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User Behaving Badly:
Phenomena and Paradoxes from an Investigation into Information Systems Misfit

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ABSTRACT

In its formative years and during the 1990s, 1Global Energy PLC (GE) went through a series of structural changes precipitated by the deregulation of the electricity industry in the UK. The severity of these changes had a disruptive effect on its enterprise information systems, which were found unable to adapt to the new and constantly emerging organizational realities. GE's experiences illustrate the vulnerability of information systems in turbulent environments, provide for a rich description of the causes of misfit due to contextual change, and establish the ability of a system to flex and adapt as a dependent success variable. In addition, the idiographic details of this interpretive field study raise interesting questions about a number of assumptions we hold regarding the development of information systems and the means by which flexibility can be attained.

Keywords: end-user computing; IS failure; IS flexibility; IT alignment; systems development process

INTRODUCTION

Avison and Fitzgerald (2003) identified instability as a "notable trap" of the Systems Development Life Cycle (SDLC) approach due to the modeling of processes that are unstable because of changing business and markets. Similarly, Lycett and Paul (1999) argue that the methodical approach to system development leads us to design systems that are unable to deal with the challenge of evolutionary complexity and work in a dynamic world. If the future is one which change will have to be reacted to continually, we understand "disappointment" as a resulting phenomenon due to the destabilization imposed by change on information systems (IS) that have not been designed to provide for it. On the contrary, the post-industrial organization should demonstrate adaptability and therefore must be characterized by frequent and continuous change in structures, domains, goals, and so forth, even in the face of apparently optimal adaptation (Huber, 1984). It is our conten-

tion that so should its IS. Flexibility as a success variable for IS – albeit implicitly or with varied placement of emphasis – has also been stressed by Blumenthal (1969), Swanson (1982), Gunton (1989), Fitzgerald (1990), Cotrell and Rapley (1991), and Oei, Proper, and Falkenberg (1994), among others.

Needless to say, the myriad of reasons that determine whether an IS is successful or not can be matched by an equal number of explanations. Arguably, one of the prevalent methods of inquiry that characterizes a large body of the empirical IS literature revolves around the concept of "fit" as defined by the contingency approach in organizational theory. In general, such research is grounded on the argument that any determination of information requirements must be based on the organizational use to which the IS is put. Hence, the success of any IS must be measured in terms of what it accomplishes in the organization. Thus, a direct approach is mostly followed, aiming to define what the relevant factors affecting the interaction effect or fit between a pair of organizational components (structure, culture, tasks, technology) are and then develop a measurement instrument with standard metrics (e.g., Goodhue & Thompson, 1995). This largely positivist stance adopted by the majority of researchers has deprived the IS field from the rich and insightful descriptions that are mainly possible through interpretive field studies. However, providing for rich descriptions of phenomena under investigation, the premise of interpretive research is important as it helps the practitioner to re-evaluate his mental frames of reference resulting in more effective implementation strategies of computerized IS in organizations.

Setting epistemology aside, it is surprising to report that flexibility as a determinant of fit or as a dependent variable for IS success has achieved little attention. What explains this may be a set of beliefs and assumptions practitioners and academicians alike hold about systems development. One can safely argue that one assumption currently held about systems is that they do indeed need to be maintained and that after implementation they simply enter the "maintenance-forever" phase. IT/IS managers and personnel accept this as a reality of their profession. Still, as Gibbs (1994) notes "...some three quarters of all large systems are 'operating failures' that either do not function as intended or are not used at all" (pp. 72-73).

The case study reported in this paper aims to challenge this very reality by arguing that maintenance is simply not enough for the contemporary organization of the 21st century. To the best of our knowledge, no research has been reported that tries to address and enhance our understanding of this issue from an interpretive point of view. In our investigation of the effects of privatization on the IS of an industrial organization, the approach allowed us to (a) illustrate the vulnerability of IS to contextual change, (b) understand the possible effects of change on IS and the ensuing repercussions on organizations, and (c) contribute valuable insight on the topic of IS flexibility. While the paper does not purport to offer definitive solutions, the experiences reported herein suggest lessons for organizations faced with the chal-

lenge of planning for and developing flexible information systems. Those will incite awareness and help IT managers to anticipate what they will probably experience should they not approach flexibility as a vital fit relationship and not cater for the accommodation of change, not only in the design of the IS themselves but in the structure and capabilities of the very corporate IS organizations they manage. The following section provides a critical review of the literature on IS fit, success, and failure. Then, we present our epistemological assumptions and research design. The analysis and interpretation of the case study data are presented in the two sections that follow, while a discussion on key findings concludes the paper.

INFORMATION SYSTEMS FIT, SUCCESS, AND FAILURE IN THE LITERATURE

For more than 30 years, the issue of fit between an organization and its strategy, structure, processes, technology, and environment has served as a building block for theory construction and research in strategic management. Many different conceptualizations and operational tests of fit can be found in the literature (Drazin & Van de Ven, 1985; Galbraith & Nathanson, 1979; Lawrence & Lorsch, 1967; Thompson, 1967; Venkatraman, 1989). Because of the multiplicity of the components covering a range of different types of phenomena in any given environment, research has typically focused on specific fits between specific pairs of components with the central idea as articulated by Nadler and Tushman (1979):

> *Between every pair of [components] there exists a degree of congruence or fit. Specifically, the congruence between two components is defined as follows: the degree to which the needs, demands, goals, objectives, and/or structures of one component are consistent with the needs, demands, structures of the other component. (p. 415)*

There have been many attempts to apply this line of reasoning to the IS field (see Ewusi-Mensah, 1981; Ein-Dor & Segev, 1982; Daft, Lengel & Trevino, 1987; Gordon & Miller, 1976; Leifer, 1988; Raymond, Pare & Bergeron, 1994). In general, such research is based on the argument that any determination of information requirements must be based on the organizational use to which the IS is to be put, for example, the work of Goodhue and Thompson (1995) on task-technology fit. Iivari (1992) undertook an extensive survey of the existing research into the organizational fit of IS, which he categorized under three headings: *Contextual Factors* (environment, technology, structure, control systems, others); *Information Systems Characteristics* (database, reports, processing, formalization, applications, architectures); and *Types of Fit* (selection approach, interaction approach, systems approach). His findings indicate that most research regarding IS fit falls under the selection approach. In other words, the objective is a direct approach determining what the relevant factors of a pair of components are and then developing a standard solution with standard metrics. This observation refers largely to causality and its nature; the selection approach implies a unidirec-

tional causal model based on the assumption that the characteristics of an IS are dependent totally on the organizational context. As Iivari (1992) put it however, "this means that unidirectional causalities expressing the fact that either the organizational context determines the characteristics of an IS, or that, vice versa, information technology and information systems determine organizational technology and structure, may be too simplistic" (p. 5). Indeed, information technology (IT) for contemporary organizations is a rather proactive and not a reactive agent. It influences the context, at least as much as the context determines the ways and the extent to which it can be deployed.

