CROSS-CULTURAL SOFTWARE PRODUCTION AND USE: A STRUCTURAL ANALYSIS

By: Geoff Walsham
Judge Institute of Management
University of Cambridge
Trumpington Street
Cambridge CB2 1AG
United Kingdom
g.walsham@jims.cam.ac.uk

Keywords: Globalization, cross-cultural work, structuration theory, software development, technology transfer

ISRL Categories: AI0114, AI0703, BD0101, BD05, EL05, EL07, EL09

Abstract

This paper focuses on cross-cultural software production and use, which is increasingly common in today's more globalized world. A theoretical basis for analysis is developed, using concepts drawn from structuration theory. The theory is illustrated using two cross-cultural case studies. It is argued that structurational analysis provides a deeper examination of cross-cultural working and IS than is found in the current literature, which is dominated by Hofstede-type studies. In particular, the theoretical approach can be used to analyze cross-cultural conflict and contradiction, cultural heterogeneity, detailed work patterns, and the dynamic nature of culture. The paper contributes to the growing body of literature that emphasizes the essential role of cross-cultural understanding in contemporary society.

Introduction

There has been much debate over the last decade about the major social transformations taking place in the world such as the increasing interconnectedness of different societies, the compression of time and space, and an intensification of consciousness of the world as a whole (Robertson 1992). Such changes are often labeled with the term globalization, although the precise nature of this phenomenon is highly complex on closer examination. For example, Beck (2000) distinguishes between globality, the change in consciousness of the world as a single entity, and globalism, the ideology of neoliberalism which argues that the world market eliminates or supplants the importance of local political action.

Despite the complexity of the globalization phenomena, all commentators would agree that information and communication technologies (ICTs) are deeply implicated in the changes that are taking place through their ability to enable new modes of work, communication, and organization.
across time and space. For example, the influential work of Castells (1996, 1997, 1998) argues that we are in the "information age" where information generation, processing, and transformation are fundamental to societal functioning and societal change, and where ICTs enable the pervasive expansion of networking throughout the social structure.

However, does globalization, and the related spread of ICTs, imply that the world is becoming a homogeneous arena for global business and global attitudes, with differences between organizations and societies disappearing? There are many authors who take exception to this conclusion. For example, Robertson (1992) discussed the way in which imported themes are indigenized in particular societies with local culture constraining receptivity to some ideas rather than others, and adapting them in specific ways. He cited Japan as a good example of these glocalization processes. While accepting the idea of time-space compression facilitated by ICTs, Robertson argued that one of its main consequences is an exacerbation of collisions between global, societal, and communal attitudes. Similarly, Appadurai (1997), coming from a non-Western background, argued against the global homogenization thesis on the grounds that different societies will appropriate the "materials of modernity" differently depending on their specific geographies, histories, and languages. Walsham (2001) developed a related argument, with a specific focus on the role of ICTs, concluding that global diversity needs to be a key focus when developing and using such technologies.

If these latter arguments are broadly correct, then working with ICTs in and across different cultures should prove to be problematic, in that there will be different views of the relevance, applicability, and value of particular modes of working and use of ICTs which may produce conflict. For example, technology transfer from one society to another involves the importing of that technology into an "alien" cultural context where its value may not be similarly perceived to that in its original host culture. Similarly, cross-cultural communication through ICTs, or cross-cultural information systems (IS) development teams, are likely to confront issues of incongruence of values and attitudes.

The purpose of this paper is to examine a particular topic within the area of cross-cultural working and ICTs, namely that of software production and use; in particular, where the software is not developed in and for a specific cultural group. A primary goal is to develop a theoretical basis for analysis of this area. Key elements of this basis, which draws on structuration theory, are described in the next section of the paper. In order to illustrate the theoretical basis and its value in analyzing real situations, the subsequent sections draw on the field data from two published case studies of cross-cultural software development and application.

There is an extensive literature on cross-cultural working and IS, and the penultimate section of the paper reviews key elements of this literature, and shows how the analysis of this paper makes a new contribution. In particular, it will be argued that the structurational analysis enables a more sophisticated and detailed consideration of issues in cross-cultural software production under four specific headings: cross-cultural contradiction and conflict; cultural heterogeneity; detailed work patterns in different cultures; and the dynamic, emergent nature of culture. The final section of the paper will summarize some theoretical and practical implications.

**Structuration Theory, Culture and IS**

The theoretical basis for this paper draws on structuration theory (Giddens 1979, 1984). This theory has been highly influential in sociology and the social sciences generally since Giddens first developed the ideas some 20 years ago. In addition, the theory has received considerable attention in the IS field (for a good review, see Jones 1998). The focus here, however, will be on how structuration theory can offer a new way of looking
Table 1. Structuration Theory, Culture, and ICTs: Some Key Concepts

<table>
<thead>
<tr>
<th>Structure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>- Structure as memory traces in the human mind</td>
</tr>
<tr>
<td></td>
<td>- Action draws on rules of behavior and ability to deploy resources and, in so doing,</td>
</tr>
<tr>
<td></td>
<td>produces and reproduces structure</td>
</tr>
<tr>
<td></td>
<td>- Three dimensions of action/structure: systems of meaning, forms of power relations,</td>
</tr>
<tr>
<td></td>
<td>sets of norms</td>
</tr>
<tr>
<td></td>
<td>- IS embody systems of meaning, provide resources, and encapsulate norms, and are</td>
</tr>
<tr>
<td></td>
<td>thus deeply involved in the modalities linking action and structure</td>
</tr>
<tr>
<td>Culture</td>
<td>- Conceptualized as shared symbols, norms, and values in a social collectivity such as a</td>
</tr>
<tr>
<td></td>
<td>country</td>
</tr>
<tr>
<td></td>
<td>- Meaning systems, power relations, behavioral norms not merely in the mind of one person,</td>
</tr>
<tr>
<td></td>
<td>but often display enough systemness to speak of them being shared</td>
</tr>
<tr>
<td></td>
<td>- But need to recognize intra-cultural variety</td>
</tr>
<tr>
<td>Cross-cultural contradiction and conflict</td>
<td>- Conflict is actual struggle between actors and groups</td>
</tr>
<tr>
<td></td>
<td>- Contradiction is potential basis for conflict arising from divisions of interest, e.g.,</td>
</tr>
<tr>
<td></td>
<td>divergent forms of life</td>
</tr>
<tr>
<td></td>
<td>- Conflicts may occur in cross-cultural working if differences affect actors negatively</td>
</tr>
<tr>
<td></td>
<td>and they are able to act</td>
</tr>
<tr>
<td>Reflexivity and change</td>
<td>- Reproduction through processes of routinization</td>
</tr>
<tr>
<td></td>
<td>- But human beings reflexively monitor actions and consequences, creating a basis for</td>
</tr>
<tr>
<td></td>
<td>social change</td>
</tr>
</tbody>
</table>

Structuration theory is described by Giddens as an "ontology of social life" or, in other words, a description of the nature of human action and social organization. At the heart of the theory is the attempt to treat human action and social structure as a duality rather than a dualism. In other words, rather than seeing human action taking place within the context of the "outside" constraints of social structure (a dualism), action and structure are seen as two aspects of the same whole (a duality). This device is achieved in part by a careful redefinition of the meaning of structure. Giddens defines structure as:

Rules and resources, recursively implicated in the reproduction of social systems. Structure exists only as memory traces, the organic basis of human knowledgeable, and as instantiated in action (1984, p. 377).

