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GLOBALIZATION AND ICTs: WORKING ACROSS CULTURES

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Abstract

This paper examines issues in cross-cultural working with information and communication technologies (ICTs), an increasingly common feature of our more globalized world. A theoretical basis for analysis in this area is developed, using concepts drawn from structuration theory. The theoretical basis is illustrated and assessed using three cross-cultural case studies taken from the literature, concerned with software teams, technology transfer, and knowledge sharing. The cases provide examples of major problems of structural contradiction and conflict between cultural groups, but the paper also discusses how to address such problems. It is concluded that globalization processes, facilitated by ICTs, are not leading to simple homogeneity of culture, but rather that a sensitive cross-cultural approach is needed for effective working across cultures. The theory developed in this paper offers a basis for future research and practice oriented to such an approach.

Keywords: globalization, cross-cultural work, structuration theory, software teams, technology transfer, knowledge sharing

Biographical Note

Geoff Walsham is a Research Professor of Management Studies at the Judge Institute of Management Studies, Cambridge University, UK. His teaching and research is centred 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 computerisation in a global context, including both industrialised 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).

INTRODUCTION

There has been much debate over the last decade about the major social transformations which are 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 labelled 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. Both the supporters and opponents of 'globalization' manifest a great variety of opinions and prejudices within themselves.

Despite the complexity of the globalization phenomena, and the unresolved debate concerning its value, all parties 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. 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 organizational and societal change, and where ICTs enable the pervasive expansion of networking throughout the social structure.

However, does globalization enabled by 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 thoughtful commentators 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. Whilst accepting the idea of time-space compression facilitated by ICTs, Robertson argued that one its main consequences is an exacerbation of collisions between global, societal and communal attitudes. Similarly, Appadurai (1996), 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.

If these latter arguments are broadly correct, then working with ICTs 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 IS development teams, are likely to confront issues of incongruence of values and attitudes.

The purpose of this paper is to examine such issues in working across cultures involving ICTs. A primary goal is to develop a theoretical basis for analysis of this area. Key elements of this basis are described in the next section of the paper. In order to illustrate the theoretical basis, and to assess its value in analysing real situations, the subsequent sections draw on three published case studies of working with ICTs across culture. These empirical sections focus on analysing the difficulties of cross-cultural working with ICTs, but the argument of this paper is not that cross-cultural working is undesirable. The penultimate section, therefore, focuses on the positive aspects of how to facilitate effective cross-cultural working with ICTs. The paper ends with some conclusions on the contribution of the paper and potential future work in this area.

STRUCTURATION THEORY, CULTURE AND ICTs

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 twenty years ago. In addition, the theory has received considerable attention in the IS field (see Jones 1998 for a good review). It is not the purpose of this paper to repeat what has already been written in the literature. Rather, the focus here will be on how structuration theory can offer a new way of looking at cross-cultural working

with ICTs. The remainder of this section will develop this analysis, starting with some basic concepts of the theory. A summary of key points in this section is provided in Table 1.

Duality of structure	<ul style="list-style-type: none"> • Structure as memory traces in the human mind • Action draws on rules of behaviour and ability to deploy resources • In so doing, produces and reproduces structure • Three dimensions of action/structure: systems of meaning, forms of power relations, sets of norms
Culture	<ul style="list-style-type: none"> • Conceptualised as shared views in a social collectivity such as a country • Meaning systems, power relations, behavioural norms not merely in the mind of one person • Structural properties of cultures display enough 'systemness' to speak of shared values • Whilst recognising intra-system variety
Information and communication technologies (ICTs)	<ul style="list-style-type: none"> • Embody systems of meaning, provide resources, encapsulate norms • Thus, deeply involved in the modalities linking action and structure
Reproduction and change	<ul style="list-style-type: none"> • Reproduction through processes of routinisation • But human beings reflexively monitor actions and consequences, creating a basis for social change
Cross-cultural work with ICTs	<ul style="list-style-type: none"> • Conflict is actual struggle between actors and groups • Contradiction is potential basis for conflict arising from divisions of interest e.g. divergent forms of life • Conflicts may occur in cross-cultural working with ICTs if differences affect actors negatively and they are able to act

Table 1 Structuration theory, culture and ICTs: some key concepts

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. It is a meta-level theory in that it can be used to analyse any social situation, although by virtue of its generality it is necessarily deficient in describing the particular features of specific contexts. Giddens himself recognises this, and indeed argues that he does not 'wield a methodological scalpel' and that his theory is a 'sensitizing device'. Despite these disclaimers, many researchers have used his theory to inform their work in specific domains, and this is the approach which will be adopted here.