Not surprisingly, if we assume that an IS with a "good fit" is a successful IS, a scan of the literature (see DeLone & McLean, 1992; Lucas, 1975; Markus, 1983; Sauer, 1993) uncovers the same plurality regarding definitions, views, and opinions as to what constitutes success and how it can be assessed. This difficulty in defining success as an objective entity existing independently of its effects explains why it is often more conveniently discussed in terms of "what it is not". The social nature of such conceptions is emphasized by Lyytinen and Hirschheim (1987), whose extensive survey defined the overriding generic concept of failure as that of *expectation*. Their work "stresses the importance of understanding how various stakeholders comment on the value of the IS: 'failure is the embodiment of a *perceived* situation'" (pp. 264, emphasis added). This highlights the fluidity and interpenetration between technological and social views and leads us to propose that success (or indeed, failure) is a perspective that emerges from the social and technical interplay within an organization. This interplay results to patterns of emergent social regularities that are not *a priori* given but are constantly shifting and evolving (Lycett & Paul, 1999).

We posit therefore that flexibility is an important fit relationship for developing contemporary IS and agree that in such an innovation process, like the development of an IS, there exist a number of variables that may be seen as unavoidable flaws which eventually could be accounted for. The same cannot be said though about change, which uncovers a fallacious assumption we hold about IS and, more specifically, about certain approaches we follow in developing them. In IS development, one works toward establishing what is needed now and using some hindsight toward what might be needed tomorrow. Any approach, methodology, or group of tools begin with and base their eventual success on one objective: to achieve a complete and correct set of system requirements. Grindley (1986) termed this stage the "freezing factor" and held it responsible for much disappointment in total integrated systems development. Because of the systems' complexity and interdependencies, it is extremely difficult to change the design once programming has commenced. System requirements have to be defined beforehand and also in one go so that all likely future demands can be catered for in its design. As a consequence, "an artificial freeze has to be imposed on the 'getting agreement' exercise after a while, partly to enable a start to be made, but mainly to ensure that no new

requirements are introduced while project development is under way" (Gridley, 1986, p. 5). Paul (1994) illustrates this with the mock Fixed Point Theorem illustrating how this freeze results in systems that are built for one (hypothetical) point in time – a fallacy – as they must work over some time continuum.

On the basis of this, we postulate that for IS exposed to change, the *perception* of most stakeholders involved with them is that of disappointment. Furthermore, we argue that this occurs primarily because most systems as currently developed are static entities whose purpose is to model a dynamic world. As such, the premise of this paper is that the description of a series of phenomena and the ensuing interpretations offered can lead to a reconsideration of assumptions we currently held about the "fit-flexibility" relationship and, consequently, about the development and management of IS in organizations.

RESEARCH DESIGN

Organizations are open systems where, we would propose, invariant empirical regularities do not hold in the sense that they do in the natural sciences (where systems can be experimentally closed and initial conditions controlled). Accordingly, we surmise that there can be no single account of success but only different perceptions influenced by context. As such, an interpretivist position is adopted regarding our epistemology (see Appendix). We believe that no individual account of social reality can ever be proven as more correct that another, since it will be impossible to compare them with any objective knowledge of a true reality. Even when two observers experience the same phenomena, the true meaning for each may be different. The answer therefore lies in broadly interpretive research methods (Walsham, 1993) that aim in producing an understanding of the context of IS, together with the process whereby the IS influences and is influenced by such a context.

The study presented herein was carried out over a period of 11 months during which we worked as external advisors at Global Energy's (GE) Information Technology Strategy and Planning Unit (ITSPU). GE was a devolved organization operating within and outside the UK electricity sector with a turnover of over $6 billion. With our initial unit of analysis being the larger intra-organizational context and the IS, we opted for a design that would allow us to obtain data from multiple levels and perspectives throughout the organization. Three data sources were identified: (a) the ITSPU department which could provide us with a holistic perspective of the organization and its systems, as it was responsible for the company's IT infrastructure as a whole; (b) the individual business units; and (c) the users of the systems at a number of sites across the company. Triangulated data was thus collected providing multiple perspectives on an issue, allowing for cross-checking, supplying more information on emerging concepts, and yielding stronger substantiation of constructs (Orlikowski, 1993). Data was being collected on a daily basis primarily through documentation review, observations, and informal discussions. Several interviews

were also conducted with IT and business unit managers. Our role as external advisors to the ITSPU engaged in a project to evaluate the company's IS ensured, to the extent possible, that the narratives collected from the participants across the various business units were objective with minor distortions and possible biases.

Using a questionnaire as a guide, the interviews were mostly semi-structured and were conducted in a way that allowed for a focus on the issues under investigation, while permitting the interviewees to expand on areas of personal interest that they thought were important. All interviews were tape recorded, and verbatim transcripts were made from the recording as soon as possible thereafter. As Hirschheim, Klein, and Newman (1991) noted: "Presenting verbatim extracts of subject's comments is obviously selective, but it does allow the reader to examine the subject's perceptions of the phenomena directly" (p. 591).

Grounded theory, developed by Glaser and Strauss (1967) as a reaction to the failure of quantitative sociology to capture "lived experience", was followed for the collection and analysis of data. Our data was analyzed for each business unit, as well as across the various units to detect similarities and compare differences using *open coding* (Strauss, 1987) as a form of content analysis. Open coding is based on an analytic technique that tends to force the generation of a core category or categories, together with their properties and dimensions. Once the core categories were established, *axial coding* (Strauss, 1987) was performed. As Strauss and Corbin (1991) maintain, it is the data itself that should guide the researcher's interpretation, further coding and collection of data. Adhering to this rule, we terminated this process when we believed that the collected data was exhausted with respect to providing enough evidence in explaining what has been observed across the various business units. The categories together with the identified concepts are listed in Table 1.

