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UNDERSTANDING IT AND SOCIAL TRANSFORMATION: DEVELOPMENT AND ILLUSTRATION OF A CONCEPTUAL SCHEME

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Abstract

It is widely accepted that IT is a key factor in the major social transformations taking place in the late twentieth century, but the nature of this link is the subject of dispute, and remains poorly understood. Better theory is needed to increase our understanding in this area, and in this paper, we offer a contribution. Drawing from the work of the sociologist Anthony Giddens, a conceptual scheme is developed which links the globalizing tendencies of modern society to associated transformations at the level of the individual. IT is deeply implicated in these changes, and the role of IT in social transformation is illustrated in the paper using empirical work on the transforming potential of geographical information systems for forest management in India. We emphasize the importance of the links between IT and social transformation, and conclude with a discussion of the broader applicability and limitations of the conceptual scheme.

1. INTRODUCTION

In the latter part of the twentieth century, advances in information and communication technologies (IT) have enabled the emergence of a global information economy associated with which has been a new zenith of fundamental and rapid societal and organizational transformations (Harasim 1993; Zuboff 1995). These radical changes have triggered much recent discussion, such as the debate as to how networking and other electronic communications are facilitating new organizational forms (Fulk and DeSanctis 1995). This debate has often involved a vision of "virtuality" as evident through recent terminology such as virtual teams (Hammer and Champy 1993), virtual organizations (Davidow and Malone 1992) and virtual communities (Rheingold 1994). Such a vision suggests social configurations whose structures and functions are highly dependent on IT, and which are therefore unconstrained by spatial and temporal boundaries (Mowshowitz 1994).

There has been a call (Rheingold 1994) to gain a deeper understanding as to how human beings and communities are being transformed by information and communication technologies. Recent research on IT and changes in organizational work have suggested the need to examine such transformations at a number of interrelated levels (c.f. Orlikowski, Walsham and Jones 1996): changes in the nature of work and personal security at the individual level, changes in form and structure at the organizational level, and increasing interconnection and globalization at the national and international levels.

Increased levels of globalization facilitated by information technology are interconnected with profound changes in personal identity. We argue that it is necessary to examine how IT-enabled transformations facilitate the reorganization of social relations and structures across time and space at these multiple interconnected levels. As such, the main focus of this paper is the development and illustration of a novel conceptual scheme based on Giddens' (1990, 1991) key theoretical ideas and concepts on the consequences of contemporary modernity.

[1]The authors contributed equally in this research effort.

In the next section, we develop this conceptual scheme after which its applicability is illustrated in section 3 through recent research which examines the transformatting potential of geographical information systems (GIS) for forest management in India. The paper concludes with a discussion as to how the conceptual scheme may further enhance our understanding of IT and social transformation and reflects on the broader applicability and limitations of this conceptual scheme.

2. CONCEPTUAL SCHEME DEVELOPMENT

Giddens (1990, 1991) argues that the transformations taking place in the late twentieth century are more radical and universalized than in earlier periods. While the influence of Giddens' ideas on IS research has been established in recent years (Orlikowski 1992; Walsham and Han 1993; DeSanctis and Poole 1994), it has often been somewhat narrowly focused on his meta-theoretical developments of structuration theory in both IS and the broader management literature (Whittington 1992). His later writings build on, but extend, the core tenets of structuration theory which emphasize the importance of time and space in the structuring of social relations. In particular, he develops his key ideas on the globalizing tendencies of modernity and the associated transformations of self-identity.

2.1 Globalizing Tendencies

The globalizing tendencies, according to Giddens (1990, 1991), derive from three key interrelated sources: the *separation of time and space*; the development of *disembedding mechanisms*; and *institutional reflexivity*.

