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OECD WORKSHOP ON THE ECONOMICS OF THE INFORMATION SOCIETY

WORKSHOP N°3

TOKYO, 4-5 MARCH 1996

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris

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PREAMBLE

OECD WORKSHOP ON THE ECONOMICS OF THE INFORMATION SOCIETY
REPORT ON THE TOKYO WORKSHOP

The OECD Workshops on the Economics of the Information Society are aimed at developing economic data, research and analysis under the aegis and direction of the ICCP Committee as the precursor for policy discussions within the Committee. The workshops will concentrate on providing leading edge research on the economics of the coming "information society", will have a quantitative and empirical stress and will identify and refine the analytical and statistical tools for dealing with these issues.

The third of a series of Workshops was held in **Tokyo, 4-5 March 1996** on the theme of “Electronic Commerce”. It was hosted by the Japan Information Processing Development Center (JIPDEC), and Posts and Telecommunications International, Japan (PTIJ), and was organised jointly with the Ministry of International Trade and Industry, the Ministry of Posts and Telecommunications of the Japanese Government, and the Organisation for Economic Co-operation and Development (OECD). The Tokyo Workshop contributed to the OECD activities on "Global Information Infrastructure -- Global Information Society" and "Technology, Productivity and Job Creation".

The Tokyo workshop was devoted to discussion of the wide range of issues raised by the development of electronic commerce and its impacts. "Electronic commerce" -- the extensive usage of telecommunications networks for all kinds of electronic transactions is undoubtedly a key aspect of the future "information economy" and "information society". Already, networks transmit an enormous traffic of internal or external e-mail, data, files, and information about products and services. In addition, the networks themselves have started to become the delivery channel for products and services and the payments for them. The developments of the information infrastructure to accommodate faster and more secure transmission would develop more and more economic activities in the network.

On the occasion of this Workshop, leading experts from major economic research centres, academic bodies, consultancies, industry groups, think-tanks, as well as government officials, presented their views and ideas for discussion. It provided the opportunity for interaction and debate on the economic impacts and policy implications of electronic commerce from various aspects, provided a stimulus for further research and highlighted priorities for future investigation. This report outlines the highlights of the contributions and discussions at the Workshop, and provides a list of participants. The OECD acknowledges with thanks the support and enthusiasm of all those involved.

SUMMARY OF POLICY IMPLICATIONS

1. Electronic Commerce

"Electronic Commerce" will have a significant impact upon society and economies. Governments and international organisations have key roles to play to upgrade the legal and regulatory frameworks in relation to electronic commerce. These include governance issues such as: economic regulation, law enforcement, personal privacy and consumer protection, and freedom of information. A pressing issue is how best to ensure the security of electronic transactions. It should also be recognised that, as a necessary service infrastructure for Electronic Commerce, new organisational settings might be required to provide various intermediary platforms in such areas as: insurance, payment guarantees, third-party referral points, etc.

1.1 Security, Payment Systems and Electronic Money

"Security" is a key issue of electronic transactions over the Internet, but the perception of security by the public is at least as important as physical security of electronic commerce itself. It is not simply a technical matter, it raises critical public policy issues concerning consumer protection and privacy.

Electronic money will be one of the most important elements for promoting electronic transactions. The creation of such "money" has important implications for currency controls and management. But it should be noted that it is unlikely that the use of electronic money would result in an economic Chernobyl 'in the near future', though public perception of such a possibility should not be dismissed.

1.2 Rule settings for Conducting Transactions and Consumer Protection

Consumers obviously play the most important role in electronic commerce transactions. But unlike other market places, no established "rules" for protecting consumers in cyber-space transactions yet exist. Consumer protection itself may become a defining issue affecting the speed with which electronic commerce develops in the future.

It is necessary to provide a framework for an agreement on the conduct of electronic transactions. It will involve: 1) setting common terms of reference for all parties involved; 2) identifying issues for negotiation between parties in a concrete, precise manner; 3) ensuring conformity to agreed-upon terms and conditions; and 4) defining, implementing and registering all payment receipts.

