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CONSTRUCTIVIST AND CRITICAL APPROACHES TO AN IS FAILURE CASE STUDY: SYMMETRY, TRANSLATION AND POWER

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Abstract

This article explores social constructivist and critical approaches to study the troubled implementation of a computerised reservation system in a transport company. The analysis draws on the social construction of technology that seeks to ‘denaturalise’ the apparent order of things and critically question the inevitability of the social status quo; actor-network theory attempts this using the concepts of symmetry and translation. Symmetry emphasises that implementation failures express the same dynamics as successes, showing that technological choices are not obvious or unproblematic. Latour and Callon’s sociology of translation helps combine both the global and the local in a series of translations occurring in the case study, some of which having failed. Constructivism highlights how social and technical distinctions are socially constructed, for instance in the conception and application of yield management, which is also a matter of power and politics. A critical analysis using Clegg’s theory of power is used to examine how power relationships are creating disadvantage and can explain failure further. Using social constructivism and actor-network theory as the basis for a critical analysis is discussed.

Keywords: IS failures; Social construction of technology; Actor-network theory; Power and politics; Yield management; Critical research

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1. Introduction

Critical IS research can be said to broadly encompass the following range of tasks (see also special critical issues of the *Journal of Information Technology*, 2002 and *ACM SIGMIS Database*, 2002):

- The in-depth investigation of the nature of IS phenomena at local levels, particularly through qualitative work;
- The development of relevant knowledge and practical understanding that enable organisational change and indicate new ways of working;
- The critique of taken-for-granted assumptions underpinning organisational, managerial and technological practices.

The first kind is being addressed by interpretive, hermeneutic and ethnographic approaches introduced a decade ago in IS research (e.g. Walsham, 1993; Lee, 1994; Harvey and Myers, 1995; Butler, 1998). Another more openly critical strand has used Habermas' critical theory with emancipatory aims for IS development (e.g. Hirschheim and Klein, 1994), and therefore falls into the second category. However, there have been recent calls for pluralism in IS critical research (Adam, Howcroft, Richardson & Robinson, 2001; Brooke, 2002a) as it is seen as "over-saturated with Habermasian analyses" (Doolin and Lowe, 2002). Habermasian critical social theory has also been judged unable to theorize the causes and preconditions of power constraints and self-interest in IS research (Brooke, 2002b). Critical interpretivism (Doolin, 1998), critical hermeneutics (Phillips and Brown, 1993; Myers, 1994a) and critical ethnography (Myers, 1997) combine these approaches with a critical perspective. They attempt to move beyond the immediate narrative of the subjects to the broader historical, social and cultural processes within which narratives are embedded, and thus belong to the third category. But there are difficulties.

By focussing on "hidden agendas" (Ngwenyama, Harvey, Myers and Wynn, 1997), "underlying sense" (Myers, 1994a) or "deep structures" (Heracleous and Barrett, 2001), critical interpretive and hermeneutic traditions entail probing the 'depth model' underneath narratives. However, notions of "the text and the socially constructed world behind it" and "the reader bound into the socially constructed world standing behind the text" (Lee, 1994) show a confusion between interpretivism and social construction. Post-structuralists and constructivists (Dreyfus and Rabinow, 1982) deny the existence of an 'underneath'. The assumption of a 'hidden' meaning of discourse and the hermeneutic reclamation of lost, 'real' or even 'true' meaning deny a radical form of social constructivism. The competing approaches of critical hermeneutics and constructivism do not share the same ontological and epistemological perspectives, which has an impact on their criticality.

Critical approaches emphasize the fact that social reality is historically constituted. However, this does not merely mean that the researcher should "seek to evaluate critically (...) the totality of understandings by analysing the participants' understandings historically and in terms of changing social structures" (Myers, 1994a). Attributing (a) the subjective, the interpretive, the socially constructed and meaning to hermeneutics on the one hand, and allocating (b) the objective, the historical and social reality separately to the critical on the other hand, reflects respectively (a) a subjectivist individualist epistemology and (b) an objectivist realist ontology. Constructivism is epistemologically about the social construction of meaning and ontologically about the construction of social reality. It combines a social theory of knowledge with an intersubjective, not an individualist, theory of action. And the analysis of power is central to understanding the reflexive link between these two levels (Guzzini, 2000). Meaning

attribution and the social world are in interaction; then the political status and the legitimacy of action depend on this interaction, this construction. A social constructivist stance supports criticality in that the present is not determined by the 'nature' or truth of things; it seeks to 'denaturalise' the apparent natural order of things; thereby questioning the inevitability of the social status quo, and positing as a preliminary the contingency of social orders. Only intersubjective rules, and not some unchangeable truths or realities, give meaning to practices. Social construction is not a kind of idiosyncratic, individual or subjective will to knowledge. Our interpretations are based on a shared system of codes and symbols, of languages, life-worlds and social practices. Socially constructed knowledge is a constitutive factor of social power and the concept of power provides a central link between the construction of knowledge and social order (Guzzini, 2000:172). So it is not just a matter of IS implementers "needing to understand the organisational context, the stakeholders and the politics involved" (Myers, 1994a) which is ontologically realist, but of understanding how a phenomenon is collectively constructed as real, which is ontologically constructivist. It is worth noting that it still becomes real in its social consequences (Hacking, 1999).

For example, finding that "the new payroll system became a symbol of the government's intention to restructure educational administration [leading to resistance from many teachers to the new information system]" (Myers, 1994a) is the starting point rather than the final result of a critical analysis. This statement only identifies these intentions or interests as 'exogenous' and takes them for granted; but, and particularly in relation to technology, we need to examine how the discursive construction of technology is presented as a set of external constraints with attendant imperatives. Actors act on the basis of assumptions and in so doing bring about outcomes consistent with that thesis, irrespective of its veracity, and indeed of its perceived veracity. For instance here, the government's thesis may possibly be that: the use of information technology streamlines administrative processes, or improves customer care, ensures quality control, adds competitive advantage, or increases transparency. Associated conceptualizations of, for example, the market, economics, organisations, management or culture, together with their implications, effects and relationships with other actors' conceptualizations should be explored further in order to bring criticality to the analysis. If actors believe the thesis to be true (or find it to their advantage to present it as true) they will act in a manner consistent with its predictions, thereby contributing to its perceived truth and naturalness (Hay and Rosamond, 2002).

In the case of existing critical IS research, there are therefore shortcomings in the treatment of technology and its social construction, as illustrated above. It is important to adopt a critical and reflective stance in relation to the role that technology plays in maintaining social orders and power relations in organisations (Doolin, 1998); hence the use of constructivist insights into the social nature of technology and into the technical orientation towards the world (Feenberg, 2000). Interpretivist and constructivist approaches to technology failures are inherently critical of the dominant rationalist functionalist perspective, as found in the factor-based and process approaches to IS failure described below. Rather than assuming that particular IS choices succeed (and others fail) if they solve the 'problems' of certain groups, the ways in which "actors come to build one or other definition of reality, how social definitions may change over the course of events and how the past is reconfigured in the present, become central considerations" (Fincham, 2002). This article thus applies actor-network theory (ANT), a social constructivist approach, to a case study of the problematic implementation of a computerised reservation system (CRS) and global distribution system (GDS) in a transport company. In order to explore the social construction of this IS failure, the constructivist concepts of symmetry and translation and an analysis of power and politics

are used to study the case material. But first, a short critical discussion of IS implementation failure literature is presented below, before formulating more specific research objectives and outlining theoretical frameworks.

2. IS implementation failure research

Difficult IS implementation cases raise interesting questions: How should one analyse IS implementation case studies? Are there inherent differences between successful and unsuccessful ones? Are there methodological points that should apply when investigating and describing such cases? The notion of failure itself is problematic in that it is often assumed that failures are anomalies and diversions from a 'normal', successful course of action. This betrays a functionalist managerialist belief that socio-technical development can be controlled and managed (e.g. Fortune & Peters, 1995; Flowers, 1994). And IS failure research is expected to accumulate knowledge and deliver solutions to prevent failures from happening through eliminating its causes. IS researchers often express confidence in the possibility of controlling and mastering the organisational future: "Future research will ultimately result in the demise of IS failures" (Lyytinen & Hirschheim 1987:301). This basic premise corresponds to assumptions that are socially constructed: they take on a natural 'commonsensical' appearance but in fact are complex and contingent historical constructions.

Social constructivism breaks with conventional and commonsensical conceptions of problems by examining them as a "social process of definition": it is concerned with unravelling how these claims are constructed (Holstein & Miller, 1993). For instance, causes and explanations for IS failure (and technology failure more broadly) can focus on the technology itself (Jones, 1995; Neumann, 1995); on individual end-users, IS professionals and executives; or on systems (Perrow, 1984). More recently, behavioural and social 'factors' have been seen as responsible, for instance: organisational factors (Peltu, MacKenzie, Shapiro & Dutton, 1996; Ewusi-Mensah & Przasnyski 1994); stakeholders (Lyytinen & Hirschheim, 1987; Pinto, 1994; Seddon, Staples, Patnayakuni & Bowtell, 1999); organisational structure (Sauer, Southon & Dampney, 1997); and culture (Beynon-Davies, 1995; Gallivan, 1997). 'Factors' are argued to be: top management support, resistance, champions, shop floor politics, user involvement, project management, organisational culture, change management, risk management, knowledge management, organisational learning, etc. (Lyytinen & Robey, 1999). The list of factors is endless, and its components claim to be universal, independent of situation and time. This is unsatisfactory; for instance, top management support can easily be seen to be counterproductive in cases of project escalation (Keil, 1995; Drummond, 1996).

This factor-based approach to failure research has not delivered results (Bussen & Myers, 1996; Larsen & Myers, 1999; Parr, Shanks & Darke, 1999), and according to Sauer (1999:290): "factor research has not satisfactorily isolated causes in a way that allows them to be eliminated in practice". Another problem with these approaches to IS failure is that they construe social factors as exogenous from the technology and imply the pre-existence of a 'natural' technological trajectory (MacKenzie, 1988) with which social factors 'interfere'. For instance, when Newman and Robey (1992) express the hope that IS practitioners can use models to diagnose and predict IS failures in order to move projects in the 'right' direction, they assume the technology on its own can be successful, if its 'normal' development is unhampered by external human or social factors.

More importantly, the formulation of these 'factors' is historically situated, socially constructed and corresponds to time-dependent managerial ideas and movements used in specific contexts for complex reasons. Specifically, managerialism and the growing use of management as a value and its elevation to a more significant and

visible position since the 1980s is related to “its enmeshment with highly contested changes [such as] public sector restructuring, downsizing and cultural re-engineering” (Fournier & Grey 2000:11; see also Enteman 1993 and Clarke & Newman 1993).

Process approaches (e.g. Markus & Robey, 1988; Newman & Robey, 1992; Davis, G., Lee, A.S., Nickles, K.R., Chatterjee, S., Hartung, R., & Wu, Y., 1992; Sauer, 1993) improve upon factor-based research but tend to be functionalist in that they still attempt to identify generally applicable causal linkages assumed to exist ‘out there’, to be eliminated. Sauer (1999) cites other theories which have been explored more recently to study IS failures in a non-functionalist fashion: interpretivism, critical theory and constructivism.

3. Research objectives

This paper aims to: explore some constructivist and critical approaches in order to move beyond rationalist and functionalist explanations of IS implementation failure and success; and to illustrate their usefulness in finding more complex and richer ways of understanding the use of IS and the social construction of its failure in a particular case study. Two theoretical movements are drawn upon:

- Social construction of technology which helps investigate how the technical and the social are combined and constructed; and it is argued that failures expose these constructions more readily. Actor-network theory (ANT) is a constructivist non-essentialist (neither socially nor technologically deterministic) analysis used to describe the translations and negotiations leading to a socio-technical actor-network, which is an IS in an organisation.
- Clegg’s theory of power is intended to complement ANT. IS researchers have used ANT for several years with interesting results (Bloomfield, Coombs, Owen. & Taylor, 1997; Vidgen & MacMaster 1996; Monteiro & Hanseth 1996; Walsham & Sahay 1997). However, Walsham (1997) criticises ANT and its disregard for social structures, its lack of political analysis and its poor capacity for explanations. These limitations point to a need to make ANT more critical and some theories of power and politics seem appropriate. In IS failures, causes are often attributed (socially constructed) to either technical or managerial reasons for political motives.

Theoretical frameworks are first briefly presented. The nature and relevance of social constructivist approaches is outlined, firstly in general, then in relation to technology, to IS and to failure, and finally using the notions of symmetry and translation. Critical IS research is then briefly discussed and Clegg’s theory of power introduced. An example of a critical constructivist analysis is provided using the case study of the problematic introduction of an American airline computerised reservation system in a French rail company. The case study descriptive material is presented briefly and has been developed more fully elsewhere (Mitev, 1996, 1997, 1999). The case analysis highlights the intertwined relationships between, and social constructions of, technology, the organisation, individuals, groups, culture, politics, economics and the transport market. Translations take place as the project is taken, moved forward and adapted by actors, as interests and solutions are developed and evolve. All too often, future users cannot be persuaded to follow the initial goals, the issues become side-tracked and unintended effects occur (i.e. a ‘failure’). Symmetry implies that projects only occur because actors carry out translations (with some unpredictability), and not by

following a predetermined 'natural' or 'best' route. Translations are presented as a means to study the social (re)construction of the information system, the market, the industry, the organisation and their relationships, by the actors, some more successfully and convincingly than others for various groups. Actor-network theory has been criticised for poorly accommodating critical concerns of power and politics (Walsham, 1997). An example of politics and power relationships in this case study is how various groups interpreted yield management and optimisation software according to power relations. Following Silva's example (Silva, 1997), Clegg's theory of power (Clegg, 1989) is applied to the case material to examine these power relations. Finally implications and potential contributions of this type of analysis are discussed. Methodological considerations as to the relationship between constructivism and intensive case study fieldwork are also briefly addressed.

4. Theoretical frameworks

4.1 Social constructivism

The overall theoretical framework, social constructivism, is based on the understanding that the search for grand narratives and universal foundations has failed; because the traditional social science ontology that there is a real world 'out there' that can be known epistemologically through positivist methods is not valid. Structural functionalists assume that world conditions exist separately from people's interpretations of them; interpretivism aims to counteract this. Additionally, the social constructivist perspective aims to subvert claims to objective knowledge about problems and expert status. The constructionist position emphasises that the activities through which problems are constructed are rhetorical and analyzes them as a social process, that is as located within their social context (Gergen, 2001; Holstein & Miller, 1993).