Giddens emphasizes the central role of time and space in the structuring of social practices. He suggests that in order to understand the globalizing dynamic and social organization one must appreciate how modern practices, including the use of IT, provide the basis for the *separation of time and space* and its recombination. For example, the timetable as a simple information system is not just a temporal chart but a time-space ordering device which facilitates the complex coordination of trains across large tracts of time-space. Furthermore, he argues that the *separation of time and space* is the condition for the "stretching" of social relations. As such, it is necessary to consider both social relations between people present in time and space and between those absent in time and space.

The process of separation of time and space is crucial for, and strongly linked to, the disembedding of social institutions. Social relations become disembedded when they are "lifted out" of local contexts of interaction and rearticulated across indefinite spans of time-space. Such disembedding is viewed as the key to the rapid acceleration in time-space distanciation (involving the "stretching" of social relations) characteristic of late modernity, and which is facilitated by what Giddens terms *disembedding mechanisms.* This contrasts with earlier periods where the vast majority of institutions were *embedded* in the confines of their own locality. Giddens identifies two types of disembedding mechanisms, namely *symbolic token*s and *expert syste*ms, although only the latter is discussed here. Giddens' use of *expert systems* should not be confused as being a technical computer system. Rather, he describes them as "systems of technical accomplishment or professional expertise that organize large areas of the material and social environments in which we live today." Such systems penetrate virtually all aspects of social life.

For example, the development and use of an ATM in a banking system draws on expert knowledge as to how to do banking as well as the design and construction of networked information systems. Such an *expert system* deploys modes of technical knowledge which have validity independent of the clients who make use of them. This involves the disembedding of social relations between the banker and clients and requires new forms of trust in the use of ATMs for banking purposes. Furthermore, the expertise of the personal banker becomes lifted out of traditional contexts, and subsequently incorporated within institutional frameworks.

The separation of time and space, coupled with the disembedding mechanisms, propel social life away from the hold of pre-established rules and practices. This provides the context of *institutional reflexivity*, the third key globalizing influence on the dynamism of modern institutions. In more traditional societies, it was hoped that the claims of reason and progress would offer a sense of certitude and replace the importance of traditional practices. However, in "late" modernity, Giddens argues that there is a context of suspicion and doubt which undermines the certainty of knowledge. As such, institutional reflexivity in

"late" modernity refers to the susceptibility of most areas of social activity to chronic revision in the light of new knowledge. This process of revision of knowledge has become a constitutive element in the organization and transformation of modern institutions.

The above globalizing tendencies can be further illustrated through the example of a modern bank (Cassell 1993). The knowledge of "how to do banking" as an expert system can be codified and reliably applied to an independent number of cases. This permits the "stretching" of bank practices across vast reaches of *time and space* and provides the context by which *institutional reflexivity* of local banking practices may lead to the decision to develop and expand to global branch networks.

2.2 Self-Identity

Giddens (1991) argues that, in late modernity, there is an increasing interconnection between the dynamic globalizing influences at the institutional level and self-identity at the individual level. Modern institutions require new trust systems which extend into the core of the self.

In developing the notion of trust relations and how they may be sustained, Giddens distinguishes between two types. The first type refers to trust relations which are "sustained by or expressed in social connections established in circumstances of co-presence" while the second refers to the development of trust in conditions of absence as a consequence of disembedding mechanisms. For example, e*xpert systems* remove social relations from the immediate context and depend upon *trust* by participants for their successful operation.

These new trust systems have profound implications for personal activities. Attitudes of trust toward persons or disembedding mechanisms are directly connected to the psychological security of individuals and groups. For example, Giddens argues that with new forms of mediated experience, particularly electronic communications, distant happenings increasingly influence both self-identity and the basic organization of social relations. The self may become a "reflexive project" being continuously explored, constructed, and revised as part of a reflexive process. Giddens (1991) does not suggest that these relationships are solely characteristic of modernity in the late twentieth century, but that there is a rapid acceleration of globalizing influences which is having a much more profound effect on self-identity than in earlier times.

