

Organizational change and networked learning: A structural model

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Abstract

What structure and processes are needed to allow a university to exist and prosper in an age of globalization and rapid changes in the information technology underlying networked learning?

This paper presents a model based on the structural theory of information technology (Orlikowski and Robey, 1991). This model posits four relationships: (1) information technology is a product of human action; (2) information technology is an influence on human action; (3) organizational properties are an influence on human interactions with information technology; and, (4) information technology is an influence on the organization. The model is extended to include the market, technical and societal influences from the external environment that affect an organization.

As an example of a university in Australia that is responding to the challenge of networked learning on a national and international basis, we examine Central Queensland University (CQU). It has been a distance education and on-campus education provider since 1974 and is now Australia's fastest growing university. Inherent in all CQU's operations is a model in which the organization, its members and its partners are all constituents of a network of learning facilitators.

Key terms— online, e-business, change, process, higher education

Introduction

As the world moves online, pressure increases on industries and organizations to change the way they do business. According to Turban, McLean and Wetherbe, (1999), pressures acting on industries and organizations result from: the market, technology, and society. *Market pressures* include global competition and consumers who are becoming more demanding; *technological pressures* include the use of e-commerce to lower the costs of production and transaction costs; and *societal pressures* include government regulations and economic conditions.

The higher education industry and universities are subject to the same pressures as other industries and organizations in the online world. For example, in Australia, university enrolment of foreign students is the country's seventh largest export earner. Because of the internet, Australian universities must now *compete* with universities offering online courses from outside the country. So universities must change the way they do business.

Those institutions that can step up to this process of change will thrive. Those that bury their heads in the sand, that rigidly defend the status quo - or even worse - some idyllic vision of a past that never existed, are at very great risk. The real question is not whether higher education will be transformed but rather how and by whom?

Duderstadt, 1999, p.1

Implications of the online world for structure and process in industries and organizations

In considering the implications of the online world for industry we need to consider both *structure* and *process*, where process includes *change processes* (Gregor and Johnston, 2000; Johnston and Gregor, 2000). For example, one defining characteristic of an industry structure is the degree to which vertical integration has occurred. Vertical integration and alliances are formed by negotiation over periods of time. The result is a structure that becomes formalized to some extent.

In the literature the idea that process (activity) and structure are reciprocal has been advanced by writers such as Giddens (1984). In Giddens view, structure is the "rules and resources recursively implicated in social reproduction; institutionalized features of social systems have structural properties in the sense that relationships are stabilized across time and space" (p. xxx1). Rose (1999) states that "Agents in their actions constantly produce and reproduce and develop the social structures which both constrain and enable them" (p. 643).

This link between process and structure is important also at the organizational level. In order to develop technology and systems to survive in the online world an organization must engage in certain processes, such as business process re-engineering. These processes are of great importance – many information systems fail and we have what is termed the *productivity paradox* (Brynjolfsson and Hitt, 1998). This paradox refers to the fact that investment in information technology appears to be unrelated to increased outputs or wages at a national level. One explanation of the productivity paradox is that some organizations do not pay sufficient attention to processes within their organization when introducing new technology. If organizational change is not implemented well, and work processes not redesigned, the new systems do not lead to gains in productivity.

Thus, we need to consider change and processes of change as well as structure. We have a particular view of organizational change. This view is that change is "emergent". Change is not solely "technology led" or solely "organizational/agency driven". Change arises from a complex interaction between technology and the people in an industry or organization (Markus and Robey, 1988).

The conceptual model developed here is based on the structural theory of information technology (Orlikowski and Robey, 1991). This model posits four relationships: (1) information technology is a product of human action; (2) information technology is an influence on human action; (3) organizational properties are an influence on human interactions with information technology; and, (4) information technology is an influence on the

organization. The model is extended to include the market, technological and societal influences from the external environment that affect an organization.

So what are the implications of the online world for industry structure and process? Barriers to participating in electronic transactions are decreasing. Rather than having networks only link existing trading partners in a tightly coupled environment, new electronic markets could conceivably include larger numbers of buyers and sellers (Malone, Yates & Benjamin, 1987). On the other hand there is evidence for hierarchical arrangements supported by electronic networks, with firms in many industries reducing the number of their suppliers, and entering into contractual arrangements for the supply of goods. These arrangements constitute supply chain management. The arguments from economic theory for the changes in market structures are complex. Holland and Lockett (1994) propose an "anything-goes" or mixed-mode hypothesis where firms develop different forms of market and hierarchical relationships that are maintained simultaneously. The interrelationships and interdependencies of governance structure, asset specificity, market complexity and coordination strategy will determine interorganizational arrangements (Klein, 1998).