In terms of the relationship between research question and research method, grounded theory starts from a vague initial question and allows the theory to emerge from the data; hence, this approach is not about identifying and testing hypotheses. A hermeneutic cycle (Gadamer, 1976) forms its essence, whereby, as Klein and Myers (1999) note, "...the process of interpretation moves from a precursory understanding of the parts to the whole and from a global understanding of the whole context back to an improved understanding of each part..." (p. 71). They also state that in line with Hans-Georg Gadamer's description of the hermeneutic cycle, a broad and liberal interpretation should be given to the terms *parts* and *whole*. Accordingly, they can be parts of a historical story, with the whole being the proper perspective of the historical context. For this study, the identified parts are the seven identified categories depicted in Table 1. Via interaction, our understanding of the categories stemming from the literature review is coupled with the views and understanding of the interviewees, resulting in a synthetic whole which is presented in the section that follows. Klein and Myers (1999) emphasize that the id-

Table 1. Categories and concepts

Categories	Concepts
Environmental Context	♦ Regulation ♦ Competition ♦ Customers
Organizational Context	♦ Corporate strategies ♦ Structure of company ♦ Culture of company
Information Systems Context	♦ Attitude toward systems and technology ♦ IS policies and practices ♦ IS structure and operations
Change	♦ Origins of change ♦ Nature of change ♦ Change as a threat to IS
Information Systems Fit	♦ Perceptions of IS fit ♦ Types of and causes of IS fit/misfit
Information Systems Flexibility	♦ Definition of IS flexibility ♦ Enablers of IS flexibility

iographic details revealed by the data interpretation should then be generalized and related to theoretical general concepts and constructions. We adhere to this principle attempting to do so in the form of a discussion in the last section of the paper.

CHANGE AND INFORMATION SYSTEMS AT GLOBAL ENERGY PLC

In the beginning of the 1990s, GE was moving from a period of relative certainty during the privatization process to a much more uncertain time in the UK electricity market. This was coupled with an expansion into new, and unfamiliar, international markets. During the initial period following privatization (1990-1993) there were clear objectives, which drove a well-defined program of IT projects. After 1993, the outlook was much less certain. The fact that it was only price distinguishing GE's electricity from that produced by any other company or source, resulted in the company having to set new and clear objectives, with a focus on generating electricity at the lowest possible cost. This required a rapid and radical reorganization to become more flexible and efficient, streamlining the business and introducing new working practices. GE's IS were put in place in 1990. Upon its establishment, the company was a "green field" with no enterprise IS in operation, and a major consulting firm undertook the task of designing and implementing them. The classic methodical approach was adopted for their development using a proprietary methodology. The main systems were:

- *Plant Reliability – Integrated System for Management (PRISM)* – a work management system.

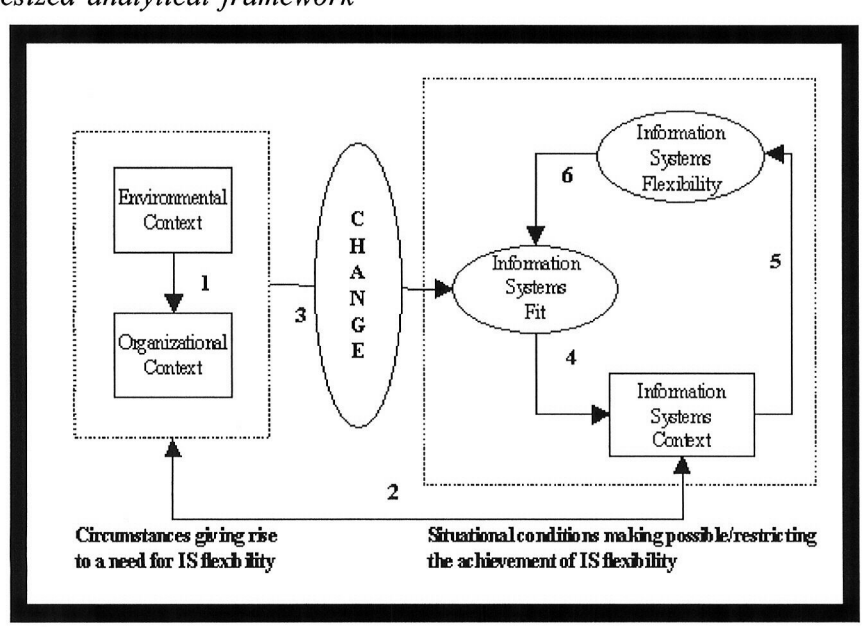
- *Energy Management Centre (EMC) systems* – based on a data warehouse, these were mainly used for optimizing the company's trading position.
- *Finance Systems (WALKER)* – catering for all financial and accounting needs and very complex with lots of interfaces to every other system in operation.

Taking into account the continuing change the organization was experiencing post-privatization, we set to investigate how these systems had fared. The synthesized analytical framework (Figure 1), which is derived directly from the interpretation and analysis of our data, provides the basis by which the categories and key concepts are ordered and subsequently interpreted, providing an explanation with regards to certain phenomena as we observed them.

The need for IS flexibility has its source in a set of circumstances that originate in the environment in which the organization resides *(arrow 1)* and are basically the result of the actions of the industry's regulator and the organization's customers and competitors. Based on their knowledge and continuous observation of this environment, assumptions are formulated by the management of the company, which are then translated into organizational initiatives for change in response to environmental shifts. These may affect the strategy, structure, and culture of the organizational context.

The outcomes of this stage are: (a) these proposed changes have a direct affect on the fit of existing information systems *(arrow 3)*; and (b) they have an affect on the information systems context *(arrow 2)*, that is, the structure, opera-

Figure 1. Change, information systems fit, and information systems flexibility: A synthesized analytical framework



tions, policies, and practices of the systems department. Being bidirectional, *arrow 2* emphasizes the fact that although fit and flexibility are IS states due to externally imposed change, the very same IS should also be seen as capable of causing organizational change themselves.

At the same time, any possible information systems misfit requires corrective action that must be undertaken by the systems department *(arrow 4)*, and it is the outcome of the employment of any evaluation practices or mechanisms that are currently in place. The activities that follow allow for an initial perspective on the flexibility of the systems; how easy, for example, was it to provide for this disequilibrium. They also allow for an increased understanding and knowledge regarding flexibility itself and the situational conditions that make it possible, or equally restrict its attainment. Possible assumption changes by developers and managers alike may result to proactiveness *(arrow 5)* with respect to future systems and the ways they should be developed. In turn, such IS with a higher level of flexibility mean an improved ability to cope with unforeseen changes, hence, a better future fit with less disruption *(arrow 6)*.

Two points must be raised regarding this framework. First, it should be remembered that it only provides an abstraction of reality, and as such, it is necessarily a simplified one. For example, most arrows that illustrate relationships and interactions between contexts and processes should be bidirectional: in some cases, the position of the company within the structure of the industry itself is such that it gives the power to influence the environment *(arrow 1)*; the systems department in an attempt to improve the systems fit may employ new policies and practices that could result in severe restructuring and layoffs *(arrow 2)*. In order not to overcomplicate the framework, such interactions are not depicted. The second point is that we can make no claim that the concepts and interactions that are identified are exhaustive.