We argue in this paper that Giddens' theoretical ideas outlined above are both relevant and useful in deepening our understanding of broader ICT-related transformations. While Giddens makes only cursory remarks concerning electronic communications and organizations, these technologies have an inherent capacity to redefine notions of time-space and social relations, and are key facilitators of disembedding mechanisms and institutional reflexivity. As such, our conceptual scheme for understanding IT and social transformation draws from Giddens' ideas on the consequences of modernity as shown in Figure 1.

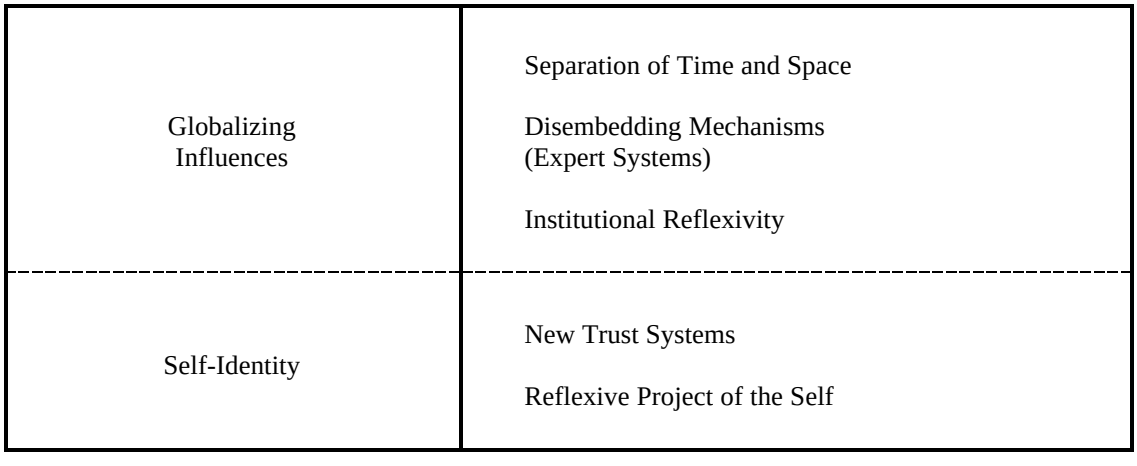

Figure 1. Transformations in Modernity: Globalization and Self-Identity

3. ILLUSTRATING THE CONCEPTUAL SCHEME

In this section, we illustrate some of the conceptual ideas developed above concerning the role of IT-based transformations using a case study in India. The Indian government's recent policies on economic liberalization, and the increasing focus on the use of modern technology, including IT, is providing the impetus for widespread socio-cultural changes. These changes are challenging the traditional mechanisms by which Indian society is structured. Within this broad societal context, we examine some of the IT-related transformations taking place in the domain of natural resources management.

Our empirical work in India has involved a three year longitudinal study of the efforts of various government agencies to apply GIS technology for managing natural resources in the country. These various governmental initiatives involve, first, establishing the technical feasibility of GIS and, second, the development of systems that can be used by forest officials to support their day-to-day management decisions. The research approach adopted involved interviewing a variety of people from key groups including technologists, planners, users, software vendors and politicians who had been involved in the introduction and development of the GIS technology, and those influencing its acceptance, implementation, utilization or rejection in India. A wide range of GIS projects were studied with a total of 150 formal interviews, including a number of repeat interviews with key people at different hierarchical levels over five separate field trips. A typical interview lasted from 1.5 to 2 hours and extensive notes were taken during each interview. Other data sources included system demonstrations, e-mail communications, and archival data in the form of reports and documents. The field data were analyzed and key concepts, themes and issues were identified and developed. As there is not enough space here to provide a detailed account of the case,[2] the approach taken is to discuss some of the key themes developed from the case analysis in illustrating the conceptual scheme developed in section 2.