4.2 Social construction of technology

Social constructivism research has included the construction of theories and accounts, of institutions, and of technical artefacts. Social constructivism has spread to science and technology studies which reject both technological and social determinism (or essentialism). Major advocates such as Latour & Woolgar (1979) and Collins & Pinch (1993) argue that there is no such thing as a social problem that does not have technological components; nor can there be a technological problem that does not have social components, and that any attempt to make such a division is bound to fail. They argue that the development of technological devices should be interpreted within an analysis of the struggles and growth of 'systems' or 'networks'. The constructivist approach to the study of technology moves away from making distinctions among technical, social, economic and political aspects of technological development; and uses the 'seamless web' or 'actor-network' metaphors, which stress the importance of paying attention to the different but interlocking elements of physical artefacts, institutions and their environments, blurring different levels of analysis.

4.3 Constructivism and IS interpretive research

Information systems are a type of technology and a form of constructivism is present in interpretivist IS research (see Walsham 1993, 1995; Orlikowski and Baroudi 1991; Myers, 1994b; Orlikowski, Walsham, Jones & DeGross, 1996; Lee, Liebenau & DeGross, 1997) in which two pivotal notions are process and context. For instance, in Walsham's interpretivism, processes of change should be studied as interconnected or

embedded levels of analysis and broader contexts (economic, social, political, sectoral, structural, cultural). Constructivism goes a step further in blurring the boundaries between these levels and distinctions, as outlined above. Moreover, a social construction approach to technology not only emphasises that the same technology has several meanings for different groups, and that there is a variety of interests in the process of developing and using a technology; but that IS are intertwined with their social meanings, and not just independent entities. This helps understand how one meaning becomes predominant, or in other words, why a certain technology fails (Blonk, 2002:143). Monteiro and Hanseth (1996:326, 328) also argue that interpretivist conceptualisations¹ of IS “lack in precision regarding the specifics of the IS” and “are not fine-grained enough with respect to the technology to form an appropriate basis for understanding”; they suggest the use of ANT. There is some evidence of growing interest in social constructivism in general on the part of IS researchers (Askenas & Westelius, 2000; Sarker, 2000; McAdam & McCreedy, 2000; Huysman 2002), as well as in ANT specifically (Bloomfield & Vurdubakis, 1994; Vidgen & McMaster, 1996; Holmstrom & Stalder, 2001; Nandhakumar & Vidgen, 2001). Monteiro and Hanseth (1996:330) claim that ANT is more effective for describing how technical design and systems are interwoven with organisational issues, and for being “specific about the technology”².

4.4 *Constructivism, symmetry and failure*

Constructivism brings symmetry between (a) success and failure, and (b) the social and the technical. In other words, the conventional dichotomy between the social (human) and the technical (non-human) is problematic as the construction of technical and social choices follows the same logic in successes and failures (Bloomfield & Vurdubakis, 1994; Silva, 1997). Additionally, failures are of particular interest since the controversy³ which surrounds them tends to reveal processes that are more easily hidden in the case of ‘successful’ projects, and more complex relationships between technical choices and social environments can be unravelled. Sociological studies of scientific knowledge (e.g. Collins & Pinch, 1993) show that methodologically it is important that they apply a principle of symmetry. The sociologist studying the work of a particular group of scientists should use the same methods, explanations and resources to explain those scientists who are ‘successful’ as those who are ‘unsuccessful’. At the start of the investigation, there is no way of knowing whether the scientists under study are going to succeed or fail. Sociologists of technology therefore have argued that technology failures are of as much interest as technological success stories. Different groups will define not only the problem differently but also success or failure, as there is not just one possible way, or one best way, of designing an artefact (Bijker, Hughes & Pinch, 1989:14). The notion of symmetry also helps dismantle assumptions and constructions of ‘naturalness’ or ‘obviousness’ (Akrich 1993). For instance, it would be inadequate to say that *Sabre* (American Airlines’ successful reservation system) was more efficient, socially acceptable and better designed technically than *Socrate* (French Railways’ reservation system, the

¹ Even, they claim, when supplemented with structuration theory (see Walsham, 1993, 1997).

² In particular, they make use of the ANT notion of symmetry between human and non-human actors, as opposed to symmetry between success and failure. **Section 4.4** expands a little on these links (success vs failure, technical vs social) but the debate around human and non-human actors will not be addressed here.

³ Failures are often controversial after the event, but it is meant here to refer to controversies during projects as well, including successful projects. In the case of failure, ‘post-event’ controversies and controversies that occur during projects are related but often difficult to disentangle, partly because of hindsight issues.

system studied in the present failure case study, see below): “all of the former’s qualities and all of the latter’s defects are results and not causes” (Latour, 1993:382, original emphasis) of the success of *Sabre* and the lack of success of *Socrate*. Applying symmetry in the social construction of success and failure is illustrated in the example below.

4.5 *Example of symmetry: Aramis*

Latour's investigation (1992, 1993) into the abandonment of a new revolutionary subway transportation system planned in the South of Paris, *Aramis*, is a good example of how to tackle symmetrically the failure story (*Aramis*) and the success story (*VAL*, a working automatic suburban train in the Northern city of Lille)⁴. Trying to explain only *Aramis*, since it has been a failure, whereas *VAL* is a success, would be “asymmetric since it would look for social explanations only when something goes wrong - the straight path of happy technical development being, in contrast, self-evident and self-explanatory” (Latour, 1993:383); both projects tie together many interests, and in both cases, these interests do not exist independently of the projects and (potential or eventual) artefacts. In following the design and redesign of *Aramis*, and all the interested groups and actors, and in gathering what they said, did and didn't do throughout the project, Latour assembled not only one explanation but at least twenty. He claims that he does not practice two different interpretations, one about the nature of the artefact and the other about the meaning it has for social groups: “It is the same task to define the artefact tying together the various groups or the groups tying together one artefact” (Latour, 1993:381). Investigating *Aramis* in such a manner avoids explanations about ‘better’ technologies or ‘suitable’ social environments. In the cases of *Aramis* and *VAL*, both their technologies and environments, together, ended up differently. Hindsight about failures tends to obscure this imbrication and constructs asymmetrical explanations to suit later purposes. Retrospectively oversimplifying the complexity and ambiguity of tasks and environments by labelling them as technical or managerial (social) is done by constructing failure and success differently, for example:

- In the case of failure, by singling out managers for failing to assess risk properly or adhering to outdated goals and beliefs; or by claiming that it would have been a success if the technology had been managed ‘properly’.
- In the case of success, by celebrating managerial vision, wise risk-taking, well-conceived goals; or by claiming the excellence of the technology.

4.6 *The sociology of translation*

⁴ The *Aramis* project ran from 1969 to 1987 and involved the State, public and private enterprises. Its aim was to design a personal rapid transit system for public urban transport and several different prototypes were designed over the period. The *VAL* project, a shorter and simpler version, was initiated in 1977 and completed in 1983 on a single line. There were strong links between the two projects but *Aramis* was abandoned for “weak chain” reasons (Latour, 1992:234) like many failed innovations: complex and ambitious technology, technical unpredictability, ill-defined need, uncertain feasibility, different interpretations of technical potential, variable costs, difficult operations, uneven political support, high sensitivity to environment, poor timing, complicated institutional relations and actions.

Constructivist approaches expand on process theory (Blonk, 2002:142) by: refusing that technology succeeds on purely functional grounds; seeing failure and success as produced in the same process; arguing that actors make the final choice among a batch of solutions; and by studying processes in their full complexity through translation construction and seamless webs. In actor-network theory, technological innovation is viewed as an attempt to build and stabilise a diffuse system of allies composed of both human and non-human entities. It enables to circumvent technological determinism in which technical projects and innovations proceed naturally unless they are actively stopped, and replaces it with the idea that things do not happen unless human and non-human actors make them happen, socially construct them. An important concept in ANT, the sociology of translation, helps understand how an innovation is translated or constructed, interpreted or transposed, from one position to another, and how translation operates (or not) between actors, leading to the formation of techno-economic networks. Networks are built according to the logic of translations or social constructions. Failures are “translation as betrayal” (Callon, 1991). It is argued here that symmetry and translation are two fundamental constructivist notions which can bring insights into the analysis of IS failure as they can help analyse the various social constructions which is an essential element of criticality.

4.7 *Critical approaches in IS research: not just Habermas*

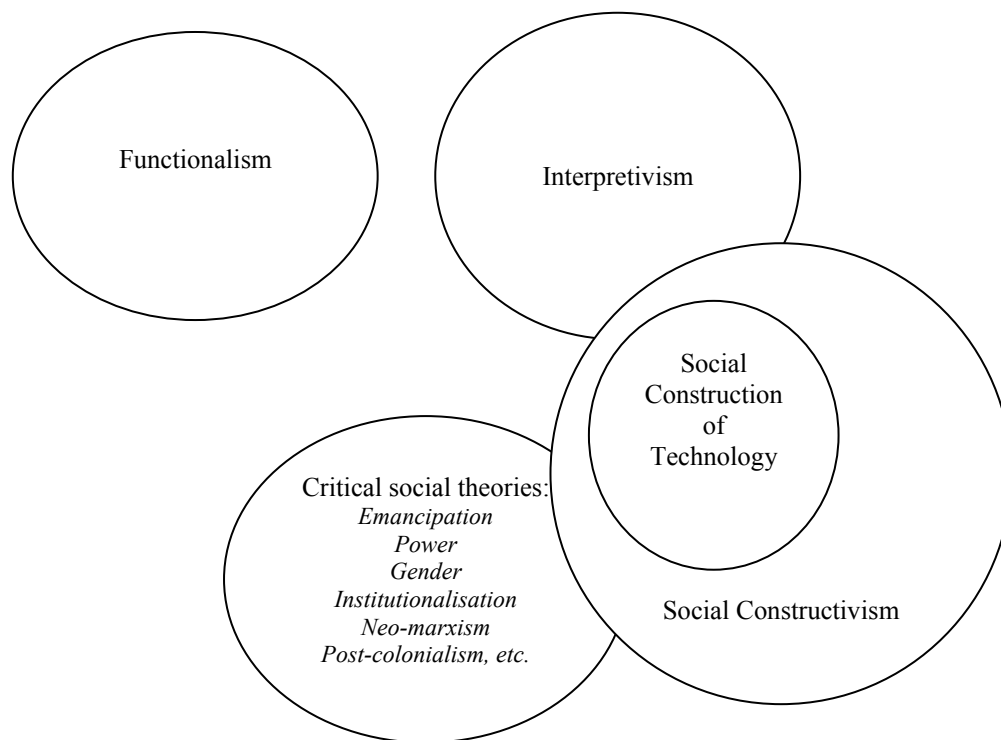


Figure 1 Diagrammatic representation of theories

A more traditional approach to criticality is concerned with power and politics. Accordingly, interpretivist IS research has been criticised for not specifically focusing on the inherent conflict and contradiction in social relations (Markus, 1983; Orlikowski & Baroudi, 1991; Knights & Murray, 1994). Monteiro and Hanseth (1996) criticise IS interpretivist researchers for not describing the influence of social factors on IS and how interests are inscribed in the technology. Equally, constructivism in general has also been

accused, for instance by Winner (1993), of concentrating on immediate needs, interests, problems and solutions of specific groups and actors, while ignoring the deeper dynamics of technological change such as cultural, economic and institutional structures. Disagreements over technical changes are an inevitable feature of organisational life, and change is a political process requiring the capacity to mobilise power resources situated in economic, cultural and institutional relations. A diagram representing the relations between functionalism, interpretivism, constructivism and critical theories can be found in **Figure 1**; and the stance chosen in this paper is at the intersection of the social construction of technology (for its emphasis on criticality through denaturalisation) and theories of power (for its focus on conflict and inequalities).

We agree with Doolin and Lowe (2002), who also draw on Orlikowski and Baroudi (1991) and Myers (1997), that “the presence of a critical stream in IS research is nascent at best”. Most of IS critical research draws on Habermas’ critical social theory, for instance Ngwenyama and Lee (1997) and Hirschheim and Klein (1994) who share an interest in emancipatory design. However:

“The relative dominance of this [Habermas’ critical theory] approach in critical IS research is unnecessarily limiting (...) There exists a continuum of possible critical approaches and IS researchers can be critical while utilising other theoretical perspectives” (Doolin & Lowe, 2002).

Critical management studies, for instance, have also drawn on Habermas’ critical theory but have invoked a plurality of other critical traditions from social science (Alvesson & Willmott, 1992, 1996): neo-Marxist approaches (labour process theory, Gramscian theory), post-structuralism, deconstructionism, literary criticism, cultural studies, feminism, post-colonialism, etc. Despite their differences, they all object to “managerialist accounts which assume or seek to justify existing social and organisational relationships as natural and/or unavoidable”, and they aim instead to “denaturalise” or “unmask the power relations around which social and organisational life are woven” (Fournier & Grey, 2000:19, 20)⁵.

In order to complement the apolitical aspects of constructivist theories such as ANT, Walsham (1997) suggests combining its methodological approach and conceptual ideas with insights and analyses derived from other social theories. Critical social theories (other than Habermas) have been used by IS researchers, for instance: Foucault’s concept of power/knowledge (Knights & Murray, 1997); institutionalisation (Silva & Backhouse, 1997); structuration theory (Orlikowski, 1992; Walsham, 1993); social shaping of technology (Wilson & Howcroft, forthcoming); gender theories (Adam, Howcroft & Richardson, 2001); power and rationality (Drummond, 1996). And in some cases, ANT has been combined with other critical theories, for example technology drift theory (Holmström & Stalder, 2001), autopoiesis (Stadler, 1997), politics and power (Silva, 1997). The case study examined here lent itself to a political and power analysis in the sense that technological choices seemed to have been guided by social interests and codes established by cultural and political struggles (Feenberg, 1995:12). Moreover:

⁵ Nevertheless, the use of Habermasian critical theory in management studies has been criticised for tending to propose a modernist grand narrative whose “seemingly emancipatory discourses can be, or become, a form of normalising, disciplinary domination” (Willmott, 1994:115; see Wilson, 1997, for a similar argument about the use of Habermas critical theory in IS research). Furthermore, emancipatory IS research has concentrated on information systems development and not implementation or failure studies, so was seen as not so relevant here.

“Many researchers have rightly incorporated the notion of power into their work but few have proposed a theoretical framework that links power concepts and power relations with actual data stemming from information systems cases” (Silva & Backhouse, 2002).