The crucial point here is that structure, defined in this way, is seen as rules of behavior and the ability to deploy resources, which exist in the human mind itself, rather than as outside constraints. (This distinction is often misunderstood in the IS literature which draws on structuration theory; see Jones 1998.) The actions, therefore, of an individual human being draw on these rules and resources and, in so doing, produce or reproduce structure in the mind. So, for example, a manager who reprimands an employee for arriving late at the workplace is drawing on the concept of the start time of an employee, the rule that the employee should arrive before or at this time, and the perceived ability for the manager to deploy the human resource represented by the employee, and thus to reprimand the employee for being late. In carrying out this action, the manager and the
employee have the structure of these rules and resources reinforced in their minds as standards of appropriate behavior.

In order to develop a more detailed analysis of the duality of structure, as defined above, Giddens introduced three dimensions concerned with systems of meaning, forms of power relations, and sets of norms. Human action and structure in the mind are composed, according to structuration theory, of elements of each of these dimensions but, as the example of the manager and the employee above demonstrated, the dimensions are inextricably interlinked. So the power to reprimand is linked to the concept of starting time and the norm of what it means to be late. This may seem obvious, but norms of behavior such as this vary widely between cultures. In our analysis later in the paper, it will be seen that it is precisely some of these differences "in the mind" as to what is appropriate behavior that can cause conflict in cross-cultural working.

Culture, at its most basic level, can be conceptualized as shared symbols, norms, and values in a social collectivity such as a country. In Giddens' terms, systems of meaning, forms of power relations, and norms of behavior have a more widespread currency than merely within the mind of one person. Giddens defines these as structural properties, namely "structured features of social systems stretching across time and space." He comments that social systems should be regarded as widely variable in the degree of systemness that they display. and he says that they rarely have the sort of internal unity which may be found in physical or biological systems. In other words, related to the focus of this paper, national cultures are composed of many different people, each with a complex structure in their mind, none of which can be thought of as fully shared. For example, there will be all sorts of nuance as to how individuals view lateness, even within the same cultural context. Nevertheless, it will be argued in this paper that the structural properties of cultures often display enough systemness for us to speak about shared symbols, norms, and values, while recognizing that there will remain considerable intra-cultural variety.

There have been a number of attempts to incorporate information systems within the theoretical framework of structuration theory (e.g., DeSanctis and Poole 1994; Orlikowski 1992). Giddens himself makes little direct reference to information technology in his development of the theory, so that the IS researcher is left to his or her own devices. This paper draws on the conceptualization in Walsham (1993, p. 64), where he argues that:

A theoretical view of computer-based information systems in contemporary organizations which arises from structuration theory is that they embody interpretative schemes, provide coordination and control facilities, and encapsulate norms. They are thus deeply implicated in the modalities that link social action and structure, and are drawn on in interaction, thus reinforcing or changing social structures.

In other words, IS are drawn on to provide meaning, to exercise power, and to legitimate actions. They are thus deeply involved in the duality of structure.

There is one further element in structuration theory, which has not been widely referred to in the literature, and certainly not in the IS literature, that is of considerable theoretical value in the study of cross-cultural working. This is Giddens' discussion of conflict and structural contradiction. He defines and discusses these concepts as follows:

By conflict I mean actual struggle between actors or groups...whereas contradiction is a structural concept.... Conflict and contradiction tend to coincide because contradiction expresses the main "fault lines" in the structural contradiction of societal systems (1984, p. 198).
Conflict is thus real activity, while contradiction can be thought of as the potential basis for conflict, arising from structural contradictions within and between social groupings. Giddens elaborates on this:

contradictions tend to involve divisions of interest between different groupings or categories of people. Contradictions express divergent modes of life and distributions of life chances. If contradiction does not inevitably breed conflict, it is because the conditions not only under which actors are aware of their interests but are able and motivated to act on them are widely variable (1984, pp 198-199).

This theorizing has immediate application to cross-cultural working and IS. Contradictions include "divergent modes of life," which can be taken to include cultural differences. They may result in conflict if actors feel that the differences affect them negatively, and they are able and motivated to take positive action of some sort. We will see examples of this in the later empirical material.

Structuration theory appears at first sight to be focused on reproduction of structure in the mind, and broader social structures within societies, through processes of routinization of activity and thus reinforcement of existing structures. However, Giddens also emphasizes human knowledgeability, and the way in which human beings reflexively monitor their own actions, that of others, and consequences, both intended and unintended. The latter provides an example of the basis for social change as well as social stability. If a human being takes action and he or she subsequently views the unintended consequences of this as negative, then it is likely that different action will be taken in similar circumstances in the future, with related changed structure in the mind. The following empirical sections will analyze stability and reproduction, but will also focus on change processes.

Software Production in a Cross-Cultural Team

This section is the first of two designed to illustrate the value of the theoretical basis described above, and focuses on a cross-cultural software development team. Software development in the context of a more globalized world is no longer carried out exclusively within the country that needs it, using citizens from that country, but is increasingly outsourced through nonlocal arrangements such as body-shopping and global software outsourcing (Lacity and Willcocks 2001), and the use of global software teams (Carmel 1999). The case below provides a specific example of this in a Jamaican insurance company, with the cross-cultural element being the extensive involvement of a team of Indian software developers. The description of the case below draws from papers by Barrett and Walsham (1995) and Barrett et al. (1996), but the structurational analysis is now.  

Case Description

The case concerns a Jamaican general insurance company, called Abco, which formed part of a broader Jamaican conglomerate, called the Jagis Group. Jamaica is located in the high risk catastrophe region of the Caribbean, but the capital base of general insurers in Jamaica is insufficient for high risk insurance coverage, such as that caused by earthquake and hurricane. Jamaican general insurance companies thus rely on worldwide reinsurers, who underwrite some of these high risks. In 1968, Hurricane Gilbert swept through Jamaica, paralyzing business activities on the island for a couple of months. At Abco, computer records were lost, and claims were made on policies that did not exist on the batch system.

Readers should refer to the earlier published material for details of the research methodology and data collection methods. As a member of the research team, the author had access to all the field notes from the study and has chosen quotes from these as appropriate to illustrate the theme of the current paper, and the new theoretical analysis carried out here.
After the hurricane and other world catastrophes, reinsurance not only became a problem to obtain, but reinsurers started to demand better quality information from companies such as Abco on risks and levels of exposure.

