Toward a Process Handbook for Organizational Coordination Processes

The goal of this project at the MIT Center for Coordination Science is to help organizations redesign their existing processes and to "invent" new organizational processes that take advantage of information technology.

The project addresses these problems in two ways: (1) by collecting organizing, and analyzing numerous examples of how different groups and companies perform similar functions, and (2) by developing new methodologies for representing and codifying these organizational processes.

** by Bob Halperin*
Massachusetts Institute of Technology

Research Approach

These process descriptions will be stored in an on-line "process handbook" which companies can consult to find a variety of alternative ways for performing particular activities, along with experiences and guidelines about which alternatives work best in which situations.

A key intellectual contribution of the work is expected to be a novel approach to representing processes at various levels of abstraction. This approach uses ideas from computer science about inheritance and from coordination theory about managing dependencies. Its primary advantage is that it allows users to explicitly represent the similarities (and differences) among related processes and to easily find or generate sensible alternatives for how a given process could be performed.

Project Members

Principal investigators on the project include Thomas W. Malone (MIT), Jintae Lee (University of Hawaii), Kevin Crowston (University of Michigan), and Brian Pentland (University of California at Los Angeles). The project has recently received a five year grant from the U.S. National Science Foundation. ■

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** Bob Halperin is Executive Director of the Center for Coordination Science at MIT's Sloan School of Management, Cambridge, USA.*

Research Programme in Supra-organizational Systems

This Programme was established in 1988 at the Department of Commerce at the Australian National University. Its purpose was to address systems which transcend the boundaries of individual organisations. The term 'supra-organisational' was coined to encompass the many different forms such systems take. The concentration of the Programme is in the following areas: Electronic Commerce, Consumer EFTS, EDI, EDI in Government and International Trade, On-line Trading, Wide-area and Public Networking and Dataveillance.

A considerable amount of work has been undertaken on a variety of aspects of EDI. The scope has progressively broadened to include all aspects of electronic commerce encompassing the complete range of electronic services which can be used in support of the buying and selling of goods and services. Additional areas include on-line or screen trading, databases and catalogues, and commercial use of the Internet. Other areas of interest have been Consumer Electronic Funds Transfer Systems (EFTS), particularly financial applications of smart cards and computer matching.

** by Roger Clarke*
Australian National University

Profile of the Programme

The orientation of the Programme is mainly towards business and policy aspects of IT applications. Support for the Programme has been attracted from a variety of sources. In some projects, the research investment is recovered from sales of the resulting publications; the depth of understanding of supra-organisational systems (S-OS) is enhanced by consultancy work. The projects undertaken provide valuable information to user-organisations in the private sector, and in Federal and State Governments; to product and service providers and consultants; to industry associations, such as the EDI Council of Australia (EDICA); and to organisations fulfilling policy and regulatory roles, such as the Reserve Bank of Australia, and the Federal Government's Information Exchange Steering Committee (IESC).

'Supra-organizational Systems'

Since the term S-OS is not in common usage, this section explains the notion. From the late 1960s, telecommunications technology was increasingly used to link geographically dispersed users with computers. This era might be described as that of 'intra-organisational systems'. Some of these systems have become large, complex and highly integrated, such as distributed CAD/CAM and CIM systems. During the 1980s, the combination of computers, communications and in some cases robotics (now referred to as Information Technology - IT), was applied not only within organisations but also across organisational boundaries. The needs of pairs of organisations operating in partnership are served by 'inter-organisational systems'. Such systems may involve a terminal installed in one organisation and connected to a processor in another, or direct links between the processors of two organisations; for example, reservation systems enable airlines to maintain direct contact with travel agents who sell tickets on their flights.

In many cases, the economics of IT militate against the proliferation of inter-organisational systems. Instead, arrangements have arisen in which many organisations communicate through some form of common facility. The term 'multi-organisational systems' is used for arrangements such as EFTS, whereby financial institutions conduct transactions electronically instead of via cash or paper-based documents. Another class of multi-organisational system is EDI or computer-aided logistics support (CALS) and on-line or screen-based trading, in such diverse products as livestock, foreign currency, grain, shares and fish.