The following subsections discuss the framework's categories and their interactions and provide our interpretation of the situational conditions resulting initially to IS misfit at GE, while at the same time making possible the emergence of true flexibility in an unorthodox way.

Environmental Context Category

With regard to continuing pressures from the external environment, GE itself was acknowledging that regulatory issues demanded both significant management attention and represented major continuing uncertainty. The uncertainty regarding the future could best be visualized by reference to generation and the supply of electricity. Competition was flourishing in generation with around 20 generators engaging in tactical battles each year to secure a segment of the market at a certain price. The increasing competition in the production of electricity had seen the market share of GE in England and Wales fall from 46% when it was privatized to around 30% in 1996. Regarding the supply side, in addition to the 12 Regional Electricity Companies (RECs), there were more than 20 other suppliers, which together sold electricity to around 23 million custom-

ers. Up to 1998, there were in effect two separate markets, the first supplying industry and commerce and the other half covering domestic and smaller users who had the sole right to supply customers in their local area. Regarding the former, GE had permanent contracts with customers, such as a number of major public coal and transport companies and the RECs, which used to buy most of the generated electricity and sell it to the domestic customers. As those were to expire in 1998, GE had to find alternative revenue streams, contributing to (or even defining) the development of new markets.

Organizational Context Category

Upon its formation in the early 1990s, GE started by having a centralized organizational structure. During 1992 to 1993, a decision was made in favor of devolving the business activities to power stations and giving them the authority to operate as independent business units with minimal centralized control. All business units across five main divisions were given almost total autonomy. This move was another attempt to increase the overall flexibility and competitiveness of the company by enabling decisions to be made closer to the operational level. However, a lack of experience with respect to certain business functions, such as planning, had delayed the introduction of formal mechanisms, and thus numerous critical functions were performed on an ad hoc basis. As a result, barriers were introduced for basic procedures designed to be common to all business units, as well as for some groups, like Strategy and Planning, which were operating at the corporate level and provided the interface between business units and executive directors.

Additionally, various change initiatives had attempted to make GE a project-oriented organization as opposed to hierarchy-based, by trying to assign groups of people assembled from a number of different business units to the various development efforts. This project-oriented attitude seemed to work providing the company with a level of flexibility at the unit level, which at the same time this very flexibility was constrained at the organizational level. A manager made the following comment:

There are barriers in our ability to respond to future changes because of the organizational structure. We have ended up with a structure [after privatization] which I believe does not enable us very easily to respond to new slots of business because the new business tend to be allocated to the existing structures.

A look into GE's culture explains, to a large extent, the disparities that are observed at the unit and organizational levels: extremely flexible at one end but at the same time a great lack of trust and territorialism at the other end which meant that when a change occurred, there was an aggressive/defensive stand rather than a cooperative one – exactly the time when more cooperation was needed.

What explains the above phenomenon was the fact that GE came into being from the old monopoly, which was a hierarchical organization. Team working did not happen at all, and managers re-

ferred to it as a "patch-protected" organization, where in a sense no one was allowed to infringe on what one did. The culture promoted in the new organization was a strikingly different one. Innovation was encouraged and so was individuality and devolution of responsibilities, resulting in intense competition at the individual and business unit levels. These two opposite cultural dimensions have given rise to a deadlock situation that seemed to plague the organization. On the one end, there was almost total autonomy and freedom with respect to performing any task or activities one saw fit with the prospect of adding value to the company. At the other end, the culture of the old monopoly that the people brought into GE with them made them unwilling to take a macro view past the boundaries of their own business units.

Information Systems Context Category

Regarding the information systems in the company, attitudes were formed by two camps: the ITSPU whose role was to safeguard and oversee the development of the infrastructure, making sure that any development activities at the unit level resulted in compatible outcomes with whatever else was going on in the company, and the individual business units. A level of mistrust and disbelief toward any initiatives proposed or advice offered by the ITSPU was evident. The fact that the group did not have the power to veto any business unit activities that were perceived as harmful gave rise to a complex and highly political situation, with attitudes fluctuating constantly around a positive/negative axis.

In spite of the above, the company's policy to remain state-of-the-art encouraged the consideration of alternative approaches to the development of systems, and it was constantly assessing the viability of new system approaches. Hence, the company's three main IS – PRISM, EMC, and the Finance Systems – paint only half of the picture with respect to the *IS structure and operations*. Bespoke application development paints the other half. Following the decision to devolve, the emergent autonomous business units had complete freedom regarding the development of bespoke applications that suited their own particular needs. The argument for that form of policy was that certain styles might have been more appropriate in different departments. This liberty given to the business units with respect to developing their own applications had culminated in a highly complex, hence, difficult to manage infrastructure. A senior manager noted:

One of the things that has happened to GE, is that we are disintegrating, we are devolving in terms of development and as a result of that, we lost a lot of coordination, so department A is using one tool, and the department B is using another tool. I mean, if you give users a lot of autonomy, you should not be surprised that they use it.

Such was the extent of the issue facing the company that a new business unit, called Business Systems Department (BSD), was established to address this

seemingly problematic situation. Its objectives were clear: to scale down and maintain the complexity quotients of the infrastructure as low as possible and create an integrated high-caliber UK business systems competency. Thus, having started from nothing in 1990, GE went through a period of major IT investments, through a period of devolved budgeting and responsibility for development, and was heading toward one of more coordinated control, having as few products to be used to deliver bespoke applications as possible. This situation GE was facing could be summed up by the two following IS development scenarios:

- Business requirements are identified, and a system is designed, built, and tested to those requirements (the classic methodical approach to development).
- The user, given tools, creates added value to the business in the form of some kind of informal application, other users view this and request to use the result, upon where the application is then used as a multi-user system.

The former systems are the ones with the large number of users, where high performance and maintainability are the criteria for success and acceptance, whereas the latter normally suffer from problems of maintainability and performance but are seen as successful by the users who build them to fit their needs as they themselves perceive them. But this is not irrational behavior. Out of necessity, the informal takes the place of the formal when, due to changing requirements, the latter as an organizational model does not anymore provide the service required of it.

Change Category

There was a wide range of forces acting upon GE, which made the need for change inevitable. These forces of change can be broadly taxonomized under two categories with respect to their origins—those that originate in the interaction of the company with its external environment (externally induced changes) and those that originate in the various organizational components themselves (internally generated changes). The responses of the interviewees indicated that the former was responsible for the majority of changes imposed on the company. The change that GE was experiencing was of an evolutionary nature – steady and permanent, albeit a fast one. A large percentage of it seemed to be predictable, but what the actual effects on the organization could be were not.

