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Designing in the Dark: The Changing User-Developer Relationship in Information Systems Development

Joe Nandhakumar
University of Southampton

Matthew Jones
University of Cambridge

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Joe Nandhakumar
University of Southampton

Matthew Jones
University of Cambridge

Abstract

Although user involvement can be problematic for all types of information systems development, the situation has become even more difficult with the recent spread of information technology to senior organizational levels. Better theoretical conceptualization of the dynamic relationship between developers and users in systems development is needed to understand how this relationship shapes, and is shaped by, various constraints. Drawing on Giddens' work on constraints on human action and interaction, a theoretical conceptualization of the dynamic relationship between developers and executive users is proposed. This is grounded in empirical studies of the executive information systems development process in two organizations. The paper seeks to illustrate the "enabling" properties of the constraints and their ongoing production and reproduction. Such constraints may vary in their malleability and some appear to be relatively resistant to change by developers. Nevertheless, through improvisation and ingenuity, developers can often find ways to overcome them.

Keywords: IS development, user involvement, social constraints, social processes, executive information systems, field study, structuration theory.

1. INTRODUCTION

The literature on information systems (IS) development almost unanimously recommends that users should be involved in the process of IS development (ISD) (Barki and Hartwick 1994; Engler 1996). In practice, user involvement may be limited or, in some cases, completely absent (King 1995). Developers are therefore forced to "design in the dark."

Although user involvement is problematic in all ISD (Newman and Noble 1990), the situation has become even more difficult with the recent spread of information technology to senior organizational levels (Watson and Frolick 1993). The different organizational status of such users has changed the relationship between user and developer, establishing a new dynamic. Whereas in traditional ISD the user may have been at a similar organizational level to the developer, or even at a lower level, the new users may now have much higher status. This can have significant effects on the potential for user involvement.

Some authors (such as Sproull and Kiesler 1996) have suggested that information technologies such as groupware (especially e-mail) will reduce constraints on interaction between different organizational levels. Evidence from

empirical studies (e.g., Orlikowski 1996), however, suggests that effective use of such technologies is itself limited by social constraints such as cultural norms and value systems.

Other authors (e.g., Barrow 1990; Martin 1989; Wetherbe 1991) have responded to this situation by proposing prescriptions to overcome the lack of user involvement. As with many such generalized prescriptions and guidelines, these disregard the influences of different organizational and historical contexts within which IS are developed and used. The research presented in this paper suggests that by shifting the focus away from generating prescriptions, to understanding the social processes shaping these constraints, we may be able to deal with these constraints better.

This paper seeks to investigate user-developer interactions in these new kinds of situations by drawing on two in-depth case studies of the executive information systems (EIS) development process. The paper proposes a theoretical conceptualization of the dynamic relationship between developers and executive users in ISD which shapes, and is shaped by, various constraints, by drawing on the work of Giddens (1984) on constraints on human action and interaction. The insights gained into the operation of these constraints, the malleability of them, and strategies for dealing with lack of user involvement are discussed. The original contributions of this paper are the development of a new conceptualization of the influences on user-developer interaction and its application to the analysis of the relationship between developers and executive users in two organizations.

1.1 User-Developer Relationships

User involvement is defined as participation in ISD by members of the target user group (Ives and Olson 1984). Many reasons for user involvement in systems development have been identified since early work by Churchman (1968). Broadly speaking, these reasons can be categorized as being concerned with improving the design process, facilitating implementation, or following ethical principles, as shown in Table 1.

Table 1. Main Reasons for User Involvement

Main Reasons for User Involvement	Illustrative References
Improve design process: identify user requirements: validate design options; achieve buy in/ownership; create shared understandings; deal with change in requirements	Lucas 1975; Rockart 1979; Robey and Farrow 1982; Martin 1989; Wetherbe 1991; Land and Hirschheim 1983; Hirschheim and Klein 1994
Facilitate implementation: ensure follow-up; overcome resistance; ensure acceptance; avoid conflicts; ensure continuous resources/support	DeLong and Rockart 1986; Newman and Noble 1990; Watson and Frolick 1993
Ethical principles: to address ethical concerns	Mumford 1981; Land and Hirschheim 1983; Hirschheim and Klein 1994

Design and use considerations have led to many empirical studies, often survey based, which seek to demonstrate the relationship between user involvement and outcomes such as systems success or user attitudes (e.g., Barki and Hartwick 1994). Ethical considerations have led to the development of ISD methodologies specifically designed to facilitate user participation such as ETHICS (Mumford and Weir 1979), multiview (Avison and Wood-Harper 1990, and participatory design (Greenbaum and Kyng 1991).