At the heart of structuration 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 clever device, or sleight of hand if one takes a critical line, is achieved in part by a careful re-definition 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 knowledgeability, and as instantiated in action' (1984, p.377).

The crucial point here is that structure, defined in this way, is seen as rules of behaviour and the ability to deploy resources, which exist *in the human mind itself*, rather than as outside constraints. The actions, therefore, of an individual human being draw on these rules and resources and, in so doing, produce or re-produce 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 behaviour.

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. In case the reader is thinking that this is stating the obvious, bear in mind that norms of behaviour 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 behaviour that can cause conflict in cross-cultural working.

This leads on to the reason why this paper proposes structuration theory as a way of analysing inter-cultural interaction. Culture can be conceptualised as shared views in a social collectivity such as a country. In other words, systems of meaning, forms of power relations, and norms of behaviour 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 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 concern of this paper, national cultures are composed of many different people, each with 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 values', whilst recognising that there will remain considerable intra-system variety.

There have been a number of attempts to 'incorporate' ICTs within the theoretical framework of structuration theory (e.g. Orlikowski 1992; DeSanctis and Poole 1994). 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. In this paper, I draw on the conceptualisation in Walsham (1993), 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 co-ordination 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 ...' (p. 64)

In other words, IS (or ICTs more generally) are drawn on to provide meaning, to exercise power, and to legitimise actions. They are thus deeply involved in the duality of structure. Illustrations of this will be given in the later empirical sections.

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 routinisation of activity and thus reinforcement of existing structures. However, Giddens also emphasizes human knowledgeable, 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.

There is one final 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 with ICTs. This concerns 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, whilst 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 198-9).

This theorising has immediate application to cross-cultural working with ICTs.

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 empirical material which now follows.

WORKING IN CROSS-CULTURAL TEAMS TO DEVELOP ICTs

This section is the first of three designed to illustrate and assess 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 which needs it, using citizens from that country, but is increasingly outsourced through non-local arrangements such as body-shopping and global software outsourcing (Lacity and Willcocks 2001). 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 is based on papers by Barrett and Walsham (1995) and Barrett, Drummond and Sahay (1996).

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 cover, such as that caused by earthquake and hurricane. Jamaican general insurance companies thus rely on world-wide re-insurers, who underwrite some of these high risks. In 1988, Hurricane Gilbert swept through Jamaica, paralysing 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. After the hurricane and other world catastrophes, re-insurance not only became a problem to obtain, but re-insurers started to demand better quality information from companies such as Abco on risks and levels of exposure.

Responding to this crisis, the Jagis Group Chairman led an investigation as to how IT could be used to provide superior quality service to clients through improved claims handling, as well as providing re-insurers 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 the MIS manager of Jagis, Roberts. The initial stages of the project were marked by some enthusiasm, at least by team members at the programmer level. Indian developers provided guidance to the Jamaican members on software development issues drawing from their experience on past development projects. 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 organised. 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 senior and team leader level. 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 ... It 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 as follows:

'The Abco MIS staff felt the whole project had been taken away from them ... They were the natural group to be utilised 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 Jamaicans more laid-back attitude 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 9pm 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 recognises 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 co-ordinated. In India, that task was handled by the project manager whose job was 'walking around and seeing how people are progressing, co-ordinating and administering

activities, while in Jamaica project co-ordination 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 co-ordinate and keep things moving.'

In contrast, a Jamaican member of the software team viewed the Indian approach to co-ordination 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 recognised 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.'