An important issue, which we also needed to discover, was whether or not *change was perceived as a threat to IS*, and if it was, what types of IS were most likely to be affected by it. A senior systems developer gave the most fitting remark as to whether change was perceived as a threat for the Generation division. He said:

I don't think anyone knows the true answer to that, but all I can say is since 1988 when all this started, we have never had a single stable period of twelve months in systems terms. Not one!

All the managers that we interviewed agreed without exception that change has serious repercussions on the IS. Change certainly introduced an amount of risk that caused considerable anxiety and stress. It was seen as affecting both current and ongoing development efforts and, equally, existing systems that were already in place. In the framework depicted in Figure 1, change is related to the category of IS fit. The next section explains how change had affected the IS at GE and what the consequences of this have been.

Information Systems Fit Category

Perceptions of information systems fit is the first concept upon which we focused our attention during the analysis of the data regarding the fit of systems. Although the perceptions of managers as to what the fit of a system was were numerous, mixed, and varied greatly between departments and from individual to individual, a common ground can be found. This revolves around two dimensions: business and technical, with both relating to a third one – the cost dimension. What our analysis shows however is that the most valuable insight regarding this concept is gained by a consideration of the time factor. Looking at fit at both micro and macro levels uncovers a dilemma and poses a fundamental question with respect to our attempts to develop systems that will have a good fit. At the macro level, any IS should fit into the overall business strategy of the company. At the micro level, a system has a fit if it at least replicates faithfully a business process in place or takes the process to a new dimension in terms of adding value. Also, it must also fit in technological terms with the company's infrastructure. What perspective should be given priority when decisions are being made to develop an IS? Is it possible to develop a system that can satisfy both macro and micro views?

The problem at the macro level is that development is totally dependent on the company's business strategy which itself changes and fluctuates abruptly responding to environmental changes. One manager commented:

I think the problem with the longer term is – the business strategy, and how this could be supported by the systems is not clearly communicated through. You should understand that this is not a management problem. It is simply that the problems we are dealing with tend to be ten minutes away. This is the environment and you cannot do anything about it. And if you say to me "You cannot sort out the business strategy – I cannot sort out the IS strategy!" you are going to get laughed at. We are all grappling with that problem.

The alternative – if it can be called that – is to disregard the long term and instead concentrate on the short term by putting in place the application that you think will suit the business needs of the moment. However, this approach has its own problems.

I tend to think these days that if you are looking at the long term 'fit' at the application level, you are wasting your time because the business is changing. In the short term, the benefits are that

you produce something very quickly, very cheaply, and you get reasonable user satisfaction because they get what they want quickly. But you are going to have problems in the long run because these systems run out of date, they are not cohesive, and they are going to loose this 'fit', and you will have a much bigger problem in replacing all these diverse elements.

This resembles a "catch-22: situation: you cannot develop systems for the long term that fit the organization's strategy simply because there cannot be a definite one, and although possible in the short term, the implications for the long term may far outweigh the possible benefits. A negative consequence seems, for example, to be the escalating cost. This was very important for a cost-conscious organization such as GE.

This situation has made managers and senior developers at GE come to an illuminating realization: it is not possible to develop an IS with a perfect fit. The literature and the numerous textbooks on information systems planning and development may like us to think otherwise. Indeed, we do not believe that one could find among the plethora of "cookbook" approaches a set of guidelines that could help us to build an imperfect system. Ironically, however, this is a more precise snapshot of reality, and to our experience, many practitioners rarely consider any of the research or books on the market that offer best practice or definitive guidelines. The notion of fit, as it stands, is rooted in the Fixed-Point Theorem (Paul, 1994) mentality, and a reconsideration of the concept in more relative terms is clearly needed, if it is to be of any practical value (Kanellis, Lycett & Paul, 1999).

The next concept in our analysis is *types of and causes for information systems fit/misfit*, and what follows explains to an extent how perceptions like the above have been formed at GE regarding this concept. The analysis of data indicated three major types of misfit experienced at GE. For the purpose of clarification, we have termed these as *structural* misfit, *process* misfit, and *technological* misfit. Structural misfit refers to a change in the organizational structure that the IS has not been able to follow. It is differentiated from process misfit because business processes may change while the structure remains more or less the same, and vice versa. Finally, technological misfit is referring to a change in technology itself that makes the existing systems obsolete and cumbersome in the eyes of the users. This type of misfit usually determines the level of systems usability. Before we address each one of these types and seek to provide some evidence for their existence, let us provide two interesting points for consideration. A manager at the Research and Engineering business unit provided the first. He remarked:

There are two points to that question! [How well do you think your information systems 'fit' your business now?] How well does the IS 'fit' with what we do, and how well we have to 'fit' with what they do.

This rather cynical comment, we believe, is by itself strong evidence for the existence of misfit. It seems that things have changed while systems have not; and

people have to adapt to the way the systems work, rather than the other way around. An attempt is made now to describe the three types of identified misfit beginning with structural misfit.

The systems at GE were built around the structure of the company, and either just after they were implemented or at the point that they were implemented, the company changed. A three-month review was carried out by the ITSPU in February 1992 of the suitability of the IS to operate following the devolution of business activities to power stations. The systems in question were mainly WALKER and the PRISM. The findings of the review were that the systems available were suitable for devolved use with some maintenance modifications. Those modifications represented only those aspects of the systems that could directly prevent devolution. It was also recognized that as those systems were designed prior to devolution, other changes could be usefully made to enhance effectiveness or efficiency. In the time space of almost three and a half years (February 1992 to May 1995), one would expect that the modifications would have been completed successfully, resulting in no misfit at all. However, evidence shows that this is not the case; the process of devolution made demands on the systems that could not be satisfied by simply maintaining them.

The finance systems [WALKER] we put in, we set up for a particular structure, culture – whatever you want to say and that changed in the last couple of years tremendously. It was like trying to 'fit' a square in a rounded hole, and the numbers of requests for changes to the systems increased, and have been coming non-stop ever since.

Procurement for example, was a central activity that had specialist people dedicated to this task. Devolution meant that this task was now undertaken part-time by nonspecialist personnel, as people were required to be more flexible and to work on different job aspects. This meant that the task was now only four or five hours a week of an employee's time, resulting in a negative perception about the systems as being too complicated and difficult to use.

The very clear division of the organization into distinct business units provides another example of structural misfit. The systems were designed to fit this structure, but in time, the business cycle has come to cross all the function areas; the systems now fit the functional breakdown, but they do not fit the organization as one entity. In addition, systems were perceived as being too big for what the organization was doing at that time. This type of misfit has serious implications for the ways that development projects will be managed in the future. It indicates a change to the structure of the systems development units themselves and poses a question as to how they will operate in the future. A senior developer explained:

You cannot shrink the business continually and expect those projects of that size to remain unchallenged. So far as the changes concerned, the threat is that if the operation is reduced, we get to a particular financial level where the IS activity becomes disproportionately large in terms of operation. I think that

is perhaps the single area where the greatest threat is.