A value chain consists of the movement of components through various stages of production and distribution as they are transformed into final products. A firm can decide to produce each of the goods and services needed along the value chain in-house or to out-source it. There is a view that greater use of interorganizational networks will lead to vertical disintegration and greater out-sourcing. However, evidence to support this view is still being collected (Steinfeld, Kraut & Chan, 1998). Some expect disintermediation to occur, where intermediaries are removed because of the ease with which they can be bypassed on electronic platforms. Others expect to see different forms of intermediaries and cybermediation.

It appears that maximum benefit is obtained from e-business when it is integrated with other applications in the organization. This integration can require re-engineering of the way in which the organization does business. E-business reduces the costs of handling paper-based information, e.g., the cost to the U.S. Federal government of a paper cheque was 43 cents compared to 2 cents for an electronic payment (Turban, McLean & Wetherbe, 1999). Small companies can use the Internet for marketing and compete against firms globally at comparatively little expense. Employees can work from home or from different parts of the globe. Teams can be linked with electronic communication.

To summarise, the implications of the online world for industry include: market transformations, the need for alliances, changes in outsourcing behaviour, and changes in the role and type of intermediaries. In addition, the need for re-engineering and the manner in which organizational change is approached must be considered carefully.

What structure and processes are needed to allow a university to exist and prosper in the online world?

Changing universities

Universities and the higher educational sector face similar challenges to other industries in the online world.

Universities are due for a radical restructuring. After centuries of evolutionary changes, they are faced with carving out new roles and methods to get there. Today the predominant model is still the combination of traditional teaching and academic research as mapped out by Wilhelm von Humboldt in the last century. The guiding

principles of Humboldt's vision of the university are forschung und lehre (research and teaching) and of professors, einsamkeit und freiheit (solitude and freedom). But change is unavoidable and pressure for change is increasing from the public, the media, and political groups. This change is mainly driven by the new technological possibilities and the new learning environments they enable.

(Tsichritzis, 1999, p.93)

Specific implications for universities can be drawn from the conceptual model based on the structurational theory of information technology (Orlikowski and Robey, 1991):

- Organizational change arises from a complex interaction between technology and the people in the organization. For example, information technology makes possible new learning environments and changed work practices for university staff.
- Information technology can influence changes in organizational structure. The improved communication options offered by advances in information technology support the formation of alliances and the "unbundling" of the functions of the university (content, packaging and presentation). This vertical disintegration, in which functions are differentiated and either outsourced or dealt with by partners in strategic alliances, creates new intermediaries in the learning/teaching network.

There is evidence of organizational change arising from the interaction of technology and people in some universities. For example, in the United States of America, institutions of higher education are collaborating to create technology-based consortia, referred to as "virtual universities". In Australia, online and videoconferencing systems are being developed as alternatives to face-to-face communication where the people are physically dispersed. These methodologies require both staff and students to change existing practice and to acquire new literacies (Wallace and Yell, 1997).

The new technological possibilities (and new learning environments which arise from the interaction between technology and the people) include: the internet (facilitating synchronous and asynchronous interactions between learners); video-conferencing (facilitating tutorials comprising distributed groups of students, and also remote access to live lectures); digital libraries (as knowledge repositories); computer simulation (substitutes for laboratories); etc. Overall, the interaction of these new technologies with the people creates a learning environment in which learners, tutors and learning resources can all be networked.

But these same technological possibilities also permit new working environments for those charged with the facilitation of learning. Thus lecturers can use the internet for synchronous and asynchronous communication with colleagues, video-conferencing for meetings, digital libraries for research, etc. The interaction of these new technologies with the people creates a teaching environment in which lecturers, tutors and teaching resources can all be networked.