Responding to this crisis, the Jagis Group’s chairman led an investigation as to how IT/IS could be used to provide superior quality service to clients through improved claims handling, as well as providing reinsurers with the more detailed risk and exposure information that they required. The decision was made to develop a new general insurance information system, called Goras. A leading management consultancy was commissioned to conduct the requirements study and a group software development company, Gtec, was set up within Abco in order to strengthen existing information technology skills. In March 1990, an Indian software expert, Raj, and other experienced Indian software developers were recruited from software houses in India to form the top management group of Gtec.

After the requirements study, bids were invited for the job of carrying out the software development, and Gtec was selected. However, in the initial stages of development, it became clear that additional expertise in insurance systems was needed, and a selected team of Jamaicans from the Jagis Group was seconded to the project as insurance consultants, including Roberts, the MIS manager of Jagis. The initial stages of the project were marked by some enthusiasm, at least by team members at the programmer level. Drawing from their experience on past development projects, Indian developers provided guidance to the Jamaican members on software development issues. There were weekly awards for the “most helpful member” and “project champion,” and cash incentives for meeting deadlines. A key developer at Gtec reflected later:

Looking back at it now, it was well organized. Every Monday, a memo came out specifying the deliverables and bonus structure for the week. There was a bonus on top of your salary if you met deadlines... but it was so hard to make

your deadlines.... Though teams were compliant, deadlines were rather stringent, if not unreasonable.

As time went by, conflict started to develop between the Indians and the Jamaicans, particularly at the senior and team leader levels. Raj was viewed by the Jamaicans as having an autocratic approach as he would “lay down the law which was not to be questioned.” In contrast, the senior Jamaican on the project team, Roberts, viewed an appropriate management style with Jamaicans as being more consensual:

If there is a problem to be solved, we would sit down and solve it.... I was not a sort of hierarchy.... It was a team effort, meet and discuss each project.

Resentment by the Jamaican software developers at all levels had deeper roots than specific conflicts on management style, since some of the locals believed that Indians were not needed in the first place. A key Gtec developer expressed this sentiment:

The Abco MIS staff felt the whole project had been taken away from them... They were the natural group to be utilized to develop a new general insurance system for Abco. Instead [the management consultancy] who were a bag of Indians again were asked to do the functional requirements and the initial design. Later on, Gtec was formed, staffed by Indians in all the senior posts, and responsible for the Goras project.... The Indians had been given power over the Jamaicans.

There are, of course, two sides to these cross-cultural issues. Raj, for example, was critical of the more laid-back attitude the Jamaicans had to deadlines, regarding their formal working hours as being all they were prepared to offer to the project:

With the Indians, there is no discussion once the deadline is agreed; they will work until 9 p.m. every night, weekends if necessary to have it on my desk at the
stipulated time. However, with the Jamaicans, this is not the case. If the worker recognizes that they cannot meet the deadline, they will call me up and give some excuse as to why they need more time...they expect me to understand and accommodate.

Raj also felt that there were significant cultural differences in the way that project activities were coordinated. In India, that task was handled by the project manager whose job was "walking around and seeing how people are progressing," coordinating and administering activities, while in Jamaica project coordination was seen by him to be inherently problematic. Raj attributed this to Jamaicans' inability to "link hands and do parallel work." To illustrate this point, he offered an analogy of Jamaica's performance at international athletics events:

They are fantastic runners...they only miss out on medals at international relay races because at the interchange of the baton, it is dropped or it is passed too late outside the permitted exchange...there is no training to coordinate and keep things moving.

In contrast, a Jamaican member of the software team viewed the Indian approach to coordination as representing an adult-child mentality, related also in his mind to the Indian caste structure:

The strict deadlines seemed impossible, and I was not used to the interpersonal relations of the closely knit teams....I was reluctant to fully integrate myself into the environment which was different to what we [Jagis MIS staff] were used to....It was a school room attitude, with someone senior to me telling me to do as he says....It was hard to relate to their caste system where hierarchy and status were so important.

These comments relate to differences in deep-seated cultural attitudes to hierarchy and authority that were recognized on the Indian side also, but of course with a different emphasis on their merits and demerits. Raj gave his view of Jamaicans' attitudes in these areas as follows:

Everybody treats everybody as equal. The boss is viewed as a supervisor but at the same time they expect to be treated as equal. If something is due at the end of the month, don't intervene [as the boss]...the attitude is, "I will tell you if the job is done or not, then we reset the date and keep going....If you feel performance is bad, then fire me with redundancy pay"...They don't want a monitoring system....It is demeaning to them if the boss asks about progress of activities in between tasks.

The above quotes from the case study may be thought to reflect racial stereotyping on the part of some of the Indian and Jamaican software developers and managers. They have been reproduced here to exemplify some of the broader issues and problems, which were interpreted by some participants to have arisen from the different cultural backgrounds of the team members. However, not all members subscribed to these views in a simple way, and the importance of individual diversity and difference within the national groups was recognized. For example, the project approach reflected the personality of Raj, in addition to elements derived from his cultural

3 A reader of this section may indeed believe that some of the organizational members were engaging in racial or ethnic stereotyping. Regardless of whether this is or is not the case, we need to make it clear that any such stereotyping reflects the values of those particular organizational members. It does not necessarily reflect the values of other organizational members and it does not reflect the values of the researcher who is reporting the organizational members' words. Such stereotyping also does not reflect the values of the editorial policy of the journal publishing the research. We believe it is the responsibility of researchers to report, rather than to cleanse or censure, the data that they collect, where such data involve the subjective interpretations that are constructed and held by the organizational members themselves. MIS Quarterly stands behind the author of this study in reporting his data, although this does not amount to any endorsement of the organizational members' own opinions.

— Michael D. Myere, Senior Editor
Structured Analysis

Structure

This subsection analyzes the Abco case using the theory articulated earlier. Key points of the analysis are summarized in Table 2. Structure “in the mind” and its links to action, according to structuration theory, can be analyzed through the dimensions of meaning, power, and norms. Cross-cultural interaction is likely to involve basic differences in these dimensions, and the development of information systems in a cross-cultural team can bring these differences into stark contrast. With respect to meaning, metaphors of team-work used by Abco and Gtec staff can be used as an illustration. A Jamaican software developer described the Indians’ approach as a “school room attitude,” linked in the mind of this person to the Indian caste system. In contrast, the Indian project leader used the metaphor of international relay races as a way of illustrating his view that the Jamaicans were incapable of working together in a coordinated way.

Turning to the second structural dimension, the case study shows radically different views of appropriate personal and power relations. The Indian team leader was viewed as autocratic by the Jamaican staff, whereas the senior Jamaican staff member thought that an appropriate management style in Jamaica was consensual. In contrast, the Indian team leader felt that the Jamaicans were too equal to make project monitoring and control effective. Related issues arose with respect to the third structural dimension of norms of behavior, for example, with respect to time deadlines for software projects and a sense of urgency. The Indian team leader was critical that the Jamaicans would go home at the “normal” leaving time, whereas the Indian team members would work evenings and weekends if necessary to meet deadlines.

