9. Conclusion: The Construction a Network Technology

Chapter 9

The Construction of a Network Technology
The Social Analysis of Electronic Commerce

This thesis has attempted to use Callon’s sociology of translation and actor network theory to analyse the formation of electronic auction systems, including both the technological artefacts and the social network. As discussed in chapter 2, the social analysis of technology is methodologically diverse, with debates concerning the ontological status of technological artefacts and the epistemological status of statements about technology. This final chapter draws lessons from the analysis of the electronic auction cases covered in chapters 4, 5, 6 and 7 for these debates, specifically the rhetorical role of discourse in the development of the social network related to technology and the advantages of an intersubjectivist phenomenological approach to overcome weaknesses in epistemological relativist, constructivist and Actor Network Theory methodologies for the analysis of the development of technologies.

The Rhetorical Status of Discourse

For Williams and Edge (1996) the social shaping approach to the analysis of technology is described as being antithetical to economic determinism, in which a simple cost/benefit calculus drives technological development towards a pre-ordained solution. However, for evolutionary theorists, including Dosi (1983), in accepting the notion of technological trajectories there is a risk of adopting a weaker social determinism, in which consensus is seen as irreversible closure and the trajectory is given but subject to deflection by social forces. There is a danger that the development of electronic commerce becomes seen as inevitable, driven by the capability of information technology and its apparent economic advantages. The focus in retrospective accounts of the development of systems by both actors in the process and external observers on successful implementations, overlooking failures, creates the impression that technologies have evolved along almost predetermined trajectories. The history of electronic markets demonstrates that, despite the convictions of early proponents, it is not inevitable that electronic trading will displace orthodox trading and that when it does develop, the complexity of the social structures it is built on and the diverse pressures shaping it mean that it will not follow a predictable trajectory.

The Failure of Economic Analysis

It was found in the electronic auction systems studied that actors could use the theoretical insights into markets and information costs found within the economics literature to enrol other actors, shape the system to provide them with benefits and assess their investment. However, MacKenzie has argued (1990) that instead of being grounded in some transcendent reality, accountancy and the assessment of technologies are themselves socially shaped, with the criteria used and the method of assessment being influenced by deeper social forces. In the case of electronic markets this social shaping of assessment goes beyond
MacKenzie’s ethnoaccountancy: the complexity of assessing the number of buyers, sellers and intermediaries who would use a system and the prices that would be achieved on the system are so imponderable that the developers invested in this technology on the basis of an act of faith. In this context, seeing the system work elsewhere is the dominant rationalisation. When a detailed analysis was undertaken for the CALM system in Australia it appears to have been undertaken primarily to enrol government support. The inherent bias of this analysis was subsequently exposed by the failure of the system to become financially independent as predicted. The USDA pilot systems were each influenced by academic agricultural economists and all failed, suggesting that a theorised approach to the design of the systems led to them being too dissonant from the social networks that they were introduced into. While general economic arguments were important for enrolling support for electronic markets, they were found to be invalid in practice.

The Interaction of Information Technology and Agricultural Economics Discourses

Both the information technology and agricultural economics combined a generic foundation, the falling cost of information technology and the economics of markets, which had a supportable claim to be true, with a prescriptive element, the strategic use of information technology and the desirability of perfect competition. The papers, reports and presentations arguing for electronic markets could unite these two discourses. The strength of this merged discourse was amplified by being able to describe examples of operational electronic markets and mediate them through the information technology and agricultural economics discourses. While the United States and Australian governments were both influenced by the economic analyses produced by academics, for market operators the most significant influence on their decision to develop or join systems came from awareness of accounts, whether in journals or in presentations, which described systems operating successfully. Descriptions of electronic market systems which claimed that they were viable were highly influential in shaping electronic market systems, both for the initiators and for enrolling actors into the networks. While the economics literature could provide a theoretical argument for their viability, real world examples both provided corroboration of these claims and also gave a detailed guide about how to structure the electronic market. As the number of electronic markets increased, the importance of examples of existing markets increased and the importance of the economic analysis declined in the process of enrolling potential users.

However, the descriptions of electronic markets, both in academic journals and in trade journals, were biased towards describing perceived successes, such as Telcot, and ignoring the failures. The launch of EASE in the United Kingdom triggered articles by journalists and academic writers, but its subsequent decline was neglected. A large part of this bias was due to the information being disseminated by actors
using cases to enrol others or by academics and journalists who found describing “successes” both easier to gain access to and more interesting for their readers. This bias was demonstrated by the weight of papers which were published by academics involved in the USDA funded pilots describing the systems they had developed but who did not publish follow-up papers explaining why these systems failed to deliver the expected benefits and why their earlier papers were misleading.

By combining the inexorability of IT diffusion and the economic analysis of markets, supplemented by examples of operating electronic markets and linking it to the strategic needs of the audience, a powerful case could be made to enrol resources to the inchoate electronic markets. This was most clearly demonstrated when ANM sought to enrol franchisees for EASE in the United Kingdom, arguing that the lower operating costs, apparent technological progress and operation of the electronic market in Canada jointly provided evidence that electronic marketing would be successful in Britain. The success of this argument was demonstrated by the rush of firms seeking franchises, which led to the emergence of two further competing systems in the United Kingdom.