3.1 Globalizing Tendencies

3.1.1 The Separation of Time and Space

The changing nature of the mode of structuring of social practices through the separation of time and space are visible in the context of forest management, where the government is undertaking IT-based initiatives to improve the utilization of land. Forest management in India has traditionally relied on physical visits by the forest officers to the field sites. Visual inspection of plantations and conversations with the local officials has provided key sources of input for developing annual reports on aspects such as the changes in land use under forest cover. This style of management is representative of India's more traditional society, wherein social relations and work practices are based largely under conditions of co-presence.

However, the application of remote sensing and GIS to obtain and process data on land cover is facilitating the redefinition of these social practices based primarily on face-to-face contact. A significant proportion of the responsibility for natural resources management is being transferred from the local forest officials situated in district offices to the domain of the remote sensing technologists who are based in scientific institutions that are "remote" from the local forest offices, and also represent a "high-tech" culture involving contrasting social practices to the forest departments. These transformations are indicative of the widespread technological and social changes taking place in the country, which imply the need for social relationships between people based more on conditions of absence rather than on presence.

3.1.2 Disembedding Mechanisms

As discussed in the above section, traditional forms of expertise are developed between forest managers and land use experts in localized contexts. Through various initiatives of the Department of Space to apply satellite data for preparing forest maps, changing forms of expertise based around remote sensing and GIS technologies are being utilized in forest management. These

[2]See Sahay and Walsham (1996) for a detailed case description.

new forms of "expert systems" facilitate the disembedding of traditional social practices from the local contexts. The Department of Space and the Forest Administration are adopting these expert systems for routine biennial mapping and monitoring of the forest cover in the country (Forest Survey of India 1989). Thus, new forms of knowledge and expertise are enabling the standardization and codification of forest management practices and their appropriation across national boundaries.

However, the incorporation of these expert systems within the Indian forest institutions is problematic because of tensions arising from conflicts with traditional practices. For example, there is a slow adoption of the use of maps by foresters which is symbolic of a society which has not embraced a map based culture. To travel in India, one normally relies on route information provided by local people rather than on maps. The use of maps in district administration is limited, and the collector (head of the district), for example, while planning forest plantation activities, will typically rely more on his or her local knowledge of the area, rather than on looking at a land-use map. The potential use of GIS-generated maps for forest management in India requires a new form of working culture wherein people think in terms of maps, and are capable of translating their administrative problems in spatial terms which can be addressed by GIS technology. This situation is accentuated especially in rural areas where traditional values give primacy in people's thinking to the role of place (Nakamura 1964) which contrasts with the assumptions of objective space embodied in maps.

3.1.3 Institutional Reflexivity

The ongoing restructuring of social practices coupled with the disembedding mechanisms associated with technological and social change taking place in India provide the context within which heightened institutional reflexivity is taking place. Organizations are being forced to re-examine their work practices based on the information which is being made available through the use of technology. A temporal analysis of change in forest cover using satellite data revealed that the core forests of the country have dwindled from about 14% of the total area in 1972 to 11% in 1982. Unni (1990) reports that the visibility of this information had two major impacts. First, it gave a big boost to the awareness and potential of remote sensing techniques which led to its application in a variety of other problematic situations. Second, it helped to create a better defined picture of the deforestation problem in the country. This focused the attention of all those concerned with resources management on the significance of the forests to the environment and to human habitability.

A further remote sensing project in India revealed that nearly 25% of the country's land was "wastelands" (degraded land). Visibility of this degraded land in the form of maps provided the impetus to the government to be reflexive about their current land management practices and to subsequently develop appropriate new land schemes and policies. One such initiative involved a high level ministerial decision to actively use GIS and remote sensing technology to aid wasteland reclamation efforts (Sahay and Walsham 1996). The initiation of various national GIS initiatives through government departments are contributing to a variety of socio-technical consequences. For example, the awareness generated through these GIS projects is enabling the government to rethink sustainable development and natural resources management practices and then to reflexively introduce new practices. These include the setting up of a national information center to support national bio-diversity management. GIS projects are also enabling the coming together of different groups of people who are involved in natural resources management. For example, the National Geomatics Council, which was established in 1994, includes scientists, researchers, government administrators, vendors and aid agencies. The council seeks to create awareness about the notion of "geomatics," and to highlight its significance in the context of national environmental policy.

