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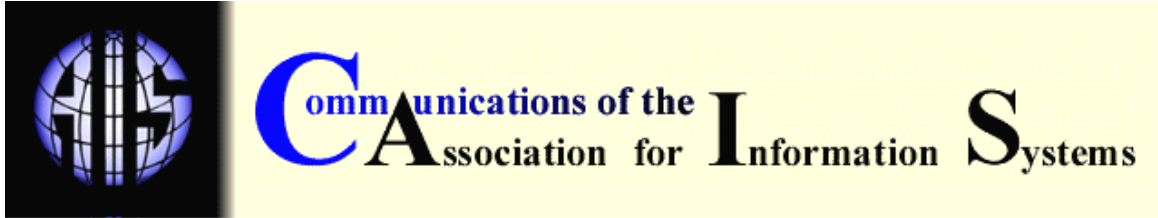
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THE VIRTUAL ORGANIZATION: EVIDENCE OF ACADEMIC STRUCTURATION IN BUSINESS PROGRAMS AND IMPLICATIONS FOR INFORMATION SCIENCE

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ABSTRACT

Virtual forms of organization, including outsourcing, are expected to bring broad, structural transformations to American business. Yet, little is known about the formal response of U.S. Business Schools to the boundary-spanning challenges that virtual organization presents. In this study, key elements of Adaptive Structuration Theory (AST) are utilized as a means to investigate the effects of virtual organization on academic disciplines. Results of a survey of 471 Business School faculty members, including 63 Information Systems faculty, on the role of virtual organization in academic curricula are analyzed in the terms defined by the AST framework. Results indicate significant variation by discipline, concept area, and appropriation of the concepts related to virtual organization. Implications for Information Science include the need for establishing academic leadership as well as attending to perceived limitations in virtual organization tools and technologies. In addition, the results have implications for the ongoing dialogue on the role of Information Science and related academic disciplines.

Keywords: virtual organization, adaptive structuration, IS curriculum

As virtual organization takes hold, life as we know it will be utterly changed.

- A. Mowshowitz [Mowshowitz, 2002]

I generally view discussion of virtual organizations and virtual teams to be a complete waste of time.

- A business school faculty member (2003)

I. INTRODUCTION

Outsourcing and related forms of technology-facilitated organization are a growing and irreversible trend [Davis et al., 2005]. The boundary-spanning impact of these new forms of organization has aroused intense attention from both the popular press and academic researchers. Many analysts predict profound and far-reaching effects from changes in The Virtual Organization: Evidence of Academic Structuration in Business Programs and Implications for Information Science by R.J. Burkhard and T.A. Horan

organizational structures that will result from virtual forms. An extreme case of such organizational redistribution is seen in General Motors, a firm that now employs 1,700 staffers to manage information technology outsourcing [Batelle, 2004]. While many argue that the effects of outsourcing are detrimental to U.S. employment, recent analyses showing benefits of outsourcing may only further stimulate efforts to distribute tasks on a global basis [Mann, 2004].

Indeed, outsourcing, as well as the related practices of remote work and global alliances, can be seen as special cases of the broader change in organizational form known as *virtual organization* (VO). Outsourcing is a highly visible indicator of deep, pervasive structural changes in organizations that hold in common the technology-facilitated, increasingly virtual nature of their organizational relationships [Brown, 2004]. Many analysts [e.g., [Malone, 2004] state that it is only a matter of time until new digital information and communication technologies, coupled with ample end-to-end digital bandwidth and groupwork software applications, yield dramatic increases in anywhere, anytime organizational telepresence. Traditional organizational and geographical boundaries are being overcome by increasingly competent information technologies that facilitate global sourcing of skills and services, bringing entirely new categories of strategic and tactical challenges. The resulting systemic restructuring of organizations may require a true paradigm shift on the part of academic researchers and practitioners in Management and Information Systems disciplines.

Virtual forms of organization have grown significantly in practice since their theoretical inception in the 1970s. The increased availability of information and communication technologies is widely acknowledged as a fundamental driver of this trend [Mowshowitz, 2002; Townsend et al., 2002]. Awareness of these trends is reflected in a survey of academic leaders that identifies “changes in how business organizations function” and “conducting business activity anytime, anywhere” as top drivers of change in business schools [AACSB, 2002]. It is clear that business school curricula, especially Information Systems programs, have the potential to play a strong role in shaping and guiding the formation and use of the virtual organizational form in the future.

What is not clear is the extent to which business schools -- including the Information Systems discipline -- have appropriated the concepts, activities, and tools of virtual organization. Within the Information Systems field there has been writing on the general need for the field to develop an adaptive capacity. For example, Robey (2003) and Lyytinen and King (2004) stress the need for IS to be adaptive or “plastic” in adjusting to emerging needs and pressures of IS audiences. Such plasticity is needed because both the theory base and practical strategies for handling virtual organization are in their infancy.

Despite these general advocations, there is a danger that the emergent phenomena of virtual organization will be met with an academic response that lags in theoretical definition, lags in leadership of managerial practice, and lags in development, testing, and implementation of tools and technologies. There is no doubt that one form of virtual organizing—outsourcing—is affecting demand for and perceptions of information systems and global management. The burden is now on academic institutions to address this trend with considered theories, concepts and methods that respond to the growing focus on the need to link theory to practice [Bennis and O'Toole, 2005].

One impediment to the development of a strong academic role in virtual organization may be the adequacy, availability and knowledge of the information technologies required for management of virtual organizational entities. Lee (2001) and others have pointed to the urgent need for Information Systems literacy in business school curricula, and that such treatment should extend beyond the technological and social topics to “acquiring the imagination to visualize how the technological and the social inevitably transform each other and, more importantly, we can deliberately enact them in ways so that they support and benefit, rather than undermine, each other [Lee, 2001].” The technologies and managerial challenges of virtual organization present such an opportunity.

Accordingly, this research begins from the premise that the pressing and competitive nature of emergent virtual restructuring of organizations calls for a diligent and leading role for academic institutions. If it is currently the case that business schools are taking a lead role in responding to this challenge, then leading programs warrant examination and support. On the other hand, if examination of such programs reveals a modest, inconsistent or lagging treatment of these key issues, then strategic modifications of research direction and instructional content may be justified.

The objectives of this article are threefold. The first is the assessment of the degree of engagement between U.S. business school programs and the concepts, issues and technologies of outsourcing and other forms of virtual organization. The second is the interpretation of this engagement in terms defined by Adaptive Structuration Theory (AST), an approach that helps us understand the interactions between the technology-enabled processes of virtual organization and academia's adaptations to these processes. Finally, we examine the broader implications of these results for the future of the IS discipline.

In keeping with these objectives, we address the following questions in this article:

- How are the concepts, theories, issues and technologies of virtual organization adopted, developed and reflected in Business, and particularly Information Systems, curricula?
- What insights are gained from applying Adaptive Structuration Theory as a framework for defining and understanding the role of virtual organization in academia?
- What are the implications for the identity of Information Science?

The following sections present the results of our research into these issues. The article begins with a conceptual discussion, first of the dimensions of virtual organization and then on the application of Adaptive Structuration Theory to these dimensions. The following section (IV) summarizes results of a national survey in terms of academic appropriation of virtual organization concepts, methods and tools in terms of the relevant AST constructs. The final section discusses the implications of the survey findings for business schools generally and Information System programs specifically.

II. DIMENSIONS OF VIRTUAL ORGANIZATION

We begin with a brief review of key issues, processes and technologies in order to familiarize the reader with the substance of the VO domain that contributes to the structuration process. There are exhaustive treatments of VO types, tasks, dynamics, and technology elsewhere (e.g. Mowshowitz, 2002) and the intent here is not to replicate this literature; rather our interest is in understanding how these issues have been appropriated by academics in their teaching of business and information systems.

TYPES OF VIRTUAL ORGANIZATION

A virtual organization "uses information technology networks to link people, assets and ideas to create and distribute products and services without the constraint of traditional organizational boundaries or physical locations [Laudon and Laudon, 2004]." As noted in the introduction, one form of virtual organization—outsourcing—has received much attention lately. This strategy seeks "outside" sources of skills, service capabilities and other factors needed to produce the products or services of the organization [Mowshowitz, 2002; Tagg, 2001]. There are many factors driving the outsourcing trend. Although the limited availability of needed skill sets such as software development may compel organizations to seek outsourced resources, salary expense reduction remains the dominant reason for offshore development activities [Gopal et al., 2002]. Outsourcing is expected to continue to be a leading way to exchange core competencies, critical knowledge and techniques, and services of many types.