Culture

The above analysis, in order to make some general points, has downplayed individual differ-
Table 2. Jamaica-India Software Development Case: Structurational Analysis

<table>
<thead>
<tr>
<th>Structure</th>
<th>Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Different meaning systems: metaphor of team-work as a school room attitude</td>
<td>Strong degree of systemness in terms of different cultural attitudes of</td>
</tr>
<tr>
<td>or international relay races</td>
<td>Indian and Jamaican groups</td>
</tr>
<tr>
<td>Different views of appropriate power relations: Indians too autocratic;</td>
<td>But important to note that individual difference also matters</td>
</tr>
<tr>
<td>Jamaicans too equal for project control purposes</td>
<td>Culture of IS development also different in the two national groups:</td>
</tr>
<tr>
<td></td>
<td>high productivity/strict deadlines versus working closely with end users/</td>
</tr>
<tr>
<td></td>
<td>application backlog</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cross-cultural contradiction and conflict</th>
<th>Reflexivity and change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural contradiction arising from different cultural backgrounds</td>
<td>Increasing recognition on all sides that cross-cultural issues were</td>
</tr>
<tr>
<td></td>
<td>important, and needed to be managed</td>
</tr>
<tr>
<td></td>
<td>Pragmatic actions taken on roles and responsibilities, reflecting</td>
</tr>
<tr>
<td></td>
<td>changed structure on the part of both Jamaican and Indian participants</td>
</tr>
</tbody>
</table>

ences within the Jamaican and Indian groups. This can be justified on the grounds that there was some consistency of the responses from within each cultural group which supports the argument that there was a strong degree of systemness operating here. In other words, the indigenous elements of Jamaican and Indian national cultures were sufficiently strong in the minds of the individuals concerned to influence their behavior in a broadly similar way to other members of their own culture and, equally importantly, for this to be perceived as such by members of the other culture. However, as noted in the case description, individuals also matter, and the personality of Raj was given as one example of this.

In addition to the influence of national culture, the word culture is often used as a metaphor (Morgan 1986) for shared values and attitudes within a specific organization or other form of social grouping. In the Abco case, Barrett and Walsham (1995) highlighted how the culture of IS development was different in the two countries:

While occupational cultures for Indians and Jamaicans alike originated from software development, the impact of the local work culture at Indian software houses and the insurance company respectively were significantly different. The norms of an Indian software house include high productivity and profitability, the software development being driven from a specification under strict project deadlines. The norms of an insurer's MIS department in Jamaica involve application development by MIS personnel working closely with end users with a backlog of applications being quite acceptable. (p. 30)

Cross-Cultural Contradiction and Conflict

Contradiction reflects differences in structural principles, according to structuration theory, such as those arising from different cultural backgrounds. However, conflict is an actual struggle,
and we have seen that significant struggle did indeed take place in the case. It was argued earlier that this is likely to occur, first, if the differences affect actors negatively. With respect to the Jamaicans, they felt the force of the structural contradictions in cultural attitudes in a very direct way through Indian approaches to project monitoring and control, attitudes to deadlines and working hours, and what they viewed as excessively hierarchical approaches. The Indian management team, in particular the overall team leader, viewed these as the right way to approach software development, and the Jamaicans' attitudes as largely negative to the goal of effective project monitoring and control. The second condition for actual conflict to arise along the fault lines of the structural contradictions is that the participants have the ability to act to support their perceived position. The Indian management team had the recognized authority to control the project and to make the rules, such as time deadlines. On the other hand, the Jamaican team members were able to resist in various ways, such as giving reasons why more time was needed for a particular software task. In addition, the removal of Raj from the CEO role in the later history of the project can be taken to reflect the resistance of some of the software team members to his leadership.

Reflexivity and Change

The analysis so far has focused on the way in which structure in the minds of actors in cross-cultural interaction affects the way they think and behave, and the way in which they perceive others from a different culture, which may result in disagreement and conflict. However, as noted in the earlier theoretical section, human beings reflexively monitor actions and their consequences, creating a basis for social change. In other words, structure and culture are not immutable. This can be illustrated in the Jamaica-India software development project, in that there was an increasing recognition on all sides that cross-cultural issues were important and that they needed to be managed effectively. This resulted, in the later years of the project, in various actions being taken to mitigate the problems which had occurred. These actions included shifting the role of Raj away from organizational issues to a primarily technical role, and giving increased responsibility for human issues such as user involvement to the Jamaican MIS group. These actions not only reflected a pragmatic interest in getting a better job done, but also changed attitudes, or structure in the mind in Giddens' terms, on the part of the Jamaican and Indian participants.

Technology Transfer of GIS Software

A second way in which software is involved in cross-cultural interaction is through the transfer of IS across borders to different cultural environments from that in which it was initially developed. This technology transfer phenomenon is not a new one, but it is increasingly common in the context of globalization. For example, major software packages such as enterprise resource planning systems have spread extremely rapidly across much of the world, particularly in large organizations, over the last decade (Davenport 1998). The case described in this section will provide a specific example of the technology transfer of another global technology, namely that of geographical information systems (GIS). In particular, the case looks at the transfer of GIS from the United States to India. The description of the case below draws from the paper by Walsham and Sahay (1999), but the structural analysis is new.³

Case Description

The case concerns attempts to develop and use geographical information systems (GIS) to aid district-level administration in India. In particular, the focus is a set of GIS projects that took place under the umbrella of the Ministry of Environment

³See footnote 2 above.
and Forests (MOEF) of the government of India over the period 1991 through 1996. The technical work to develop the systems was carried out by scientists in a range of institutions, including two remote sensing agencies, three research groups within universities, and three other scientific agencies concerned with forestry, space research, and the study of science and technology in development. The systems were intended to be used by district-level administrators. The MOEF initiated 10 GIS projects in January 1991, in collaboration with the eight scientific institutions, with the aim of examining the potential for using GIS technology to aid wasteland development. Wastelands are categorized as degraded land that can be brought under vegetative cover with reasonable effort, and land that has deteriorated due to lack of appropriate water and soil management.

The initiation of the project in 1991 can be traced back to two earlier events. In 1986, the government of India started the National Wastelands Identification Project, involving the mapping of the distribution of wastelands across the various states of India. Detailed maps were produced on a 1:50,000 scale for 147 selected districts using remote sensing techniques. The existence of these maps provided a basis for considering how to develop and manage these wastelands. The stimulus for the possible application of GIS to this issue was provided by a chance meeting of some GIS experts from Ohio in the United States with Indian government officials, in the context of a general USAID mission to India in 1989. This was followed by a visit of an Indian expert team to see GIS installations in the United States in 1990, and then the eight scientific institutions in India were invited by the MOEF to test the efficacy of GIS in wasteland management, using specific districts as research sites.