Despite the wide acceptance of the importance and benefits of user involvement and the availability of methodologies and prescriptions to facilitate this, in practice the user-developer relationship appears to be less than successful.

Many authors (Curtis et al. 1988; Hirschheim and Klein 1994; Robey and Markus 1984) claim that this problem may be due to a range of constraints such as lack of motivation on the part of users and developers; limitations in personality, specialization, and level of education; asymmetries in the social context such as social differentiation and authority; and time, space, and resource limitations. Although such constraints are often cited in the literature, an understanding of how they operate and the relationship between them is lacking (Franz and Robey 1984; Tait and Vessey 1988). A theoretical framework to differentiate these constraints and to conceptualize the relationship between developer and user and the way this shapes and is shaped by various constraints is required.

2. THEORETICAL CONCEPTS AND RESEARCH APPROACH

2.1 Theoretical Concepts

As a basis for the investigation into the user-developer relationship in ISD, the study looked to social theories, in particular the work of Giddens (1984). Although Giddens structuration theory has been used in IS research (e.g., Orlikowski 1992; Walsham 1993), his work on constraints has been relatively neglected. This paper draws on Giddens' work to identify three main types of constraints that may limit user involvement in ISD: namely physical, social, and individual.

It should be noted that this tripartite classification is primarily an analytical device, since in practice the constraints will overlap with each other. For example, although physical constraints may restrict user involvement, the way in which interactions are conducted in the possible locations will also be affected by social norms.

Physical constraints: Physical constraints refer to limits arising from the physical constitution of individuals, such as the indivisibility of the body (which means that people cannot be in two places at once) and its sensory and communicative capability, and the material features of the environment, such as the architectural layout of office buildings and geographical separation. The finite disposable time of individual developers and users, and the limits placed upon them physically to come together in a location, may restrict the number of interactions which can take place in a given time-space. When interactions with users temporally coincide with other activities, precedence has to be given to one over others.

Social constraints: Social constraints originate in socially established conditions for action and interaction which place limits upon the range of options open to an actor in a given circumstance. For example, organizational power relations may restrict interactions between users and developers at different hierarchical levels: an organization's established social routines, such as communication patterns between departments, may restrict certain interactions. The developers' culture relating to professional norms on the conduct of certain interactions and the developers' routines in dealing with users may also limit involvement.

While power may be seen as a source of social constraint, Giddens focuses on its role as negative sanction—such as the permission to perform certain activities in a given circumstance. Power is also seen as a relationship, rather than a property of individuals, which is sustained by the willingness of less powerful groups to acquiesce to it and which therefore can potentially be challenged by them.

Individual constraints: Individual constraints involve the limits arising from the individual's sense of identity and personality, biographical experience, social skills, and perception of the social world. Giddens does not refer to individual constraints as his primary concern is at the level of social institutions. He also argues that the self may not be easily separable from the context in which it is routinely embedded. For analytical purposes, however, it was

found useful to treat this as a distinct category as it enabled a focus on aspects of the differences between individual developers in their approach to interaction with users. Since Giddens also emphasizes the importance of human knowledge ability and agency in the constitution of society, this would seem compatible with his general approach.

The nature and properties of constraints: Giddens argues that the nature of constraints varies in relation to not just the material and institutional circumstances of the activity but also to the forms of knowledge ability that agents possess about these circumstances. Constraints should not be seen as fixed elements producing a certain outcome. Social constraints are also seen as being reproduced during the ongoing course of social life. For example, in so far as developers adhere to certain communication patterns with users, they also contribute to their reproduction.

An important, and distinctive, feature of Giddens approach to constraints is that he regards them not simply as restraints on action. Thus he argues that "all types of constraints...are also types of opportunity, media for enablement of action" (Giddens 1984, p. 117). For example, physical constraints, such as the layout of a workplace, may also provide conditions necessary for interaction to occur, or social constraints, such as established patterns of interaction, may facilitate certain relationships. Situations that appear to limit certain types of action may therefore simultaneously enable others. In drawing attention to this dual quality, Giddens serves to shift the focus from the negative features of constraints, to highlight the ways in which they may also be seen as opportunities.

2.2 Research Approach

The research approach adopted in this paper is interpretive (Orlikowski 1992; Walsham 1995), seeking to understand the complex social processes of user-developer relationships in practice, rather than to develop law-like generalizations as a basis for prescription. Altheide and Johnson (1994) argue that the validity of such research depends on gaining sufficient access to the knowledge and meanings of actors to enable a plausible, credible, and relevant representation of their interpretations to be generated.