Variants of outsourcing arrangements can be described as extended intra- or inter-organizational alliances [Saunders, 2000]. These include offshore development centers or global development centers that may or may not be owned by the outsourcing organization [Chandrasekaran and Ensing, 2004]. The managerial level of outsourcing relationships varies, but some suggest that outsourcing relationships are best managed as strategic partnerships [Kishore et al., 2003]. Key drivers in the outsourcing phenomenon are information technology advancements and the increasing availability of a variety of global outsourcing alternatives [King, 2005]

The second major type of virtual organization is the related intra-firm variant known as the flexible work relationship, sometimes described as tele-work [Wagner, 2003]. The promise of the tele-working organization has been the focus of study for decades [Lopez and Gray, 1977; Nilles et al., 1976], and recent Internet-based improvements in information and communication technologies are beginning to offer workers freedom from the requirements of physical co-location [Gray and Markus, 1996]. Like outsourcing, tele-work is characterized by geographic dispersion, but possibly at more modest distances.

The general relationship between virtual organization, outsourcing, and remote work is illustrated in the following diagram.

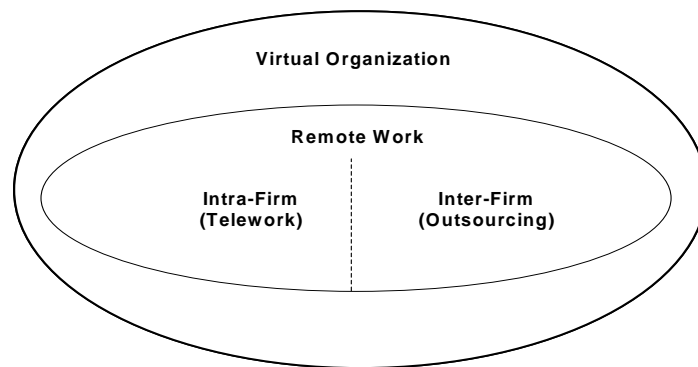


Figure 1: A Venn diagram of Virtual Forms of Organization

Whether inter-firm or intra-firm, virtual organization has several defining characteristics. One key characteristic of the virtual organization is its dispersion. Organizational dispersion, as in the trans-firm linkages typical of outsourcing, and geographic dispersion, is seen in both outsourcing and intra-firm remote work arrangements. Another key characteristic of virtual organizations is the increased ability to reconfigure group roles, responsibilities and relationships made possible by information technologies [DeSanctis and Monge, 1999]. A third critical aspect of virtual organizations is their utter dependence on information technologies. Co-workers in virtual organizations interact using a combination of telecommunications and information technologies to accomplish organizational tasks (Townsend et al., 1998). The technologies of virtual organization continue to increase in power, sophistication and widespread use. These conditions result in virtual organizations and virtual teams that are composed of members who seldom, if ever, meet face-to-face, yet who are able to work together in a technology-mediated way on cross-functional activities and projects of many kinds [Lipnack and Stamps, 2000; Majchrzak et al., 2000].

TASKS OF VIRTUAL ORGANIZATION

Virtual organizations exist to perform business tasks. Prior research has identified a number of key tasks that are characteristic of the virtual form of organization. Many of these tasks may be included under the broad heading of value chain management [Tagg, 2001]. It is not surprising

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that information technologies have proven to strengthen the relationships between geographically-dispersed supply chain participants [Subramani, 2004]. Technology-assisted supply chain management can include such tasks as digital exchange of quotations, negotiation of pricing and terms, purchase order execution, shipment tracking and notification, creation of delivery windows, payment settlement notification, inventory alerts and various forms of predictive data analysis that serve the supply chain members. This list suggests that joint document preparation is a major task category of virtual value chain management.

The second major category of virtual task is joint product and knowledge development [Lipnack and Stamps, 2000]. While often taking the form of outsourcing, joint product and knowledge development, such as that accomplished by virtually-organized software teams, is a rapidly growing trend [Lichtenstein, 2004; Markus et al., 2000]. This phenomenon has led to dedicated offshore development centers and global development centers [Chandrasekaran and Ensing, 2004]. Such activities emphasize the need for formal methods for handling virtual committee work, as well as for work-passing practices.

DYNAMICS OF VIRTUAL ORGANIZATION

While business tasks are fundamental elements of VO, research has identified a number of important dynamics that are associated with the function of virtual organization. These issues include trust in virtual groups, risks associated with virtual teams, and technology-mediated procedures and protocols of virtual work.

At least three classes of interpersonal trust have been identified that individually and collectively enhance or inhibit virtual collaboration [Paul and McDaniel, 2004]. Complex virtual relationships cannot prosper without trust, and this may be particularly true of outsourced Information Systems projects [Paul and McDaniel, 2004; Sabherwal, 1999]. Some have suggested that managers be specifically assigned to foster trust and communication among virtual team members [Grabowski and Roberts, 1999]. Issues of trust may be exacerbated by fear of using technology, especially fear of using technology to communicate. For example, many studies have shown anxiety to be a strong factor that influences the perceived self-evaluation component of computer-mediated communication [Brown et al., 2004].

Closely related to trust are the issues of risk within virtual groups. A number of known risks are currently seen or expected in virtual organizations. One category of risk arises from the uncertain motives of remote workers; that is, the vendor of outsourced services may simply be uncommitted to the objectives of the outsourcer. For example, some research has shown decreased incentive for performance of such vendors [Lichtenstein, 2004]. Rational self-interest in the form of a cost-benefit analysis approach to commitment may limit commitment by remote members of virtual teams [Paul and McDaniel, 2004]. Opportunistic behavior by such contractors is a constant threat [Krishna et al., 2004].

The emergence of new kinds of virtual work processes presents another category of issues for virtual organizations. For example, organizations increasingly find that entire business processes, such as financial transaction settlement, can be virtually organized [Sunder and Tas, 2004]. Similar outsourcing of entire processes is seen in manufacturing, customer support, and information systems maintenance. This creates an environment of reconfigurability of the structures of virtual organization, characterized by improvements in outsource switching and increased ability to combine resources in a more efficient way [Mowshowitz, 2002]

Another recurrent issue is that of poor or inaccurate communication between virtual team members. As a result, cross-cultural communication skills are key to the success of outsourced, global virtual relationships. "Cultural bridge" staffers, for example, may be needed to span the communication gulfs between virtual organizational participants [Krishna et al., 2004]. Communication efficiency, defined as message volume and understanding, is often diminished in virtual telecommunications that lack social context cues provided in face-to-face interaction

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[DeSanctis and Monge, 1998]. Cross-cultural communication with offshore virtual teammates presents an added dimension of communication complexity in virtual teams [Gopal et al., 2002]. Technology mediated communication allows asynchronous communication, which along with other forms of digital communication can lead to a diminished sense of presence or telepresence [Wagner, 2003].

TECHNOLOGIES OF VIRTUAL ORGANIZATION

The technologies that enable and help create virtual organizations have grown significantly in scope of functions, and all technology predictions point to exponential increases in the capabilities of the technological bases of virtual organization: digital bandwidth, processor power and application features. Currently available technologies fall into four major groups.

The first of these are familiar but important basic computer-mediated communication techniques that include chat utilities and instant messaging systems. E-mail is the simplest and most widely used computer-mediated communication tool in this group, and it is a critical component of technology-extended organizations [Brown et al., 2004]. The enhancement of e-mails with voice and video files is increasingly common.

A second category of tool is known as groupware, or group support systems. Information system applications for group support have traditionally been described as decision support systems (DSS), group support systems (GSS), executive information systems (EIS), and collaboration information systems (CIS) [Nunamaker et al., 2001; Power, 2003]. These systems have benefited from over two decades of research and development and have been deployed and evaluated in a wide variety of management contexts.

A third category of technology for virtual organization is composed of advanced tools for project management, tracking, and control. These include the rapidly growing supply chain management application suites that are based on the web service model of interaction [Laudon and Laudon, 2004], as well as more traditional ERP systems that are used to integrate large, distributed entities [Lee et al., 2003].

Finally, specific tools for advanced and ubiquitous communications are currently available at varying stages of development. These include videoconferencing systems enhanced to take advantage of the increased end-to-end bandwidth available over the Internet [Boudreau et al., 1998; Townsend et al., 1998]. In some cases, use of electronic networks for virtual organization can have a negative effect on inter-organizational efficiency [Kraut et al., 1999]. Yet, many expect that these first-wave technologies will soon be eclipsed by new generations of applications. For example, many researchers predict that these tools are on the verge of offering high definition, multi-mode virtual telepresence [Boese, 2004; Wagner, 2003].

This section (II) has provided some of the key concepts, issues, tools and technologies of VO. Our intent is not to add to or contest this literature. Our interest is in understanding how these issues have been appropriated by academia in teaching of Business and Information Systems. To accomplish this, we turn to Adaptive Structuration Theory (AST).