So, how successful was the project itself in this cross-cultural environment? The development of Goras started in 1990. The original plan envisaged a year for completion, but there were significant delays and major project cost overruns. The acceptance testing done by end users showed substantial inadequacies in the design, but the system was finally 'delivered' by Gtec to Abco in August 1992. After further quality assurance, user testing and system modification, a first attempt at implementation was made in December 1992. The implementation was not a success. System performance was poor in terms of time taken to carry out tasks, and users were critical of the restricted functionality of the new system, partly due to incomplete data conversion from the old system. Five years after project inception, in 1995, some further developments had taken place, and there was general optimism about successful project implementation within a reasonable time frame, but this still remained a promise rather than a reality.

Case Analysis

This sub-section analyses the Abco case study using the theory articulated earlier. Key points of the analysis are summarised in Table 2. Firstly, structure 'in the mind' and its links to action, according to structuration theory, can be analysed through the dimensions of meaning, power and norms. Cross-cultural interaction is likely to involve basic differences in these dimensions. 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 co-ordinated 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 behaviour, for example with respect to time deadlines 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.

Structure	<ul style="list-style-type: none"> • Different meaning systems: metaphor of team-work as a 'school room attitude' or 'international relay races' • Different views of appropriate power relations: Indians too autocratic; Jamaicans too 'equal' for project control purposes • Different norms of behaviour: attitude to time deadlines
Culture	<ul style="list-style-type: none"> • Strong degree of systemness in terms of different cultural attitudes of Indian and Jamaican groups • Culture of IS development also different: high productivity/strict deadlines versus working closely with end users/application backlog
Contradiction and conflict	<ul style="list-style-type: none"> • Structural contradiction arising from different cultural backgrounds • Resulted in conflict since these affected all participants directly, and they had the ability to act: e.g. to 'enforce' deadlines, or to resist them

Table 2 Cross-cultural working to develop ICTs: analytical summary

The above analysis, in order to make some general points, has downplayed individual differences within the Jamaican and Indian groups. A fuller analysis could articulate these in more depth, but the relative consistency of the responses from within each cultural group supports the argument that there was a strong degree of systemness operating here, whereby the indigenous elements of Jamaican and Indian national cultures were sufficiently strong in the minds of the individuals concerned to influence their behaviour in a similar way to other members of their own culture.

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)

Some might argue that professional groups such as software developers share common global attitudes to their work, but this example illustrates the limitations of such an argument.

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, firstly, 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 recognised 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. How could such issues, and more generally the management of the cross-cultural software project, have been better handled? This question will be addressed in some detail in the later section on facilitating effective cross-cultural working.

TECHNOLOGY TRANSFER

A second way in which ICTs are involved in cross-cultural interaction is through the transfer of technology across borders to different cultural environments from that in which it was initially developed. This technology transfer phenomenon is not a new one, but 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 USA to India. The description of the case below is based on the paper by Walsham and Sahay (1999).

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 and Forests (MOEF) of the government of India over the period 1991-96. 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 categorised 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 USA 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 USA 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 1991-3, 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 centres. 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 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 characterised 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 co-ordination from the centre, 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 towards transferring the technology to district level, there were no actual working systems receiving real use.

Case 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. Whilst acknowledging that these may be relevant, the theoretical basis of this paper can be used to analyse 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 summarised in Table 3.

As with the case study in the previous section, it is not possible to analyse 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 US GIS specialists and USAID personnel, the Indian scientists concerned with GIS development, and the Indian district-level administrators. With respect to 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.

Structure in different cultures [US personnel; GIS scientists; district-level administrators]	<ul style="list-style-type: none"> • Meaning attributed to GIS: as appropriate spatial technology; as lead-edge technology; as alien technology • Form of power relations: deploying financial resources; gaining financial resources; being required to provide data • Norms: the right form of development; suitable for a scientific institution; GIS does not affect normal job role
Role of technology	<ul style="list-style-type: none"> • Embodies systems of meaning: external map-based representations of space • Encapsulates norms: of need for co-ordinated action • Provides resources: to introduce western concepts into an Indian context
Contradiction and conflict	<ul style="list-style-type: none"> • 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 non-use by district-level administrators in Phase II

Table 3 Technology transfer: analytical summary

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 Centre (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 conceptualisations 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 conceptualise this in terms of maps, whether computer-generated or not.