4.8 *Power theories*

Various power theorists have been of interest to IS researchers, for example Heidegger (Introna, 1997) and Clegg (Silva, 1997), or used to complement other perspectives such as Beck’s notion of risk (Hanseth, Scott, Silva & Whitley, 1999). Discussions of power in IS research cover many aspects (Saunders, Carte, Jasperson, Croes & Zheng, 2000): political models of decision-making, organisational politics, individual and group politics, interrelationships between organisational structure, technology and redistribution of power, influence or authority to overcome resistance, resource dependence and decision structures. And they include many levels of analysis, individuals and groups (rewards, punishments, legitimacy, expertise), intraorganisational and interorganisational bases of power (resource provision, resource irreplaceability, network centrality). However, these approaches to power in IS research generally follows the ‘factor’ or ‘process’ models which look for causal linkages (see **Section 2**).

The critical approach taken here is not to see politics as disruptive to the smooth and rational management of an organisation, but as an inescapable fact of organisational life (Knights & Murray, 1994:3). Local sites of social process are part and parcel of the global relations that condition, and are reproduced, in those localities. “Tensions surrounding IT management are systematically related to complex sets of power, managerial and market relations” (Knights & Murray, 1997:37). Knights, Murray & Willmott (1997) recommend that we should concentrate on the internal political context, as well as on the social and institutional aspects of the external context; and that we should not neglect the way in which organisations both reflect and reproduce the major social inequalities in society and hence the essentially contestable nature of organisational relations. This understanding of power is opposed to the individual and functionalist or structuralist conception of power as a property or capacity of individuals or institutions⁶. Power is synonymous with social relations and one cannot reduce power to being either explained by actors’ intentions or determined by social structures (Clegg, 1989)⁷. Conflict is conditioned by, and regulated through, the exercise of material and symbolic power. This power can be used to mobilise particular views of the market and technology in order to legitimate choices (Knights & Murray 1997:43). For example, the formulation and implementation of IS strategies is a social process in which political activities are related to the choices being made, the structures of organisational control and co-ordination, and the changes taking place in the organisation’s broader environment (Knights & Murray 1997:44). Organisations do not have power structures but are comprised of power relations, which determine information systems, and “an adequate interpretation of such relations underscores the success or failure of technology-based systems” (Silva, Dhillon & Backhouse, 1997:512).

⁶ Markus (1983) and others, adopt this individual or ‘voluntaristic’ approach to power which explains power via mechanical metaphors, e.g. individuals or groups affecting other individuals or groups.

⁷Note that in his formulation of power, Clegg (1989:202-207) in fact also makes use of the non-deterministic, anti-essentialist notion of symmetry proposed by Callon and Latour and outlined earlier.

4.9 *Example of Clegg's power theory: London Ambulance Service*

Silva (1997) and Silva and Backhouse (1997) combine actor-network theory, institutionalisation theory and Clegg's power theory⁸. Clegg's (1989) frameworks of power are intended to lead us to understand the relationship between the authority and politics of organisations. Silva and Backhouse (1997) analyse the failure of the London Ambulance Service information system (see also Beynon-Davies, 1995⁹) and use Clegg's theory of power in order to articulate an explanation covering all the possible political elements. The use of Clegg's theoretical elements, in particular the three dimensions of power underlined below, is best illustrated in their following findings (Silva & Backhouse, 1997:402-407):

- The organisation responded to the UK government's desire to transform the health system into an internal market (exogenous contingencies).
- This affected resources and outcomes and the social relations that give roles to the agencies involved (causal power), for instance management's resources and control, staff discretion on operations and focus on jobs.
- The information system influenced the way employees interpreted management style, and tensions rose as it was perceived as a way of undermining participation and threatening their identity (social power). These contradictory social interpretations across groups and roles made it difficult to achieve institutionalisation and the new information system did not support social integration.

⁸ They develop the idea that if an information system is not fixed as an obligatory passage point, its institutionalisation will not be achieved (Silva & Backhouse, 1997:397). An obligatory passage point comes from actor-network theory and is a rhetorical device that presents the solution for a problem, and that will allow the formation of alliances and the control over resources which agents need to achieve their outcomes. Information systems can be considered as obligatory passage points (Silva & Backhouse, 1997:400). In the present case study, computerised reservation systems are an example of an obligatory passage point since commercial airlines in effect present them as an unavoidable way for travel agents to do business. The concepts of obligatory passage point and details of the translation process in ANT (problématisation, intéressement, enrolment and mobilisation) have not been described here as it has been done fully already by other IS researchers. The choice was that of symmetry, translation and power instead, as they seemed more relevant to this failure case. Similarly, this paper simplifies Clegg's circuits of power with a minimum of jargon, to leave room for the case material and its analysis.

⁹ The computer-aided despatch system at the London Ambulance Service collapsed shortly after launch in October 1992 and twenty people allegedly died as a consequence. The system was abandoned and manual procedures were reintroduced. The chief executive officer resigned and the British government ordered a public inquiry. Managers had implemented the system to change the organisational culture and to improve the overall performance of the service.

- Decisions about deploying ambulances were taken away from the controllers and programmed into the new system, bypassing local knowledge and experience. One of the reasons for the collapse of the new system was its inability to identify duplicate reports thus sending more than one ambulance to the same place. Previously, controllers had personal knowledge of geographic areas and could quickly identify when an emergency was being reported twice (Silva & Backhouse, 1997:406). New tasks and rules failed to capture existing skills, staff perceived the system as disempowering and this caused disruption to the production power dimension.

Causal power deals with agencies or actors and helps answer the following questions: Who are the agencies engaged in power struggles? What are their standing conditions? What are their projected outcomes? Agents struggle to control resources and other agents may resist. Organisational change will be successful (or the information system implemented) when the resources utilised to carry out the outcomes are recognised. Those agents who successfully control resources will be the ones with a stronger power base. The power base of agents is also supported by social power and production power. Social power concentrates on: What is the general attitude towards innovation? What are the institutional mechanisms that legitimate the adoption of innovations? It refers to rules for meaning, group relations and membership and is therefore related to institutional order. It leads to the identification of the legitimate and illegitimate dimensions of power within the organisation. Information systems may change the organisational norms, meanings and membership of groups. Production power deals with questions such as: What are the techniques and technologies adopted to ensure compliance? Who controls the innovation? Who are the disempowered and empowered agents as the result of adopting innovations? It is defined in terms of the material conditions: the material means of production, but also the material means of organisation, or in other words, the techniques of production and discipline. New techniques of production and discipline, such as information systems, imply new agencies "that social power might find difficult to resolve" (Silva, Dhillon and Backhouse, 1997:515) as they will affect the way jobs are performed. Additionally, actors (re)construct and translate different exogenous contingencies such as management priorities, market ideas, efficiency notions, expectations from the technology, effects on staff expertise, users' tasks and analysts' understandings; and these social reconstructions or translations were not successful for ambulance dispatchers as there were conflicts and contradictions: the system failed to value their expertise and experiences. Despite management gaining enough resources (some causal power achieved), the information system was seen as threatening and disempowering for workers and it did not gain legitimacy (social power not achieved); and the new computerised tasks and rules were disruptive (production power). It is premature to consider information systems as producing changes in cultures and power structures without considering the social and production power dimensions (Silva & Backhouse, 1997).

Whenever an innovation is introduced in organisations, this creates new meanings and therefore disturbs power dimensions. Implementation success depends greatly on the ability to translate the new rules and norms implied by the system into pieces of discourse that other members of the organisation can understand and accept. The rest of this article will first describe the *Socrate* case study, then propose various social constructions of the information system and its implementation by applying the notions of translation and symmetry introduced above, and finally examine conflicts and inequalities by using Clegg's power dimensions outlined.

5. Case study: More or less than a failure?

5.1 Qualitative fieldwork

Constructivist research is well suited to the traditional model for qualitative researchers and theorists insist that constructivism is empirically based (Best, 1993:138). Qualitative methods have been used by IS researchers for some time (Harvey & Myers, 1995; Myers, Lee & Markus, 2000) and they have found that “only a rich, integrative view of IS implementation does justice to the complex realities of social life in organisation” (Myers, 1994b:198). Harvey and Myers (1995:23) argue that “generalisable knowledge is often neither relevant nor meaningful, in which case we are better off understanding specific contexts” even though story-telling approaches may be misinterpreted as non-rigorous (Ely, Vinz, Downing & Anzul, 1997). Many believe that case study research enables the capture and understanding of context (e.g. Darke, Shanks & Broadbent, 1998; Dyer, W.G. Jr., Wilkins, A.L., & Eisenhardt, K.M., 1991; Montealegre, 1995). Sauer (1993:3) recommends studying whole cases so as not to reject any part of them as irrelevant in order to come closer to a realistic understanding of IS failure. The research methods of choice in critical studies also tend to be long-term historical studies or ethnographies of organisational processes (Orlikowski & Baroudi, 1991:20). Social constructivism relies on theoretically informed empiricism and a sensitive methodology. The latter is particularly important in failure case studies, as there may be a code of silence or political tensions, which prohibit discussions about failures (Nulden, 1996:69).

Fieldwork at SNCF (‘Société Nationale des Chemins de Fer Français’ or French Railways) to investigate this case study began in 1994, six months after the problematic introduction of *Socrate*, and lasted eighteen months. Research access was relatively easy and the timing was judicious: access immediately after the events (summer 1993) would certainly have been refused as SNCF was greatly exposed to media scrutiny for several months and a climate of blame prevailed. I was also not seen as threatening, a French academic living in the UK, and most interviewees were very willing to talk at length to someone they perceived to be an outsider. In fact, they appeared to welcome an opportunity to re-examine events six months later, and some interviews lasted 3-4 hours. I was also given liberal access to internal files and documentation covering the initiation and development of the *Socrate* project, starting from 1989. Reflecting upon my own involvement, my first encounter with *Socrate* – and the ensuing decision to study it for my PhD – was when queuing at length to buy a ticket at the Gare de l’Est in Paris in the spring of 1993. And my first reaction was of bewilderment and anger at SNCF having done something to ‘my’ trains, at having imposed a change to ‘my’ long-established (and youthful!) way of travelling in my native country... I suspect this was a widespread and very French way of reacting that reflects a deep attachment to our geographic, identity-forming, national space and our familiar ways of moving around it. This initial reaction in itself was of interest, and the subsequent realisation that *Sabre* was a major component of this new situation made me reflect on my years spent in the late 80s in UK business schools nearly believing in the rhetoric of IT and competitive advantage¹⁰... An obvious and convenient, if not strategic, advantage of being bilingual and French-born and educated was my extensive knowledge of the French and English cultural contexts and perspectives, which was extremely useful in interviews; for instance many SNCF executives in fact used many management, marketing and IT concepts in English...

¹⁰ One quote often used and heard then was allegedly that of a top executive at American Airlines claiming that “[he] would rather sell his planes than his *Sabre* computers”...

The analysis included understanding events going as far back as 1981 with the introduction of high-speed trains and until 1997 when the company was split into two (see **Appendix 1** for a chronology of major events). It is important to resituate phenomena in their cultural, historical and political context, particularly that of the development of technologies at SNCF with which *Socrate* became associated. For instance, organisational discourses expressed through slogans (e.g. “*Democracy through speed*”, “*Progress is only worth when shared*”) provide an understanding of how the company perceives itself in social, technical and cultural terms and how these evolve over time. Since they are all intertwined with the *Socrate* project itself, **Appendix 1** includes the following aspects (in a brief format):

- The history of computerised reservation and pricing differentiation at SNCF;
- The advent of high-speed trains (French TGV or ‘Trains à Grande Vitesse’);
- Major SNCF organisational reforms;
- Deregulatory moves in European transport from the 70s to the 90s;
- Events directly related to the *Socrate* project itself, which are printed in bold characters in **Appendix 1**.

Primary methods resulted in approximately 25 hours of audio-taped in-depth interviews (12 individual face-to-face interviews and 8 group interviews of 3-4 staff). Several (6) of the original members of the *Socrate* executive team were interviewed, as well as SNCF senior managers (4), yield management experts (2), marketing (1), human relations (1) and training managers (1), SNCF sales staff (4), railway union representatives (6), passengers’ associations representatives (3), CRS (computerised reservation systems) experts (2) and travel agents (2). Tapes were transcribed and analysed qualitatively. Secondary sources included press reports, internal SNCF memos and documents, government and audit reports, technical documentation (pricing, ticketing, training manuals, software), unions’ and consultants’ reports. The next section can only describe the events surrounding the introduction of the new system succinctly for space reasons, but it should be sufficient to get a broad understanding of the material.

5.2 *The problematic introduction of Socrate at SNCF*

SNCF introduced *Socrate* (Système Offrant à la Clientèle des Réservations d’Affaires et de Tourisme en Europe), a computerised reservation system (CRS) in April 1993. SNCF bought *Sabre* from American Airlines in 1989 in order to build *Socrate*. One of its aims was to transform its commercial activities through the instigation of a new philosophy of selling, based on a technological investment importing techniques used in the airline industry. When introduced, *Socrate* provoked nation-wide strikes and attracted massive negative media coverage. The number and type of problems encountered were rather spectacular: problems in its analysis and design, development and implementation, consultation, ergonomics, training, linked to a highly controversial commercial strategy and to communication blunders (Naulleau, 1993).

The aim of SNCF was to reposition the enterprise in a new European competitive environment and gain strategic advantage (Bentegeat, 1991). The initiators of the project emphasised the importance of a policy for maximising revenue and yield management was seen as the ideal solution (Bromberger, 1993). *Sabre* was a classic example of an information system claimed to have provided competitive advantage to a major air company (Hopper, 1990).

When first implemented, however, SNCF staff and customers rejected this new technical tool and its underlying ticketing, pricing and selling policies. These

implementation problems were widely reported and examined by SNCF itself (SNCF, 1993a; SNCF, 1993b); by French trade unions (CGT, 1994; FO, 1994); by business consultants (APST, 1991; Causa Rerum, 1993); by passengers' associations (FNAUT, 1993); by the French government which commissioned a public inquiry into its implementation failure (Moissonnier, 1993; Cuq & Bussereau, 1994), and by the media (Faujas, 1993a; Pénicault & Riche, 1993; Henno, 1993). Technical malfunctions, political pressure, poor management, unions and user resistance led to an inadequate and to some extent chaotic implementation (Eglizeau, Frey & Newman, 1996; Mitev, 1996). Staff training was inadequate and did not prepare sales people to face tariff inconsistencies and ticketing problems. The user interface was designed using the airlines logic and was not user-friendly. The new ticket proved unacceptable to customers. Public relations failed to prepare the public to such a dramatic change. The inadequate database information on timetable and routes of trains, inaccurate fare information, and unavailability of ticket exchange capabilities caused major problems for the SNCF sales force and customers alike. Impossible reservations, inappropriate pricing and wrong train connections led to large queues of irate customers in all major stations. Booked tickets were for non-existent trains whilst other trains ran empty, railway unions went on strike (Devillechabrolle, 1993), and passengers' associations sued SNCF (D'Aufresnes, 1993; Faujas, 1993b).