Phase I of the projects took place over the period 1991 to 1993, and the staff of the scientific institutions saw the objectives to be primarily technological, involving the production of working GIS systems based on real data from the field sites in their particular districts. The detailed models and systems developed by the institutions tended to reflect their view of themselves as scientific research and development centers. For example, there was a heavy reliance on data obtained by sophisticated remote-sensing techniques, reflecting the nature of the interests of the typical research scientist in these institutions. There was less emphasis on other socio-economic variables relevant to wastelands management, such as population and livestock data. In addition, and of crucial importance to later development of the project, many of the scientists involved in the project saw their institutional mandate to be limited to the development of technology rather than to its transfer to administrators at the district level.

Although the Phase I projects were completed in early 1993, proposals for continuation were not submitted until about a year later, and then only by five of the original eight institutions. This period of transition from Phase I to Phase II was characterized by uncertainty about the objectives and nature of the continuation phase. The project director saw it as involving the transfer of the developed systems to the district level so that they could be used for real management applications. However, the project managers in the scientific institutions did not view their staff skills or resources to be adequate for this task in most cases. The institutions asked for further funding largely to provide more hardware and software, whereas the project director felt that the institutions should concentrate on using the existing equipment and on its transfer to the field.

Eventually, five institutions agreed to terms for Phase II and these continuation projects were authorised by the MOEF. Soon after this, the project director left the MOEF and transferred to another institution, and there was very limited further central direction of the Phase II projects. Despite this lack of coordination from the center, all of the five Phase II projects went ahead, in different ways and with different levels of success in terms of the stated project goals. However, by the end of the project in 1996, although some efforts had been made in some of the sites toward transferring the technology to the district level, there were no actual working systems receiving real use.
Table 3. GIS Technology Transfer Case: Structurational Analysis

| Structure | • GIS embody systems of meaning, such as the representation of space through maps; provide resources; and encapsulate norms, such as the high value of coordinated activity  
|           | • However, these may clash with the structure in the mind of actors in the different cultural interest groups |
| Culture   | • [U.S. personnel] GIS as appropriate spatial technology; provides means of deploying financial resources; promotes good development  
|           | • [Indian GIS scientists] GIS as lead-edge technology; provides means of gaining financial resources; is suitable for a scientific institution  
|           | • [District-level administrators] GIS as alien technology; requires them to provide data; but need not affect normal job role |
| Cross-cultural contradiction and conflict | • Interests not threatened in Phase I  
|           | • Some conflict in interim phase between GIS project director and scientific institutions—some of the latter withdrew  
|           | • Passive resistance in the form of nonuse by district-level administrators in Phase II |
| Reflexivity and change | • Increasing awareness of maps and map-based systems in India  
|           | • Resulting in subtle shifts in perception, but major social change over longer time horizons is made up of such minor shifts  
|           | • Some current evidence of successful use of GIS for land management in India, reflecting changed attitudinal rigidities |

**Structurational Analysis**

At one level, this project can be thought of as another example of a failed technology transfer effort, all too common in the history of aid agencies and their attempts to promote the use of western-origin technologies in Third World contexts. One could argue, for example, of the need for improved training and education, or institutional development. While acknowledging that these may be relevant, the theoretical basis of this paper can be used to analyze more underlying reasons. A principal argument will be that information technologies such as GIS, developed in the western countries, can be thought to reflect and embed western values. These may not be compatible with deeply-held beliefs and attitudes in other cultures such as India. Key points of the analysis in this section are summarized in Table 3.

**Structure and Culture**

As with the case study in the previous section, it is not possible to analyze in detail the individual perceptions and actions of the many project participants. Rather, the analysis here aims to aggregate to the level of groups who can be taken to broadly share similar structure in the mind. Three such groups consist of the U.S. GIS specialists and USAID personnel, the Indian scientists concerned with GIS development, and the Indian district-level administrators. With respect to the three structural dimensions of meaning, power, and norms, the first group took the view that GIS was an appropriate technology to help with spatial issues, that they had the power through financial resources to sponsor its application in India, and that computer-based applications such as this were the right way forward for development in
India. The Indian scientists saw GIS as a new lead-edge technology which they wished to learn about, that the USAID-sponsored project was a way to obtain the necessary resources, and that this fitted their mandate as a scientific institution. Finally, the Indian district-level administrators thought that GIS technology was something outside their experience, that they were required to provide data for the systems, but that the norms of carrying out their own job in the usual way still applied.

There is clear structural contradiction here, and an analysis of this can be sharpened by looking carefully at the technology itself and the way in which it can be thought to embed structural properties in terms of meaning and norms, and to provide political resources. With respect to meaning, GIS are a way of representing space through the explicit device of maps, a common enough concept in western societies. However, India is not a map-based culture. Typical Indians will rarely, if ever, use maps in their daily life. A GIS project leader in the National Informatics Center (NIC), one of the other institutions in India trying to introduce GIS, said:

The most difficult part of GIS introduction is getting people to think spatially. There is no simple strategy here. A first step would be to motivate NIC’s own people. They must start thinking spatially first.

This remark misstates the core of the issue. It is not that Indians do not think spatially, but that they do not in general use external conceptualizations of space, namely maps, as key aids to spatial awareness. District-level administrators, for example, those concerned with forestry management, are well aware of spatial distributions of trees in their areas. However, they do not normally conceptualize this in terms of maps, whether computer-generated or not.

Sahay (1998) linked Indians’ conceptualization of space to fundamental aspects of their identity. He argued that Indians view space as basically “inhere,” subjective and inherent to the person, rather than “out-there” as some objective entity. Sahay summarized the lack of fit between GIS technology and these aspects of Indian cultural identity as follows:

The objective reality depicted in GIS software is interpreted to represent a disconnection of space from place, a relationship that allows interaction between absent others. In contrast, in Indian society, a strong relation is seen to exist between notions of space and place, arising out of political, cosmological, religious and social considerations. These differences between subjective considerations and objective reality (of the GIS) seem to contribute to the discomfort which some Indians feel in relating to the notion of a GIS map (p. 181).

Sahay added that the purpose of a GIS reflects a sense of being able to control space and nature through technology. This need to dominate nature is also not a concept that comes naturally for many Indians, who typically see themselves as part of nature rather than standing outside of it.

A second feature of GIS technology can be seen as reflecting an organizational norm in western societies that places a high value on coordinated activity. The multi-layered nature of GIS systems, where data on different characteristics are brought together as overlays in the same map-based system, assumes that management issues will be addressed in a coordinated way. For example, the management of land resources in any country involves a wide range of disciplinary specialities, including agriculture, forestry, wildlife management, and many others. However, in India, these issues have typically been handled in relative isolation by the different agencies involved. Over 20 separate government agencies operate at the district level in India, each dealing with a particular functional area, and reflecting the wider governmental funding structures that are built around departmentally-based schemes. An employee in a non-governmental organization operating at the district level in India described this as follows:
The main problem is the compartmentalism of activities. Different departments do not speak to each other. There is a problem of attitude, people do not want to do things. The crux of the problem is not technical but that of sustained coaxing. The district level engineer says that he is interested only in dams, the agricultural scientist in soils, the forester in trees. Everyone says that I am fine and no one sits and talks with each other. There is extreme compartmentalization. There is a mental barrier among the people.