III. USE OF ADAPTIVE STRUCTURATION THEORY

As academic disciplines respond to virtual organization by reflecting and attempting to lead the changes that result, changes in practice transfer to academia and are moderated and contextualized by the disciplines. Historically, such external forces led to evolution of disciplines. For example, the challenges of managing global enterprises inspired the creation of the boundary-spanning International Business discipline found in some institutions [Ball and McCullogh, 1993; Buckley, 2004], and interdisciplinary E-commerce degrees enjoyed favor for a time [Bartholome and Olsen, 2002; Rob, 2003].

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But management of the emerging virtual firm may lead to deeper transformation by presenting new, cross-disciplinary challenges that arise from the complexity of defining and coordinating flexible, distributed, and loosely coupled business process services. Obstacles to academic engagement with virtual organization may arise from territorial claim by individual disciplines to the emerging issues of virtual organization, as well as differing levels of familiarity with the information systems of virtual organization. While it is clear that virtual organizations are unified by cross-disciplinary reliance on information and information technologies, the cascade of changes implied by virtual forms leads to different issues for different academic disciplines.

Understanding this cascading effect requires theory that captures the transfer of concepts and practice from business, along with the dynamics through which these elements are integrated into academia. We approach the structural dynamics of the academic response to the developments of virtual organization through the lens of Adaptive Structuration Theory (AST), which models the interplay between advanced information technologies and organizational response to the use of the technologies [DeSanctis and Poole, 1994]. While many adaptive structuration-based studies focus on the structure of a technology and its appropriation in organizations, the orientation of this study is on using AST to help explain the structuration that occurs between the technology-based processes of VO and academia's response to these processes. Our intent is not to enhance theoretical development of AST, but rather to use AST as a prism through which the dynamics surrounding virtual organization and its use in academia can be explored.

AST is particularly well suited for our analysis because of the distinction it draws between a system of group interrelations, such as academic disciplines, and structures, and those that emerge from the nature and use of the information technology resources of VO [Arrow et al., 2004]. The capability of AST to capture the emergent character of VO technologies-in-use offers insights that extend beyond those available from technology adoption and innovation diffusion models. In this paper we employ AST to help understand the influences on an academy faced with adapting to the theoretical and practical challenges of the technologies and practices of virtual organization, and we include modest adaptations to the details of the AST framework to better target the issues presented by virtual organization. Figure 1 shows the constructs in the adapted AST model.¹

It is useful to begin by considering the extent to which academia would appropriate VO into their curricula. As noted in Figure 2, it is expected that disciplines will differ in the extent by which they have appropriated VO concepts and tools into their courses. The expectation is that business disciplines (e.g., marketing, IS, operations) will differ in the extent to which they have appropriated concepts and methods of VO into their curriculum. This is principally assessed by persistent attitudes toward appropriation, extent of appropriation, and VO technology use. The figure also conveys that interaction is fundamental to the structuration process. Important interactions are found both within and between the four main constructs of AST.

In the Structure of Information Technology for Virtual Organization, individuals and groups in academia interact to varying degrees with the structural features and spirit of the technologies of VO, leading to adoption of concepts and methods of VO technologies within these disciplines. The original AST focuses on restrictiveness, sophistication, and comprehensiveness of the technology under study. To target the structural features of virtual organization, we considered task specificity, ease of use, and inter-system interactivity. Task specificity of information technology use by groups has been the focus of considerable research [Choudhury and Sampler, 1997; Dennis, 1996; Gill, 1996], and it varies greatly between such group applications as value chain integration systems which have high specificity, and tools such as instant messaging utilities that have no inherent task specificity. Ease of use of information technologies also has an extensive research basis [Davis, 1989; Doll and Torkzadeh, 1988] and will vary greatly according

¹ Appendix I shows the original AST framework.

to the complexity of the VO application and its state of evolution. Inter-system interactivity, the nature of the relationship of the technology to related systems with which it interoperates, has been extensively studied [Grimson et al., 2000; Hasselbring, 2000; Sutherland and VandenHeuvel, 2002].

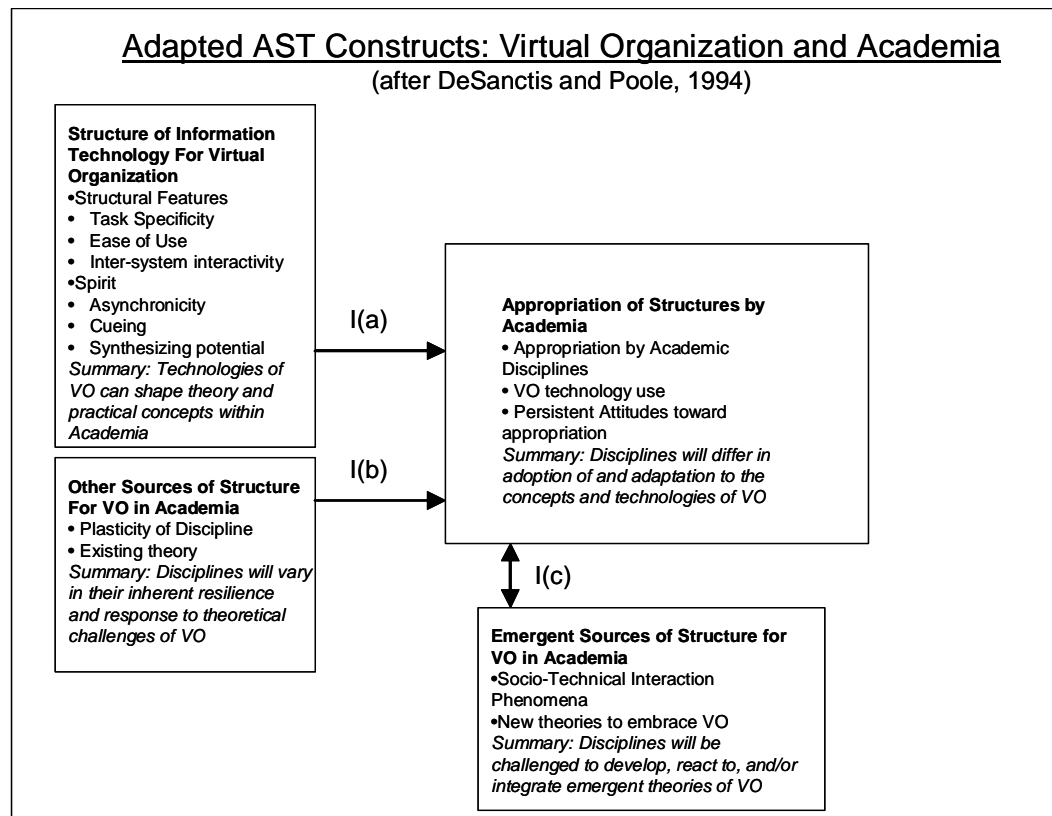


Figure 2. Adapted AST Constructs

The second aspect of the structure of technology in AST, the spirit of an information technology, can be seen in its tendency to facilitate participation and consensus. We devised adapted scales to help capture the spirit of the technologies of virtual organization: asynchronicity, cueing, and synthesizing potential. Asynchronicity, which has been studied for decades as a key characteristic of information technologies [Crawford, 1982], describes the characteristics of VO technologies that allow them to bridge collaborators across continents and time zones. Video mail applications, for example, are more effective at bridging time barriers than synchronous technologies, such as videoconferencing. The cueing capabilities of information technologies, which have been studied in a variety of group contexts [Chidambaram, 1993; Crawford, 1982; Daft et al., 1987], refers to the potential of the technology to provide visual or other cues to enhance understanding among virtual collaborators. Synthesizing potential, which refers to the capability of an information technology to combine the aims and objectives of dispersed departments and other entities and to act as a change agent, has been examined in theoretical and case study approaches [Cross et al., 1997; Markus and Benjamin, 1996].

Next, in Emergent Sources of Structure, these interactions extend to advances in theory that arise from the exchange of ideas within academia as they are informed by reflective use of the technologies of VO. While these emergent sources are by their nature difficult to predict, a clear constant is the need for new theories in the adapted AST to address the requirement for

theoretical frameworks and theory-based redefinition of organizational structures in light of the emerging changes of virtual organization. Further, VO environments create a context for emergent socio-technical interaction phenomena in the form of new user behaviors in response to evolving VO technologies. Such interactions have been extensively studied in other IS contexts [Cogburn et al., 2002; Herrmann et al., 2004] and have special relevance in evolving VO environments

In *Other Sources of Structure*, the plasticity of discipline-based academic groups controls the extent of interaction with and adoption of theories for VO. Academic disciplines are shaped by their histories and cultural “muscle memory,” and systemic changes such as virtual organization may contravene efforts to establish consistent identities for the academic fields, resulting in continuing challenges for many disciplines. The ability to remain flexible or plastic in the face of adaptation pressures can be an asset. As Lyytinen and King explain:

The history of the academy demonstrates that the legitimacy of academic fields lies not in holding tight to the reasons for the field's emergence, but in keeping the field's center 'plastic' by adapting to the shifting salience of the issues that might concern it [Lyytinen and King, 2004].