Access to the knowledge and meanings of actors in this study was obtained through the intensive engagement with EIS developers in two organizations over an extended period of time. Such methods are characteristic of ethnographic studies (Atkinson and Hammersley 1994) and are argued to provide a particularly rich source of data for interpretative research (Becker and Geer 1957). The first case study involved six-months of participant observation by one of the authors as a member of the EIS development team at the European division of a large multinational manufacturing company, LMC Europe (a pseudonym). The second involved about three months of observations and interviews with the EIS development team at MC Group (a pseudonym), a large manufacturing company.

The descriptions of the user-developer relationships given in this paper are therefore based on the field notes from these periods of observation, supplemented by documentary evidence from the two companies and informal discussions with EIS developers and other organizational actors during the study period. These have been written up as "realist" narratives (Van Maanen 1988), a normal practice in organizational ethnographies (such as Kunda 1992). While accepting that the accounts presented here represent a particular interpretation of the situations observed, this is the case, as Denzin and Lincoln (1994) argue, for all forms of description, even those that include quotations. As Geertz (1973) puts it, the data on which any description is based are inevitably the researcher's "constructions of other people's constructions of what they and their compatriots are up to."

It should also emphasized that the use of structuration theory was primarily as a sensitizing device (cf. Jones and Nandhakumar 1993; Walsham 1993), providing concepts found to be helpful in informing the analysis. At the same time the paper sought, as Giddens (1990) argues, to go beyond the simple "application" of the theory as a whole, and

to remain reflexive about its role in shaping the perceptions and its limitations in understanding the user-developer relationship.

3. CASE STUDIES

3.1 LMC Europe

LMC Europe has a clear management hierarchy of several layers of senior executives and a divisional structure. The headquarters of LMC Europe, the site under study, formally coordinates the strategic planning and provides support services, including computing, for its national companies.

The LMC EIS used proprietary software running on company-standard PCs with a touch-screen, graphical interface. This system provided online access to financial reports for top executives, such as divisional vice presidents. A mainframe-based system managed the distribution of reports to the PCs. The development of the EIS was carried out by an "EIS team" headed by an EIS manager. At the time of the research, the team consisted of four analysts and a trainee. The team was responsible for the development of new reports for the EIS (referred to as "EIS projects") in liaison with managers in the relevant company divisions (data providers). This involved designing screens and mainframe program codes to present the data. The team was also responsible for maintenance and support activities, such as fixing hardware and software-related problems, upgrading software and hardware, documentation, and security.

Development practices: One of the main projects at the time of the research was the upgrading of STOCK-EIS, which provided monthly data on inventory performance. This had been suspended by the inventory data providers in the production finance division because the EIS had not kept up to date with changes in their report formats. Meetings were therefore arranged between the EIS team manager and the financial analyst responsible for preparing the inventory data to identify a new project that might get STOCK-EIS reinstated. A team member was assigned to work with the analyst and together they decided which reports to show and their sequence by guessing how executive users would view the reports.

When the development of the new STOCK-EIS prototype was completed, a demonstration was planned for the production finance executive but his PC was found to be still using the old version of EIS software. The earliest available day when the production finance executive was away turned out to be a week later (team members were not allowed to work in executives' offices when they were there). When the PC was upgraded, a demonstration was arranged with the executive's secretary, but it was canceled because of other important meetings. The team manager, however, managed to mention the project to the executive when they met in the car park. When the demonstration was finally held, the executive requested some changes, although some of these were rejected by the developers as being technically unfeasible.

Many of the conventions for the design of the new STOCK-EIS were based on established procedures, such as the use of certain colors and icons, and close consultation with data providers to try to improve cooperation. Although this was possible for STOCK-EIS, for other projects only limited interactions were possible between team members and data providers. For example, the QUALITY-EIS prototype (providing monthly data on product quality) was developed without any interaction with data providers who were located at another site. Instead, a systems analyst who had originally developed the database for the quality division was consulted. When the prototype was completed, the team manager waited until he had other business at the quality division site to organize the demonstration.

Limitations with the EIS software meant that one of the EIS team members had to visit all of the hundreds of EIS PCs throughout Europe to upgrade them, although other team members were keen to assist with this process when it involved travel to attractive locations such as a holiday resort. The EIS software also did not provide facilities to directly monitor executive usage (on the grounds of protecting executive privacy). One of the team members found, however, that an 'access-log' file gave details of system access by EIS PCs even if this was not always an accurate measure of usage as it would be up-dated automatically if a PC was left logged on.