Process misfit refers to the inability of an IS to keep providing the same level of service to a business process. It would not be an exaggeration to say that no process has remained the same since the early stages of privatization; processes have not only changed, but they have kept on changing. For example, the systems at the Energy Management Center (EMC) had to be scrapped altogether, and a new breed of systems based on the concept of data warehousing had to be developed to account for the changed processes. Also, a senior manager at another division commented:

I have seen a couple of instances where management information systems have failed to cope with the pace of change and have caused the organization to make inappropriate decisions as a result, and we then had to run to catch up with the circumstances.

This type of misfit emphasizes the need for a different approach to development. One developer responsible for developing such systems for the Sales and Marketing and Strategy and Financial Planning business units remarked:

If everything is changing which it does do, then one thing that I have found is that it is actually quite difficult to alter the scope of a system whilst under development. You tend to fix your scope at the beginning, and you refine it into more and more detail, and by that stage it is quite difficult to stick your head above the parapet and see if you are still at the same place. Then you show it to the users for acceptance tests, and they say "Oh! But that was all very well then – we do things differently now!"

Technological misfit, which is caused simply by advancements in technology, seemed to affect all the main systems at GE as those were character-based and with busy screen representation. In the sense of usability, they were perceived as not being up to the then current practice standards. This meant that in order to use the systems, users had to get familiar with them for some time, and this was not always possible under the current situation – few employees, many tasks, little time. Users simply had to be fairly able to switch from one system to another and perform various tasks at the same time. Technological misfit does not immediately mean that an existing process can be performed more effectively with new technology, in terms of the quality of information needed to make a decision. Indeed, managers commented that for many people at GE, that seemed to be secondary, and they drew a parallel with the fashion world. They saw, however, this desire to work with the most current and "sexy" system as a natural thing – a progression – but at the same time they were also aware of the fact that it might lead to a diversion from what the business actually wants. Most managers, feeling powerless with this technological evolution have decided to consciously "ride" along with it. What they were discovering, however, is that the line between "going there because it is there" and "going there because you know why

you go there" is becoming more blurred, as the rate of this technological progress increases.

IMPLICATIONS OF INFORMATION SYSTEMS MISFIT AND THE EMERGENCE OF TRUE FLEXIBILITY

This section presents an interpretation of the data related to the category of information systems flexibility and the associated concepts, *definition of IS flexibility* and *enablers of IS flexibility* (see Table 1). It was at this point in our investigation that we were faced with a paradox. How, on one hand, is it possible for such a level of IS misfit to exist, and yet an organization as heavily dependent on its systems as GE, to be able to flex and adapt successfully to continuous environmental contingencies? Although there was a negative overall perception regarding the fit of the systems, with a large percentage of those not being used as they were supposed to – user activities and tasks did not seem to be disrupted in any way. We expected otherwise, but we found that users were not tied down by the systems. What explains this phenomenon is perhaps the simple rule of survival: threatened by adverse circumstances, one has no choice but to adapt. One manager from Sales and Marketing said:

As changes occur in the business world, if you cannot get to change the system because the money or the project team has gone – they do it with a spreadsheet – they do not bother with the system that you have spend half of your life to develop – that's a hidden problem as well. I mean, we look at systems and say "Oh! We never change the system. It is a bloody success!" But really, what happens is that the buggers put a Lotus spreadsheet there to do their work with it. I mean our Finance systems are crap. If I wanna know how much money I have spend on contracts at the end of this month, I go and get a bloody spreadsheet. WALKER cannot tell me – not in the way I wanna say it. So people do bits and bobs around the edges, don't they?

The same phenomenon was evident at Generation. A manager commented:

Systems have fallen away and people are not using them as much as they should. And just about everybody, everywhere, is taking data out of the main systems, and either re-keying it in, or use whatever method is available to them to get data into little applications, so that they can then move the data around and use it the way they want to, because they see that the system they access – the PRISM system – is inflexible. What we are trying to do now is to recognize that this is a key requirement, and just deal with the data – not to deliver them any systems.

There were a number of conditions that made possible the development and existence of the above phenomenon. If we consider our discussion thus far, those become clear. GE upon privatization put in place a number of IS; continuous change since then has practically crippled them with respect to what their initial purpose was. At the same time, the policy of the company was such that it gave users al-

most complete autonomy and freedom with respect to meeting their own systems and informational needs. People used this freedom and have developed small applications of their own, and along with application packages, have cannibalized the overarching systems to give themselves a system that is working by adapting it to their particular need. A truly flexible IS but certainly not a planned or intended one.

ITSPU even had a name for this situation. When we were asking for comments, they were referring to it as the "Lotus Cult". An appropriate name we thought – *cult* signifying a kind of underground alliance – for the groups of users who have a disregard for the formal IS imposed on them, and in a way, have taken control of their own fate. We must note, however, that this underground activity has come to be seen as essential even by the authorities themselves. One member of the ITSPU team said that if one ever attempts to take this away, parts of GE would stop operating within a day, and the company would soon collapse. To us, as researchers faced with this phenomenon, there remained an obvious question that we soon asked. We were curious to find out what the plans for future development were in the light of this situation. The leader of the ITSPU team gave us an answer:

Why don't we just build them a Lotus system that does all that? Well, the real reason is that they will not use it – they all got a slightly different view of what they want it to be.

Within ITSPU and the various business units, the idea that you should ask people what they do with a system before you impose it on them was perceived as anathema. Users, it seemed, have criticisms about what the systems are not able to do, but when they are actually asked what they like or what they would use a particular system for, they do not have an answer. What can be postulated from this, however, is that there is a clear need for systems that are able to adapt to unforeseen circumstances. The one described above is a good example, but it was the result of certain conditions giving rise to circumstances that made it possible Furthermore, it was an informal one.

The challenge we face therefore as systems developers is to try and offer the user a flexible IS. Will an old mindset and unchallenged ways of thinking suffice for approaching this task? To that, a manager of the systems development team at Finance offered us his view:

Flexibility...I think it is a difficult area which is why I think the solution does not lie in providing these people with a system, because you work in a department, you have your own way that you want to produce information. I am not pointing out that there are rights and wrongs with that but then somebody else comes along in this department and has certain key parameters that he thinks are important to him – there may be valid changes because the business has changed or from a better understanding of information needs. But to actually try and deliver that in a system, you just are prescriptive again, and as soon as you have done that, you take the flexibility away.