Electronic commerce will promote cross-border transactions significantly, and consumers will be directly involved in such transactions. Harmonisation of laws concerning consumer transactions on the Internet between different countries needs to be addressed.

It is foreseen that the unification of domestic laws in the different countries will be difficult. Therefore, widespread use of "standard form contracts" for electronic commerce transactions should be attempted.

1.3 Harmonisation of Institutional Setting

How can global perspectives be maintained and harmonised in view of the sometimes divergent national perspectives and what can be done about international differences in institutional arrangements (such as those relating to tax systems and regulatory policies)?

More effective international harmonisation in the form of the creation of an institutional framework for a truly global electronic commerce network is required.

I.4 General Roles of Public Institutions

The efficiency of the various private institutions relies on the behaviour of public ones, while, at an international level, public institutions are seen to have a major role to play in reconciling the actions of national governments (copyrights, authentication, etc.) with a need to promote universal harmonisation of practices and policies governing electronic commerce.

Justifications for continued government involvement were proposed : (1) ensuring transparency, fair practice and interoperability; (2) encouraging regulatory reform; (3) promoting wider government internal use of electronic commerce tools; (4) encouraging broader consensus between public and private actors on the need to harmonise policies and regulations.

Research should be continued to find an appropriate and feasible role for government, a common research agenda among international organisations, as well as public and private institutions.

2. Economic Policies for Growth and Employment

Governments should recognise that the realisation of productivity gains from ICT implementations takes time. ICT investments are closely correlated to organisational change, which involves both the replacement of jobs and creation of new firms, which, in turn, can be a major source of employment. The need to facilitate the promotion of new SME policy measures involving educational and training aspects should be investigated.

2.1 SME

A new breed of small and medium-size enterprises (SMEs) such as 'infomediaries', multimedia firms, and new start up software SMEs are making themselves felt across the Internet. Research is necessary on the role of those SMEs within the framework of ICT and the nature and characteristics of employment opportunities they may present.

It is needed to develop efficient means to promote such aggressive and bright SMEs. This involves the development of new models for collaboration, interface and work distribution between large and small firms, and ways to promote life-long learning as an asset.

2.2 Education and Training

The culture of education and training needs to be changed towards promoting more open-access, self-responsibility and true life-long learning.

3. Research, Statistics, and Data

There was a recognised need to bridge the gap more effectively between micro- and macro-economic analysis, especially with respect to assessing the productivity impact of ICT on the knowledge-based economy, and the potential impact of electronic commerce on macroeconomy.

Lack of knowledge should be recognised in terms of the analytical models of what users do with ICT. Knowledge about "users of ICT" needs to be developed further with more statistical and analytical efforts.

There are ground breaking national statistical initiatives such as to measure the development and use of the information networks. But there is a need to expand further the scope of such national surveys to other service sectors, including finance, insurance and related business services sectors.

Qualitative measures on how infrastructure is functioning are of paramount importance. Identification of key infrastructure characteristics and functions for monitoring, and the development of new qualitative indicators for their measurement.

PROGRAMME

OECD WORKSHOP ON THE ECONOMICS OF THE INFORMATION SOCIETY

Workshop No. 3, Tokyo
Monday 4 March and Tuesday 5 March, 1996

Organising Institutions: Ministry of International Trade and Industry
Ministry of Posts and Telecommunications
Organisation for Economic Co-operation and Development

Venue: Crystal Room
9th Floor, Keidanren Kaikan, Tokyo, Japan

Background

The OECD Workshops on the Economics of the Information Society are aimed at developing economic data, research and analysis under the aegis and direction of the ICCP Committee as the precursor for policy discussions within the Committee. The workshops concentrate on providing leading edge research on the economics of the coming "information society", have a quantitative and empirical stress and identify and refine the analytical and statistical tools for dealing with these issues.