Relationship with executives: Secretaries often reported technical problems on executives' EIS PCs and only rarely did executives report problems to the team directly. When they did so, it could provide an opportunity to find out about their usage of the EIS. For example, when the team manager had a meeting with an executive about a recurring software problem, he found that the executive mainly used the external news service for his work. Normally, however, the EIS team had no contact with executives. Thus, when the divisional vice president (VP) who had been the driving force in establishing the EIS left the company, the team felt that those executives who had especially installed the EIS to answer his queries became less enthusiastic. The team manager therefore decided that the team needed to find out more about what the executives actually wanted. He was also concerned that team members frequently diverted their attention to work on technical features, such as improving software performance, rather than concentrating on business issues and user needs.

The team therefore proposed to send an evaluation questionnaire to executives. This was rejected by the systems director as it was against the division's established practice. He suggested that team members should use informal discussions with executives whenever they had the opportunity. When the team manager asked the team to do this, however, it was pointed out that the systems director had complained to the EIS area manager when one of the EIS team had been seen fixing a PC when the executive had returned to his office. He further commented that the executives' secretaries treated the EIS team members like maintenance workers and would not talk to them, although others did not share this view. The team manager therefore commenced negotiations with the area manager on the need for user feed back by providing evidence from the executives' log files. After renegotiating several times, the user survey was finally given the go ahead as a first attempt to formally assess user needs.

3.2 MC Group

MC Group is a manufacturing company with hundreds of factories in many countries around the world. MC Group Headquarters (GHQ), the site under study, officially controls the operations of the group's businesses.

The EIS utilized a PC-based EIS software package that provided senior executives with communication and touch screen menu facilities to access data on the Group's performance held on the company's mainframe. The EIS team consisted of three staff from the strategy division: a divisional manager, a systems manager, and a development manager. They were regularly joined by analysts from other divisions (data providers) in the Group and by trainees to provide temporary support with development work. The team was also responsible for daily maintenance and upgrading of EIS software and hardware.

Development practices: Most new EIS reports were added in response to requests from senior executives in the data provider divisions. Occasionally, however, the team included some new information temporarily based on "hints" from users and later these were included permanently in the EIS. For example, following the 1987 stock market "crash," more share price information was provided. Interactions with the data provider division were normally limited to the senior level, such as data provider executives.

The team normally developed prototypes without much close consultation with data providers. The data provider executives often decided what was needed for the senior executives from their divisions. Data provider executives were also the main users of EIS. The team accepted the data providers' authority over the system and worked along with it. Although there were no standard procedures for EIS except those relating to hardware and software procurement, the team had established conventions for screen layout and usage of colors and for development practices, such as seeking data-providers' approval before launching a new project.

The EIS software had been upgraded several times since its original introduction. This was normally carried out during the day while the executives were at board meetings.

Relationship with executives: Since the early stages of EIS development, the systems manager had been interacting with the executive users to provide support for daily operations and to obtain feedback. This practice evolved into formal interviews during less busy periods of the year. Arrangements were made to see users not based at GHQ when team members were traveling on other business.

The interviews had three aims: to assess usefulness and usage of the EIS; to identify any requests for information or amendments; and to determine any problems in using the system. The system manager claimed that these interviews consistently showed that the main users of the EIS were the professional analysts and support staff for whom the EIS was essential. A few users claimed that the EIS did not support their work but kept the system for other reasons, such as for future jobs.

It was also found that measuring the data/file access gave a false impression of the usefulness of the EIS. For example, many users looked at the news in the EIS during a break in work but it was not essential to their work (e.g., to see sports scores). Further, many senior executives accessed the EIS information indirectly, such as using the EIS PCs of their support staff while discussing issues.

Following the main meeting, a follow-up meeting was normally arranged with the user, although informal interactions were encouraged with non-senior executives. These executives sometime visited the system manager's office while on the way to their offices.

4. ANALYSIS AND DISCUSSION

In seeking to understand the constraints limiting the user-developer interactions, the paper will first illustrate how influences of the three senses of constraints shaped the user-developer relationships in the two case study contexts by drawing on the theoretical concepts discussed in section 2.