The failure of the livestock auction systems in Europe, North America and Australia, as perceived by the proposers and developers of the systems, leads to a questioning of the validity of the economic analyses of Bakos (1991) and Malone et al. (1987). Their positivist economic analyses may therefore, adopting the critical economics perspective in McCloskey (1986; 1994), be seen as rhetorical, using desocialised conceptions of the market and information technology to enrol interest in the potential for electronic markets. The problem posed by the status of the economic in social analysis of technology in general and the “broad church” social shaping approach of Williams and Edge (1996) in particular was identified in chapter 2. The economic arguments of electronic market proponents embody a claim that their conceptions of market price, market depth et cetera represent a transcendental reality upon which the social elements of markets are built, but it is this claim to represent objective reality which provides them with their rhetorical force.

Electronic Markets: A Socially Shaped Technology?

This study of electronic markets demonstrates the impossibility for advocates of a network technology of knowing whether it will be used and, if used, how it will be used. While this uncertainty exists for discrete technologies, it is greater for network technologies because the developer not only has to assess whether the technology will have utility for isolated users, the utility for users depends on the behaviour of other users, so the assessment by potential users is influenced by their expectations of the behaviour of other users. This uncertainty is particularly severe in assessing proposed electronic markets because the potential
user community is heterogeneous, with the actions of sellers influenced by buyers and vice versa, and so on in a regression.

In the formation of electronic markets there have been two influential discourses: a normative discourse concerning the impact of Information Technology on organisations, and a discourse based around the economic analysis of markets. While both of these discourses claim to provide a true analysis, selectivity of evidence and their fundamental assumptions lead to partiality. The cases discussed in this thesis demonstrate that it was the interplay of these discourses rather than the negotiation between actors which has been the underlying force shaping the formation of electronic markets. While the IT and economic discourses were a catalyst for making actors realise that an electronic market could be built in a particular sector, the same discourses were used by them to draw the other actors in to build the system and beyond that the trading community.

**The Archaeology of Social Networks**

An insight provided by the network approach used in this study to the analysis of technologies requiring the construction of complex networks of heterogeneous users is the realisation that the need to build upon the existing constructed realities of actors limits the feasibility of radical social change. While Malone et al. (1987) saw industries as clean slates where network technologies could enable radical structural change, in practice they are palimpsests, with the innovation being shaped by the networks of social relationships on which it is overlaid. Network systems may appear to offer an opportunity for third-parties with technical expertise to displace existing market structures, but they lack the industry expertise and social contacts to achieve this easily. Where the existing member of the market initiating the innovation lacks the resources to develop it unilaterally and the strength to impose it on users, it must build inter-organisational conception and adoption networks. The dominant approach to network building observed was simplification: exploiting the embeddedness of existing social relationships (Granovetter, 1985), utilising existing components and emulating existing processes. This reliance on existing elements and relationships limits the potential for the innovation to restructure the industry because actors are unwilling to be enrolled if there is a fear of detrimental effects. While this process of simplification reduces the uncertainty for enrolled actors, it is still impossible for them to determine completely during the conception phase how the adoption network will evolve. With the innovation in operation the relationships between actors evolve as they learn how the technology can be exploited. Therefore, while naive predictions for electronic commerce forecast major impacts, the requirement that the systems are overlaid on existing social networks reduces the planned impacts of electronic commerce systems, but the complexity of the networks on which they are overlaid make it impossible for developers to determine how they will be used.
The use of ANT for analysing network innovations

Callon’s concept of translation provides a plausible account of the building of the systems by the instigators. However, in analysing these cases following Callon’s methodology the use of a social network approach becomes problematic. The instigators of the systems proposed electronic markets as a solution to the farmers’ need for a competitive market, the abattoir buyers’ need for a direct sourcing, the livestock’s need to be slaughtered and their own need to maintain a role in the market. However, in analysing these cases following Callon’s methodology the feasibility of a social constructivist network approach becomes problematic.

Callon implies in his analyses that he is analysing a single network incorporating all the involved actors\(^{46}\). As Grint and Woolgar (1997, p 30) have noted, this raises the question of which account is to be taken as definitive. In the cases described in this paper all the actors interviewed saw themselves as part of a network involved in electronic markets and could narrate how they developed, but individuals had widely diverse interpretations of their networks. For the auctioneers the technology was at the heart of the network, leading to them gaining ownership of the technology in each case, but for the farmer the technology was never seen and those interviewed saw the fieldsmen as pivotal. The abattoir buyers saw electronic markets as an addition to their existing networks of agents buying directly from farms or in live markets. The networks were unstable because of the differing perceptions in the links between auctioneers and fieldsmen. The auctioneers recognised the importance of the fieldsmen, both in terms of their ability to grade stock and their ability to persuade farmers to sell electronically, but the fieldsmen did not need the auctioneers, being able to defect when they achieved a reputation with abattoirs and farmers, taking their links to farmers and abattoirs with them. Each actor had their own idiosyncratic conception of the market, which could also include abstract concepts, such as “housewife”, “competition” and “animal welfare”, and where the boundaries of the network lay. Rather than a single network there are as many networks as there are actors to construct them. If the reality of the electronic market is a personal construction for each actor it becomes difficult to maintain Callon’s symmetrical treatment of human and non-human actors alike. It is still possible to view the markets as socially constructed due to the tendency of social actors’ views of reality to converge intersubjectively through experience and interaction, but it is impossible to state categorically what the market is.