This feature of compartmentalism of role in India is not a simple matter of inefficient bureaucratic organizations, but reflects some deeply-held cultural beliefs. Indian society has traditionally been stratified on functional lines with caste as the basic structural feature. Hinduism, the religion of the majority in India, emphasizes a social framework that embodies caste rituals, and these have governed the lives of most Indians for hundreds of years. One of the sacred Hindu texts, the Bhagavad Gita, says:

And to thy duty, even if it be humble, rather than another's, even if it be great. To die in one’s duty is life: to live in another’s is death.

The compartmentalism of role and activity was a clear feature of the GIS projects. Most of the GIS scientists viewed their goal as producing accurate scientific models for the GIS, which they then expected the district level administrators to use.

The GIS can be viewed, therefore, as embodying systems of meaning such as the representation of space through maps, and encapsulating norms such as the need for coordinated action. The systems were thus aligned to the interests and structures in the mind of the U.S. personnel, and can be thought of as actors (Walsham and Sahay 1999) introducing those ideas into an Indian context. Another way of expressing this is that the systems provided a political resource for an attempt to use western ideas in Indian district-level administration. No value judgement is being made in this paper about whether this attempt was a "good thing" or not. The point being made here is that there was a marked structural contradiction between the values embedded in the technology and those in the minds of local actors, particularly the district-level administrators.

Cross-Cultural Contradiction and Conflict

Structural contradiction, according to the theory in this paper, does not necessarily result in conflict. Conditions under which conflict is likely to occur are when actors feel that their interests are affected negatively, and when they are able to act to counter this. The relatively smooth nature of Phase I can be explained in that, although the GIS scientists were not map users themselves in their daily lives, they did not feel their interests threatened by the technology. Indeed, it provided a resource for them to learn about a leading-edge technology, with positive career connotations. Although the district-level administrators were, in some cases, required to provide data for the GIS, this did not compromise their normal way of working. The interim period between Phases I and II did, however, start to manifest some conflict, notably when the GIS scientists felt that they were being asked by the project director to carry out a role which was not theirs, namely working closely with the district-level administrators to implement the systems. Some institutions withdrew from Phase II as a consequence.

Phase II itself saw little overt conflict, despite the stark structural contradictions between the values embedded in the technology and those in the minds of the Indian participants. Yet, there was real potential for some participants to be affected negatively. For example, the district-level staff were having alien systems imposed on them, which they saw as of little value. However, forms of resistance are many and subtle. The district-level staff did not, in general, reject the systems or undertake any form of direct action. Rather, they simply did not use the systems—action in the form of inaction, a type of passive resistance. This provides a nice illustration of what Giddens (1984)
calls the "dialectic of control," namely the ways in which the seemingly less powerful manage resources in such a way as to exert control over the more powerful.

Reflexivity and Change

This passive resistance to the GIS on the part of district-level staff can be taken as an example of reproduction of structure, but change is also inherent in the human actors' reflexivity here. India is not a static culture and there is an increasing awareness of maps and map-based systems in India, not least since private Indian software companies in places such as Bangalore have been very successful in selling their services as GIS developers in the world software market. Structures in the mind do change over time, even with respect to such a fundamental issue as the conceptualization of space. Changes in culture are often imperceptible over short time periods, but major social change over longer time horizons is made up of such minor shifts.

As an example of longer-term shifting attitudes in the development and use of GIS in India, Puri (2002) describes ongoing efforts to use GIS for land management in the Indian state of Andhra Pradesh. He argues that some indications of successful use are now discernible, in contrast to the earlier work described by Walsham and Sahay (1999). Puri ascribes the later success to shifts in earlier "attitudinal rigidities," and gives examples of new approaches: GIS scientists assuming ownership of implementation as well as development of systems; increasing consultation with local departments and people; and nodal district agencies managing implementation action plans. Puri's research provides a valuable reminder that longitudinal studies of several years length, as carried out by Walsham and Sahay, may still not be long enough to detect the effect of shifting individual attitudes, or structure in the mind, which can aggregate over time to major shifts in national or subgroup cultures.

Theorizing Cross-Cultural Working and IS

In order to assess the contribution the structural-analyses of this paper can make to the study of cross-cultural software production and use, or more generally to cross-cultural working and information systems, it is necessary to examine the existing literature in this latter domain. A good starting point is the widely-cited work of Hofstede (1980, 1991), which describes cultural difference in terms of scores on five dimensions: power-distance, individualism, masculinity, uncertainty avoidance, and long-term orientation. Myers and Tan (2002) noted that much of the literature concerned with cultural and cross-cultural issues in the IS field has relied on Hofstede's work. They analyzed 36 studies from the cross-cultural IS literature, and noted that 24 of these used some or all of Hofstede's dimensions.

While the work of Hofstede, and that of similar style such as Trompenaars (1993), has the merit of alerting us to the importance of cultural difference, it can also be criticized as rather crude and simplistic. Myers and Tan note that the very concept of national culture is problematic on several grounds. These include the heterogeneity within a given nation-state and the difficulty of relating national cultural values to work-related actions and attitudes. They propose that IS researchers should adopt a more dynamic view of culture—one that sees culture as contested, temporal, and emergent. The rest of this section will examine why such issues are important to the study of cross-cultural working and IS, and what the structural-analyses of this paper has to offer. The discussion is organized under the four headings of cross-cultural contradiction and conflict, cultural heterogeneity, detailed work patterns, and the dynamic nature of culture. Key points in this section are outlined in Table 4, summarizing limitations of Hofstede-type studies and related contributions from a structural-analyses.
### Table 4. Cross-Cultural Working and IS: Contribution of Different Theories

<table>
<thead>
<tr>
<th>Topic</th>
<th>Hofstede-Type Studies</th>
<th>Structurational Analysis</th>
<th>Examples in Jamaica Case</th>
<th>Examples in GIS Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-cultural contradiction and conflict</td>
<td>Describe aggregate differences between cultures</td>
<td>Detailed way of relating contradiction and conflict</td>
<td>Differences in cultural views about teamwork, power relations, time deadlines</td>
<td>Three different cultural subgroups with different attitudes to GIS</td>
</tr>
<tr>
<td></td>
<td>But provide no link to conflict</td>
<td></td>
<td>Resulting in conflict since perceived negatively and resistance possible</td>
<td>Resulted in resistance in Phase II only, when participants perceived negative consequences</td>
</tr>
<tr>
<td>Cultural heterogeneity</td>
<td>No description of heterogeneity</td>
<td>Can be used to analyze differences in cultural subgroups and even individuals</td>
<td>Some analysis of individual difference related to the Indian project director</td>
<td>Analysis of different attitudes of Indian scientists and district-level administrators from the same national culture</td>
</tr>
<tr>
<td>Detailed work patterns</td>
<td>Aggregate cultural variables do not easily translate to effect on work patterns</td>
<td>Meaning systems, power relations, norms already targeted at the detailed work level</td>
<td>Example of approaches to control of subordinates</td>
<td>Example of different ways of representing space</td>
</tr>
<tr>
<td>The dynamic nature of culture</td>
<td>Normally treated as static</td>
<td>Can analyze reflexivity and change</td>
<td>Increasing recognition over time of importance of cross-cultural issues</td>
<td>Recent work indicates some shift away from the attitudes that characterized the earlier studies</td>
</tr>
</tbody>
</table>