These events (e.g. Christie, 1993; Dutertre, 1993; Langley, 1993; Maleysson, 1993), showed that such a project contributed to the upheaval of the French railways scene, which had been relatively unchanged, particularly regarding the services on offer and the passengers' practices. The new ticketing and pricing policies introduced through *Socrate* radically changed railway users' and rail workers' practices, which were grounded in important cultural dimensions and contradictions within French society; specifically, the perception of technological progress, and the traditional national public service culture, and their political aspects. *Socrate* began to represent for some a new phase of forced global innovation in an enterprise facing strategic imperatives. The competitive environment was constructed as that of European integration, which opened the area of transport to deregulatory moves and to the growth of competition across transport modes (rail, air, and road). These will be expanded upon in the next two sections.

6. Analysis

The multiple explanations for, and social constructions of, the IS implementation failure, gathered during interviews, are first reported as they build a more complete picture of the case and the various groups involved. The notion of symmetry is then applied through the comparison between the *Socrate* failure and the earlier TGV technological success. Ensuing social constructions of technology by major SNCF actors are then detailed, and a series of translations is developed through the discourses of strategy, politics, marketing, organisational change and markets, abstracted from these accounts, in an effort to express an element of criticality and reflect upon dominant rhetorics and expose their contradictions.

6.1 *Actors' multiple interpretations*

Retrospective explanations for the implementation débâcle vary enormously. A first finding which most interviewees agreed upon retrospectively is that in transferring a technical solution (CRS, GDS and yield management) from one context to another (US to Europe, air to rail), both SNCF and American Airlines, were underestimating the difficulties.

“Unlike the reservation and distribution parts of Socrate which are clones of Sabre, the yield management software was entirely written from scratch at SNCF, in collaboration with US [American Airlines] staff. In fact, the yield management software written for Socrate displayed better performance and has been rewritten for American Airlines as a result (...) They [the American experts] used to tell us that ‘really it is quite simple, it is only because you are French [that you don’t understand]’.... (...) But eventually they acknowledged that they had not thought trains were so complicated and that in fact air transport is really quite straightforward compared to rail” (Interview, Socrate Yield Management Expert).

One of the most fundamental changes in design was the disappearance of the railway station as the basic ‘unit’ or entity, as used in the previous CRS at SNCF - a simpler and popular timetable consultation and seat booking system called *RESA*, built and implemented in the 70s and 80s (see **Appendix 1**) and available directly to the public¹¹. The station unit was replaced by the concept of a ‘relation’ between two stations (origin-destination), derived from air reservation systems and relational databases. Design difficulties arose since *Sabre* was written for a maximum of 80 relations with very few intermediate stops. It had to be expanded and rewritten to cope with the most important of the 22,000 relations of the French rail network and its 2,400 stations. Such operational differences in the nature of the air and rail markets explain some of the difficulties faced by SNCF¹². Nevertheless, technical solutions are not neutral, they carry with them social constructions about the context which interact with contexts. **Figure 2** presents some of the new screen displays made available to the sales force; the ‘privileged’ relations show how pre-recording only the main and most profitable routes (through main TGV ‘hubs’) reflects a logic of competition, which didn’t exist before. The notion of origin-destination relations in transport is associated to introducing competing travel market ‘segments’ and will be examined in more detail later on. These operational difficulties contributed greatly to negative public perceptions in the first few months of the implementation, even though they were rectified fairly rapidly. Stories of small ‘unimportant’ stations being ignored by the system spread wildly amongst the general public.

The *Socrate* story is still a French favourite and appears in popular accounts of ‘incompetent’ management, such as Kerdellant (2000) who argues that the disaster was due to a lack of ‘real’ managerial expertise in the enterprise. Interviewees blamed the administrative elite, which tends to run large public French institutions such as SNCF for:

- Its “*archaic management style, distant, and cut off from realities (...) and ‘ivory tower’ mentality*” (Interviews, Union Representatives);
- “*An overconfident ‘technically-dominated’ attitude in the top layers of the organisation*” (Interview, Human Relations Manager);
- “*Making decisions unilaterally without consulting users, partners, staff or passengers*” (Interviews, Passenger Representatives).

¹¹ It is worth pointing out that the public and sales staff were therefore used to this type of computer technology and that the difficulties were not due to technophobia or resistance to technology.

¹² There was a very similar case at Greyhound Lines Inc. in the US coach industry. Greyhound Lines Inc. faced the same problems as SNCF (Tomsho, 1994) in that there are many more stops during coach trips than on air routes and the system was abandoned after a disastrous implementation in 1994.

Disponibilités ALLER PST PARIS ST LAZARE à ROU ROUEN 27/11/93					Disponibilités RETOUR ROU ROUEN à PST PARIS ST LAZARE 27/11/93				
train	heure	via	classes	services sup	train	heure	via	classes	services sup
1 TGV R	11:16		1A3 1AJ1 1AC7	B R N3	1 TGV R	16:23		1A3 1AJ1 1AC7	B R N3
08721	15:18		2A7 2AJ7 2AC2		08972	20:25		2A7 2AJ7 2AC2	
2 TGV R	12:56		1A7 1AK3	B R F N2	2 TGV R	17:23		1A4 1AJ7 1C2	B F N2
08625	15:06	EVR	2A3 2AJ2		08973	21:25		2A7 2AJ32	
EXP RP	15:19	EVR	1A7		3 TGV R	17:57		1A7 1AK3	B R F N1
03689	17:45		2A5		08972	19:54	EVR	2A3 2AJ2	
3 TGV R	14:16		1A4 1AJ7 1C2	B F N1	EXP RP	20:03	EVR	1A7	
08737	18:18		2A7 2AJ3		03689	21:54		2A5	
Affichage du dossier voyage No 1414 Affichage du dossier client No 456 Dispo de PLY à ROU le 23/11/93 Dispo de ROU à PLY le 23/11/93 Dispo de ROU à PLY le 25/11/93 Dispo de PST à ROU le 27/11/93 Dispo de ROU à PST le 27/11/93 Système central: OK (message d'erreur ou de confirmation)					(Bloc note : 1 ligne)				
RP					Origine				
Fichier RP1					Via				
Retour					Dossier Voyage				
Suite disponibilité					Réservation				
					Prix				
					Tarif				

Main screen with example of availability for return tickets

RELATIONS PRIVILEGIEES – Fichier 1

1 PST ROU : PARIS ST LAZARE – ROUEN
2 PST CAE : PARIS ST LAZARE – CAEN
3 PST LEH : PARIS ST LAZARE – LE HAVRE
4 PLY MSC : PARIS LYON – MARSEILLE ST CHARLES
5 PLY LPD : PARIS LYON – LYON PART DIEU
6 PLY DIJ : PARIS LYON – DIJON
7 PLY AVI : PARIS LYON – AVIGNON
8 PLY VAL : PARIS LYON – VALENCE
9 PLY MTP : PARIS LYON – MONTPELLIER
10 PLY TOU : PARIS LYON – TOULOUSE
11 PLY NAR : PARIS LYON – NARBONNE
12 PLY JOI : PARIS LYON – JOIGNY
13 PLY AUX : PARIS LYON – AUXERRE
14 PNO LIL : PARIS NORD – LILLE
15 PNO AMI : PARIS NORD – AMIENS
16 PES MET : PARIS EST – METZ
17 PES THI : PARIS EST – THIONVILLE

VOTRE CHOIX? ☐ 1 ☐ ☐

Example of pre-recorded 'privileged' relations

Figure 2 Examples of *Socrate* screens (Faïta, 1993:155,162)

The marketing managers and experts interviewed located the *Socrate* implementation problems in:

“An inflexible, traditionally engineering-oriented organisational culture” particularly present in middle managers seen as *“too safety conscious and unconcerned about customers”*; *“a hierarchical, old-fashioned, top-down organisation”*; and more specifically *“paternalistic relations”* with sales staff.

Traditionally SNCF has been a ‘social employer’ and has recruited poorly educated young people, many as sales clerks who generally are very loyal to the company, if poorly paid. However, their job security has reduced progressively with increasing use of part-time and contract staff, together with more demanding tasks. Marketing-oriented staff saw this paternalistic culture as leading to:

“Passive, not market oriented behaviours” and an *“inability to apply the new marketing principles behind the system effectively and proactively”* (Interviews, PR staff, Socrate team members).

However, other interviewees (Passengers’ Representatives, Sales Staff) blamed the new system for:

“Imposing new selling principles (...) and a [human-computer] interface unsuited, even adverse, to good customer relations”.

One major change introduced with *Socrate* was a user-computer interface logic derived from airlines in which customers have to choose a time of travel first rather than find out about prices first (see **Figure 2**); once a time is entered, routes on offer are ranked according to speed of travel and number of ‘legs’ or connections (as if they were competing air companies) thereby favouring TGV routes with higher fares which appear on the screen first. Additionally, fares on offer change constantly as price optimisation and yield management are used in real time. Sales staff cannot explain to passengers why prices keep changing and they felt that this:

“Prevents [us] from helping passengers find what suits them and leads to difficult sales dialogues, especially with time pressures found in station sales situations”.

IT managers and yield management experts interviewed argued that the system was a success technically and that the problem was with sales staff as well as the organisational culture at large. Other interviewees criticised SNCF for not facing up to the government and using IS and yield management to:

“Impose a technical solution instead of addressing complex transport policy issues” (Passenger and Union Representatives).

Members of the *Socrate* team accepted that *“organisational issues had been overlooked”* but believed that:

“[The choice of system was] strategically correct and would prove to be an asset in the future of the company”; and that *“the implementation problems were only minor, if irritating issues, blown out of proportion by the media”*.

Staff from other divisions claimed that the *Socrate* team and the Commercial Division were:

“Arrogant organisationally and saw themselves as superior to other divisions”.

Some staff was allegedly not displeased when the troubles took place during the *Socrate* implementation as it *“taught these [arrogant Commercial Division and Socrate team] people a lesson”* (Interview, Human Relations Manager). Some interviewees also understood the *Socrate* project as:

“A preamble to privatisation through its sophisticated accounting for profit and cost on every train and route (...) leading to “intensification of maintenance rotas for instance, and staff cuts” (Union Representatives).

It is clear from these comments that we have multiple and subjective interpretations of the events, related to the interviewees' roles and positions. In terms of symmetry between the technical and the social, some exonerate the technology and blame the social in their social construction of the IS failure - it was the fault of management, or the organisational culture, or the lack of marketing focus, or the wrong staff. Others the other way round – for instance, yield managers blaming the American software experts. These interpretations only provide partial explanations and disagreements continue to exist. The initial operational problems (mainly data input problems with pre-recorded relations, and some technical bugs) were resolved quite quickly and queues in stations disappeared. But, in response to the implementation problems, the company in its public discourse dissociated the computer system from yield management software, from the customer interface and from pricing policies. It argued (or even pretended, see Dumont, 1996) that *Socrate* had no pricing implications. The name of the system, *Socrate*, was removed; the application of yield management curtailed; the tickets were simplified and redesigned with great publicity; price differentiation was partly abandoned and simplified pricing reintroduced; as a result, passengers and the public think the system has been abandoned... But in fact it is still used on French trains to some extent (under another name), on the Channel Tunnel *Eurostar* (Paris-Lille-London), on Franco-Swiss TGVs and on *Thalys* (Paris-Brussels-Amsterdam). And an organisational transformation has also been initiated (Dumont, 1996), partly forced by the information system, for instance in the establishment of sophisticated links between accounting, pricing and operational data for each route and segment. More generally, it is argued here that the system embodied contradictions, which pre-existed the events and which continue to exist and evolve, and that the implementation failure exposed underlying conflicts, which would have remained less visible if the implementation had been successful.

6.2 *Failure and symmetry*

We can also analyse this IS failure symmetrically by comparing it to an earlier SNCF technological success. The same technocratic elite held responsible by some for the *Socrate* failure, had been responsible for a very successful renewal of SNCF through another technological innovation, the TGV high-speed network. It has been continuously expanding since the 1980s and has ensured the survival of French rail transport in the 1990s and into the 21st century (Suleiman & Courty 1997; see also **Appendix 1**). The TGV technological success legitimated the existence of railway engineers and was construed as a way of simultaneously addressing commercial, social and political objectives. The tensions between public service and profit making were still present in the mid-80s, and some of the aims and rhetoric surrounding the *Socrate* project

were very similar to the ones surrounding the TGV project in addressing business objectives and public service mission at the same time. Trust in technical progress and a faith in modernisation appeared in both the TGV and the *Socrate* cases, leading to similar negotiations, perceptions and conflicts. Traditionally, the notion of public service was strong and shared across organisational actors even with different interests (workers, engineers, executives, civil servants). There was pride in belonging to the enterprise with a belief in the spirit of modern and rational innovation for the public good, and rail engineers and managers alike had a strong loyalty to the national company. It is no coincidence that the *Socrate* project director, Jean-Marie Metzler, had previously successfully managed the introduction of the TGV at SNCF between 1977 and 1981 (see **Appendix 1**). According to a *Socrate* project member interviewed:

“It was a very strong episode in his [Jean-Marie Metzler] career, he gained an enormous reputation within the company and was therefore highly trusted for delivering technical projects”.

The TGV technical innovation became a social success through planned and unplanned implications of actions and forces driving actors, which coincided. Perceiving speed as the most rational and modern way to deliver a transport mode was coupled to a democratic purpose: “*Democracy through speed*” and “*Speed for everyone*” were the organisational slogans used. Other fortuitous elements were the choice of the Paris-Lyon route for the first TGV which has deep symbolic and cultural connotations in France; and the fact that, after the 1973 oil crisis, electricity became the dominant energy, the main rail network was largely electrified, and the aero-dynamic TGV was thus represented as saving energy and as more cost-effective than road and air (Powell, 1997). With strong R&D and engineers researching technical solutions to policy problems, speed became the major technological issue and a politically seductive promise to resolve all rail problems, that is decline, deficits and public mission obligations.

Symmetrically, the success of the TGV and the failure of *Socrate* show that any technological innovation is a situated construct subject to negotiation and differential access with unpredictable elements and is constantly created and recreated through perceptions, conflicts and failures attendant to such efforts. Additionally, the success of the former may have led to high expectations for the latter, but at the same time it effected a transformation of rail transport that set the scene for the troubles *Socrate* encountered. The TGV innovation was seen as successful so an effort was made to repeat it, with unanticipated consequences. The TGV innovation formed minds to seeking solutions in similar ways but at the same time it became a handicap as it had itself changed the scene. In particular, it shifted the focus from road/rail to air/rail¹³. The next section uses the notion of translation and social construction of technology to further our understanding of these contradictions.