Sahay (1998) linked Indians' conceptualisation of space to fundamental aspects of their identity. He argued that Indians view space as basically 'in-here', subjective and inherent to the person, rather than 'out-there' as some objective identity. Sahay summarised 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 which places a high value on co-ordinated 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 co-ordinated 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 district level in India, each dealing with a particular functional area, and reflecting the wider governmental

funding structures which 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 compartmentalisation. 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, emphasises 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 co-ordinated action. The systems were thus aligned to the interests and structures in the mind of the US 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.

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 lead-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.

USING ICTs TO COMMUNICATE ACROSS CULTURE

The third empirical example examines a case study concerned with cross-cultural communication, and the degree to which this communication can be facilitated by ICTs.

There is much talk in writings on globalization about the role of communication technologies in bridging time and space, and related topics such as virtual organization. However, a further dimension to these arguments concerns bridging culture, where the groups involved cross cultural boundaries. The case described in this section provides an example of such issues, based on a paper by Lam (1997), with the empirical research carried out over the period 1992-5.

Case Description

The case concerns a technological partnership between two global players in the electronics industry, a Japanese firm (J-firm) and a British firm (B-firm). J-firm had acquired a majority stake in B-firm, although prior to the acquisition the two companies already had a strong trading relationship and a technology-sharing agreement. Post-acquisition, B-firm retained a high degree of autonomy, so that the relationship between the firms could be classed as collaborative rather than integrative. A key strategic goal of the collaboration was to take advantage of the complementarity of each firm's knowledge and expertise, through enhanced knowledge creation and sharing

However, there are very different approaches to the organization of knowledge and technical work in the UK and Japan, and Lam examined these in some detail. The engineers in the British firm based their specialist expertise primarily on abstract theoretical knowledge acquired through formal university training. In contrast the Japanese engineers relied heavily on practical know-how and problem-solving techniques accumulated in their workplace. Product development in the British firm was organised on a sequential and hierarchical basis, so that the knowledge required for each stage tended to be relatively self-contained. In contrast, product development in the Japanese firm was typically undertaken by a multi-functional team, consisting of members with diverse backgrounds, and took in all the stages of planning, design and development, quality assurance and production.

These differences in educational background, bases of skills, and approach to co-ordination of work were reflected in different methods of knowledge transmission through the product cycle. In the British firm, co-ordination across the functions was achieved by passing on detailed documents and full specifications from one stage to the next. This required

'externalising' knowledge and coding and structuring it into procedures, guidelines or specifications for transmission to others. In contrast, the Japanese firm was highly dependent on intensive human-network-based communication. Knowledge required for overall project achievement was stored 'organically' in team relationships and behavioural routines.

Attempts were made to get the British and Japanese engineers to work together and to share knowledge, but these were largely unsuccessful. The mutual incomprehension is nicely captured in Lam's paper by two quotes from a British and Japanese engineer respectively:

'You've got two ways of doing something. You are either very much more rigorous about the way you design it and try to ensure you do it right, or you just have a scatter-brain effect and just hope something will work. This is the way I see J-firm... A lot of people do lots of little things and it's like waiting for revolution.' (p.982).

'They (the British Engineers) can read the specifications but I am not sure they have the ability to make the product. I think we have far more technical capacity – we've got the know-how. On this project, we have to supply them with a lot of our know-how but it's really difficult. There's so much of it which simply cannot be captured only by reading the documents.' (p.982).

In the end, the management of the British and Japanese firms abandoned attempts at genuine joint development work between their respective engineers, and divided the work on projects into compartments, leaving each team to pursue its own part of the projects in its own way.