\(^{46}\) this analysis is implicit in his conception of \textit{irreversibility} in networks (Callon, 1991) and is explicit in a discussion by Callon of ticket barrier technology (Callon, 1993).
Callon’s approach is not constructivist because to maintain symmetry between human and non-human actors it is impossible to treat human actors subjectively. In the discussion of the case studies in chapters 4, 5, 6 and 7 the analysis is of how human actors formed a network which included non-human entities. While the enrolment of sheep, cattle and fish was necessary for the electronic market systems to become operational, their refusal to be interviewed unfortunately led to them being viewed through the interpretations of human actors. Similarly, while Callon (1986) professes a symmetrical treatment of scienists and scallops, it is implied that the scallops were less co-operative to Callon’s research than the scientists, leaving him to impute the scallops’ involvement from the scientists’ accounts. Callon’s actor networks may therefore be seen as social-technical fields formed intersubjectively by the human actors.

Habermas (1987) splits the social universe between the intersubjectively negotiated lifeworld and the impersonal system level, comprising institutions and formal organisation. Habermas (1987) shares with Foucault (1975, 1984) an interest in how subjectivity is created through discourse and communication. Foucault’s approach, as exemplified by his discussion of Bentham’s panopticon (Foucault, 1979, p 200), in so far as it addresses technology as an embodiment of knowledge, treats technology as creating subjectivity in a disempowered subject, therefore aligning with a view of technology which sees it as having impacts on subjects. While Foucault’s model of subject formation has been related to technology (Zuboff, 1989; Silverstone & Mansell, 1996), Habermas’s intersubjective theory of communicative action has been used by Habermas to analyse the formation of bureaucratic institutions and the state (Habermas, 1996). While Habermas’s exposition of his theory of communicative action (Habermas, 1987) focuses on how the formation of social institutions creates systems which remove aspects of social life from the negotiable lifeworld and translates them into the un-negotiable background of social reality, the same process can be seen in the creation of a technology. While social analysts of technology (Grint & Woolgar, 1997; Fleck, 1994) have criticised essentialist analyses of technology, arguing that technologies can be interpreted and used in diverse ways, this neglects the constraints on people’s beliefs about what any technological artefact is capable of doing. As with social institutions, intersubjective beliefs about the capabilities of technology remove aspects of social life from the negotiable lifeworld.

Because Habermas’s approach is intersubjective it is implicitly open to a social network interpretation. In this interpretation the process of network building may be seen as the intersubjective identification of a need (problematisation in Callon’s terminology). This consensus is negotiated rhetorically using texts, interpersonal communication and exemplars. The network building then proceeds by increasing the size of the community by enrolling further members and systematising elements as either institutions, for example
in the case of electronic auctions creating institutions to own the rights to software, or as technological artefacts. The movement of elements from the fluid negotiable lifeworld into systems corresponds to closure in technological debates (Bijker, 1992).

An intersubjective phenomenalism derived from Habermas is a broader basis for the analysis of technology seamlessly from initiation in small specialist communities to its use in large user communities than constructivism. The constructivism in Science and Technology Studies (STS) has followed an epistemological bias from its roots in the philosophy of science (Jasanoff et al, 1995). However, while a focus on the debates about electronic markets provide insights into the conception phases of the systems in which the alternative options were being assessed and the system designs finalised, it provides little insight into the frequent failure of the social networks created to become stabilised. During the adoption phases a constructivist approach based on the more quotidian phenomenological constructivism of Berger and Luckman (1966) provides a greater insight into how the electronic systems failed to infiltrate the worlds of buyers and sellers. A Habermasian approach is more valuable than epistemological approaches for analysing the social processes behind the development of technology because, as has been seen in the case studies, the uncertainties faced by actors involved at each stage were more related to whether a vision of the electronic market embodied in technological artefacts would become real to the other actors than to questions about the truth of competing claims and knowledge. Where Callon’s ANT focuses on a negotiation between the interests of actors during translation, Habermas’s theory of communicative action’s enables the role of discourses and rhetoric in the creation of the lifeworld to be uncovered and the roles of experts in legitimising systems, and thereby removing them from the arena of consensus negotiation, to be unmasked.

In conclusion, while the perspective that a technology is socially constructed was criticised in chapter 2, the case studies demonstrate that the electronic market systems studied were metaphorically constructed from existing components using rhetoric, exemplification and systematisation to achieve consensus and enrol subjects.