The concept of plasticity is key to understanding the structuration effects that transfer from business to academia. Some disciplines may respond to structuration influences of virtual organization with high plasticity, while others may remain relatively brittle. Similarly, the existing theory base of a discipline serves as an anchor that will affect the incorporation of VO technologies and phenomena into the working concepts of the discipline. Based on this reasoning, we introduce plasticity as an existing theory of discipline to the adapted AST as categories of *Other Sources of Structure* for virtual organization in academia.

The major interactions between the constructs in Figure 2 are indicated by arrows labeled Interaction a, b and c, following the general pattern of relationships defined by DeSanctis and Poole (1994). In the first of these, I(a), appropriating academic entities will interact with the structural features and spirit of the technologies of VO. Similarly, in I(b) and I(c), the interactive relationships between appropriating academic entities and the *Other Sources of Structure* and *Emergent Sources of Structure* are highlighted. The directions of influence of interactions I(a) and I(b) are toward Appropriation because the features and spirit of technologies, as well as the state of theory and disciplines, are expected to show a net influence on appropriation. Interaction I(c), on the other hand, is bidirectional as it derives from the mutually dependent exchange of ideas between appropriating entities and new theories to embrace VO.

IV. SURVEY OF BUSINESS SCHOOL FACULTY

METHOD

A web-based survey instrument allowed us to evaluate the concepts, theories, technologies and management issues of virtual organization in U.S. business schools, including their implications for the adapted AST constructs for VO as discussed in the preceding section. Survey methodology has been used in a variety of AST-based studies in IS [Poole and DeSanctis, 2004], and this approach enables us to examine structuration processes for a large and representative sample.² We measured each construct with standard Likert-format inventory items, following [Hair et al., 2003], as indicated in Table 2.

² While various methods have been used to study AST, the authors acknowledge the predominant use of qualitative methods in AST research. Additional comments on alternative methods can be found in the Conclusion.

SAMPLE

The population of interest for this study is the faculty of business schools in the United States. We sent out requests for participation to various business faculty distribution lists throughout the United States, and survey results were offered as an incentive for participation.³ A total of 598 individuals responded to the survey, and of these, 471 provided sufficient information for analysis. The sample offers a broad range of geographic location, academic rank, teaching experience and business school specialties, as discussed in the following section. Table 3 summarizes the main characteristics of the sample.

Table 2. Adapted AST Constructs and Survey Content

Adapted AST Constructs	Survey Content
<i>Appropriation of Structures by Academia</i>	Incorporation into curriculum, as considered first by level of awareness of VO and then by discussion of concepts in courses <ul style="list-style-type: none"> • Familiarity with the concepts of Virtual Organization and Virtual Teams • Discussion of the concepts of Virtual Organization or Virtual Teams in courses
<i>Structure of Information Technology for VO: Structural Features and Spirit</i>	Satisfaction with range of tools, effectiveness of tools, information available on tools, ease of incorporation of tools into curriculum, for several categories of tools: <ul style="list-style-type: none"> • Messaging Tools • Groupware • Group Decision Support Tools • Project Management Applications
<i>Emergent Sources of Structure for VO in Academia</i>	Familiarity with issues Discussion of issues in courses <ul style="list-style-type: none"> • Trust in Virtual Teams • Cost / Benefit Tradeoffs in Virtual Teams • Organizational Culture as it Affects Virtual Teams and Virtual Work • Communication Efficiency and Communication Tradeoffs in Virtual Teams • General Management Challenges in Dealing with Virtual Workers, Teams and Alliances
<i>Other Sources of Structure</i>	Viewpoints on VO in curriculum Open-Ended Comments on Topic

³ Late November, 2003

The mean duration of teaching experience was 13.95 years, with a range of less than one year to 46 years. Nearly half of the respondents were in their first ten years of academic life, with the other half concentrated in the 10-35 year range. Table 3 breaks the distribution of teaching years into 5-year categories. All major regions of the country were represented in significant numbers, with Midwest and Eastern schools most strongly represented. The distribution of the four main academic ranks among the respondents varied from 21 to 28 percent, as shown in Table 3. Management represented the single largest academic focus area, with other major business school specialties represented in significant quantities.

Table 3: Description of Sample: Academic Discipline, Rank, Experience, Region

Academic Area	N	Percent	AACSB Comparison Group (%) ⁴	Teaching Years	N	Percent
Management	120	25	12	0-5	131	29
Marketing	64	14	13	6-10	89	20
Accounting	51	11	17	11-15	57	13
Finance	29	6	13	16-20	60	13
Information Systems	63	13	11	21-25	44	10
Operations	28	6	5	25-30	46	10
General Business	11	2	2	30-35	19	4
Other ⁵	103	22	28	35-46	9	2
Academic Rank	N	Percent	AACSB Comparison Group (%)	Geographic Region	N	Percent
Professor	132	28	35	Northwest	31	7
Associate Professor	98	21	28	Southwest	92	20
Assistant Professor	128	27	25	Midwest	128	27
Lecturer	110	23	11	South	28	6
				Northeast	95	20
				Southeast	95	20

⁴ In order to evaluate the validity of our non-random sample, we provide a comparison of the sample's distribution of academic rank and discipline to the distributions of a reference group of 25,928 faculty of schools accredited by the Association to Advance Collegiate Schools of Business (AACSB) (data courtesy of AACSB, August 2004).

⁵ The disciplines reported in the Other category were as follows: 47% Business or Management specialties such as International Business, Entrepreneurship and Supply Chain Management, 15% Economics, 12% Business Communications, 8% Organizational Behavior and related disciplines, 5% Human Resources, 5% Quantitative Methods, and 7% various other disciplines such as Business Law.

Nearly all respondents who classified themselves as belonging to an “other” business research or teaching category were in specialized business sub-disciplines such as taxation, business economics, and human resources.

SUMMARY OF RESULTS

Table 4 presents selected survey results for each of the primary AST constructs. The general picture is one of differential VO appropriation across business disciplines; with less satisfaction with tool and technologies, some consideration of emergent sources of structure, and highly varying plasticity in terms of faculty viewpoints on appropriateness of VO to their field. The following discussion explores the results in detail.

Table 4: Selected Survey Results for Primary AST Constructs

Adapted AST Constructs	Selected Results
<i>Appropriation of Structures by Academia</i>	Although high familiarity with VO concepts was reported among Management (78%) and IS (86%) faculties, there was less (but still moderately high) appropriation in terms of treatment in courses. Accounting and Finance disciplines showed low awareness and very low discussion of VO concepts.
<i>Structure of Information Technology for VO: Structural Features and Spirit</i>	High variation in satisfaction and perceptions of effectiveness and capabilities of ITs for VO, with 80% of the IS discipline dissatisfied. Information available on the ITs for VO was considered inadequate by most and technologies were seen by many as immature and difficult to apply, despite their importance.
<i>Emergent Sources of Structure for VO in Academia</i>	Trust in Virtual Environments and Communications Efficiency in Virtual Teams emerged as leading conceptual areas, particularly among Management faculty. Similarly, Outsourcing is seen by many as a critical but complex emerging topic, but its more challenging subelements such as Virtual Supply Chain Management are less well recognized. Emergent cost / benefit tradeoffs of VO were of little interest to Accounting and Finance faculty.
<i>Other Sources of Structure</i>	Considerable variation in summary measures of plasticity of disciplines, with Management displaying high plasticity, IS moderately high, and with Finance very low.

VO APPROPRIATION BY ACADEMIA

Familiarity and discussion are key indicators of the Appropriation of Structures of VO by Academia. The overall level of familiarity with the virtual team concept varied significantly by academic discipline. Similarly, the frequency of discussion of this range of topics varied greatly. A full 61.57% of the respondents reported moderate to high familiarity with the issues and concepts

of virtual organization, but at least 60% give little or no discussion treatment to these topics in their courses. Table 5 in Appendix II presents further details of these results.

A large proportion of the faculty provides some degree of treatment of the topics of virtual organization in specific courses. The following percentages of faculty reported discussion of virtual organization in at least one course: Management 83%, IS 81%, Marketing 70%, Operations 71%, Accounting 59%, Finance, 35%, Other Business 42%. Levels of familiarity and discussion across disciplines are presented in Table 6 in Appendix II.

These results reveal a range of responses in familiarity with and discussion of virtual organization. The first of these are several clear distinctions between the responses offered by the business school disciplines. Familiarity with topics of Virtual Organization was highest among Information Systems faculty, with nearly 86% reporting a high level of familiarity with these issues and over 52% incorporating the topic to a high degree in coursework. This may be the result of several factors, including the fact that information systems and technologies are the indispensable enablers of virtual organization. Other disciplines that reported a high level of VO familiarity were Management and General Business, with the latter reporting the highest level of discussion of VO, at nearly 64%.

