cambridge University Press, Cambridge).
Somerville, I. (1999) Agency versus identity: actor–network theory meets public relations. *Corporate Communications*, **4**(1), 6–13.
Star, S.L. (1991) Power, technology and the phenomenology of conventions: on being allergic to onions. In *A Sociology of Monsters: Essays on Power, Technology and Domination*, Law, J. (ed.) (Routledge, London), pp. 26–56.
Thomas, J. (1993) *Doing Critical Ethnography* (Sage, Newbury Park, CA).
Tinker, T. (1998) Hamlet without the prince: the ethnographic turn in information systems research. *Accounting, Auditing, and Accountability Journal*, **11**(1), 13–33.
Wajcman, J. (1991) *Feminism Confronts Technology* (Allen & Unwin, North Sydney).
Walsham, G. (1997) Actor–Network theory and IS research: current status and future prospects. In *Information Systems and Qualitative Research*, Lee, A.S., Liebenau, J. and DeGross, J.I. (eds) (Chapman & Hall, London), pp. 466–80.
Walsham, G. and Sahay, S. (1999) GIS for district-level administration in India: problems and opportunities. *MIS Quarterly*, **23**(1), 39–66.
Webster, J. (1996) *Shaping Women's Work: Gender, Employment and Information Technology* (Longman, London).
Whitley, E.A. (1999) *Habermas and the Non-humans: Towards a Critical Theory for the New Collective* (Centre for Social Theory and Technology, Keele University, Keele. Available at http://www.keele.ac.uk/depts/stt/cstt2/papers/whitley.htm).
Wise, J.M. (1997) *Exploring Technology and Social Space* (Sage, Thousand Oaks, CA).