Case Analysis

Table 4 summarises key points of an analysis of the case through the theoretical lens of this paper. A fundamental meaning structure in any social grouping or society concerns the very nature of knowledge itself. For example, questions concerning what is regarded as meaningful knowledge, and how it should be shared with others. It is clear from the case description above that the answers to such questions were rather different in J-firm and B-firm, and a knowledge typology from Blackler (1995) can be used to sharpen this distinction. Blackler categorised five knowledge types as embrained, embodied, encultured, embedded

and encoded. Embrained knowledge refers to individual conceptual skills or cognitive abilities, whereas embodied knowledge emphasizes the ability to carry out particular actions with the body, as possessed for example by skilled craft workers. Encultured knowledge refers to the process of achieving shared understandings within a particular social grouping, whereas embedded knowledge is a second category of shared knowledge reflected in routines. Finally, encoded knowledge refers to explicit knowledge representation, for example in books, computer databases or web sites.

Structure and culture	<ul style="list-style-type: none"> • Meaning systems: nature of engineering knowledge as embrained, embedded and potentially encodable (UK) or embodied and encultured (Japan) • Norms: of group work and knowledge sharing through sequential stages and document transfer (UK) or through intensive interaction in multi-functional teams • Power relations: genuine collaborative work very difficult and contentious due to these fundamental structural differences
Role of ICTs	<ul style="list-style-type: none"> • Computer-based systems embody systems of meaning and encapsulate norms of behaviour more closely aligned to the British engineers' structural attitudes • They can thus be used as a political resource e.g. to complain of 'lack of rigour' on the part of the Japanese engineers • However, they can be used as a resource to advance the counter-position e.g. that much know-how cannot be captured in such systems
Contradiction and conflict	<ul style="list-style-type: none"> • Contradiction led directly to conflict in this case • Both engineering groups had much to lose by abandoning their own style of working • And could take action by articulating major concerns about the other group, as an indirect exercise of power over senior management decision making

Table 4 Communicating across culture: analytical summary

In the language of this typology, the knowledge of British engineers tends to be embraced through formal education processes, and embedded in routines such as the sequential stage-based approach to work-coordination. A major focus is placed on translating knowledge into an encoded form for the purposes of knowledge sharing. In contrast, the knowledge of Japanese engineers tends to be more embodied and encultured, the latter referring to features of the Japanese 'way of doing things', such as multi-functional teams working together using intensive and continuous interaction to share knowledge through all stages of the product development process. Much of this tacit knowledge is considered difficult or impossible to encode in an explicit form. It is not surprising that these different views on the nature of knowledge, and accepted norms in terms of how to carry out work and to share ideas, resulted in difficult work relations between the two cultural groups.

Although Lam did not go into detail on the particular ICTs used to support the British or Japanese groups, it is possible to extrapolate some implications in this area from the above analysis. Computer-based systems such as databases, documents and procedures reflect an approach to work organization and knowledge sharing more closely aligned with the way that the British engineers viewed the world. They can be considered as embodying systems of meaning and encapsulating norms of behaviour that favour this cultural group, and the group used them as a political resource, to complain for example of 'lack of rigour' of the Japanese engineers. In contrast the computer-based document systems were criticised by the Japanese engineers when arguing that much of the valuable tacit knowledge or know-how needed to make a good product could not be captured through reading the documents.

The structural contradiction in this case led directly to conflict, with the attempt at genuine cross-cultural working being abandoned in favour of a compartmentalised approach to later projects. The British and Japanese engineers would have found it very difficult to abandon their own cultural style, since this would have undermined their own position as knowledgeable engineers based on their own tradition. Although the ordinary engineer employees would not have had the power to abandon the joint project themselves, they did have the power to take action in the form of articulation of disquiet on both sides, no doubt having a major effect on senior management resulting in the eventual outcome. Lam (1997)

provided quotes from managers of the two firms which nicely illustrate the later conclusions of both sides on the difficulties of integrated cross-cultural working:

‘As far as possible, we would rather not work too closely together. Our ways of working are very different, problems are bound to occur if we have joint project teams pursuing common activities. Yes, we have joint development projects but the way we do it is to divide up the work into separate parts, each with its own clearly defined objectives. We discuss how the whole project is to be carved up beforehand, and after that, each team is free to pursue its own project in its own way’ (J-firm executive – p991)