On the other hand, nearly two thirds of Operations faculty reported high familiarity with VO, but only 39% of Operations faculty were likely to include the topic at a high level of discussion, significantly less than that of Information Systems and Management. This result appears to be at odds with an expected rate of discussion of virtual organization in the Operations discipline, particularly in view of the impact of outsourcing on organizational operations of all types. Lowest in familiarity and discussion of VO were the disciplines of Accounting and Finance, with only 10% of Finance faculty discussing VO in a significant way.

Open-ended comments ranged from enthusiastic interest (“Virtual teaming and virtual organizations will likely become the dominant structure for business in the future. . . As virtual team technology gets easier to use and as more people become familiar with the technology, virtual teams will become as standard a part of business culture as office and cubicles were at the end of the twentieth century . . . It should be part of a balanced MBA or BBA education”) to clear resistance (“Unimportant. If students have a good understanding of real teams (as opposed to virtual) the transition to virtual is very easy. . . I generally view discussion of virtual organizations and virtual teams to be a complete waste of time”).

We removed the Other Business discipline from statistical analysis due to its inherently mixed (indiscriminate grouping of Economics, HR, Decision Science, etc.) and therefore confounding nature. The resulting inter-discipline differences for both familiarity and discussion were highly significant. (Familiarity: *Pearson Chi-Square* = 61.380, *P-Value* = 0.000; Discussion: *Pearson Chi-Square* = 36.970, *P-Value* = 0.000). Table 6 in Appendix II details these results.

STRUCTURAL ASPECTS OF VO TOOLS AND TECHNOLOGIES

Although there was considerable variation, respondents reported generally less satisfaction with the tools and technologies of virtual organization, which directly reflects the appropriation of VO structures by academia, as well as the structural features of the technologies. About 42% of the respondents found that the existing tools and technologies were easy to incorporate into the curriculum, and this may be partly due to the modest complexity of the most popular technologies (few respondents reported using advanced groupware or videoconferencing, for example).

The effectiveness of these technologies was considered highly satisfactory by slightly more than 35% of the faculty respondents. However, a major problem connected with adoption of the tools and technologies of virtual organization, especially the more advanced tools, is the general lack

of information available to faculty: More than 72% of faculty reported low levels of satisfaction with the information available on the tools and technologies of virtual organization, and several of the written comments expressed the view that information about tools and technologies is not presented in a useful or coherent manner.

Many recognized the increasing importance of these technologies: "We probably don't discuss and use these tools as much as we should. . . I definitely would like to explore why these technologies haven't been adopted as widely as they should be. . . Virtual teams and organizations have been around for quite a while, it is only with the new IT related tools that focus on it as a special topic has occurred." Others expressed frustration and skepticism with the ease of use, cueing and synthesizing potentials of the technologies: "As yet, the technology more often gets in the way (more) than it assists. . . Not ready for prime time. Virtual teams will have an impact, but the technologies still need a lot of development before they can be a realistic alternative to face-to-face."

Significant differences were found between the results for Management and Information Systems faculty, with Management significantly more satisfied with the range of technologies (49% highly satisfied) and their effectiveness (48% highly satisfied) than IS faculty on the same variables (24% high satisfaction with range of technologies and 20% high satisfaction with effectiveness). The clear dissatisfaction within IS is particularly notable because the locus of responsibility for the tools and technologies of virtual organization is clearly within IS. Accounting faculty were also largely unsatisfied with the tools of virtual organization. Table 7 in Appendix II presents these results in greater detail.

EMERGENT SOURCES OF STRUCTURE

Among the issues of emerging importance for virtual organization, the issue with the highest rating of perceived importance was communication efficiency and communication tradeoffs in virtual teams, with a high rating by 42% of respondents. The number according a high rating to this issue is more than double the number who gave high importance to more complex topics such as business negotiation by virtual teams, which was considered to be of high importance by only 19% of respondents.

Among the activities of virtual organization, outsourcing was accorded a high importance rating by nearly 35% of respondents. However, two theoretically complex aspects of outsourcing, virtual project management and virtual supply chain management, were found to be of high importance to only about 22% of respondents. Many respondents addressed these emergent sources of structure and the need for new theories to embrace VO with comments that ranged from endorsement: "Increasingly we will need to do research and teaching of the use of virtual (forms). . . We do need more research on building and maintaining Virtual Teams. Another thing is to study how the team begins to function as a team," to criticism: "A lot of tech hype with little theory or other analytic substance." Others focused on emergent socio-technical interaction phenomena: "Relationships remain vital but elusive in virtual teams and provide an opportunity to develop tools/technology to deal with the gap. . . The issue is technology overplayed and the potential effects for the sociology of work and social integration processes underplayed."

Significant differences were found between the rankings offered by the Management and Information Systems faculty, with Management according high importance to Communication Efficiency in Virtual Teams (56% high importance) and Trust in Virtual Teams (49% high importance), and with the IS discipline significantly lower on many topics (Communication Efficiency in VO = 22% high importance; Trust in VO = 19% high importance). By contrast, Accounting faculty accorded very little importance to the topics of virtual organization (Communication Efficiency in VO = 6% high importance; Trust in VO = 4% high importance). All inter-discipline differences for perceived importance were highly significant (Communication Efficiency and Tradeoffs: *Pearson Chi-Square* = 18.982, *P-Value* = 0.000; Telework: *Pearson Chi-Square* = 7.536, *P-Value* = 0.023). Detailed results are shown in Table 8 in Appendix II.

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OTHER SOURCES OF STRUCTURE

Respondents offered numerous comments addressing the issues of virtual organization and the tools and technologies of virtual forms. Many comments directly addressed other sources of structure such as the plasticity of disciplines and the role of existing theory. As one respondent wrote, "This is a problem with the myopic viewpoint today that every faculty member must publish in their field's A journals. Virtual teaming goes beyond all of this and does not belong to any one field. It is a capability that will be needed for every manager in every field, including Accounting." Others agreed: "I think this focus and attention is long overdue. It would be helpful if there were more standardization as to terms used in this environment. . .This is one topic that is not owned by any one academic field, (but) in some schools it is already getting ossified in this manner, thus shutting out coverage of it throughout the curriculum."

Still others were plainly opposed to adapting their discipline to VO: "I really don't care about the tools and technology to support virtual teams. It is not a big subject in Finance. . .Unless it has performance measurement or costing implications (e.g., outsourcing) then the concept of virtual organization and teams is not a critical issue in an introductory management accounting course. . .These are basically MIS issues and are included in our MIS course."

We now turn to the discussion section, where we integrate these insights on academic treatment of VO with the other AST findings to arrive at our summary assessment of VO across business fields, including implications for Information Systems.

V. DISCUSSION

APPROPRIATION BY DISCIPLINE

The findings have highlighted differential appropriation of VO across business fields. Our use of AST allows us to focus on how the use and study of the information technologies of VO in academia is a "mutual shaping" process between VO concepts, issues, technologies and the disciplines that will embrace them (or not) in their curricula [Pozzebon and Pinsonneault, 2001]. Table 9 presents a summary of our analysis, with a focus on the degree of appropriation by academic discipline as a summary indicator of the structuration process. The discussion that follows explores the appropriation of VO across disciplines, followed by reflections on the implications of our results for the remaining AST dimensions.

Table 9: Review of Survey Results in terms of AST for Virtual Organization

Academic Discipline	Degree of Appropriation of VO Structures	Interpretation in terms of AST for VO: <i>Structure of IT for VO, Emergent and Other Sources of Structure, Appropriation of Structures</i>
Management	High	Management faculty reported a high level of familiarity (78.33%) and a moderate level of discussion (52.50%) of virtual organization. In addition, Management faculty showed comparatively high interest almost all of the topics of virtual organization (22-56%). In addition, Management faculty were more satisfied with the technologies of virtual organization than IS, and far more than other disciplines such as accounting. In addition, Management faculty accorded high importance to many of the topics of virtual organization. These results suggest strong degree of structure appropriation, with a high level of plasticity in the discipline. However, this awareness was accompanied by cautious discussion. Critical issues of socio-technical interaction in virtual teams may be neglected in course discussion, and further research is needed to better evaluate this situation.