4.1 The Restrictive Properties of Constraints

The limits arising from physical constraints: The opportunities for interactions between developers and EIS users in each organization was limited by the geographical separation of the locations where interactions took place. Many of the EIS projects, such as the QUALITY-EIS prototype at LMC, were developed without much consultation because users and data provider executives were not in the same location. It was therefore necessary to take advantage of opportunities for interaction when EIS team members visited the relevant site. Similarly, the opportunities for informal interaction between EIS developers and executives in MC Group were enhanced by the fact that their

offices were just along the corridor from their users, whereas the LMC team was situated in an area that was not visited by senior executives.

In each company, the possibilities of user involvement were limited by the time available for disposal by the individuals involved. Thus, at LMC, the team was too busy with new development to notice the changing requirements of the production finance division and thereby prevent the suspension of STOCK-EIS. Executives and developers were also typically involved in many activities, so arranging meetings was often difficult. At LMC, for example, the meeting with the production finance executives had to be rescheduled many times. At MC Group, interviews with executive users had to be completed during times when executives were less busy and there was no major development work going on within the team.

The limits arising from social constraints: The case studies indicate that, although each of the two organizations had different cultural norms and organizational arrangements, they both had clear hierarchical structures which constrained user involvement. For example, LMC's strong hierarchical structure severely limited the possibilities for direct interaction. This meant that developers often had to guess what the executives' requirements might be.

The team members' lack of authority also limited their ability to insist on user involvement. Any attempts to interact with executive users were marked by a major imbalance of authority. For example, to set up demonstrations, analysts were forced to rely on the executive's secretary to arrange meetings at which the executive might well not turn up. At the same time, the team members were expected to respond promptly to user requests, such as dealing with technical problems.

At MC Group, the influence of hierarchy was different as the EIS team, through their association with strategy division executives, had higher status than at LMC. The team members were also able to have limited interaction with executives through interviews carried out by the systems manager. The imbalance of authority was still evident, however. For example, the systems manager was expected to carry out amendments promptly. The team members also had to accept the data provider executives views on what was needed on the EIS from their divisions.

The embedded power relations were experienced by the developers as a form of moral sanction as the policies and rules imposed from the top of the hierarchy were expected to be followed. For example, at LMC analysts were not permitted to be seen in an executive's office while the executive was present. At MC Group, software upgrades were carried out when the executives were at board meetings.

The user involvement in both companies was limited by the developers' established practices and cultural norms regarding certain interactions. At LMC, during the early development of the EIS, interacting with users was not seen by the developers as part of their job, so limited involvement took place. Even when the system was more established, team members focused on technical improvements rather than organizational issues and interacting with users. At MC Group, this kind of "technical culture" was less strong.

The limits arising from individual constraints: The possibilities for developers' interactions with executive users were limited by individual developer's social skills and knowledge of the users and circumstances. The team members at LMC, for example, generally lacked social skills and confidence in interacting with senior executives. They identified themselves with technical experts and so regarded themselves as being treated like maintenance workers. This may have been because most of them had previously worked on factory support systems and had never interacted with senior managers.

The higher status of the MC Group EIS developers made their relationship with executives somewhat easier, but their weak social skills made them dependent on the systems manager to obtain feedback on EIS usage and problems. The developers also relied on the team manager's personal contacts with "friendly" executives.

4.2 The Enabling Properties of Constraints

In the above analysis, the focus was largely on the disabling nature of these three constraints on the possibilities for user-developer interaction. It was evident from the case studies, however, that these constraints were also opportunities for enablement. For example, physical constraints such as the location of some EIS PCs at LMC meant that when the team manager visited a remote site his meetings would be less likely to be canceled. Similarly, the pre-existence of social constraints in some form also provided opportunities for interactions. For example, at MC Group, the hierarchical norms were seen as providing opportunities for the systems manager to plan her interviews with executives according to their status to enable faster and more effective interactions. Hence the social constraints that limited interactions with executives were also media for the enablement of legitimate interaction**.** The established design practices and patterns of interactions also provided prestructured opportunities for interactions.

Although the constraining aspects of power were discussed earlier, power was also an enablement. Thus, the developers were able to draw on the power relationship with executives in their interactions. At LMC, for example, the EIS team used the authority of the executive to obtain the cooperation of data provider managers even though, as analysts, they had lower status within LMC's hierarchy. Individual constraints such as certain skills and personal identity, which limited the possibilities of interactions could also be enablements on other occasions. For example, the EIS team at LMC used their technical skills to provide attractive interfaces quickly to maintain user interest.