‘I think we could gain a lot by actually doing some genuine joint development projects, but I think it’s going to be quite difficult to get to that stage. I think there’s got to be a change in the way B-firm is managed ... And I think it needs a change of culture almost.’ (B-firm manager – p991)

FACILITATING EFFECTIVE CROSS-CULTURAL WORKING WITH ICTs

The cases described above have provided examples of major problems in cross-cultural working with ICTs. They have illustrated the argument made earlier in the paper that the notion that globalization has brought with it cultural homogeneity is simplistic. Indeed, it can be argued that some elements of globalization, such as increased cross-cultural contact, mean that differences between cultures are now more visible and important. In the theoretical language of this paper, structural contradiction between cultures is always present, but is only liable to result in conflict when the cultures interact.

However, neither people nor cultures remain fixed and unchanging. In the paper to date, the emphasis has been on reproduction of social structure to a large extent, whereas it was noted in the earlier theoretical section that human reflexivity and monitoring of the consequences of action, intended and unintended, creates a basis for social change. The focus of this section is

on such change processes, and more specifically on the question as to whether and how it might be possible to facilitate effective cross-cultural working with ICTs.

The three case studies were all relatively unsuccessful in this respect, but they did provide some examples of learning and change. For example, in the Jamaica-India software development project, 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 the Indian head of project, 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. In the Indian GIS case, 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. Indian culture is not static, and structures in the mind do change, for example in ways of conceptualising space. Although the UK-Japan collaboration resulted in the end in team separation, there was certainly an increased awareness of the complex issues of cross-cultural knowledge sharing and collaboration amongst the participants on both sides, and some desire at least to attempt more in-depth collaboration again in the future.

So, what advice can be given to those trying to achieve more effective cross-cultural collaboration involving ICTs? The remainder of this section offers some ideas, derived from the theoretical basis and empirical examples of this paper, and some reference to other literature addressing similar issues. A summary of key points is provided in Table 5.

Taking Culture Seriously

A necessary first condition for trying to facilitate effective cross-cultural working is to take culture seriously. This may seem an obvious remark, but it is worth noting that this was not a common attitude at the start of any of three cases reported on in this paper. A realisation gradually dawned on some of the participants of the importance of the different systems of meaning, cultural norms and appropriate forms of power relations. If such a realisation had been there at the outset, the chances of effective working would surely have been improved.

There are various ways in which cultural understanding can be developed, not least by living in a particular country, and thus being immersed in the culture. However, distance is not simply a matter of space, but also reflects mental attitude. An expatriate manager of a multi-national company, staying in a five-star hotel, may be physically present in a particular country, but may have little access to or interest in local culture. Understanding through immersion requires a starting point of respect for local cultural values, and considerable effort to understand these. A further way to develop cultural understanding is to read extensively about a particular region or country: its history, geography, social and religious beliefs.

Taking culture seriously	<ul style="list-style-type: none"> • Different systems of meaning, norms, power relations • Understanding can be developed by immersion and/or reading, but requires a respect for the cultural values of others • Need for adaptation and compromise in working together, based on an appreciation of the expectations of the other
Adapting technology	<ul style="list-style-type: none"> • ICTs embed cultural assumptions, but retain a degree of interpretive flexibility • Metaphor of cultivation, with ICTs as similar seeds needing to be nurtured in particular local cultural conditions • Structural contradiction is not immutable, and local technology adaptation may be implicated in shifting 'structure in the mind'
Designing the role of ICTs	<ul style="list-style-type: none"> • Cross-cultural interaction may be particularly dependent on the need for face-to-face interaction • Or, at least, a blend of face-to-face with electronic media • Cultural preferences for particular media, linked to different ways of working and interacting, need to be taken seriously by cross-cultural teams

