Chapter 6
Using Actor–Network Theory to Research the Adoption of Inter–Organizational Information Systems

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ABSTRACT

Inter-organizational information systems depend at least as much on collaboration across organizational cultures as on the development of technical infrastructure for their success. Actor-network theory (ANT) is a useful approach for bringing together social and technical considerations. In this chapter we discuss key features of ANT and show how it might be applied to a particular case of IOIS adoption; this ANT approach is compared to co-evolutionary theory which was originally applied to this case. Some possible extensions to ANT are contemplated, and we offer advice to those attempting ANT-based research. We also give advice, based on ANT, to those undertaking IOIS development.

STUDYING TECHNOLOGY AND ORGANIZATIONAL CULTURE

In this chapter we discuss the adoption of inter-organizational information systems (IOIS). We define IOIS as systems that allow operational information to be sent across organizational boundaries (Johnston & Vitale, 1988). By 'operational information' we mean information that is directly used by business processes that support commercial relationships among the organizations; information that is structured to provide this support, as opposed to unstructured information included in emails or web pages. This implies that the collaborating organizations

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will most likely need to adjust their internal systems and processes to the requirements of the interorganizational system, and this is one of the main impediments to IOIS adoption. Our discussion of adoption is not at the strategic level; we do not consider economic motivations, overall business strategies or top management attitudes that might impact the original decision to move to IOIS. Instead we consider how, as the IOIS are developed, the various intra-organisational actors (such as operational management) do or do not alter their objectives and procedures, and how the behaviour of these actors might affect success or otherwise of IOIS projects.

In their study of e-procurement systems in the Hong Kong textile industry Yen and Ng (2002) found that process reengineering represented a far greater challenge to IOIS adoption than did technology implementation. Thus in understanding the success or failure of IOIS we need theories and research methods that can help us to understand technical aspects of IOIS, the cultures of the collaborating organizations, and the interactions of technology and culture. This raises the problem of finding suitable frameworks, theories or approaches for researching interdisciplinary issues, such as the design and use of computer-based information systems. To understand the technical aspects of these systems we can draw upon computer science, network theories, relational database theory and the more traditional aspects of information science. For cultural aspects we have psychology, sociology and anthropology (all often referenced through organization studies, itself an interdisciplinary 'discipline'), as well as recent work on information behavior in information science (Wilson, 1997). But as well as the difficulty of becoming familiar with all these 'reference' disciplines, the information systems (IS) researcher needs theories for linking the technological and the cultural.

One approach is to look for a single theory that applies to both the social and the technical. Popular candidates in IS research have been information science (Shannon & Weaver, 1964), control theory (Beer, 1985) and general systems theory (Weinberg, 1975), most recently re-emerging as complexity theory (Goldspink & Kay, 2003). These theories have been effective in alerting IS researchers to important features of socio-technical systems, but have been unable to provide specific guidelines for conducting IS research projects. This is partly because the theories are in fact too general, describing results which apply in every circumstance, and partly because researchers have attempted to use mathematical versions of the theories, only to discover insurmountable problems of measurement when studying cultural aspects of systems.

Actor-network theory (ANT) deals with the relationship between the technical and the social in the most radical way—by defining it away. A major feature of ANT as a method is to emphasize a number of 'symmetries,' in particular a symmetry in how we think about 'humans' and 'non-humans.' ANT has been used in a considerable amount of IS research, although not extensively in IOIS. In the next section of this chapter we discuss the development of ANT, its main features, and some of its applications in IS research. We then introduce a case study of the introduction of IOIS by some large Australian organizations, and discuss the re-analysis of this case using ANT. The ANT analysis is compared with the original analysis of the case which used co-evolutionary theory. The final section summarises some advantages and benefits of ANT, suggests some possible improvements, and provides some guidelines for those contemplating using ANT for IOIS research.

VARIETIES OF ACTOR-NETWORK RESEARCH

ANT arose as a framework for interpreting research in science and technology studies. In attempting a sociological study of scientists in their laboratories, it became apparent that equipment,