### Cross-Cultural Contradiction and Conflict

Hofstede-type studies describe intercultural differences in the selected aggregate variables, and these can be taken as reflecting contradictions between different cultures. However, no analytical tools are provided by such studies as to how to analyze whether, and if so how, such contradictions result in actual conflict, physical or otherwise. For example, people from different cultures may coexist quite easily despite such differences, but in other cases the differences seem to cause major difficulties. In trying to analyze possible conflict in cross-cultural working and IS, such as in software production and use, the aggregate national variables are of little use.

The structurational analysis in this paper offers a way of addressing the question of both structural contradiction and conflict. It has been argued that conflicts may occur in cross-cultural working if differences in structures in the mind are perceived.
to affect actors negatively, and they are able to act to resist or oppose these negative impacts. This was illustrated in the Jamaica-India case by identifying differences in cultural views about approaches to teamwork, forms of appropriate power relations, and attitudes to time deadlines. These contributed to conflict since they affected all participants in the software project directly, and in ways that were largely perceived to be negative. Opposition or resistance was possible, and detailed ways in which this occurred were described in the case.

The GIS case also illustrated the value of a structurational analysis of cross-cultural contradiction and conflict, although in a slightly different way. Three cultural subgroups were identified, with rather different structures in the mind with respect to GIS systems, but no significant conflict occurred in Phase I of the project. This was explained by an analysis of the specific interests of the three groups, which were not negatively affected by the GIS project, although they had different views concerning its merits. However, in Phase II, some resistance did occur, for example when the Project Director wanted the GIS scientists to become involved in local-level implementation, something which they viewed as outside their remit.

**Cultural Heterogeneity**

By treating the concept of national culture through the use of scores on particular dimensions, as is the case in Hofstede-type studies, the implicit assumption is that national culture shows a strong homogeneity. However, there is much evidence against this view of the world. For example, India provides a good counterexample. Its one billion people come from many and varied cultural, racial, and religious backgrounds, speak hundreds of different languages, and exhibit enormous variety at different hierarchical levels within the society. Within western countries, there is an increasing heterogeneity of history and background, not least due to the existence of ethnic subgroups (see, for example, Appadurai 1997).

An interesting example of work in the IS field which goes beyond the simple attribution of national cultural characteristics is that of Korpela and his colleagues (Korpela 1996; Korpela et al. 2000). Korpela criticized the approach of taking West Africa, an area equal in size to Europe, as one culture characterized by Hofstede's aggregate variables such as low individualism and a high acceptance of an unequal distribution of power. In contrast, Korpela pointed out that the country of Nigeria, for example, is a colonial creation and contains many different groups with "sharp cultural discontinuities." One such group is the Yoruba people, numbering some 20 million. Although there are differences within this large group itself, Korpela drew on the extensive literature on the Yoruba to highlight five aspects of the Yoruba cultural heritage that are distinctive. The work of Korpela and his colleagues used these characteristics to illuminate complex issues of IT development problems in the health sector in Yorubaland.

So, what does structurational analysis offer to the study of cultural heterogeneity and its impacts on IS? If we look back to the case studies of this paper, such an analysis does not require that cultures are regarded as homogeneous, but rather that one should be looking for a measure of systemness or homogeneity within particular social groupings. A good example is provided by the GIS case study. As we saw earlier, the subcultures of the GIS scientists and the district-level administrators, both composed solely of Indian nationals, had radically different attitudes toward the GIS and their value. For example, the first group viewed the GIS as providing ways for them to work with lead-edge technologies and systems, whereas the second group viewed the GIS as alien technology of little relevance to their role. A structurational analysis opens up the possibility of examining the heterogeneous systems of meaning, power relations, and norms of different social groupings within the same national culture.

The Jamaican case study did not analyze cultural heterogeneity within the two national groups.
directly, but aspects of it can be seen through the discussion of the role of the initial project director, Raj. His interest in organizational issues was limited, and the quotes from him in the text show his tendency to racial stereotyping of the Jamaican software employees. He was later moved to a role dealing with technical issues, leaving the way open for a new Indian CEO with a rather different management and cross-cultural approach. Space and resource limitations provide a natural barrier to case analyses which treat every project participant as an individual person with a different mixture of attributes, but structural analysis can, in principle, be used to analyze cultural heterogeneity down to the level of subgroups, or even individuals.

**Detailed Work Patterns**

A further criticism of the use of Hofstede-type national cultural characteristics as a basis for analysis of cross-cultural working and IS is that there is normally a poor link between these characteristics and detailed work-related attitudes and actions. It is one thing to know how the people of a country score on masculinity or uncertainty avoidance, but another to know how this translates into the details of systems development processes, or attitudes to particular technologies. In terms of cross-cultural working, it is not necessarily the case that similarities in national characteristics imply similar work-related patterns. For example, Khare (1999) describes radical differences between Indian and Japanese work patterns, in areas such as commitment to their organization and attitude to time, despite similarities between India and Japan in terms of their scores on individualism, long-term orientation, and power-distance (Hofstede 1995).

In order to analyze detailed patterns in cross-cultural working, it is necessary to go away from the high level of national characteristics to a more detailed focus on behavior at the micro-level of the group or organization. For example, in the general management literature, Lam (1997) described a fascinating longitudinal study of cross-cultural working between Japanese and British engineers. Her detailed analysis demonstrated how differences in educational background, bases of skills, and approaches to coordination of work resulted in very different attitudes to knowledge sharing by the two cultural groups, and thus major problems in cross-cultural working. In the IS literature, a limited number of authors have carried out cross-cultural studies from this perspective of a detailed analysis of work patterns and attitudes. For example, Truth (1999, 2000) examined the management of IT workers in an American-Irish cross-cultural work environment as part of a detailed longitudinal study of the information economy in Ireland. Barrett et al (1997) described cross-cultural working on software outsourcing from U.S. to Indian companies, examining detailed work patterns in areas such as forms of partnership and coordination mechanisms.