Table 5 Achieving more effective cross-cultural working with ICTs

An understanding of the 'other' is a good starting point, but may still leave structural contradiction in terms of attitudes. It is one thing for a team of British engineers, for example, to gain some understanding of Japanese methods of working, but it is quite another

for them to wish to adopt such methods themselves. This is why adaptation and compromise are necessary, based on an appreciation of the approaches and expectations of the other side. An interesting discussion of this issue is provided by Sahay and Krishna (2000) when describing a case study involving global software outsourcing from a North American multinational, called Global, to an Indian software house, called Shiva. The article discusses how the radically different cultural base of the partners was handled, not always in an amicable way. For example, in the early phases, Shiva resisted the introduction of monthly progress reports, a practice that was routine in Global. More generally, Global attempted to make Shiva conform to a range of their standard practices. Later, Sahay and Krishna argued that the relationship 'showed signs of maturing' based on both sides gaining an increased understanding of the other's problems. The earlier state of 'speaking past each other' had changed and people were listening. The authors concluded that, in the later stages, there was a sense of concreteness to the expectations of the other, even though there may not have been agreement on the appropriateness of the expectations.

Adapting Technology

It has been argued in the paper so far that ICTs embed cultural assumptions, in the sense that they embody systems of meaning, such as ways of conceptualising space, and encapsulate norms, such as the role of explicit data in knowledge sharing. Therefore they provide a resource in political debate and action, and indeed can be viewed as actors aligned to particular interests. However, without wishing to retract from this position, it should be noted that particular technologies can be adapted and used in different ways, and thus retain a degree of 'interpretive flexibility' (Pinch and Bijker 1987; Orlikowski 1992). The challenge in cross-cultural working with ICTs is to try to design and use information technology and related IS in ways which are compatible and helpful to both sides of the relationship. An example of work which attempts to do this is now given.

An ongoing body of work has taken place in the Republic of South Africa concerned with developing district level information systems to support primary health care, and based on a long-term collaborative project between Norway and South Africa (Braa 1997; Braa, Heywood and Shun-King 1997; Braa and Hedberg 2000). The Norwegians started from their own cultural basis of participative design approaches in the workplace, and a Norwegian

context where ICTs are often seen as a potential threat to workers' jobs or job satisfaction. Braa (1997), one of the Norwegian team, argued that these experiences, systems of meaning and norms in the language of this paper, needed significant adaptation for the different cultural context of South Africa:

‘There I have learned that lessons from Scandinavia are indeed important, but they need to be adapted and cultivated in third world contexts. First of all, in the ‘shanty huddles’ of township South Africa, system development, learning and empowerment need to address the community rather than the workplace. Another important difference to the Scandinavian approach is that deprived communities are not threatened by technology, they are threatened by being ignored and sidelined by the technology’. (p2)

The metaphor of cultivation in the quote above is an interesting one. The argument is that particular ICTs may be planted in specific locations, with similar ‘seeds’, but that local growing conditions are infinitely variable. Thus the developing plant needs to be tended and nurtured through people at the local level who have ownership and commitment towards it. This is an approach to technology adaptation which is highly sensitive to cross-cultural issues. Structural contradiction between different cultures is not something immutable, and the work on adapting technology to local cultural conditions reported here has undoubtedly had the effect of shifting the perceptions or ‘structure in the mind’ of people on both sides, the Norwegian team and the South African health workers.

Designing the Role of ICTs

A related issue to that of adaptation of an ‘alien’ technology in a different cultural context is the use of ICTs for cross-cultural communication, as discussed in the UK-Japan engineering case study. We saw there that structural contradiction between the two sides in terms of the appropriate nature of engineering knowledge itself, and norms of knowledge sharing, led directly to conflict and ineffective cross-cultural working. However, in the more globalized world which we now inhabit, global ‘virtual’ teams which attempt to transcend both physical barriers of time and space, and cultural barriers, are becoming increasingly common

(Jarvenpaa and Leidner 1999). What is an appropriate role for ICTs in supporting such teams?

The paper by Sahay and Krishna (2000), cited earlier in this section, addressed this issue indirectly. These authors argued that the need to co-ordinate the Indian-North American team working across space created major tensions, resulting in a strong preference of the software developers for proximity in space. In other words, the structural contradictions in the cross-cultural team were particularly problematic when communication was through electronic media, the implication being that face-to-face interaction made it easier to try to resolve cross-cultural differences, or at least to better understand them.