6.3 *Translations and social constructions*

Socrate represents, and contributes to, conflicts and contradictions about transport access and two examples of different formulations or social constructions of the technology are those of the director of the *Socrate* project and the president of SNCF at the time, which both draw on notions of progress. The former, Jean-Marie Metzler, bases his argumentation on the notion of modern transport:

¹³ An official report on SNCF to the National Assembly accuses SNCF of still being “obsessed with the TGV” in 1994 (Cuq and Bussereau, 1994:127). One could also argue that the new focus on competing with planes rather than cars made plane-oriented solutions such as CRS more appealing (Mitev, 2003).

“Consumer needs are changing (...) Future clients will require high speeds, comfort, car rental and hotel bookings, and sophisticated travel distributors (...) Passenger associations do not understand this and have an ‘old-fashioned’ view of transport” (Interview, Socrate Director).

The argument of Jacques Fournier, the SNCF president¹⁴ is related to the notion of ‘social progress’ through the use of technology:

“Socrate allows a more sophisticated and flexible approach to pricing. Indeed its very flexibility has the potential of making the TGV more accessible financially to lower social classes, through charging higher fares to wealthy customers” (Fournier, 1993a:52; see also Fournier, 1993b). This argument was vehemently contradicted and attacked by passenger associations (Interviews Passenger Representatives; see also FNAUT, 1993).

These tensions appear in a series of translations from one set of interpretations and enrolments to the next, and an effort is made to systematise them here to clarify the issues. This is achieved by abstracting from the various social constructions identified in the empirical material, through the use of the following discourses: strategy, politics, marketing, organisational change and markets. Drawing on these dominant and evolving discourses and rhetorics is an essential element of criticality and is expressed in the following translations. The first is a strategic one. The reasons SNCF management gave for the purchase of *Sabre* were firstly a technical need to increase capacity. This assumed European passenger traffic would increase – although this was eventually criticised as an unfounded justification for the project. *Sabre* was the only technology available at the time that could cope with the forecast increases of reservations. The dominant discourse of IT providing competitive advantage of the 80s influenced the perception of this system and SNCF top management adopted this rhetoric. In 1991, with 85,000 terminals in travel agencies in 47 countries providing access to fares and schedules for 665 airlines, *Sabre* accounted for about 85% of American Airlines’ earnings (Copeland, 1991). One crucial element of this advantage is seen as the electronic control over global distribution channels (Schulz, 1992). With transport deregulation looming in Europe, emulating American Airlines’ competitive positioning through the ownership of a sophisticated CRS was very attractive and one persuasive argument was the aim *“to sell rail tickets to all Europeans”* (Anon, 1992); another argument was:

“To stop major existing GDS from dominating the European market and forcing us to pay them for each [consumer sales] transaction we carry out” (Interview, Socrate IT Director).

This relates to global issues and the second political translation links these socio-economic conditions to subsequent organisational and commercial translations, at a local level of individual and group action. The *Socrate* project team was able to convince SNCF that this type of strategic advantage could increase revenues on profitable lines. An important macro-perspective that was used as a justification was how the French rail industry was evolving from a public monopoly situation to one of increased intermodal competition and deregulation of European transport (see **Appendix 1**). However, the necessary modifications to turn *Sabre* into a French rail CRS and the controversial use of yield management and optimisation techniques exposed the difficulties in translating

¹⁴ Jacques Fournier was SNCF president during the *Socrate* events; he left and was replaced by Jean Bergougnoux in May 1994. It is not clear whether his departure was related to the *Socrate* problems.

strategic concerns from air to rail. Differences between US air and European rail transport deregulation highlight the social and economic conflicts between competition, co-operation and complementarity in intermodal and intramodal transport¹⁵ (Mitev, 1997). A major actor in this respect is the French State, who has an ambiguous relationship to SNCF, simultaneously requiring: (a) profit maximisation to reduce deficits and State support; and (b) public service obligations and social pricing (e.g. old age pensioners, children, families, soldiers, etc.) in response to political pressures such as elections. The transferability of the deregulation model from the US to Europe, and from air to rail became controversial. The role CRS are claimed to have played in the restructuring and deregulation of the US airline market was a threat in the French rail context. The intended translation from air to rail CRS therefore reflects a certain political reading of environmental changes and construes the technology as an independent agent capable of intervening in this environment.

The third commercial translation attempts to use a new marketing rhetoric to change passengers into customers. New commercial techniques to manage passenger travel and differentiated pricing were made possible by yield management software. These systems were associated with a new marketing culture, which implied an unwelcome change in buying and travelling patterns: the basic unit of francs per kilometre was replaced by complex and obscure pricing; the ability to freely turn up and

pay on the day of travel was replaced by a push for booking ahead. This is a failed translation for passengers, who interpreted the technology as facilitating demand control and price discrimination, and associated *Socrate* to making more money out of high-speed trains (see **Figure 3**). Passengers had to become ‘clients’ and ‘customers’ who are expected to behave rationally and adapt their choice of route, time of travel and type of train to what the system offers¹⁶. They also had to alter their buying behaviour by booking as early as possible. This in effect shifts the burden and the responsibility of the commercial transaction onto the customers, mediated and driven through the use of technology.

CRS and yield management techniques become a management tool for maximising profitability through market segmentation. This erodes cross subsidizing between profitable and unprofitable lines. The CRS became associated with a contentious effort to change the company ethos so as to make it more accountable, business-like and marketing-driven. The fourth translation is therefore organisational and concerns management, technical and sales staff. *Socrate* came to symbolise the maximisation of profits, the implementation of productivity gains, the reduction of over-capacity and the streamlining of unprofitable lines. The technology was seen as representing a change in the organisational culture, away from a public service ethos, leading to tensions and clashes. Sales jobs became heavily standardised and monitored through a complex

¹⁵ Some important aspects are that: there is limited rail passenger transport and little competition between air and road in the US compared to Europe; infrastructures and safety costs, financial and fiscal regimes are very different in air, road and rail; the French high speed rail network has grown to be one of the largest in Europe but to the detriment of the older and one of the most dense intercity network, leading to intense debates on regional development and “désertification” of rural France: TGV lines require very few stops to go fast and many intermediate stations disappear as a result; *Socrate* enables intramodal competition between high speed lines and older intercity services, but within the same company - rather than between different air companies as GDS did in the US.

¹⁶ One anecdote heard during fieldwork reflects this tension: *Socrate* posters in rail stations were apparently defaced with graffiti where the word ‘client’ had been crossed out and the word ‘user’ painted over. Through *Socrate* an SNCF passenger can be in turn a ‘client’, a ‘citizen’, a ‘user’ or a ‘customer’ according to social, economic and geographic segmentation. A resident in a non-TGV area (e.g. in a rural area) is a ‘passive’ customer.

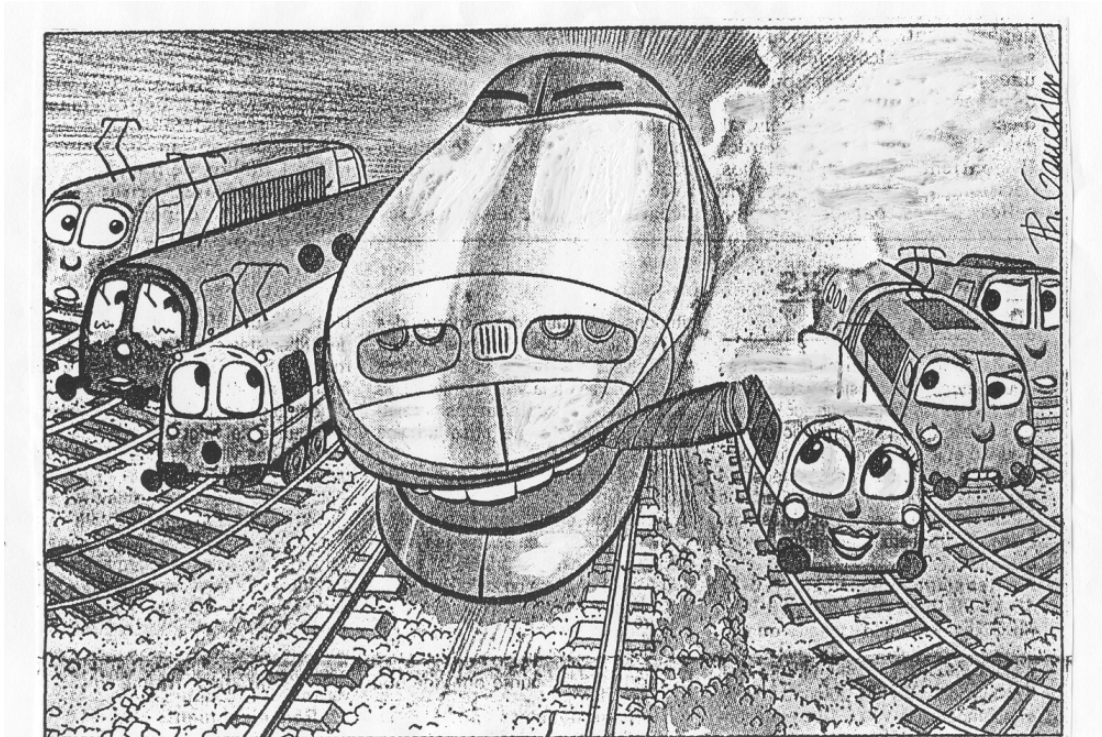


Figure 3 The TGV and classical intercity trains [Philippe Gauckler, in Faujas, 1993c]

computer interface; it encapsulates a new intricate pricing knowledge, making it inaccessible to sales staff, who are merely transmitting to the customer what the machine has decided; it profoundly modified their working practices and identities. Sales staff used to be selected and promoted on their knowledge of price structures, products and discounts available, and of the rail network routes. This knowledge was heavily relied upon in their interactions with clients to help them make a buying decision and find a compromise between prices, times, routes and passengers' priorities and constraints. Sales staff also experienced at the same time increasing difficulties and work pressures in their day-to-day activities (Interviews, Sales Staff): lack of controllers on trains, staff cuts at ticket offices, closing down of services (information desk, after sales office, luggage services), reduction of opening hours and casualisation of labour.

Finally, the fifth translation draws upon the changing discourses on the market and is here about market restructuring. CRS are intertwined with organisational, industrial and market changes in terms of infrastructures, operations and transport planning. The marketability of specific route segments is supported by the information systems in place; and different organisational forms are emerging within SNCF and in the European rail transport industry at large. Infrastructure costs and trains operations are accounted for separately. It is thus possible to link profit and cost information much more precisely and accurately for each route segment and for each individual train, through the accumulation of customer and market data. However, the transformation and restructuring of this market sector is not a smooth exercise and is still heavily disputed in many European countries (Ross, 1998; Van de Velde, 1999).

So far the case study has been analysed in terms of the social construction of technological failure, the attempted translations across actors at global and local levels and the various discourses called upon. The next section examines yield management in more detail, as it seemed to represent the core of the system and/or the major stumbling block for many interviewees and, analytically, it crystallises conflicting issues of power and politics.

7. Yield management and power relationships

Yield management techniques combine differentiated pricing, profit maximisation and quota management. Together, they work out the ideal point at which a customer who does not get a discounted fare either transfers to a higher fare or to another train. Much effort was put into the design of *Thalès* (Traitement Heuristique Algorithmique et Logique des Espaces de Service), *Socrate* optimisation software subsystem, as it was seen by SNCF as the strategic core of the project, possibly to the detriment of the other IS components. This may have contributed towards some of the operational problems faced during the initial implementation as resources were dedicated to designing the yield management software. Yield management is seen here as the core in the sense that it is also closely related to deregulation, pricing and organisational changes considered above; and it is about yield management that the most divergent views were found during data collection. The techniques themselves are first briefly described, followed by a short analysis of how they relate to pricing in rail transport. Contradictions and conflicts surrounding pricing implications are considered through the discourses used by various actors, particularly from the standpoint of passengers. Finally, power relations and politics are more specifically addressed and represented through the application of Clegg's power dimensions.

7.1 *The techniques of yield management*

For all trains, *Thalès* stores the changes and evolution over time of filling rates, prices paid by clients (full fares, commercial or social discounts) and routes. Combining this information with forecasting and optimisation software, *Thalès* can then propose, dynamically, train per train, the best distribution of fares (or quota) to increase profitability. It can, for each train, modify fare allocation according to how this particular train is currently filling up compared to past rates. If the figures are less than the initial forecasts, *Thalès* can choose to increase the number of seats offered at discounted prices (SNCF, 1992a). Reservation and distribution systems are required as they consist of a database management system centrally controlled, which simultaneously: manages the complexity of a fluctuating demand related to the variability of prices through yield management techniques; provides real time information on marketing policies and fare structures of competitors; and accumulates data for statistical capacity and profit analyses. The computer networks and management techniques allow large-scale data collection in stations and distributors. They manage the complexity of the price/capacity relations and routes/times, in order to optimise the commercial and financial yields, in a context of inter-sectorial competition (air, rail, road). Yield management databases and models require certain functionalities in the reservation and distribution system. The yield management system is linked to:

- Historical databases (past reservations per origin-destination, per fare paid, cancellations, no shows);
- Databases of current reservations;
- Databases with characteristics of capacity;
- Database on competition.