The structural analysis described in this paper can offer a valuable theoretical underpinning for studies of this latter type, which otherwise tend to be somewhat anecdotal in nature. Such an analysis, as we have seen, focuses on meaning, power, and norms within particular work groups and how these affect particular work patterns and behavior. For example, in the Jamaica-India case, we saw how the Indian managers of the project were used to hands-on approaches to control subordinates, whereas this was viewed as reflecting an "adult-child" approach by one of the Jamaican participants. In the Indian GIS case, we saw how the different ways of representing space between the U.S. developers and the Indian users resulted in passive resistance to the implementation of the technology. The insights from these studies could not have been obtained by a high-level analysis of cultural dimensions. It may be possible, in theory, to make a connection between Hofstede-type dimensions and detailed work patterns and attitudes, but such an analysis is not easily found in the literature. A structural analysis, with its focus on meaning, power, and norms, is already targeted at the detailed work level.
The Dynamic Nature of Culture

A final area of weakness of the cultural dimensions approach to cross-cultural working is that culture is not static. For example, we have seen quite dramatic changes in many societies over the last few decades in areas such as attitudes to gender, the environment, race, sex, family life, and religion. In the context of globalization, with increasing contact between different societies, it is increasingly difficult for any group to remain isolated and uninfluenced by other cultures. Thus, in the domain of cross-cultural working, we need theories that reflect change as well as stability, and that are attuned to shifts in attitudes and actions as well as their continuance.

An example of such work in the cross-cultural management literature is that of Brannen and Salk (2000) on negotiated culture. They used the case example of a German-Japanese joint venture to show how the attitudes of the two cultural groups shifted over time as they engaged with each other in collaborative work activities. The groups negotiated a compromise between themselves in areas such as styles of decision making and attitudes to time off on weekends and holidays, resulting in a hybrid culture for both groups. This is not saying that the two groups became homogeneous, but that they both shifted in their attitudes from their initial cultural starting point. In the IS literature, Sahay and Krishna (2000) described a similar process in some ways, although they did not use the term negotiated culture. They described a case study of a software outsourcing venture over a period of several years from a Canadian multinational to an Indian software house. At first, cultural contradiction produced some conflict, but the authors argued that, later, the relationship "showed signs of maturing" based on both sides gaining an increased understanding of the other's culture. Again, this did not result in the parties becoming the same in terms of attitudes and values, but it certainly supports the view of work-group culture being dynamic and emergent, and not derived in a static manner from national cultural characteristics.

Although neither of the above studies used a structurational analysis, this would have provided a theoretical framework within which to embed their analyses. Structuration theory, in addition to analyzing structural reproduction, emphasizes reflexivity on the part of human actors and thus changes in structure in the mind. This was analyzed in the earlier case studies under the heading of reflexivity and change. In the Jamaica-India case, we saw this reflected in an increasing recognition over time of the importance of cross-cultural issues, and the necessity for actions to be taken to address such issues. Job roles were changed, people were moved to different positions, and the India-Jamaica team started to function rather better. The negotiated culture concept fits quite well here.

In the Indian GIS case, longer-term attitudinal changes are needed if people working at the local level, such as district-level officials, are to embrace technologies such as GIS in their day-to-day work, or if GIS scientists are to perceive their role as involving implementation as well as technical development of systems. Although such changes are hard to trace in detail in the complexity of a context such as India, the earlier structurational analysis of the case drew on some recent work to indicate, at least in some areas, a shift away from the attitudinal rigidities which had characterized the earlier reported case studies. Indian culture, as with all other societies, is dynamic and emergent, and a structurational analysis can offer insights on such change processes.

Conclusions

In the more globalized world of the 21st century, working with information and communication technologies is increasingly taking place in a cross-cultural context, but we are short of good theory to analyze such phenomena. A recent article by Goodall (2002) argued that this applies to the cross-cultural management literature more generally, namely that "we are short of both rich
descriptions of cross-cultural interaction, and theoretical explanations of the same." The primary contribution of this paper has been to provide such a theoretical basis, drawing from structuration theory, which was used to analyze cross-cultural software production and use. The theorization goes beyond the relatively simplistic Hofstede-type studies which dominate the IS literature to date. In contrast to such studies, it was shown in the preceding section that a structural analysis can accommodate elements such as the links between structural contradiction and conflict, cultural heterogeneity, an analysis of detailed work patterns, and the dynamic and emergent nature of culture.

The theory has been illustrated using two empirical examples only, with a focus on software production and use, but it could be used to analyze any case study involving cross-cultural working and IS. Viewed from a more critical perspective, however, any theory illuminates some elements of particular case situations and is relatively silent on others. Structuration theory is no exception, and as noted by Giddens (1984) himself, the use of structuration theory does not preclude the use of other theories in tandem with it. For example, Walsham and Sahay (1996) drew on actor-network theory to analyze elements of the GIS case other than those discussed in this article. In particular, they focused on the detailed processes of human reflexivity, technical adaptation and network building involved in the case. The structural analysis in this paper can be supplemented with other specific theories, as appropriate to the particular domain of interest.

Moving finally to the issue of IS practice, what conclusions can be offered? The paper lies squarely within the literature which considers that globalization, facilitated by ICTs, is not leading to simple homogeneity of culture and approach. While it has been argued that culture is not static, the relatively enduring nature of cultural norms and values results from processes of reproduction of structure in the mind. Thus, there is a need for practitioners to be highly sensitive to cultural difference when working in a cross-cultural context. Sensitivity to other cultures does not imply the need for practitioners to change their own attitudes and values to those of the other culture. What is needed is some understanding, and ideally empathy, for the attitudes, norms, and values of others. This offers the possibility of mutual respect between cross-cultural partners and the opportunity for a move toward a more negotiated culture of cooperation.

A detailed discussion of ways in which this can be achieved is beyond the scope of the current paper. However, some broad approaches are worth mentioning in conclusion. Cross-cultural education and training can be achieved through such means as reading, formal courses, and on-the-job facilitation. With respect to the latter, open discussions about difficult cross-cultural issues can be valuable starting points to increased understanding in cross-cultural teams. While technologies, such as GIS, have features that reflect their cultural origins, technology has a degree of interpretive flexibility (Pinch and Bijker 1987), and can be adapted and used in different ways. For example, Braa (1997) used the metaphor of cultivation to describe the process of adapting Scandinavian technologies and approaches to the different context of the development of South African health information systems. In our more globalized world, cross-cultural working is increasingly common, and the information systems field needs to increase its understanding of the problematic issues involved and approaches to resolving them. It is hoped that this paper makes a modest contribution to these goals.

Acknowledgements

The author would like to thank the senior editor, Michael Myers, who was particularly helpful in guiding the paper through the review process. He is also grateful to the anonymous referees and associate editor for their helpful and constructive comments on the earlier drafts of the paper.
References


---

About the Author

Geoff Walsham is a professor of Management Studies at the Judge Institute of Management, Cambridge University, UK. His teaching and research is centered on the development, management, and use of computer-based information systems, and the relationship of information and communication technologies to stability and change in organizations and societies. He is particularly interested in the human consequences of computerization in a global context, including both industrialized and developing countries. His publications include *Interpreting Information Systems in Organizations* (Wiley 1993), and *Making a World of Difference: IT in a Global Context* (Wiley, 2001).