3.2 Individual Transformations

The three globalizing tendencies discussed above are deeply interconnected with transformations at the individual level. In the Indian case, these processes of globalization provide the impetus for new forms of trust systems. For example, increasing

dependencies of the Indian forest department on international agencies like the World Bank and USAID for financial aid often result in the entry of foreign consultants and modern management practices into the local domain. The Indian bureaucracy, which has traditionally been quite suspicious of foreign-based agencies (Saha 1990), is often forced to take on board these external influences to ensure the inflow of aid.

3.2.1 New Trust Systems

This shifting focus to the application of scientific knowledge for addressing issues that include global dimensions is leading to the creation of trust systems that are different from those in the recent past. For example, for these applications to be effective, trust systems will need to be built around a belief in computer-supported information rather than on promises originating from political institutions. Believing the deforestation figures generated by satellites requires a leap of faith which derives from a trust in the "scientific method" based on modern technology. Under this scenario, the role of the scientist and scientific knowledge will become more significant in comparison to the bureaucrat and his or her understanding of administration. Actors included in new communities, such as the National Geomatics Council described above, will need to communicate using a common language based on professional expertise rather than on local trust systems based on political favors.

3.2.2 Reflexive Project of the Self

The changing nature of the technical and social environments in government administration puts pressure on individual officers to be reflexive about their individual roles and to take steps to deal with the uncertainty that it brings about. The changing requirements of expertise for forest management, and the increased visibility of actions, puts pressure on the Indian Forest Service officers to adopt a more technical rather than administrative stance. The increasing emphasis of governmental planning systems on natural resources management puts pressure on a district collector to rely more on the technical group providing GIS support in making everyday operational decisions. The reduced role of local forest officers in providing forest management expertise creates a sense of anxiety about what to expect in their future work. This has led to the officers' resistance to the development and use of GIS since these new forms of work relations built around this use of IT are in conflict with traditional forms of hierarchy and control.

The increasing emphasis on technical knowledge of GIS, and remote sensing, contributes to the development of more technologically literate district collectors. Exposure to training and new forms of technology also provide individuals with opportunities to chart alternative career courses. For example, the exposure to GIS which a senior official received on a project helped him to relocate from the government to a prestigious international non-governmental organization. Exposure to a variety of international contexts, for example while undergoing GIS training, can also contribute to shape different ways of thinking about space and social interactions. For example, a government official remarked that the exposure to maps which one obtains while traveling may help to provide the impetus to initiate a map-based culture in Indian society.

In summary, the changes taking place in Indian society are interesting examples of transformations in the late twentieth century and the tensions they create. On the one hand, we have a society with a strong sense of culture and history, with deeply rooted values and belief systems. The traditions of the family, community, rural life, and governmental bureaucracy are developed largely around social practices that require face-to-face interactions. These deeply rooted structures provide a sense of inertia and counter-balance which makes large scale social change highly problematic. On the other hand, India is subject to the processes of globalization characterized by the forces of big corporations, the focus on consumerism, the power of the electronic media and other IT, and the changing nature of knowledge, which are challenging the very roots of traditional society. Such contradictions and tensions are reflected in the transformations taking place in the context of Indian forest management. At the level of globalizing tendencies, traditional management practices are no longer based entirely on face-to-face contact between officials from various hierarchical levels. Instead, IT facilitates the standardization and codification of forest mapping methods which contributes to the disembedding of social practices from their local context. As a result, the forest officers are under pressure to manage forests based on "scientific" methods which require new forms of trust systems. The associated change in roles may involve significant anxiety for some officials, while others may reflexively examine new opportunities.