In trying to identify what was perceived as necessary prerequisites for the attainment of flexibility, the answers of senior managers and developers focus on people and technology. In general, advancements in technology are seen as highly enabling with respect to both what developers and users themselves can do. For example, new technologies hold the promise of providing the users with more hands-on user-friendly tools that allow them to generate their own inquiries and deliver their own development without coming back to the systems department for an implementation of the change they want.

The use of methodologies, on the other hand, was seen as severely limiting any possibility of achieving flexibility. With respect to a number of methodologies that have been used at GE, opinions range from bad to worse than bad. It is because those methodologies were so constraining and inadequate which guaranteed that no one would go near them. This ensured that nothing was done in a disciplined fashion, and instead, the development of the systems was driven underground – very paradoxically resulting to unintentional but flexible IS.

People themselves play an important role in achieving a flexible IS. Managers were referring to a new breed of sophisticated users that is needed, calling it an "intelligent population" – users who are technologically competent and never say "I have always done it this way!" For an IS to flex and adapt, the first and foremost of its components that should be able to do the same is the people themselves. What managers were effectively asking for is a new culture, and the same applies to the developers themselves. They, in addition, must have a strong understanding of the business, be aware of the changing organizational and environmental realities, and furthermore, be prepared to accept this fact even though this realization may result in a paradigm shift with respect to the ways they carry out their work.

DISCUSSION

This research was guided by a number of theoretical preconceptions about fit, flexibility, IS development, and IS success as presented in the Information Systems Fit, Success, and Failure in the Literature section. The purpose of this section is to reflect on the actual findings provided by the case study and to relate the idiographic details to those theoretical and general concepts in line with the fundamental principle of the hermeneutic cycle for interpretive field research (Klein & Myers, 1999). The findings emanating from our inquiry on the post-implementation fit of systems at GE illustrate that (a) flexibility is a vital fit relationship in designing IS for organizations operating in turbulent environments; (b) that development approaches for such systems should cater for the emergent sociotechnical regularities that constantly evolve and cannot be *a priori* given; and (c) that although flexibility can be attained at a micro level (i.e., the application level), the real challenge is how to allow for maximum flexibility at the user and business unit level without the introduction of conflict that could jeopardize the integrity and stability of the corporate IS organization. The pre-

requisite in order to meet this challenge is for IS departments to be transformed into "emergent" organizations. Next, we discuss those in turn.

Flexibility is a Vital Fit Relationship

With the selection approach as the prevailing contingency paradigm for the study of fit between an organization and its technology (Iivari, 1992; Knoll & Jarvenpaa, 1994), empirical IS literature has assumed static environments. We argue that for contemporary organizations, the flexibility of a system determines to a large extent how successful this system is, and furthermore, because of the rate of change, the assumption that systems can achieve a long-term fit at the application level needs to be revisited. The misfit of the systems at GE, which were built by defining a set of requirements with the belief that these requirements could at least hold true for a long period of time, proved the opposite. A good fit, or success, is a perceived state describing the accomplishment of a set of desirable goals – a fit between the IS and its context. Such a fit is not permanent but is dependent on external or internal change, which is a product of time. Change affects the context (the organization) within which the IS exists and has direct implications for the capabilities of the IS to satisfy expectation. It follows that a system with a good fit is a system that is capable of demonstrating the ability for continuous adaptation and not one that satisfies some requirements at a particular point in time. Truex, Baskerville, and Klein (1999) argue that "...systems should be under constant development, [and] can never be fully specified" (p. 121). Similarly, Lycett and Paul (1999) propose that IS design should be thought of as an ongoing process, and not as a predictive or contingent one. This line of thinking has also been followed by Baskerville, Travis, and Truex (1992), Paul (1993), and Kanellis and Paul (1995, 1996). It follows, that the practical relevance of the selection approach as a fit model should also be questioned together with the epistemological assumptions that guide such contingency-focused research. Undertaking an assessment of the contingency theory of Management Information Systems (MIS), Weill and Olson (1989) argued that it has too narrow a focus, advocating largely its abandonment. Based on the above discussion, we share their call for more subjectivist, less functional, and less deterministic research approaches.

Emergent Sociotechnical Regularities are Constantly Evolving and Can Never Be A Priori Given

An interesting question that should be asked is how designers would know at the time they are building a system if they are achieving more or less flexibility. It is doubtless that the answer can be found in the methodical approaches to IS development. Generally, methodologies are inflexible, do not allow changes to requirements during and after the development phases, assume stable environments, as well as knowledgeable users and skilled analysts that can reach a consensus as far as requirements are concerned (Avison & Fitzgerald, 2003). But as the authors un-

derline, rarely such conditions exist in practice. At GE, models of producing software or IS, which had the traditional specification design delivered in one big chunk, stopped being followed. The time horizon for new development project is now perceived as a very short one with the longest time period an integrated enterprise system having to produce the expected benefits in two years from five to eight that was before. GE had lost its faith in methodologies, and it is not hard to see why. They were simply unable to cope with the pace of change. As a result, they produced suboptimal systems that had to be either modified continuously (the PRISM system) or completely redeveloped after their implementation (the EMC systems). It is this poor pedigree of the methodical approach to development that has been forcing researchers and practitioners alike to reappraise the concepts and usefulness of the methodologies since the late 1990s (Avison & Fitzgerald, 2003). All new efforts that will define this "post-methodology" era have to be based on the realization that the success (or indeed, failure) of a development effort is a perspective that emerges from the social and technical interplay within an organization resulting to patterns of emergent social regularities that are not *a priori* given but are constantly shifting and evolving (Lycett & Paul, 1999). The assumption that social structures, mechanisms, and processes can be seen as "invariant regularities" that only have to be revealed to be understood has to be abandoned. Turning back to the question asked in the beginning, we argue that true flexibility in systems development is achievable only at the user level, when and if, the axis of system ownership in an organization shifts from the IS department/developer to the user. What is meant by system ownership is to defer the design decisions and transfer the authority to the end user who has the means to manipulate the behavior of the IS. These means in the form of tools and enabling technologies are increasingly made available to the market (Stamoulis, Kanellis & Martakos, 2001). Undoubtedly, this will have implications for the ways the actual development teams in organizations are structured and operate. As a consequence, the idea of having systems analysts and designers will fast become obsolete. One manager at GE said that it is not good anymore having a team – getting a piece of paper, putting down the requirements, and saying: "Well, here we are chaps!" For him, the very name *IS Department* was erroneous. He mentioned, with some cynicism, that this should be changed to *data-pointer department*. In other words, show the user where the data that he wants resides. The user then starts with what he wants to do, the question he wants to answer, or the decision he wants to understand and make, and then having the means to do it, the user just builds the application. The application is then used and can be kept or equally can be thrown away. True flexibility at the user end is the ability of the user to develop a system that matches precisely the way the user views the world at the moment. The "Lotus Cult", as described in the previous section, is an illustration of that. It was a mix of certain conditions that allowed the users at GE to transform the formal overarching and organizationally invalid systems into work-

ing ones. Therefore, will information technology and systems departments, as we know them, be discarded completely or given a new or different role? We cannot be sure of the outcome, but we strongly believe that things as they are now will not remain the same for very long.