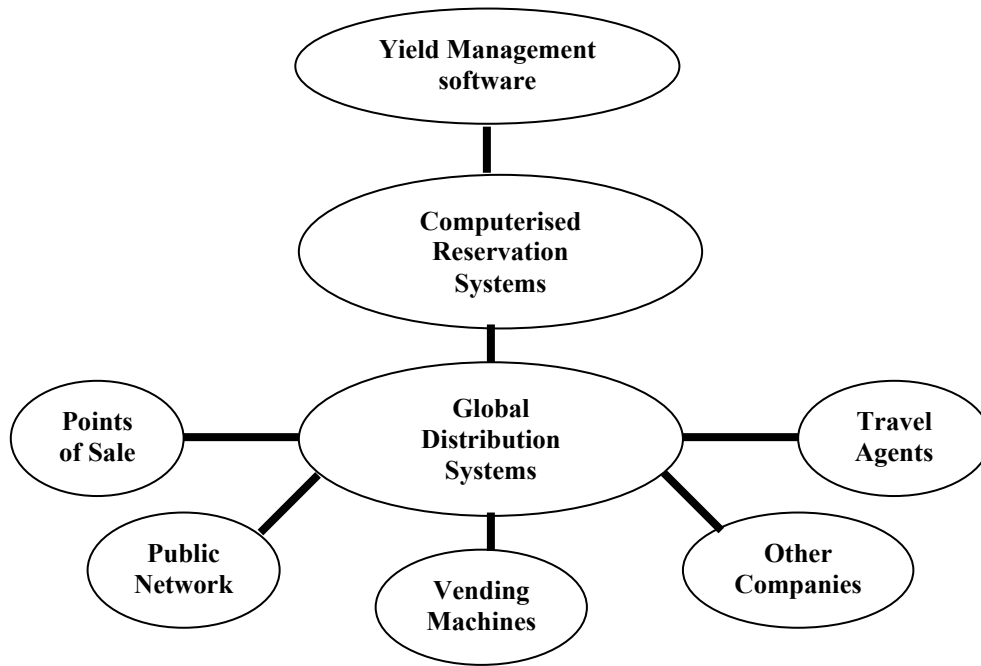


Figure 4 Yield management, CRS and GDS

Information for these databases comes from the CRS, which manages the reservations and holds information on timetables, availability, prices, etc., to which is connected, through the GDS, the points of sale terminals in the stations, the travel agencies, other companies, ticket machines, and the public access network (see **Figure 4**). The yield management system manages quotas and overbooking through minimum and maximum thresholds based on predictions. Human analysts' intervention to modify these parameters is required when unusual conditions arise, which can be aided through computer simulations. Models are refined through comparisons between predicted and actual demand, capacity and profit implications.

Through a process of trial and error, SNCF yield management seeks the optimal situation in which the cost of the risk of waste (loss of earnings) and the cost of the risk of denials (clients will need to be compensated and reputation will get damaged) are minimised. Since the more the risk of waste decreases the more the risk of refusal increases, the total cost of overbooking is at its lowest when the two risk costs are equal (Daudel and Vialle, 1989). In practice, determining this total final cost requires very complex probability calculations, and a progressive improvement of forecasting models by incorporating new data from staff experiences and historical records. The principles of quota and yield management are illustrated in **Figure 5** that shows the proportion (or quota) of discounted and standard prices can be altered anytime (the dashed line can move).

7.2 *Yield management and pricing in rail transport*

Prior to *Socrate*, the way to calculate fares in *RESA* was straightforward. It simply multiplied the number of kilometres travelled by a unit price per kilometre and it corresponded to geographic cross-subsidizing and the principle of equality of access to transport for all citizens in a national homogeneous space. By contrast, the fundamental principle of *Thalès* is that of commercial optimization: not just the filling of trains, but their profitability, by limiting access to certain prices, train per train. Price quotas (the proportion of discounted fares per train, see **Figure 5**) can change daily before departure

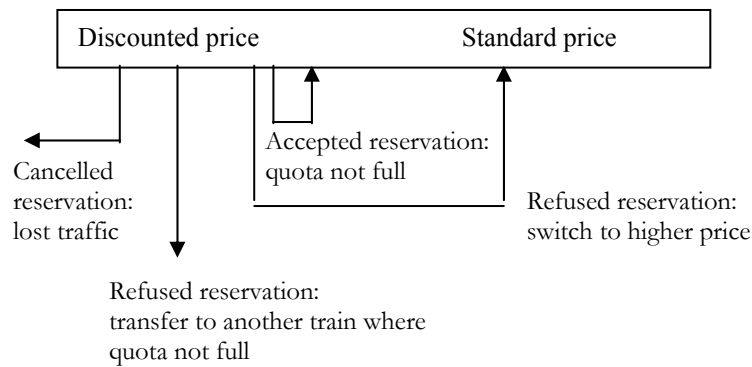


Figure 5 Quota management (Gianfaldoni, 1993:52)

NB. The dashed line is not fixed and is adjusted constantly, in real time, according to sales so far and previous filling rates and revenues on the same route segment in the past.

according to bookings. *Thalès* stores a history of all seats sold to determine pricing and number of discounted seats train per train. Through the *Thalès* system, information about past reservations is extracted from the CRS and the demand analysed.

In the European rail industry, many rail companies (e.g. Danish, Norwegian, Austrian, Swedish, German) have introduced some simple yield management (Arthur Andersen, 1997:55) but usually in a limited form and only on some routes in high demand; unlike SNCF with its sophisticated system and its decision to encompass all intercity travel. The use of yield management in rail (and in utilities in general) raises many questions as market segmentation and price differentiation are controversial. The travelling public is large and complex and these techniques can misfire and lead to a mixing of segments and a failure to distribute demand more evenly. More differentiated pricing and restricted discounts are closely related to a belief in the elimination of regulations; the latter are seen as restraining otherwise 'freely' competing businesses and political considerations are constructed as an obstacle to the 'neutral' use of yield management.

Transport is being redefined as a service industry amenable to marketing and business 'natural' principles. Consumer rights and customer protection legislation are perceived by some experts as obstacles to yield management applications (Boella, 1997:41). On the other hand, rail passengers associations representatives interviewed objected to techniques enabled by *Socrate* and *Thalès* and complained about:

"The lack of transparency in pricing; 'bait and switch' tactics, whereby a company aggressively advertises very low prices [in order to fulfil their public service obligations] but in fact has very little inventory available at that price; 'gouging' where the prices are so high that they can be regarded as unfair".

Whereas yield managers interviewed stated that:

"Optimisation software is entirely neutral, is dissociated from policy issues on pricing and can fulfil any purpose including public service obligations".

This reflects a fundamental conflict between sellers who want the flexibility of pricing according to yield management principles, and buyers who want stability and predictability of prices and delivery. There is a movement of countervailing forces as the buyers and sellers each seek to obtain market power in their relationships. Bell and Kaven argue that:

“Yield management is not based upon market power equilibrium, but on an inequality between large sellers and small or independent buyers who can be induced to buy when business is soft or forced to buy a higher price when business is good. Yield management application is only really useful against the price powerless” (Bell & Kaven, 1997:93).

7.3 *Passengers or customers?*

SNCF marketing research constructed a certain justification of *Socrate* yield management and pricing by avoiding ‘social’ connotations and proposing a focus on ‘individualised’ customers (SNCF, 1992b). Consultants suggested avoiding the following ‘negative’ images and concepts (Bruno de Courrèges Consultants, 1992):

- *“Trains for the rich, trains for the poor”;*
- Pricing complexity;
- Advance booking;
- ‘Cheap’ sales techniques (*“SNCF is not in the business of selling soap”*, Interview, Marketing Manager);
- Yield and profit.

Marketing consultants also recommended concentrating on the existence of discounts for all and on all trains, and a shift from a collective anonymous public to a diversity of individual situations, as expressed in the following marketing material:

“[A new system] for all and for every one”; “For each client – a need, for each need – a question, for each question – an answer”; travel opportunities with positive connotations of personalised occasions such as “you are going away for the weekend...” rather than access conditions and constraints; a new ‘open’ interaction between SNCF and its clients where customers are at the centre of the transaction with a “new active way of managing one’s travel”, “I am an active subject and I negotiate my travel with SNCF” (SNCF, 1992b).

Technical optimisation experts, on the other hand, drew on the neutrality of technology to distance themselves from social implications. When accused of increasing prices, yield management experts declared that:

- *“Socrate does not change prices; they are established and published once a year in consultation with the Ministry of Transport and these are well known to the public” (SNCF, 1993c);*
- *“Socrate merely changes the number of reduced fares available and the technology is not to be blamed” (Interview, Yield Manager Expert);*
- *“It is reasonable as clients who want to travel at busy times should organise themselves in advance, like people booking holidays or hotels” (SNCF, 1993d).*

This puts the burden of the commercial transaction onto the customers by drawing on a logic of ‘rational’ buying behaviour. Yet another justification of more extensive pricing differentiation through *Socrate* (Descoutures, 1992:23, 74) is the market economics rhetoric: “pricing ‘freedom’ is necessary to cover real costs in order to establish a ‘sane’ basis for competition”; *Socrate* “allows ‘truth’ and ‘transparency’ of prices”; it ensures “equality of treatment and enables the mechanism of free markets which secures an efficient allocation of resources”. On the other hand, passenger

associations argued that the new commercial policy did not fulfil public service obligations of transport law. Controversies surrounded the ‘overpricing’ introduced by *Socrate*, seen as outstripping the previous standard franc/kilometre pricing system perceived as uniform, clear and easy to understand. Passenger representatives interviewed opposed the generalisation of quota management to the whole SNCF network on the grounds of equality of access; and an interviewed member of the *Socrate* team responsible for sales reflected that in fact:

“There are different priorities and tensions between different functional needs across the national rail network, and yield management only really applies to limited route categories”.

Taking a non-deterministic stance, it can be said that the technical (optimisation and yield management software) is totally intertwined with the social (pricing); and from a critical perspective, we can also see here obvious power relations. Far from the technical being blameless and disconnected from the social, technology and modernisation are discourses and instruments of social action. SNCF top executives shared a belief in modernisation and progress, and positioned technology as logical and neutral. Nevertheless, many contradictory lines of argumentation, discourses and social constructions existed, as illustrated above. For instance, and like many other SNCF technocrats, the *Socrate* key expert in yield management interviewed also adhered to the view of yield management as a modern, technical and ‘natural’ progression¹⁷ (or natural ‘trajectory’ see **Section 2**). By contrast, transport experts (e.g. Quinet, 1995:57) argued that it is necessary to replace “technocratic diktat” by a “broad and open political debate [on major transport issues]”. Like the yield managers interviewed, IS writers Adam and Cahen (1997:20) argued that: “*Socrate* is not questioned as a technological device, but on the strategic field (...) It is the commercial policy that *Socrate* was carrying out that was the heart of the problem [not *Socrate* itself]”. This convenient split between the technical and the social isolates and exonerates the technology. By contrast, a representative of passengers’ associations remarked in an interview that:

“Once they [SNCF] had invested in this marvellous new thing, it had to be used. They say it simplifies matters, but as soon as you do things with such a tool, everything becomes more complicated (...) Some things could not be done before, it is not neutral”.

The choice of *Socrate* as a strategy for SNCF was the expression, the translation, of a particular reading of the social, economic, technical and political environment, and corresponded to the development of a new actor-network as a techno-commercial solution to the problems faced by SNCF. Top executives were convinced by the logic of this translation, and yield management came to represent the means of achieving that strategic vision. However, yield management is not just a technical tool and is associated with power relationships such as pricing, access to transport and its socio-economic implications. Subsequent translations and the extension of the actor-network to staff and passengers therefore became problematic. And the ‘failure’ reintroduced actors who would have been overlooked (e.g. rural citizens) if implementation had been successful and if high-speed travel had succeeded in gaining more autonomy from the rest of the rail network.

7.4 Power dimensions

¹⁷ This trajectory could be seen as continuing from the earlier TGV technology and its buying and travelling assumptions (see also Mitev, 2003).

As shown so far, examining social constructions, studying the failure symmetrically and systematising translations enable a progressively deeper and richer investigation of the case material; critically assessing the discourses and rhetorics drawn upon, and formulated in, these translations also support the unwrapping of tensions, contradictions and conflicts. Elements of Clegg's power framework can help identify empowered and disempowered agencies further (Silva, 1997:93) and represent power dimensions and struggles more clearly. **Table 1** shows the three power dimensions in the last three columns. The rows group agencies into three main categories, starting with the top row consisting of the Government, SNCF top management, the Commercial Division and the *Socrate* management team as they are major decision-makers; a second group include SNCF staff and unions; and the third row represents the passengers as the ones with the least influence in organisational decision-making. Having to systematise agencies here already addresses issues of power, as it deals with the ANT lack of attention to structural differences between 'weak' and 'strong' actors in terms of their influence and how actors are not all equal (Walsham, 1997; Stadler, 1997). The first column ('exogenous contingencies') refers to changes in external conditions and constraints for these agencies, relevant discourses and problem-solving rhetorics used by certain agencies, as well as historical relationships between actors that appear to have a bearing on the events in the case study. The first two columns are also a convenient way of representing how local actors (organisational entities, staff categories) are associated with global issues (e.g. SNCF deficit, equality of access to transport). Most of this material has already been mentioned in a narrative form in the previous two sections¹⁸; it is assembled in **Table 1** for analytical and summative purposes and is discussed below from the viewpoint of the various agencies or actors, in a top-down order for each power dimension, but starting with exogenous contingencies to summarise the political context first.

Exogenous contingencies

The economic context of rail transport was understood to be in a state of crisis by the Government; the French State was seeking to reduce SNCF deficit and respond to European deregulation programmes as well as apply social pricing; trans-European high speed networks were seen as the next competitive challenge by SNCF; and associated managerial discourses on competitive advantage through IT and the use of new IT-based management and marketing techniques became available to SNCF top management. Yield management specifically came to represent a technical solution that could accommodate both market principles and public service obligations for SNCF executives and the *Socrate* team. New discourses on flexible organisational forms were also a backdrop to organisational restructuring, for instance the creation of the Commercial Division in order to bring a marketing focus into the organisation, and to which the *Socrate* project was attached.

¹⁸ Please note that organisational aspects (changes in organisational structure, culture, management control, tensions between divisions, professional groupings and identities, relations between SNCF and unions), and political elements (the intricate negotiations and relations between SNCF top management, civil servants, government and European officials, partners, unions and public opinion), have not been covered in any detail in this article for reasons of space. Also, a deliberate choice was made to concentrate on yield management software, as it was central to the *Socrate* events. Observing the obvious tensions it generated between marketing, IT, sales staff and passengers, corresponded to the ANT objective of 'being specific about the technology' and it appeared to encapsulate the problematic relations between technology and power.