The third of a series of Workshops, the Tokyo Workshop contributed to the OECD activities on "Global Information Infrastructure - Global Information Society" and "Technology, Productivity and Job Creation". The Workshop was co-organised by the OECD, the Ministry of International Trade and Industry and the Ministry of Posts and Telecommunications, and hosted by the Japan Information Processing Development Center (JIPDEC), and Posts and Telecommunications International, Japan (PTIJ).

Objective of the Tokyo Workshop

A key aspect of the future "information economy" and "information society" is undoubtedly **"electronic commerce"** -- the extensive usage of telecommunications networks for all kinds of electronic transactions. Already, networks transmit an enormous traffic of internal and external e-mail, data, files, and information about products, and services. In addition, the networks themselves have started to become the delivery channel for products and services and the payments for them. The developments of the information infrastructure to accommodate faster and more secure transmission would develop more and more economic activities in the network.

The growth and diffusion of electronic transactions will have significant impacts on relationships among various economic entities and activities, notably between end users and original suppliers. Intensive usage of electronic transactions may alter the relationship and rules of competition among firms. Hence the market structure as well as organisational structure would be affected significantly. But there are still issues on the technological development on infrastructures and on the applications. Also, given the national and global nature of electronic network, considerations for the institutional aspects including the security, liabilities, and regulations over the transactions within the national and international economy cannot be ignored.

Thus, as the third workshop after those in Toronto and Istanbul, the Tokyo workshop was devoted to discuss in the issues raised by the development of electronic commerce and its impacts.

Overall Structure of the Workshop

Session 1: How does investment in ICT change the configuration of the firm?

Session 2: What are the frontlines of electronic commerce and Infrastructure developments?

Session 3: What is the right institutional setting for electronic commerce?

Session 4: How can we measure electronic transactions?

Session 5: Summary and discussion for the future research agenda.

MONDAY 4 MARCH 1996

9:00 Registration

9:30 Welcome Speeches

- Yoshio Ichiryu, Director-General for Machinery and Information Industries Policy, Machinery and Information Industries Bureau, Ministry of International Trade and Industry (MITI), Japan
- Norimasa Hasegawa, Director-General of the International Affairs Department, Ministers Secretariat, Ministry of Posts and Telecommunications (MPT), Japan
- Risaburo Nezu, Director, Directorate for Science, Technology, and Industry, OECD

10:00 Introduction: Administrative matters

- Toshio Kaneko, Manager, International Affairs Section, Research Department, Japan Information Processing Development Center (JIPDEC), Japan

10:15-13-15 Session 1: Reconfiguration of Firms' Activities Using ICT

Investments in ICT may no longer be simply aimed at "improvements" of on-going businesses, but rather re-configuring the business processes which include applying ICT for sourcing of inputs and distribution of outputs, or for diversification and marketing new products as well as internal functional changes. The session covered recent results of work on the development of firms' usage of ICT's from various aspects and first-hand views of their impacts.

Discussion:

-- Re-engineering activities and ICT investments -- Surveys and case studies
-- Emerging practices of firms -- Functional changes, or outsourcing and distribution activities
-- Organisational implications of increasing capability to address individualised market segments
-- Implications for skill distribution, education and training issues

(Chair)

- Timothy Bresnahan, Professor, Stanford University, USA

(Speakers)

- Dominique Foray, Director of Research, Université Paris-IX Dauphine, France "Information Infrastructures and Emerging Practice of Multi-Channel Knowledge Acquisition"
- Barry Sullivan, Vice President, Electronic Data Systems, Ltd., USA. "Perspectives on the Information"
- Yumio Imamura, Managing Director, Japan User Association of Information Systems, Japan "Case Study: BPR in Japan Adopting Information Technologies (IT)"

- Graham Spinardi, The Research Centre for the Social Sciences, University of Edinburgh, UK "How do ICTs affect organisations?; Product Data Exchange and the Continuous Acquisition and Life-cycle Support Programme"

(Discussants)

- Alain Dumort, Head, New Technologies in Education and Training, European Commission
- William Lehr, Assistant Professor, Graduate School of Business, Columbia University, USA
- Joichi Ito, President, Eccosys Ltd., Japan

14:30-17:30 Session 2: Electronic Commerce: Front-line of the Businesses, Technologies and Infrastructures

The session explored the technology frontlines on systems, infrastructures assessing economic potential of electronic commerce. Leading edge perspectives for both the technology and business development were presented. The discussion extended to cover the estimation of costs and benefits; impacts on the "content industry" and other sectors; implications for social aspects; as well as prospects for the emergence of new services generated by electronic commerce capabilities.