4. DISCUSSION AND CONCLUSIONS

Giddens' theoretical developments, which underpin the conceptual scheme in this paper, reflect aspects of the "post-modern" debate on the nature of contemporary society, but he suggests that the extent of radicalness commonly associated with post-modern writings may not be appropriate. He argues that the discontinuous nature of modernity does not represent so much a radical shift but rather an intensification of the interconnections between globalizing tendencies on the one hand and individual transformations on the other. Giddens provides a conceptual scheme for analyzing these interconnections, but his theoretical developments are limited in their value for IS research by the lack of explicit consideration of the development and use of IT in late modernity. IT is an integral part of current globalizing influences, and we argue that, by giving these technologies a more central analytical role, Giddens' theoretical developments can be further enriched (Barrett 1996).

The conceptual scheme, while exploratory in nature, seeks to further our understanding of IT and associated processes of social transformation through an examination of globalizing tendencies at a macro-level and self-identity at the micro-level. In so doing, it seeks to contribute to the literature on IT and social change which is currently characterized by mixed and contradictory findings (Barley 1986; Markus and Robey 1988; Orlikowski and Gash 1994), highlighting the need for novel approaches. As such, we argue that the scheme provides a rich set of analytical concepts to understand IT and social transformation which build on earlier approaches such as cultural analysis (Robey and Azevedo 1994) and contextualism (Pettigrew 1990).

While earlier approaches have emphasized the importance of the social context of implementation and the subjective meanings ascribed to IT (Robey and Sahay 1996), the principles underlying the conceptual scheme seek to fruitfully analyze multiple level interconnections by emphasizing the role of time and space in the structuring of social relations at the macro-level and concepts of trust and identity at the micro-level. These concepts have not been previously examined in an integrated manner. Our conceptual scheme also offers potential to aid learning by sensitizing IS professionals to global issues and their impact at the individual, group, and organizational levels. For example, the difficulties India has experienced in making the transition to a more map-based culture is indicative of the challenges of GIS development and associated social change.

While the case study of the use of IT for Indian forestry management illustrated the value of learning that the conceptual scheme can provide, it also suggests some areas where the scheme can be further developed, modified, or extended. Two main points are discussed here. First, the case suggests that, while expertise is indeed disembedded, the subsequent incorporation within institutional frameworks may frequently be problematic as might be expected with any major change process. Linked with this observation is the conclusion from the case that changes in expertise may often be associated with changes in roles and power relations as to who is the expert; such power relations require further investigation and incorporation in a future elaboration of the conceptual scheme.

Another limitation of the scheme in its current form concerns its scope, which could be extended in at least two directions. First, the current representation could be enhanced to account for other levels of analysis such as the group or individual organization. Second, due to space limitations, the conceptual scheme in its present form does not include other key concepts such as the nature of changing risk environments associated with these new forms of trust. Furthermore, the conceptual scheme could be enhanced to include *symbolic tokens* as a disembedding mechanism, and this may provide further analytical power to understand IT and social transformation in other contexts. Giddens describes symbolic tokens as media of exchange which have standard value, and which are thus interchangeable across a plurality of contexts. One example of a symbolic token, EDI networks and standards, can facilitate the flow of standard transactions across global financial markets.

Our study of GIS use in Indian forest management has highlighted the fact that IT enabled change in more traditional societies such as India may be extremely problematic because of the tensions created between the introduction of new technology and existing traditions. Social practices in traditional societies often involve a lot of face to face interaction and interpersonal relationships and these may be in tension with the assumptions of rationality and coordination inscribed in new technologies such as GIS. While we chose to illustrate the scheme in this paper using the case study in India, the authors have carried out detailed empirical work in other sectors such as banking, insurance and manufacturing, and in other economies including the USA, UK, Malaysia and Jamaica. In all of these sectors and national economies, we found similar links between the influence of broad global trends at the societal level and the changing nature of work and work-identity at the individual level. We would

like to argue that our conceptual scheme is relevant to IT and social transformation more generally, although specific modifications would be needed to tailor the scheme to particular types of work, sectors, or national economies.

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