4.3 The Production and Reproduction of Constraints

Giddens' emphasizes that constraints are continuously reproduced through individual action, but also that individuals are capable of transforming them. For example, the EIS team members, by adopting the hierarchical norms and not directly interacting with executive users, also helped to reproduce these constraints. At every instant of action and interaction, however, there were also potential opportunities to transform social constraints. For example, the developers at LMC were able to overcome the established norm opposing the evaluation questionnaires for executives. Other social constraints, such as organizational status, however, appeared resistant to such transformation, at least in the short term. This indicates that constraints may vary in their malleability and that some appeared to be relatively resistant to change by developers.

It was also evident that the developers used their ingenuity to get around constraints. For example, because the EIS did not allow monitoring of executive usage, the developers at LMC sought evidence from executives' log files. They also seized every chance to talk to executives during demonstrations, maintenance, and even during a short encounter with an executive in the car park. At MC Group, a female systems manager was deliberately appointed to try to overcome the communication barrier with executive users, as it was assumed that the predominantly male executives would be less reluctant to admit to a woman that they had problems in using the EIS. Developers also interacted with intermediaries such as executives' secretaries and data providers to assess user requirements.

In response to individual constraints, the developers at MC Group found ways to overcome their lack of social skills by using the female systems manager as a go between. At LMC, the team manager recognized that the team members' interactions with users were unsatisfactory and used team meetings to urge them to become more user-oriented and less technology-focused.

4.4 User-Developer Relations

Most of the literature on ISD, even where it does not recommend participative design, proposes that users should be involved at the earliest possible stage of the process and should be regularly consulted on design decisions, if not fully integrated in the design team. As the direct use of IS has spread to the highest levels in organizations, however, such prescriptions become problematic. Senior managers are likely to expect that systems will be designed to meet their requirements, but do not have the time, or perhaps often the inclination, to get involved in the detailed design process. Their status also means that they may be reluctant to interact with developers and may be sensitive about their lack of technical competence. Participative design may thus not be a feasible option.

User-developer relations in such situations have to rely, therefore, not on close cooperation, but on the developers' skills in overcoming constraints on interaction. Although, as the case studies illustrate, developers can demonstrate considerable ingenuity in finding ways to assess their users' requirements and reactions, to the extent that they accept such constraints as implacable, they can also contribute to the reproduction of the difficulties they face. If, for example, developers see themselves as "mere" technicians, and lack the social skills to interact effectively with senior managers, then their task in understanding their users' requirements and reactions will be all the greater. This is not to suggest that there is likely to be an easy, or foolproof, way of overcoming constraints, but to emphasize that in these changed conditions of user-developer relations, standard recommendations of greater involvement may not be applicable. Rather, new skills and techniques would seem likely to be needed for successful ISD.

5. CONCLUSIONS

Although often presented as a desirable, and sometimes necessary, feature of successful ISD, user involvement is not always possible in practice. This paper has sought to illustrate the variety of constraints that may restrict the opportunities for involvement, thus requiring developers to "design in the dark."

The theoretical perspective presented, based on Giddens' work, provided a basis for differentiating the constraints on ISD. It provided a conceptualization of the dynamic relationship between developers and executive users and an understanding of how this relationship shaped, and was shaped by, various constraints. While the restrictive properties of constraints have been emphasized in the literature, this paper sought to further our understanding of the way in which constraints may simultaneously act as media for the enablement of action, and their ongoing production and reproduction. The analysis also indicated that constraints may vary in their malleability and that some appeared to be relatively resistant to change. Developers, therefore, often have to improvise approaches to get round constraints which are not practically negotiable. Awareness of the different types of constraint, and of the developers' role in reproducing and potentially transforming them, may be of practical value in facilitating such improvisation.

From the evidence of the two cases, it was not possible to identify any generalis able strategies for overcoming constraints but the particular solutions developed appeared to reflect the developers' local conditions and their knowledge, intuition, and experience. This would suggest that rather than giving a set of generalized guidelines for improving user involvement (as is common in the literature), the emphasis might be better placed on supporting developers' ingenuity and improvisation and on developing their social skills to enable them to overcome the constraints on involvement.

Finally, although the issues discussed in this paper have been based on examples of EIS development in just two organizations, the issues identified on the dynamics of user-developer relationships would appear relevant to many

other forms of ISD. Thus, with the spread of information technology to senior organizational levels, the understanding of the effects of these constraints and of strategies to build relationships with users are becoming more important. Further studies of the practices of systems development for senior organizational members in different companies would help to improve understanding of how these constraints operate in practice and to develop the theoretical perspective proposed in this paper.

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