There is also evidence of changes in organizational structure which have been influenced by information technology. Traditionally, universities have carried out all the functions relating to the provision of higher education: content production; packaging content; credentialing programs; presentation to students; marketing; registration, payment and record keeping; and, assessment. In the online world, these functions can more readily be "disintegrated" and the university can specialise in those functions which it regards as its "core business", forming alliances for other functions or outsourcing to new intermediaries in the value-added chain. As the various functions of the higher education process are differentiated, so too the nature of work and the workforce change (Coaldrake & Stedman, 1999).

The function of content production is perhaps the one seen as most likely to remain with universities. But there are those who even suggest the need for outsourcing and alliances for the performance of this function. Gibbons (1998, p.61) predicts that universities “will learn to make use of intellectual resources that they don’t own fully. This is the only way that they will be able to interact effectively with the distributed knowledge production system”. For example, Unext is an internet-based distance learning ‘university’ which utilises content developed by the London School of Economics, Chicago, Colombia, Stanford and Carnegie Mellon Universities, and delivers MBAs to the corporate sector.

Gibbons (1998, p.61) suggests that we should see a university as “a sort of ‘holding institution’ in the field of knowledge production, perhaps limited to accrediting teaching done primarily by others while in research doing their part by forming problem-solving teams that work on fundamental issues”. This view sees the core business of the university as participating in *knowledge production* and *credentialing* the teaching programs of others.

Case study of one university in Australia

Central Queensland University (CQU) is one regional university in Australia that is responding to the challenge of the online world. CQU has 15,000 students and is now Australia’s fastest growing university in terms of international students.

In Central Queensland, CQU’s traditional catchment area, there are campuses at Rockhampton, Mackay, Gladstone, Emerald and Bundaberg. A key component of this integrated network of campuses is the Interactive System-Wide Learning (ISL) system – a synchronous video link which facilitates networked learning. Thus, on these campuses, classes are taught using combinations of synchronous video delivery of live lectures, videoconferencing to connect distributed groups of learners, web-delivery, synchronous and asynchronous computer mediated discussions, and face-to-face classes.

CQU has been a distance education provider since 1974. Distance education students are serviced with a combination of printed, CD-ROM and web-delivered material, as well as electronic asynchronous communication for class discussion and mailing lists.

CQU formed an alliance with a commercial partner, Campus Management Services, to establish campuses at Sydney in 1994, Melbourne in 1996 and more recently in Brisbane. At these campuses the students are mostly of international origin. In addition, there are campuses operating in Singapore, Hong Kong and Fiji. At all these campuses, the CQU programs are tutored by locally appointed academic staff, with an emphasis on teaching rather than research. The mode of delivery is face-to-face tutorials and lectures, but utilising the resource materials produced by the staff in Central Queensland.

Inherent in the CQU partnership with Campus Management Services is a model in which the function of content production has been detached from other functions (e.g., lecturing) traditionally carried out by the university. This vertical disintegration, in which functions are differentiated and either outsourced or dealt with by partners in strategic alliances, creates new intermediaries in the value chain.

For both on-campus and distance education modes, CQU has moved to a networked learning paradigm, using communication and information technologies to link learners, tutors and other learning resources. But it has also moved to a networked teaching paradigm in which lecturers, tutors and teaching resources are all linked. Thus, a lecturer on one Central Queensland

campus is designated as the coordinator of a particular unit (course), and that person then coordinates the collection of the resources, the creation of the materials, and the activities of the learning facilitators/tutors on all the other campuses on which that particular unit (course) is taught.

To facilitate the management of this complex operation and to increase its competitiveness in the online world, CQU is engaged in a large re-engineering project. This project, named "Project Renaissance", will install PeopleSoft systems for finance, student administration and human resources over a period of three years and involves a project team of 80 staff. The project is not just about software but about the way CQU does business - processes and procedures are being re-examined to facilitate networked education, streamline the organization and allow it to compete more effectively.

Concluding remarks

We have identified forces leading to change in industries in the online world including increasing global competition, increasingly powerful consumers and rapid changes in technology, especially those related to telecommunications. Implications for industry include market transformations, the need for alliances, changes in outsourcing behaviour, the need for re-engineering, and changes in the role and type of intermediaries.

In the higher education industry, pressures for change include global competition and technology facilitated learning. Outcomes are evolving, but include the formation of alliances, outsourcing and re-engineering of systems and work practices. In particular, the communication and information technologies which facilitate networked learning, also link lecturers, tutors, and teaching resources to create the possibility of networked education.

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