Information Systems	Mod-High	Information Systems faculty reported a very high level of familiarity (85.71%) but only a moderate level of discussion (52.38%) of virtual organization. These results suggest adequate awareness but weaker academic treatment of virtual organization, suggesting inhibited appropriation of VO structures. IS faculty accorded relatively high importance to outsourcing (28%), general management challenges of virtual organization (24%) and communication efficiencies in virtual organizations (22%). On the other hand, IS faculty were largely unsatisfied with effectiveness of technologies of virtual organization (80%) and other aspects of the technologies, suggesting a heightened awareness of the shortcomings of these tools. In general, these results suggest a lower level of structure appropriation and plasticity for IS than for Management faculty.
Operations	Moderate	Operations faculty reported a moderate level of familiarity (64.29%) and a low level of discussion (39.29%) of virtual organization. These results suggest low plasticity and an inadequate level of appropriation of structures within the discipline. The many issues that affect academic treatment of virtual organization in Operations, including the need for new theory, appear to require more study.
Marketing	Moderate	Marketing faculty reported a moderate level of familiarity (59.38%) and a significantly lower level of discussion (32.81%) of virtual organization. These results suggest a moderate plasticity within the discipline and a low to moderate level of appropriation of VO structures.
Accounting	Low	Accounting faculty reported a low level of familiarity (35.29%) and a very low level of discussion (17.65%) of virtual organization. In particular, Accounting faculty accorded very low importance to the key topics of virtual organization (range 94-99%). Satisfaction with the technologies of virtual organization was also consistently low. These results suggest a low level of appropriation of VO structures within the discipline and a low level of overall plasticity in response to the challenges of VO. In particular, such emergent sources of structure such as the data capture for remote entities and supply chain accounting issues may be neglected.
Finance	Low	The results of finance faculty were similar to Accounting in that they reported a very low level of familiarity (27.59%) and a very low level of discussion (10.34%) of virtual organization. These results suggest an inadequate level of appropriation of structures within the discipline and a very low level of overall plasticity. In particular, such issues of virtual organization as risk exposure from remote partners may be neglected.

APPROPRIATION OF TECHNOLOGY AND TOOLS OF VO

Our results suggest that although the appropriation of VO concepts is generally high, there is significant resistance to the technology and tools of VO, and engagement with the technologies is generally lower than with the more general VO conceptual issues. Our findings also point to the fairly dramatic need for more research and information about tools and technologies available for supporting virtual organizations, including outsourcing arrangements. While rudimentary tools (such as emailing and groupware technologies) have a baseline level of awareness, there appears to be a paucity of activity relating to supporting tools and the training therein. The field of

IS can enhance its technical contribution by improving both the development of and training therein of tools that support a range of virtual organizations.

It is important to note the apparent disconnect between the relative high degree of interest paid to VO concepts and issues and the relatively modest to low satisfaction with the tools and technologies that would support these models. The technologies of virtuality can be seen as lagging and inhibiting when they should be leading and enabling, creating an environment for increased overall appropriation. Many respondents point out that the technologies are difficult and complex to deploy and use, and the information available about the technologies of virtual organization is seen as inadequate. These views present paradoxes and challenges that may best be met through a deliberate, systematic, cross-disciplinary synthesis of academic treatment by faculty trained at the juncture of business and technology [Lataif, 2003]. External incentives for such efforts may be found in moves by major technology firms such as Microsoft into collaborative systems [Ricadela, 2005], which may signal a trend of growing interest in the tools and technologies of virtual organization.

ADDRESSING EMERGENT FORMS OF STRUCTURE

A recurrent theme across disciplines in the survey responses was the important role of new theories to embrace VO as a representative emergent source of structure. Many respondents felt that such theories are long overdue and should focus on organizational themes such as trust and team-building in virtual teams, as well as the emerging capabilities of the information technologies of VO. Typical of this view is a respondent's comment that "Increasingly we will need to do research and teaching of the use of virtual (forms)."

Yet another theme in the survey responses was the challenging complexity of virtual organization. Part of this complexity stems from the emergent socio-technical interaction phenomena of virtual organization and the lack of stable theories to address VO, both of which are described in the AST for VO. For example, one respondent remarked that discussing the topic could be "overwhelming" for students. The complexity of outsourcing as a form of VO inhibits discussion of these topics in the classroom. Throughout all disciplines, the awareness of theoretical issues of virtual organization was higher than the levels of discussion, and complexity as a deterrent to course treatment may be a cause for concern. This complexity results in part from the structures of the information technologies of VO, including problematic levels of ease of use noted by many respondents. As a result of these obstacles, the spirit of use of the technologies of virtual organization, including its inherent asynchronicity and synthesizing potential, remain largely unexplored within academia.

OVERCOMING ACADEMIC RESISTANCE

While it may be tempting in academic circles to believe that the academy drives change in practice through theory, methods, and research, the reality is that business-driven professional fields often evolve independently of academia, and thereby challenge the adequacy and structural integrity of academic disciplines (Robey, 2003). This is the case with the wide-ranging challenges presented by the evolution to virtual organization.

As noted earlier in the paper, plasticity is key in understanding the response of academia to the multifaceted influences of virtual organization. An important finding is that Management faculties appear to be highly plastic in response to the challenges of the theory and more aggressive than other faculties in the appropriations of the structures that stem from of virtual organization. IS faculty, on the other hand, showed a high level of appropriation of VO structures but did not match Management on key indicators of plasticity, such as according importance to key topics of VO. Management's aggressive adoption of the topics of virtual organization should be seen as a challenge to IS faculty to show leadership in research and academic treatment of virtual forms.

A promising approach to addressing resistance to the technologies of VO as seen in this study may lie in directly fostering use of these tools, first within the IS discipline, followed by transfer of the resulting knowledge to other disciplines.

CONCLUSION

We introduced a version of Adaptive Structuration Theory as a conceptual framework to explore the cascading effects of virtual organization in practice on academic engagement of these topics. We evaluated the survey findings in terms of the structures of information technologies for virtual organization in academia, the other sources of structure, the emergent sources of structure and the appropriation of structures, all within the larger context of VO in academia.

Returning to the issues of adaptive capacity of the IS profession, the results suggest there is both a need and value in IS taking a strong role not just in outsourcing, but in articulating the broader concepts and tools of virtual organization, including its implications for outsourced arrangements. Not only is virtual organization utterly dependent upon information technologies, it is shaped, to some degree, by the features and capabilities of those technologies. The view of the organization as an information processing system enjoys wide acceptance [Choo, 1998; Laudon and Laudon, 2004], and significant theoretical work in virtual organization was initiated by researchers from the Information Sciences field [Saunders, 2000].

We must acknowledge the limitations of our survey in fully exploring academic structuration. Although survey approaches have a significant (though somewhat contentious) history in structuration research in IS [Poole and DeSanctis, 2004], and our survey can provide a snapshot of academic treatment of VO, further research can probe more deeply into the academic systems that are operative. As any faculty member can attest, the processes by which academic topics can be adopted are myriad. Grounded approaches, which have an extensive tradition in AST research, can provide a critical texture that would be a valuable complement to the survey method used in this study. Indeed, a logical next step would be to explore the dynamics suggested by the survey within a richly detailed qualitative context.

Finally, there is a clear need for more work in the theory and techniques of virtual organization, which are in their infancy. We see the need for a concerted effort by business and IS researchers to develop models and templates to address and guide the response to the real changes happening in organizations. The field has always benefited from "contributing disciplines," as virtual organizations represent a complex array of management issues (strategy, procurement, cultural, team work) and technical issues (collaborative systems, project management systems, asynchronous environments). For IS to contribute strongly to the academic structural adoption of virtual organization, it will require dynamic interaction with related academic endeavors to devise and disseminate new models and tools — indeed, perhaps adaptability is best achieved through meaningful collaboration.

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REFERENCES

- AACSB (2002), "Management Education at Risk: Report of the Management Education Task Force to the AACSB International Board of Directors."
- Arrow, H., M. Poole, K. Henry, S. Wheelan, and R. Moreland (2004), "Time, Change, and Development: A Temporal Perspective on Groups," *Small Group Research*, (35) 1, pp. 73-105.