Exogenous contingencies	Agencies	Causal power	Production power	Social power
<ul style="list-style-type: none"> - <i>Transport crisis</i> - <i>SNCF deficit</i> - <i>Withdrawal of State</i> - <i>European transport deregulation</i> - <i>Growth of high speed networks</i> <p><i>Managerial discourses available:</i></p> <ul style="list-style-type: none"> - <i>New flexible entrepreneurial organisational forms</i> - <i>CRS and competitive advantage</i> - <i>New IT based management and marketing techniques</i> 	<ul style="list-style-type: none"> - Government - SNCF top management - Commercial Division - Socrate management team 	<ul style="list-style-type: none"> - Policy making (social pricing, budgets cuts, efficiency demands) - Authority and discretion on policies, plans, financial resources: approval of <i>Socrate</i> project - New marketing and PR to deal with yield management - Choice of software - Recruitment of yield managers and IT staff 	<ul style="list-style-type: none"> - Instigate an organisational transformation - Internal markets - Cost cutting and improve efficiency - Increase control over operations and distribution costs - Yield management for price differentiation - Accumulate accounting and marketing data 	<ul style="list-style-type: none"> - Uncertain climate - Concerns about splitting infra-structures from operations - Staff cuts - Controversial organisational restructuring - Cultural change from public service to selling ethos - Loss of public trust - Change system name - Changing authority and legitimacy: from engineering to IT and marketing
<ul style="list-style-type: none"> - <i>Partnership with American Airlines</i> <p><i>Erosion of SNCF traditional role as a social employer</i></p> <ul style="list-style-type: none"> - <i>History of tense tripartite relations between the State, SNCF and unions</i> - <i>Profit-making vs Public service</i> 	<ul style="list-style-type: none"> - IT staff - Sales managers - Sales staff - Accounting staff - Operations managers - Unions 	<ul style="list-style-type: none"> - System design, consultation, training - Implementing new team management & sales targets - Implementing new customer dialogue - Implement cost control - Now accountable through IT - Participation and negotiation over working conditions 	<ul style="list-style-type: none"> - Yield managers gain expertise & decide availability and fares - IT staff integrate information across functions - Increase sales productivity - New sales targets perceived as unrealistic - Loss of control over dialogue with clients - Gain new expertise - Loss of independence - Labour strike - Engage with passengers 	<ul style="list-style-type: none"> - High status (seen as arrogant by others) - Redefinition of sales jobs and expertise - Inappropriate training - Tensions between ticket office closures and customer orientation discourse - No improvement of qualifications and work conditions - Professional identity & higher status - Lower status - Opposition to changes to public service mission and staff cuts
<ul style="list-style-type: none"> - <i>Equality of access to all French citizens</i> - <i>Homogeneous national network vs market segments</i> 	<ul style="list-style-type: none"> - Passengers 	<ul style="list-style-type: none"> - Some discretion on buying and travelling behaviour - Adapt to new customer segmentation 	<ul style="list-style-type: none"> - Dealing with new reservation, pricing and ticketing logic and principles 	<ul style="list-style-type: none"> - New relationship to sales staff - Resistance to new pricing and selling practices - Loss of trust in company

Table 1 Power dimensions

- IT and marketing staff grew in numbers and clout compared to traditional engineers, and gained expertise from American Airlines. Sales staff suffered from the erosion of SNCF role as a social employer.

Unions and passengers drew upon the public discourse of equality of access to all citizens, pointing to political contradictions between public service obligations and profit making.

- Causal power
- The Government exerted its causal power through policy-making and budgets cuts; SNCF management through its discretion and authority on policies and plans in approving the *Socrate* project which for them corresponded to a political compromise between profit making and public service mission; the Commercial Division through its marketing and PR activities around the new commercial principles derived from yield management (see also **Section 7.3**); the *Socrate* team through its software and recruitment decisions.
- IT staff exerted causal power through system design; Sales managers through implementing new team management and sales targets; Sales staff through implementing (or not) a new type of customer dialogue; Unions participated in negotiations over working conditions.
- Passengers had causal power and discretion over their buying and travelling behaviour.

The strong position held by agencies in the first category, e.g. SNCF management, given their resources and their authority for decision-making, was not sufficient to produce a successful information system. They failed because social and production powers were not associated with causal power.

Production power

- Techniques of control, discipline and production used by the more powerful actors (first category of agencies, in the top row) were: organisational restructuring and transformation; reorganising SNCF divisions into internal markets; cost cutting and efficiency improvements; increasing control of distribution and operations costs; using yield management for price differentiation; accumulating accounting and marketing data.
- At the middle level, new experts had the power and tools to decide seat availability and fares, integrate information across divisions and functions; sales managers had the production power to increase sales productivity and set sales targets. New sales tasks and rules were introduced through the information system, which undermined control and expertise of some and increased that of others, leading to new empowered and disempowered agencies. Empowered agencies included yield managers who now decide availability and fares; commercial managers who establish sales targets; accounting staff who check costs; and IT staff who integrate information across organisational functions. Disempowered agencies became sales staff who lost control over dialogue with clients and who experienced sales targets as unrealistic; and traditional operations managers who lost their discretion and became accountable through IS; Unions had the power to withdraw labour.
- Passengers were expected to deal with the burden of new reservation obligations, complex pricing principles and ticketing interfaces in their buying decisions and transactions, which embodied new marketing-oriented customer segmentation.

Social power

The new rules stemming from the IS and the new tasks were not translated successfully: the introduction of the system created a gap between management on the one hand, and sales staff and passengers on the other hand, in terms of attitudes, social legitimisation, meaning and group relations.

- At organisational level, there was a climate of uncertainty as to the future of the company due to the prospect of dividing infrastructures from operations; the organisational restructuring and the shift from a culture of public service to a selling ethos were controversial in various ways in different divisions; there were problematic changes of authority and legitimacy, away from an engineering tradition to IT and marketing. *Socrate* became associated with these forms of social power, leading the company to loose public and some employee trust, and to change the name of the system.
- *Socrate* influenced the way employees interpreted management style and objectives: ticket offices closures and the new customer orientation discourse were perceived as contradictory and hypocritical, in a context of casualisation and intensification of labour control; sales staff objected to the training and the new interface seen as not supporting a good customer dialogue; their qualifications, promotion prospects and working conditions did not improve whilst they were required to increase sales. They interpreted the system as a threat to their professional identity and role, understanding of their work and of the organisation. Managers interpreted staff attitudes and actions as a lack of collaboration and resistance.
- Passengers resisted new pricing and selling techniques and lost trust in the enterprise. Unions objected to the loss of public service mission. These contradictory interpretations and unequal relations hindered social integration, making it difficult for management to adjust their causal power. The new IS did not support social integration.

8. Discussion and contributions

We first summarise how the concepts of social construction, translation, and symmetry were applied to the case study and the subsequent findings. The benefits and limitations of using social constructivism and Clegg's power theory for a critical analysis are compared and discussed in the final section.

8.1 Social construction, translation and symmetry in the case study

The problematic implementation of a computerised reservation system at French Railways was investigated and analysed using a constructivist approach, actor-network theory and one of its main tenets, the sociology of translation. The *Socrate* project was an attempt to link different actors into a network: the French government and its transport policy agenda in a context of market deregulation pressures in Europe; SNCF management, its profitability objectives and organisational restructuring plans as well as politically sensitive public service obligations; different staff categories, their expertise and changing authority and legitimacy, in particular IT and marketing staff; new computerised ticketing, reservation, sales and price optimisation systems; sales employees, their changing roles, tasks and behaviours; passengers and their buying and travelling expectations. If the translation of the project is successful and accepted by the agencies, the actor-network becomes indispensable. Particular agencies attempt to

interest and enrol other agencies in their programmes. SNCF management translated transport deregulation, governmental pressures and expectations about technology into using CRS to gain strategic advantage. The *Socrate* team translated this into techniques and strategies enacted by a system to increase profitability and cater for public service obligations through yield management. Commercial expertise was inscribed in the form of new pricing rules and a new user-computer interface. Passengers were also expected to accept these new selling principles. However, sales staff and passengers in particular did not adhere to these translations.

In this case study, the analysis is complex since it involves many groups and actors and many levels, local, organisational and global. It encompasses a cross-cultural (from the US to France) and cross-sectoral (from air to rail transport) transfer of an information system, together with an attempt to reformulate management discourses, commercial practices, economic models, strategic goals, political perspectives, technological expectations, sectorial markets and structures. Drawing on these new social constructions, the project goes through translations in order to proceed. It succeeds, not because it is inherently better than the alternatives, nor because it is the 'right' answer to the problem being faced, but rather because it is adopted by other actors to serve their purposes. Instead of understanding IS projects as proceeding 'normally' unless they are actively stopped (and hence 'fail'), projects are seen here as not proceeding unless actors make them happen. Each actor 'translates' the project and takes it in a specific direction according to his/her context, or fails to do so as the case may be.

A symmetrical analysis of the earlier TGV technological success at SNCF showed how it formed minds to seeking solutions in a similar ways (e.g. oriented towards speed and the air industry), and allowed some exploration of similar social constructions and discourses, particularly around technology and politics, and attendant contradictions and conflicts. The constructivist concept of symmetry between success and failure was applied and many interpretations were found showing how failure and success are defined through different social constructions of the social and the technical. Conflicting social constructions revolved around the nature and role of the technology, optimisation and yield management software specifically, which was perceived as neutral and successful by some, problematic and unacceptable by others: some exonerate the technical and blame the social, others the other way round, usually based on their positions and social relations which differ in terms of power.

8.2 *Power and politics*

Clegg's theory of power, helped identify empowered and disempowered actors who contributed to stabilise or unsettle the actor-network. Social and production powers were not integrated with the causal power held by SNCF management; and inequalities between empowered (marketing, yield managers) and disempowered (operations, sales staff, passengers) actors reflected conflictual market and organisational relations. The *Socrate* team successfully translated *Socrate* for SNCF management which saw this technology as a continuation of earlier techno-social successes, and as a solution to governmental demands and perceived market pressures. Enrolment of some agencies (Commercial Division, marketing and accounting staff, yield managers) was also achieved successfully. However, involvement (by persuasion or force) of other divisions and groups (e.g. engineering and operations managers), sales staff and passengers did not succeed: resources were perceived to be unequal, objectives as unfair, persuasion failed, and the climate became antagonistic. Being in a position of authority and having access to resources is not enough. Staff and customers had social power too. In fact, there was a reversal of power and backtracking in the use of the system: the name *Socrate* was

withdrawn, the head of the project removed, price differentiation simplified, tickets redesigned, the use of optimisation software curtailed, the development of high speed trains questioned and their use made more flexible (e.g. by stopping at more stations). *Socrate* constituted a power element in the enterprise, was conceived of as a lever for organisational transformation by some sections of the organisation (e.g. Commercial Division) and not others, and questioned SNCF existing collective values.

8.3 *Contribution to IS research: constructivist and critical perspectives*

Using the sociology of translation helped describe actors involved at many different levels of analysis, their interpretations of the social and the technical, and how the project was carried forward or not by various agencies, rather than following a pre-determined trajectory. As a constructivist theory, ANT proved to be effective for describing how technical design solutions are interwoven with social issues (Monteiro & Hanseth, 1996). And the notion of symmetry made it possible to analyse how the failure was socially constructed at local level:

“Much of the accounting for failure usually assumes that the world can be understood as a set of distinct compartments, such as the technical, the managerial or the psychological (...) This locates responsibility in a specific compartment, and it builds a barrier between one compartment and the next (...) However, causes and responsibilities don’t stop for very long in compartments and tend to move on (...) We need to be specific, modest, located in particular contexts and situations” (Law, 2001).

One explanation of the failure by some actors (IT and marketing staff) saw the technology as neutral, and the problem as social in terms of resistance by other actors to the new commercial policy inscribed in the system. Unions and passengers on the other hand presented the technology in a different light and argued that technocrats used it as a sort of surrogate to avoid debating the real political issues of transport. A non-deterministic (neither technological or social) explanation is that these new commercial policies couldn’t exist without the new information system – the social and technical are not separable. It would be impossible for sales staff to cope with the volume of information generated by constant changes in fares without CRS. At the same time, yield management software is a certain social representation of the deregulation and the management of fluctuating prices and routes. The technology addresses and creates social problems, and social problems have technological elements and representations. This also avoids an environmental or political essentialism. We do not have to lapse into a simplistic determinism to acknowledge that a phenomenon is part of wider technological, economic, cultural and policy environments. These contexts and their interpretation are socially constructed by actors, and are an important influence on techno-organisational change. External ‘factors’ are merely “conditions of possibility” that “make certain courses of action feasible while constraining or ruling out others” (Knights & Murray, 1994:39). While ‘conditions of possibility’ such as ‘the [transport] market’, frame organisational behaviour, actors construct at the local level the ‘external forces’ that they then respond to. “A market exists only in as much as people believe that it exists and act accordingly. Similarly, a technological opportunity or constraint exists only in so much as people believe it to exist” (Knights & Murray, 41). It is believed here that macro-structures do not determine micro-events (Knorr-Cetina, 1981), and that social processes exhibit chains of intended and unintended outcomes, which it is argued, explain failures (and successes). Some human perspectives win over others in the

construction of technologies and truths, some human actors go along with the will of other actors, and some humans resist being enrolled.

But there are some difficulties with constructivist approaches that have also been identified by other IS researchers (Stalder, 1997; Nandhakumar & Vidgen, 2001); for instance Walsham (1997) finds that ANT is amoral and apolitical (see also **Section 4.7**). When analysing this case study, it was found that only relying on the configuration of the actor-networks for an explanation was not enough. “ANT’s a priori that society is ontologically flat is an excellent starting point but a weak ending of the analysis” (Stalder, 1997). In particular, treating actors equally is problematic. The ANT notion of the ‘seamless web’ supported an open-ended and inclusive approach to actors in the largest possible sense, much more than is usually the case in IS research. On the other hand, the notion of actor in ANT is difficult to handle: not all actors are equal. This was much better operationalised in having to systematise agencies in terms of their weak or strong influence in organisational decision-making according to Clegg’s power dimensions in **Table 1**.

Conversely, it was found that problems with Clegg’s framework were situated in the notion of ‘exogenous contingencies’ that would have remained poorly explored if contextual conditions, discourses and rhetorics had not been studied earlier through the translations. The constructivist ‘seamless web’ which prevented focusing only on either the micro, organisational or macro level supported this through including them all in translations. Similarly to Silva, Dhillon and Backhouse (1997), it was found that the role of ‘exogenous contingencies’ such as economic crisis, deregulation and IT-supported managerial principles, must not be underestimated. But a power analysis on its own can be too static and socially deterministic. Exogenous contingencies have to be related more clearly, through social constructions, to actors’ interpretations and translations. There is a tendency to see them as outside objective reality imposing structural causality. Then again, it is important not to forget how social constructions and translations relate to unequal actors.