This solution of face-to-face working is not always feasible, however, for cross-cultural teams. What approaches can be offered to address problems where cross-cultural communication is largely virtual? Some ideas are offered in a paper by Maznevski and Chudoba (2000), who described a substantial longitudinal case study that they had carried out on three 'virtual' teams, with parts of the teams in the USA, Europe and Asia. The paper concluded that team interaction was composed of a series of communication incidents, with effective interaction blending regular face-to-face incidents interspersed with less intensive shorter incidents using various media.

This conclusion was drawn by Maznevski and Chudoba for general team-working across time and space, whereas implications for the cross-cultural aspect were less clearly developed, partly due perhaps to less research access to the non-US respondents. Nevertheless, the authors argued that cultural issues were important, and gave an example of one of their cross-cultural teams having different attitudes to responsibility, requiring members to use telephone or face-to-face meetings to discuss such issues rather than fax or e-mail. They also made an interesting remark concerning cross-cultural sensitivity, or rather lack of it, in one of the teams with an Asian component. Members at the East Asian site preferred a sequence of a faxed agenda for discussion, informal discussions over the phone, then faxed confirmation of decisions made during the discussions. However, the researchers saw no evidence that the non-Asian members tried to accommodate these preferences. An argument of this paper is that such cultural insensitivity, reflecting structural contradiction, is likely to result in conflict and ineffective cross-cultural team-working.

CONCLUSIONS

In the more globalized world of the early twenty-first century, working with information and communication technologies is increasingly taking place in a cross-cultural context. A primary contribution of this paper has been to provide a theoretical basis, drawing from structuration theory, which can be used to analyse cross-cultural working with ICTs. Key elements of the theory include a focus on the duality of structure; the dimensions of meaning, power and norms; and processes of reproduction and change in social structure. These concepts have been drawn on by IS researchers in other contexts, but this paper's theorisation of cross-cultural working with ICTs has also emphasized structural contradiction and the potential for conflict, ideas less commonly referred to in the literature.

Empirical illustrations of the theory were provided by examples from the three areas of cross-cultural software development teams, technology transfer, and knowledge sharing. The variety and range of these examples was chosen to demonstrate the applicability of the theory in seemingly different situations, supporting the argument that the theory could be applied in the future to any situation of cross-cultural working involving ICTs. From an IS research perspective, therefore, the theory developed in this paper offers a starting point for further work in other cross-cultural domains.

Viewed from a more critical perspective, theories such as the one described in this paper are, however, necessarily limited. The general applicability of the theory is bought, to some extent, at the price of lack of specificity. Although the theory illuminates some elements of particular case situations, it is relatively silent on others. For example, in concentrating on culture as shared values, little attention has been given to individual variety within cultural groups. Secondly, although reference was made in the previous section to structural change arising from human reflexivity and adaptation, the processes by which this occurs are not directly addressed by structuration theory. In the Indian GIS paper by Walsham and Sahay (1999), used as one of the case illustrations here, the authors draw on actor-network theory to describe such processes. This leads to the more general point, made by Giddens (1984) himself, that the use of structuration theory does not preclude the use of other theories in

tandem with it. Similarly, this paper is not advocating the abandonment of all other theoretical approaches to cross-cultural working with ICTs. Instead, the theory in this paper can in principle be supplemented with other specific theories, as appropriate to the particular domain of interest.

Moving now to the issue of IS practice, what conclusions can be offered? Firstly, the paper has aimed to counteract the naïve view that globalization facilitated by ICTs is leading to simple homogeneity of culture and approach. The case examples were drawn from work in Jamaica, India, the USA, Japan and the UK, supplemented by some reference to cases from Norway, South Africa and Canada. It is hoped that the enduring variety of culture has been amply illustrated by these examples. Secondly, therefore, the paper has aimed to provide some starting points for the practice of more sensitive cross-cultural working with ICTs. In particular, in the previous section, ideas were put forward on the need to take culture seriously, on adapting technology, and on designing the role of ICTs. Further development of these ideas is, of course, both possible and desirable. The theory developed in this paper offers a basis for such future work.

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