- Ball, D. and W. McCulloch (1993), "The Views of American Multinational CEOs on Internationalized Business Education for Prospective Employees," *Journal of International Business Studies*, (24) 2, pp. 383-91.
- Bartholome, L. and D. Olsen (2002), "A Practical Approach for Implementing E-Commerce Programs in Business Schools," *Communications of the ACM*, (45) 1, pp. 19-21.
- Batelle, J. (2004), "The CTO in a GTO," in *Business 2.0* Vol. 5.
- Bennis, W. and J. O'Toole (2005), "How Business Schools Lost Their Way," *Harvard Business Review*, (83) 5, pp. 96-104.
- Boese, C. (2004), "The Screen-Age: Our Brains in our Laptops," Vol. 2004: CNN.com.
- Boudreau, Marie-Claude, K. Loch, D. Robey, and D. Straub (1998), "Going Global: Using Information Technology to Advance the Competitiveness of the Virtual Transnational Organization," *Academy of Management Executive*, (12) 4, pp.
- Brown, J.S. (2004), "Discussion of Implications of Virtual Organization," Personal Communication, July 9, 2004.
- Brown, S.A., R.M. Fuller, and C. Vician (2004), "Who's Afraid of the Virtual World? Anxiety and Computer-Mediated Communication," *Journal of the Association for Information Systems*, (5) 2, pp. 79-106.
- Buckley, P. (2004), "Problems and Developments in the Core Theory of International Business," *Journal of International Business Studies*, (21) 4, pp. 657-65.
- Chandrasekaran, N. and G. Ensing (2004), "ODC: A Global IT Services Delivery Model," *Communications of the ACM*, (47) 5, pp. 47-49.
- Chidambaram, L. (1993), "Impact of Communication Medium and Computer Support on Group Perceptions and Performance: A Comparison of Face-to-Face and Dispersed Meetings," *MIS Quarterly*, (17) 4, pp. 465-91.
- Choo, C. (1998), *The Knowing Organization: How Organizations Use Information to Construct Meaning, Create Knowledge, and Make Decisions*. New York: Oxford University Press.
- Choudhury, V. and J. Sampler (1997), "Information Specificity and Environmental Scanning: An Economic Perspective," *MIS Quarterly*, (21) 1, pp. 25-53.
- Cogburn, D., L. Zhang, and M. Khothule (2002), "Going Global, Locally: The Socio-Technical Influences on Performance in Distributed Collaborative Learning Teams," in *Proceedings of SAICSIT 2002: Association for Computing Machinery*.
- Crawford, A. (1982), "Corporate Electronic Mail - A Communication-Intensive Application of Information Technology," *MIS Quarterly*, (6) 3, pp. 1-13.
- Cross, J., M. Earl, and J. Sampler (1997), "Transformation of the IT Function at British Petroleum," *MIS Quarterly*, (21) 4, pp. 401-20.
- Daft, R., R. Lengel, and L. Trevino (1987), "Message Equivocality, Media Selection, and Manager Performance: Implications for Information Systems," *MIS Quarterly*, (11) 3, pp. 355-66.
- Davis, F. (1989), "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly*, (13) 3, pp. 319-40.
- Davis, G., A. Massey, and Bjorn-Andersen (2005), "Securing the Future of Information Systems as an Academic Discipline," in *Twenty-Sixth International Conference on Information Systems (ICIS 2005)*. Las Vegas, NV.

Dennis, A. (1996), "Information Exchange and Use in Group Decision Making: You Can Lead a Group to Information, but You Can't Make It Think," *MIS Quarterly*, (20) 4, pp. 433-57.

DeSanctis, G. and P. Monge (1998), "Communication Processes for Virtual Organizations," *Journal of Computer-Mediated Communication*, (3) 4, pp.

--- (1999), "Introduction to the Special Issue: Communication Processes for Virtual Organizations," *Organization Science*, (10) 6, pp. 693-703.

DeSanctis, G. and M. Poole (1994), "Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory," *Organization Science*, (5) 2, pp. 121-47.

Doll, W. and G. Torkzadeh (1988), "The Measurement of End-User Computing Satisfaction," *MIS Quarterly*, (12) 2, pp. 259-74.

Giddens, A. (1984), *The Constitution of Society*. Berkeley, CA: University of California Press.

Gill, T. (1996), "Expert Systems Usage: Task Change and Intrinsic Motivation," *MIS Quarterly*, (20) 3, pp. 301-29.

Gopal, A., T. Mukhopadhyay, and M. Krishnan (2002), "The Role of Software Processes and Communication in Offshore Software Development," *Communications of the ACM*, (45) 4, pp. 193-200.

Grabowski, M. and K. Roberts (1999), "Risk Mitigation in Virtual Organizations," *Organization Science*, (10) 6, pp. 704-21.

Gray, P. and M. Markus (1996), "The Role of Telecommuting in an Integrated Workplace: The Worksmart Project," in *Special Interest Group on Computer Personnel Research Annual Conference*. Denver, CO: Association for Computing Machinery.

Grimson, J., W. Grimson, and W. Hasselbring (2000), "The SI Challenge in Health Care," *Communications of the ACM*, (43) 6, pp. 49-56.

Hair, J., R. Bush, and D. Ortinau (2003), *Marketing Research: Within a Changing Information Environment* (Second ed.). New York: McGraw-Hill.

Hasselbring, W. (2000), "Information System Integration," *Communications of the ACM*, (43) 6, pp. 33-39.

Herrmann, T., G. Kunau, K. Loser, and N. Menold (2004), "Socio-Technical Walkthrough: Designing Technology Along Work Processes," in *Proceedings of the Eighth Conference on Participatory Design: Artful Integration: Interweaving Media, Materials and Practices* Vol. 1. Toronto, Ontario, Canada: Association for Computing Machinery.

King, W. (2005), "Outsourcing Becomes More Complex," *Information Systems Management*, (22) 2, pp. 89-90.

Kishore, R., H.R. Rao, K. Nam, S. Rajagopalan, and A. Chaudhury (2003), "A Relationship Perspective on IT Outsourcing," *Communications of the ACM*, (46) 12, pp. 87-92.

Kraut, R., C. Steinfeld, A. Chan, B. Butler, and A. Hoag (1999), "Coordination and Virtualization: The Role of Electronic Networks and Personal Relationships," *Organization Science*, (10) 6, pp. 722-40.

Krishna, S., S. Sahay, and G. Walsham (2004), "Managing Cross-cultural Issues in Global Software Outsourcing," *Communications of the ACM*, (47) 4, pp. 62-66.

Lataif, L. (2003), "An MBA is Not Enough," *BizEd Magazine (AACSB International)*, pp.

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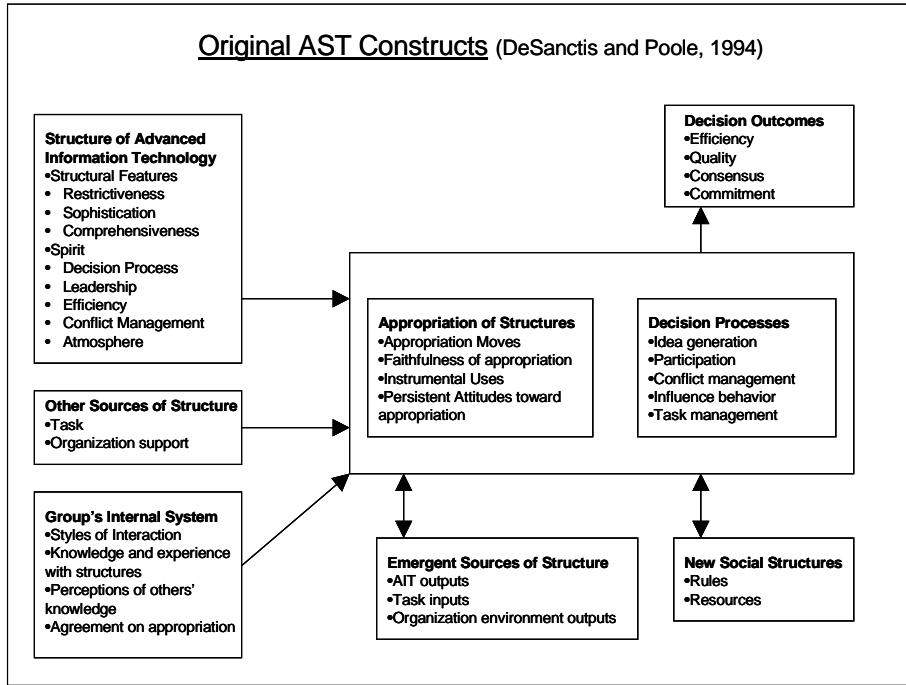
- Laudon, K.C. and J. Laudon (2004), *Management Information Systems* (Eighth ed.). Upper Saddle River: Pearson Prentice Hall.
- Lee, Allen S. (2001), "Editor's Comments: Information Systems Literacy and the Responsibilities of Business Schools and Universities," *MIS Quarterly*, (25) 2, pp. v-vi.
- Lee, J., K. Siau, and S. Hong (2003), "Enterprise Integration with ERP and EAI," *Communications of the ACM*, (46) 2, pp. 54-60.
- Lichtenstein, Y. (2004), "Puzzles in Software Development Contracting," *Communications of the ACM*, (47) 2, pp. 61-65.
- Lipnack, J. and J. Stamps (2000), *Virtual Teams: People Working Across Boundaries with Technology*. New York: John Wiley and Sons.
- Lopez, D. and P. Gray (1977), "The Substitution of Communication for Transportation - A Case Study," *Management Science*, (23) 11, pp. 1149-60.
- Lyytinen, K. and J. King (2004), "Nothing At The Center? Academic Legitimacy in the Information Systems Field," *Journal of the Association for Information Systems*, (5) 6, pp. 220-46.
- Majchrzak, A., R. Rice, A. Malhotra, N. King, and S. Ba (2000), "Technology Adaptation: The Case of a Computer-Supported Inter-organizational Virtual Team," *MIS Quarterly*, (24) 4, pp. 569-600.
- Malone, T. (2004), *The Future of Work: How the New Order of Business Will Shape your Organization, Your Management Style, and Your Life*. Boston, MA: Harvard Business School Press.
- Markus, M. and R. Benjamin (1996), "Change Agency - the Next IS Frontier," *MIS Quarterly*, (20) 4, pp. 385-407.
- Markus, M., B. Manville, and C. Agres (2000), "What Makes a Virtual Organization Work -- Lessons from the Open Source World," *Sloan Management Review*, (42) 1, pp. 13-26.
- Mowshowitz, A. (2002), *Virtual Organization: Toward a Theory of Societal Transformation Stimulated by Information Technology*. Westport, Connecticut: Quorum Books.
- Nilles, J., F. Carlson, P. Gray, and G. Hanneman (1976), *The Telecommunications Transportation Tradeoff: Options for Tomorrow*. New York: John Wiley and Sons.
- Nunamaker, J., R. Romero, and R. Briggs (2001), "A Framework for Collaboration and Knowledge Management," *Proceedings of the Hawaii International Conference on System Sciences, HICSS34, IEEE*, pp.
- Paul, D. and R. McDaniel (2004), "A Field Study of the Effect of Interpersonal Trust on Virtual Collaborative Relationship Performance," *MIS Quarterly*, (28) 2, pp. 183-227.
- Poole, M. and G. DeSanctis (2004), "Structuration Theory in Information Systems Research: Methods and Controversies," in M. Whitman, and Woszczyński, A., (ed.) *The Handbook of Information Systems Research*. Hershey, PA: Idea Group Publishing.
- Power, D. (2003), "A Brief History of Decision Support Systems," DSSResources.com.
- Pozzebon, M. and A. Pinsonneault (2001), "Patterns of Use of Structuration Theory in MIS: Epistemological and Methodological Issues," in *Proceedings of the European Conference on Information Systems*.
- Ricadela, A. (2005), "Microsoft's Groove Move," in *Information Week* Vol. March 14, 2005.