Politics are an inescapable feature of organisational life and local sites are part and parcel of global relations. “The activity generated and reproduced through managers (...) is rooted in market relations” (Knights & Murray, 1997:41) leading to tensions between individual and collective goals. To be critical, it is insufficient to just study the succession of events as either (a) negotiated outcomes of global power struggles or (b) as a series of translations between local actors resulting in a set of networks. Deeper change processes are included, for instance here the changing nature and perception of transport as markets, the issue of co-operation versus competition, the role of technology and the notion of equal access to transport. Technology (in the form of yield management here) was the political result of trying to balance profit objectives and public service obligations. Or put another way, political issues were seen by management as amenable to a technical solution (Fournier & Grey, 2000:11). A critical analysis therefore involves examining “what is being done in the name of managerial performativity” (Fournier & Grey, 2000:17) – here through optimisation software - and “probing socially divisive forms of management theory and practices” (Alvesson & Willmott, 1996) – here through dividing the travelling French public into market segments, for instance. This form of critical analysis cannot be achieved through an application of either a constructivist approach such as ANT or a traditional power analysis such as Clegg’s power framework.

The strengths of social constructivism and ANT are its non-essentialist exigencies and its inclusion of all actors at all levels, local and global, which in itself enables some criticality (e.g. in avoiding deterministic explanations). Its weaknesses are in its analytical ‘flatness’, its tendency to lead to a superficial descriptive tracing of actors and its lack of techniques for linking the local to the global. Because of its concentration

on actors and the difficulty in identifying networks and demarcating their boundaries (see also below), it can easily turn into a linear, graphical representation (e.g. with nodes and arrows between actors), especially when used by researchers with a systems background. “The scientific and positivist heritage of IS research will tend to favour the adoption of approaches that are more easily ‘modelled’ or normatively articulated” (Brooke, 2002b:55). The strengths of a critical approach such as Clegg’s power framework are also its focus on actors but in terms of their differences and their relationships with more theorised types of power. Nevertheless, power can also be envisaged in a mechanistic way and lead to causal structuralist explanations (see **Section 4.8**). A critical analysis is not just about power and politics, it needs to incorporate social constructions of technology and reality. It should emphasise the link that exists between the social production of knowledge and collective political action, in particular with regards to the technology.

“The specific symbolic power to impose the principles of construction of reality, in particular social reality, is a major dimension of political power (...) [A critical analysis] must show how the orientation toward reality characteristic of technology is combined with the realization of technology in the social world (...) [and combine] insights into the technical orientation toward the world, with constructivist insights into the social nature of technology” (Feenberg, 2000).

Methodologically speaking, Walsham (1997) argues that ANT is a good contribution to building a serious empirical base and that “actor-network theory is both a theory and methodology combined” (p.469). He also observes (p.476) that actor-network theory studies produce a veritable mass of detail which often lead to book-length outputs, for example Latour’s (1996) monograph on *Aramis* mentioned earlier – much like other books on technology failures (e.g. Perrow, 1984; Vaughan, 1996; Drummond, 1996) which are typical of in-depth sociological case studies. Walsham (1997) estimates that IS research is lacking in research-based books such as those, and that studies based on constructivism could offer a contribution to interpretive IS research; and it is argued here, to critical IS research too, as defined in **Section 1**. Others have also acknowledged the usefulness of ANT as a recording device, how it can stimulate theoretical sensitivity during data analysis and be a useful basis for gaining understanding (Nandhakumar & Vidgen, 2001). One area of interest is how not to treat innovations as single events or projects separate from their antecedents and not limit ourselves to snapshot data, in other words to adopt a more socio-historical approach. In this case study, it was found that the IS project itself was strongly linked to another previous technological innovation (the high-speed trains many years earlier, see **Appendix 1**), and had long-lasting organisational ramifications, particularly in the socio-cultural construction of technology. However, these studies are extremely labour-intensive and time-consuming. And there are methodological difficulties: determining what ‘all’ actors are; how to treat small (e.g. optimisation software) and large actors (e.g. the French State) and their power and political differences; knowing where one network starts and another begins, where they overlap and where to stop - ANT advocates claim that “everything is a network” which sounds universalist and is rather vague and difficult to apply; how to relate the local and the global; and how to include social constructions in the analysis. In practice, one builds an account that selects and prioritises actors and ranks their importance according to categories and constructs. Analytic purity comes at a high price. Social constructivists aim to be aware of the rhetorical devices they (as well as other actors) use to construct textual realities, and that they offer understandings that are partisan and potentially contestable by others. Some argue that constructivism is a step further than interpretivism: it is not

just gathering people's interpretations, but is also about being aware of the process of social construction of reality in order to probe tendencies to relate 'facts' as how things are (Holstein & Miller, 1993) and question their 'naturalness', therefore adding criticality. But this is hard to carry out and case study research routinely fails to attain a constructivist ideal of standards for evaluating research, which are difficult and possibly not even desirable (Best, 1993:135).

A promising research direction can be found within social constructivism debates, which differentiate between 'weak' (or contextualist) and 'strong' (or strict or purist) constructivism like ANT that argues that actor-networks are the only explanation. Strong constructivism focus remains on claims-making, but on the rhetorics rather than the socially and historically grounded actions of claimants. Weak constructivism (or constructionism, see Gergen, 2001) acknowledges assumptions about objective conditions and treats the evaluation of problems claims as an important part of the analysis; it studies claims-making within its context of culture and social structure (Best, 1993; Gubrium, 1993). Weak constructivism, or constructionism, is therefore much closer to the critical approaches described earlier and could be a worthwhile theoretical framework to explore further in critical IS research. Finally, from a practitioner's standpoint, a clear finding here is that the social construction of technology as capable of solving socio-organisational problems seems to be overpowering and difficult to shift, in that it reflects a dominant "technical orientation towards the world" (Feenberg, 2000). Instead, organisations should be viewed as "an arena containing many differently and often unequally placed actors and interests" and perhaps we should attempt to strike "some sort of accommodation (...) between new technology and these actors and interests" (McLaughlin, Rosen, Skinner & Webster, 1999:39).

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Appendix 1 Chronology of events surrounding the *Socrate* project

Please note that events directly related to the *Socrate* project are indicated in **bold** characters.

1970s	<ul style="list-style-type: none"> - RESA (Réreservation et Suppléments Associés), the first SNCF computerised reservation system is designed and implemented in-house. - Simple pricing differentiation throughout the 60s and 70s (e.g. weekend travel more expensive). - Research into high-speed turbo-trains and aero-trains in many countries.
1977	<ul style="list-style-type: none"> - SNCF and France Telecom set up a joint pilot which eventually led in the 80s (see below) to the nationwide ‘Minitel’ public data network, with access to, first, online train timetables, then reservations through RESA.
1981	<ul style="list-style-type: none"> - Introduction of the first high-speed train (TGV for ‘Train à Grande Vitesse’ or high-speed train) on Paris-Lyon (South-East). - SNCF creates new marketing slogans: “<i>Democracy through speed</i>” and “<i>Speed for everyone</i>”. - First occurrence of trains that require reservations before boarding, together with more sophisticated pricing differentiation introduced on the TGVs. - Jean-Marie Metzler is director of this prestigious and successful first TGV project, and later initiated the Socrate strategy in 1989 and was head of the Socrate project from 1989 to 1993 when he was removed after the implementation débâcle. (He was interviewed in 1994).
1980s	<ul style="list-style-type: none"> - Increased competition with air travel on Paris-Lyon as a result of the new TGV route. - Deregulation of US airlines starts in the late 1970s and develops fully in the 80s. - 1981-1994: Further TGV building programme initiated (West Paris-Bordeaux, then North Paris-Lille).
1983	<ul style="list-style-type: none"> - SNCF status is changed to a semi-commercial enterprise under State financial control and is expected to bring in more revenue.
March 1984	<ul style="list-style-type: none"> - SNCF Minitel (RESA) server available to Ile-de-France and Picardie regions.
November 1986	<ul style="list-style-type: none"> - Minitel train timetabling and reservation RESA available to the whole country and will become heavily used throughout the 80s and early 90s (it is cheaper than booking on the phone and is very simple to use).
1987	<ul style="list-style-type: none"> - SNCF carry out strategic studies on the future of European passenger rail supply, pricing and distribution, in anticipation of European deregulation and the opening up of the European Single Market in 1993. - Yield management first investigated and CRS/GDS software researched worldwide by SNCF.

1988	<ul style="list-style-type: none"> - SNCF Minitel server (through <i>RESA</i>) available for international passenger traffic and abroad. - Sweden separates infrastructures from operations, the first European country to do so. - European Commission instigates far-reaching Action Programme in transport with trans-European infrastructure networks and an emphasis on high-speed links.
1989	<ul style="list-style-type: none"> - SNCF Direction Grandes Lignes (TGVs and intercity trains) investigates “<i>dépéréquation géographique</i>” (erosion of geographic cross-subsidizing and pricing). - Jean-Marie Metzler gets approval from the SNCF board for the <i>Socrate</i> project. Cost-benefit analysis predicts FF 830m annual benefits – benefits include productivity gains in sales and accounting, but primarily increases in revenue per seat sold through new pricing. - SNCF buys <i>Sabre</i> at a cost of FF 1 billion. - Partnership signed between American Airlines and SNCF until 2007. - Launch of <i>Socrate</i> project - 29 March. - Two members of the <i>Socrate</i> team publish the first French book on yield management (<i>Daudel & Vialle, 1989</i>).
1989-1990	<ul style="list-style-type: none"> - <i>Socrate Phase 1</i> – replacement of dumb <i>RESA</i> terminals with 30,000 PCs in all stations, without changing sales software. - 400 software staff (both SNCF and American Airlines) begin software development work. - The 1990-1994 “<i>Contrat de Plan</i>” between the State and SNCF plans to reorganise SNCF activities into purchaser/supplier relationships towards the realization of an internal market. - SNCF internal programme of social dialogue and cultural transformation (salaries, recruitment, training) perceived as progressive but new managerial authority (e.g. marketing and IT) resisted (as opposed to traditional engineering expertise).
1990	<ul style="list-style-type: none"> - SNCF creates new marketing slogans: “<i>Progress is only worth when shared</i>”, and “<i>With SNCF everything is possible</i>”.
April 1990	<ul style="list-style-type: none"> - Approval of development of new commercial and accounting software <i>Thalès</i> and <i>Aristote</i> to be integrated to <i>Socrate</i>. - Development to start in November 1992 and finish in June 1994.
May 1990	<ul style="list-style-type: none"> - Three super mainframes installed in Paris and Lille for <i>Socrate</i> project.
December 1990	<ul style="list-style-type: none"> - Specifications reach 8,000 pages.
1990-1991	<ul style="list-style-type: none"> - <i>Socrate Phase 2</i> – new distribution software installed and linked to old <i>RESA</i> system; connections to global distribution system established. - Various organisational reforms to increase managerial autonomy and break down compartmentalisation (e.g. between engineers and marketeers) faces difficulties and resistance.

January 1991	- National forums to inform sales managers about <i>Socrate</i>.
May 1991	- <i>Socrate</i> training of sales staff starts (cascade training, simulations).
June 1991	- European Union directive 91-440 launches deregulation in transport.
1991-1992	- <i>Socrate Phase 3</i> - new reservation software designed and tested in pilots; trains to which the commercial optimisation software apply are added progressively. - Project management and quality assurance audits of <i>Socrate</i> software by external consultants carried out successfully. -
1992	- SNCF financial deficit had been cleared in 1989-91 but worsens in 1992. - Degradation of relations and consultation with staff and unions. - Mid 1992 – number of <i>Socrate</i> software staff grows to 650.
January 1993	- Single European market is created. - <i>Socrate Final Phase</i> – progressive implementation in stations and <i>RESA</i> is phased out. - January-June: Pricing, ticketing and purchasing changes implemented.
Spring 1993	- Wide-ranging SNCF structural reform to increase commercialisation, centralise distribution (perceived as strategic) and introduce cost centres, leading to staff cuts and resistance.
March 1993	- <i>Socrate</i> system finally delivered 10 months late (instead of mid-1992). - Cost 30% more than planned. - Technical difficulties lead to enormous customer queues at ticket offices, media scrutiny, public outcry. - Staff strikes in January, February and March, the latter popular with the public as sales staff issue open tickets.
April 1993	- Opening of TGV North Paris-Lille which will eventually connect to <i>Eurostar</i> passenger services across the Channel and to Brussels.
May 1993	- Yield management implemented on TGV North (Paris-Lille), <i>Thalès</i> system applied to accumulate statistical data and create a history of demand.
Summer 1993	- The <i>Socrate</i> name is not used anymore, although the system mainly remains in place. - <i>Jean-Marie Metzler</i> is moved.
October 1993	- Massive passenger survey to retrieve public relations <i>Socrate</i> disaster and improve customer relations, entitled “<i>We have so many things to tell each other</i>”, is carried out in 165 stations involving 100,000 passengers.
1993	- Traffic decrease estimates range from 5.5% (SNCF figures), 7% (Government enquiry) to 8.4% (Observatoire Economique et Social des Transports) – Large debate as to its relationship to the <i>Socrate</i> débâcle.
1994	- Government public enquiry into the <i>Socrate</i> project and various official reports produced in 1994-96.

	<ul style="list-style-type: none"> - Opening of the Channel tunnel and <i>Eurostar</i> which uses a cut down version of <i>Socrate</i> (under a different name). - SNCF ticketing, reservation and pricing simplified for the whole network (intercity and TGVs), which represents a step back in terms of applying yield management principles to the whole rail network. - On the other hand, yield management is applied to the new TGV Paris-Bordeaux (South West). - British Rail splits infrastructures and creates 25 operators. - Opening of the Paris Charles de Gaulle airport air-rail TGV hub in an effort to move towards multi-modal transport.
1995	<ul style="list-style-type: none"> - Yield management applied to TGV South East (Paris-Lyon). - EU directive 91-440 adopted in France. - Agreement signed between SNCF and <i>Amadeus</i>, Air France global distribution system, allowing travel agents subscribing to <i>Amadeus</i> to book SNCF tickets. - November-December: Massive public strikes to protect public services, and the conservative Chirac-Juppé government falls as a result. Rail privatisation was one of the initiatives suggested by this government.
1995-1998	<ul style="list-style-type: none"> - Public controversy over the high costs of building new TGV East (Paris-Strasbourg), eventually approved in 1998.
1996	<ul style="list-style-type: none"> - Government report criticises SNCF for its inflated estimates on the TGV North traffic, used as justification for the approval of the <i>Socrate</i> project in 1989. - Deutsche Bahn decides not to separate operations and infrastructures but opens infrastructures access to other companies to facilitate competition. - SNCF creates new slogans: “<i>There is a formula adapted to your each and every need</i>” and “<i>It is up to us to make you prefer the train</i>”.
1997	<ul style="list-style-type: none"> - Split between operations (SNCF) and infrastructures (RFF-Réseau Ferré de France). - Change of emphasis towards multimodal mass public transport policies (e.g. more flexible use of the TGV) with much simplified and popular pricing policies, leading to limited application of yield management. - Traffic figures increase for first time since 1992.