IS Departments Should Be Transformed Into and Managed as Emergent Organizations

It is, we believe, that the battle for IS flexibility will be decided not at the user end (micro level) but at the organizational level (macro level). Flexibility will not be assessed with respect to how well a tool, system, or application allows the user to "get what he wants, when he wants it". There is a simple reason for this. Users are getting more informed and sophisticated by the day, while at the same time, technology is advancing with great leaps. As a result, flexibility will become a managerial problem at the macro level; users themselves will be able (and increasingly enabled by the technology) to satisfy their changing needs at the micro level. Our case study provides the necessary insight needed to understand this point of view. GE had a flexible IS, and its employees did not need any models or the most advanced technology to achieve that. All they ever used were Lotus spreadsheets to produce systems that were working, by constantly adapting them to their particular needs. By doing so, they achieved maximum flexibility at the micro level, but in the eyes of the company, they created a whole subuniversal system that got out of control. It became difficult to manage and to keep an eye on its evolution. Such was the perceived problem that led to the introduction of a whole new business unit – the Business Systems Department – whose main role was to stop this from continuing to happen. A wrong decision for more formalization and control that could lead back to "dead" systems? Not necessarily so if IS departments as organizational entities reconfigure themselves around a set of principles borrowed from "organizational emergence" – "a theory of social organization that does not assume that stable structures underpin organizations" (Truex et al., 1999, p. 117). Emergence theory emphasizes a continuous redevelopment perspective demanding the creation of an IS development environment that is optimized for high rather than low adaptation. This can be interpreted as an environment where maximum independence and flexibility is allowed at the user and business unit level but with the necessary culture, policies, and controls in place so as to avoid the introduction of conflict that could jeopardize the integrity and stability of the organization as an entity. According to Truex et al. (1999), the closer to "emergent" the IS development environment gets, the more freedom it gives to each and every end user for participating in an active reality reconstruction. As requirements conflicts rise – as they undoubtedly will – increased negotiation and other service activities are prescribed and provided to support ongoing business processes. Although end user productivity tools, open system architectures, and software components are some of the vehicles that could support an emergent organization, an extended number of organizational capabili-

ties is clearly required that will define the form of the interface between the user end and the organization. These capabilities can be technical, economic, social, cultural, or a mixture of them all. Isolating and paying attention to one level or to one aspect of this interface will be at the expense of the others and ultimately will have negative consequences on the flexibility of any contemporary IS. Further research is urgently needed toward this direction.

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ENDNOTES

[1] For confidentiality reasons, the actual name of the organization has been disclosed.

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APPENDIX

Interpretive Approaches to Information Systems Research

The ontological and epistemological assumptions a researcher makes drive any subsequent scientific inquiry. These assumptions are the outcome of reflection on reality and its nature. For example, it is easy to observe the common thread that runs through any positivist[2] notion. The awareness of the notion of subjectivity that the human element introduces gave rise to the anti-positivist epistemologies and doctrines. The major theme of anti-positivism as introduced by Wilhelm Dilthey (1833-1911) is the view that as individuals do not exist in isolation, they need to be studied and understood in the context of their cultural and social life. In addition, the possibility of positive and observer-independent knowledge is denied. Instead, the emphasis is placed upon sympathetic reason in understanding phenomena and attributing meanings through "understanding" (*Verstehen*) methods rather than seeking causal connections and universal laws via the employment of "explanation" methods (Hirschheim, 1992; Hirschheim, Klein & Lyytinen, 1995).

The point that made anti-positivism come of age is therefore an acknowledgment of the fact that it is not viable to understand and explain the nature or the rationale behind the actions for the human element, as it is impossible to collect complete and objective sets of data that cover all the biological, social, and most importantly, psychological drivers that give rise to them.

On the empirical side, interpretive research techniques in information systems include case studies, textual analysis (hermeneutics), participant observation/action research, and ethnography. Due to their relevance to the empirical side of this paper, case studies as tools for interpretive research are explained in some detail in the following section. For a comprehensive coverage on ethnography, the interested reader should consult Fetterman (1989) and Van Maanen (1995), while Orlikowski and Baroudi (1991) and Reponen (1994) cover participant observation/action research. Boland (1985) addresses hermeneutics in information systems research.

Case Studies in Interpretivist Research

The flexibility of the case study as a research approach allows it to be equally promising from a positivist stance (Yin, 1989), or an interpretivist one (Walsham, 1995). Galliers (1992), for example, included it under the scientific (positivist) heading of his taxonomy because the majority of its exponents classify it as such. Ultimately, the utilization of the case study method depends on the philosophical stance of the researcher and the research objective. Benbasat, Goldstein, and Mead (1987) although approaching the issue of case studies from a positivist perspective, provide a useful definition:

A case study examines a phenomenon in its neutral setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organisations). The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used. (p. 370)

Case studies can use either qualitative or quantitative evidence, or even a mixture of both. The case study does not imply a particular type of evidence, nor does it imply the use of a particular data collection method (Yin, 1989, p. 59). The main criticism that is made regarding interpretivist case studies is that they are problematic with respect to generalizability. As their

application is restricted to a single organization, generalizations cannot be made easily if at all. But for non-positivist studies, generalizability is not of concern. This is because in interpretive information systems research, the validity of the case study approach becomes clear once it is realized that one seeks to understand "the context of the information system and the process over time of mutual influence between the system and its context" (Walsham, 1993, p. 14). To this end, the case study is not merely a technique or even a means of obtaining data; for the interpretivist, it is a method for organizing data, and the selection of a case for study will not as a consequence therefore rest on how typical (for example) the case may be but on its explanatory power (Smith, 1990). Epistemology and research methods are interrelated, and a conscious effort must be made by the researcher to establish and communicate the extent of this relationship. Hence, if one adopts a positivist epistemological stance, statistical generalizability is the key goal (Walsham, 1993). For an interpretivist, generalizability is irrelevant; the focus is instead on "the plausibility and cogency of the logical reasoning used in describing the results from the cases, and in drawing conclusions from them" (Walsham, 1993, p. 15).