- Rob, M. (2003), "The Rise and Fall of an E-Commerce Program," *Communications of the ACM*, (46) 3, pp. 25-26.
- Sabherwal, R. (1999), "The Role of Trust in Outsourced IS Development Projects," *Communications of the ACM*, (42) 2, pp. 80-87.
- Saunders, Carol S. (2000), "Virtual Teams: Piecing Together the Puzzle," in Robert W. Zmud, (ed.) *Framing the Domains of IT Management: Projecting the Future Through the Past*. Cincinnati: Pinnaflex Educational Resources.
- Subramani, M. (2004), "How Do Suppliers Benefit from Information Technology Use in Supply Chain Relationships?," *MIS Quarterly*, (28) 1, pp. 45-73.
- Sunder, S. and J. Tas (2004), "Financial Services: Business Process Outsourcing," *Communications of the ACM*, (47) 5, pp. 50-52.
- Sutherland, J. and W. VandenHeuvel (2002), "Enterprise Application Integration and Complex Adaptive Systems," *Communications of the ACM*, (45) 10, pp. 59-64.
- Tagg, Roger (2001), "Workflow in Different Styles of Virtual Organization," in *IEEE Workshop on Information Technology for Virtual Enterprises*. Queensland, Australia.
- Townsend, Anthony M., S. DeMarie, and A. Hendrickson (1998), "Virtual Teams: Technology and Workplace of the Future," *Academy of Management Executive*, (12) 3, pp.
- Townsend, Anthony M., A. Hendrickson, and S. DeMarie (2002), "Meeting the Virtual Work Imperative," *Communications of the ACM*, (45) 1, pp.
- Wagner, Christopher (2003), "Course Materials for IS3000, City University of Hong Kong."

APPENDICES

APPENDIX I. ORIGINAL CONSTRUCTS OF ADAPTIVE STRUCTURATION THEORY

Structuration Theory originates with research by Giddens [Giddens, 1984] that examined the interdependencies of individual agents, their actions, and the institutional structures in which they operate. Structuration thus describes the mutual shaping that occurs between individual and structure [Pozzebon and Pinsonneault, 2001]. Our use of structuration theory is based on extension of the concepts of structuration to technology-intensive environments, resulting in various sources of structure, both technology-based and organization-based. Our research model is adapted from the widely accepted Adaptive Structuration Theory developed by DeSanctis and Poole (1994), which defines five sources of structure: the information technology, emergent sources, new social sources, group sources, and other sources. These sources of structure are appropriated by individuals and groups, which in turn shape the structures themselves. Finally, the appropriation of structures affects various decision processes and outcomes. The adapted model used in this study focuses on appropriation of structures, the structures of information technologies, emergent sources of structure, and specific additional (other) sources of structure, and does not extend to decision processes or outcomes.



APPENDIX II. DETAILED SURVEY RESULTS

Table 5: Familiarity with VO and Incorporation into Courses ⁶

Familiarity			Incorporation into Courses		
Level	N	Percent	Level	N	Percent
Not Familiar	38	8.07	Never	123	26.11
Slightly Familiar	128	27.18	Occasionally but informally	157	33.33
Moderately Familiar	170	36.09	Occasionally and as a formal part of course	103	21.87
Highly Familiar	120	25.48	Moderately Often	48	10.19
			Extensively	25	5.31

⁶ Anderson-Darling normality tests of key response variables presented in Tables 5, 6, and 7 showed the highly normal distribution of responses expected from a large response set (typical $p < 0.005$).

Table 6: Treatment of Virtual Organization by Academic Discipline⁷

Variable	High Familiarity with VO (Percent of category)	Low Familiarity with VO (Percent of category)	High level of VO discussion (Percent of category)	Low level of VO discussion (Percent of category)
Discipline				
General Business	81.82	18.18	63.64	36.36
Information Systems	85.71	14.29	52.38	47.62
Management	78.33	21.67	52.50	47.50
Operations	64.29	35.71	39.29	60.71
Variable	High Familiarity with VO (Percent of category)	Low Familiarity with VO (Percent of category)	High level of VO discussion (Percent of category)	Low level of VO discussion (Percent of category)
Discipline				
Marketing	59.38	40.63	32.81	67.19
Accounting	35.29	64.71	17.65	82.35
Finance	27.59	72.41	10.34	89.66
Other Business	49.51	50.49	28.16	71.84
Rank				
Professor	68.18	31.82	43.18	56.82
Lecturer	56.36	43.64	30.91	69.09

⁷ Low and high groups were defined according to response to scaled items “seldom, never” and “moderately, highly.”

Table 7: Satisfaction with Tools and Technologies of Virtual Organization

Factor	Mean Satisfaction (1= Highly Unsatisfied, 5= Highly Satisfied)	Low or Neutral Satisfaction (%)	Moderate or High Satisfaction (%)	Results by Academic Subdiscipline		
				High Satisfaction: Management (n = 120, %)	High Satisfaction: Information Systems (n = 63, %)	High Satisfaction: Accounting (n = 51, %)
Range of technologies and tools	2.66	63	37	49	24	9
Effectiveness of technologies and tools	2.58	65	35	48	20	10
Information available on technologies and tools	2.47	72	28	34	19	6
Ease of incorporation of technologies and tools into curriculum	2.65	58	42	56	34	8

Table 8: Perceived importance of Outsourcing, Remote work, and related virtual organization topics

Factor	Mean Importance (1= Low, 5= High)	Low or Neutral Perceived Importance (%)	Moderate or High Perceived Importance: All Respondents (%)	Results by Academic Subdiscipline		
				High Importance: Management (n = 120, %)	High Importance: Information Systems (n = 63, %)	High Importance: Accounting (n = 51, %)
Communication Efficiency and Communication Tradeoffs in Virtual Teams	2.45	58	42	56	22	6
Outsourcing	2.50	65	35	38	28	6
Trust in Virtual Teams	2.28	66	34	49	19	4
Organizational Culture as it Affects Virtual Teams and Virtual Work	2.23	66	34	47	20	3

General Management Challenges in Dealing with Virtual Workers, Teams and Alliances	2.26	66	34	53	24	3
Global Alliances	2.38	67	33	44	16	5
Cost / Benefit Tradeoffs for Virtual Teams	2.15	72	28	32	16	5
Joint Document Preparation	2.09	72	28	34	15	5
Joint Product Development	2.07	73	27	31	18	2
Virtual Supply Chain Management	1.93	78	22	20	15	1
Remote Work	2.15	76	24	28	17	4
Project Management for Virtual Teams	1.92	78	22	21	14	2
Telework	2.02	80	20	22	15	5
Business Negotiation by Virtual Teams	1.83	81	19	22	9	1

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