We distinguish furthermore a class, for which the term 'extra-organisational systems' has been coined. These systems

Projects	Year	Subject
1. Electronic Commerce Projects		
1.1 Industrial Re-structuring through Electronic Commerce	1991-	Response to developments in S-OS and electronic commerce; contingency theory of S-OS
1.2 Business Integrity and Security in Electronic Commerce	1994-	Protection against risks; legal issues (evidence provability in court, intellectual property)
2. Projects in Consumer EFTS		
2.1 EFTS and EFT/POS in Government	1989/90	Practices and intentions towards the application of EFTS
2.2 Security of Consumer EFTS	1989-92	Risks and vulnerabilities of Australian EFTS
2.3 The Swiss Cardomat EFTS/POS	1990/91	Case study at Swiss supermarket chain Migros
2.4 The Swiss Multi-function Chip-card Project	1991-94	Longitudinal case study on 'smart cards' project in Biel (CH)
2.5 Risks and Vulnerabilities in EFTS	1994-	Monitoring of the operation of consumer EFTS
3. EDI Projects		
3.1 Governmental Stimulation and Regulation of EDI	1990-	Identification and Evaluation of alternative policy measures
3.2 EDI Network Architecture	1992-	Facilities and services of EDI network providers
3.3 EDI in Payment Systems	1992-	Studies on design and implementation factors
3.4 EDI in Australian Government Agencies	1989-92	Practices and intentions of Government in EFTS, EFT/POS, EDI
3.5 Purchasing-related EDI in Government	1992-	Structured interviews on use of EDI for purchasing
3.6 EDI in International Trade	1989-	Analysis of EDI applications within internat. trade
3.7 Trade EDI Systems	1989-	International comparative study on port systems
4. On-Line Trading Projects		
4.1 The Australian Stock Exchange	1991-	Case Study on the SEATS stock trading system
4.2 Case Studies in On-line Trading	1991-	Electronic auction systems in primary industries

Table 1: Projects under the umbrella of the Research Programme in S-OS

involve not only large organisations with professional IT services staff, but also small business enterprises, unincorporated businesses and associations, and private individuals. Consumer EFTS includes, for example, Automated Teller Machine (ATMs), EFTS at Point of Sale (EFT/POS), and point-of-banking (POB) and home-banking services.

Research Concentrations

The concentrations of the several projects of the Programme are:

Electronic Commerce
- ❒ Consumer EFTS
- ❒ Electronic Data Interchange (EDI)
- ❒ On-line Trading
- ❒ Wide-area and Public Networking
- ❒ Dataveillance
- ❒

Electronic Commerce Projects

The general notion of Electronic Commerce includes Electronic Markets and Electronic Trading. It represents an integrative concept for a wide range of business support services. The supported areas are trading (for commodities, products, customised products, custom-built goods and services), logistics, settlement, management information and statistical reporting.

EFTS and EDI Projects

Areas of interest in EFTS projects include emergent second-generation ATMs, EFTS/POS services in merchants' premises, application of chip-cards and home banking and shopping. The projects address sub-sets of the Electronic Commerce area. EDI is a means whereby structured transactions (such as purchase orders, statistical returns, etc.) can be conveyed electronically. The origins of EDI are traceable back over twenty years, primarily in the United States and the United Kingdom. During the late 1980s, Continental Europe and Australia began to adopt modern EDI very quickly. The technologies underlying EDI have matured, and the economics of EDI applications have changed sufficiently that many clusters of organisations are seeing prospects for both cost savings and improved service. It has become apparent, however, that to reap the benefits of EDI, structures and processes must be modified, perhaps quite significantly. Because EDI is essentially supra-organisational in nature, it is a potent change agent for whole industry sectors. Relevant sectors are international trade and the governmental sector. The Australian Government agencies recognize far more than many other countries their significant impact on the penetration of EDI. The scale of operation and the importance of their inter-organisational data flows enable some agencies to justify implementation of EDI earlier than many major corporations.

On-line Trading

On-line, screen-based trading is appropriate for high-value commodities such as large parcels of shares and currencies. An alternative form supports automated matching of buy and sell instructions, and is appropriate to smaller parcels and lower-value commodities. Appropriately conceived and designed IT applications can also significantly improve single-site markets. The two projects will briefly be described:

- ❒ *The Case Study of the Australian Stock Exchange (ASX SEATS)* is describing and analysing the application of IT to the trading of stocks and shares, including on-line interchange of market data in support of the trading activities of principals and their agents, the completion of trades on-line, computer-initiated 'program trading' and background (batch) processing of settlement and registration data.
- ❒ *The Case Studies of On-line Trading: in Primary Industries.* Three studies of successful on-line trading schemes have been completed. The two Australian systems studied were the auctioning of live stock (CALM), and the Dutch auctioning system of the North South Wales Fish Marketing Authority (FAST). The Singaporean Hog Auction Market (HAM) has also been studied. A cross-cultural comparison of the CALM and HAM systems is planned.

Staffing and Infrastructure

Participants in the Research Programme blend technical expertise with business and policy perspectives. The programme enjoys the support of the Department of Commerce and the Faculty of Economics and Commerce. Associations have been developed with staff and students at Universities in Europe, the USA, Canada and Singapore.

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** Roger Clarke is Reader in Information Systems and Director of the Research Programme in Supra-organizational Systems at the Department of Commerce of the Australian National University in Canberra.*