Discussion:

-- Perspectives on the infrastructure development and the electronic transactions. The scenarios for development? How does development of infrastructure affect the electronic transactions?
-- Trends in technology and the new platforms and tools for conducting business. Commerce services, development of "virtual malls", encryption technologies, frontlines of electronic commerce.
-- Articulating the possible impacts of electronic transactions, inventory management and logistics of the delivery of goods.
-- Potential economic impacts of electronic commerce. Value for consumers, costs and benefits, estimation of the potential market.

(Chair)

- Kenichi Imai, Chairman, Stanford Japan Centre, Japan

(Speakers)

- Mitsutoshi Hatori, Professor, University of Tokyo, Japan "Infrastructure for Electronic Commerce"
- Kenji Ito, Engagement Manager, McKinsey & Company Inc., Japan "Interactive Media Services and Electronic Commerce"
- Rob Morel, Vice President, Oracle Corporation, Asia Pacific, USA "Key Technologies in Electronic Commerce for Interactive Media Services"
- James Rudd, Vice President, Wells Fargo Bank, USA "Mondex: Electronic Cash for the Next Generation"

(Discussants)

- Yasuhiro Senda, Cyber Business Association Japan
- Edward Steinmuller, Professor, Maastricht Economic Research Institute on Innovation and Technology (MERIT), The Netherlands
- Kang, Hong-Yol, Senior Research Fellow, Information Policy Team, KISDI, The Republic of Korea

(Session Rapporteurs)

- Eric Perraudin, Researcher, The University of Tokyo
- Christine Cunanan, Editor, The World Executives Digest

TUESDAY 5 MARCH 1996

9:00-12:00 Session 3: Institutional Settings for the Realisation of the Global Market Place on the Network

The session covered the institutional aspects of the electronic commerce. To realise the global market place on the network, we might need to identify the necessary institutional environment. What are the obstacles to fully exploiting the opportunities rendered by the technological developments? What kind of rule setting are necessary to realise the market place activities? What rules should be managed?

Discussion:

-- What would be the potential obstacles for the realisation of electronic commerce activities? Issues stemming from current regulational systems, customs in applying the electronic transactions.
-- How can rules be set up for the key aspects on the network such as standards, securities and liabilities?
-- To create and manage those rules, what kind of implications can be withdrawn for the institutional settings to realise the cross border transactions on the network?

(Chair)

- Shigeo Tsujii, Professor, Chuo University, Japan

(Speakers)

- Eric Brousseau, Professor, Université Nancy II & ATOM, France "What Institution to Organise the Electronic Commerce?"
- Taro Komukai, InfoCom. Research, Japan "Multimedia Application Issues, Regulational Aspects"
- Takashi Uchida, Professor, University of Tokyo, Japan "Regulational Issues for Electronic Commerce"

- Robin Mansell, Professor, Science Policy Research Unit (SPRU), University of Sussex, UK "Standards, Security and Encryption: Technical Innovations, Policy and Strategy"
- Konrad Alt, Senior Deputy Comptroller, Office of the Comptroller of the Currency, US Treasury, USA "Public Policy and Regulatory Issues Posed by E-cash"

(Discussants)

- Nagayuki Yamashita, Senior Consultant, NTT Data Institute of Management Consulting Inc., Japan
- Jiro Kokuryo, Associate Professor, Graduate School of Business Administration, Keio University, Japan
- Georges Ferné, Science, Technology, and Communications Policy Division, OECD

13:30-16:00 Session 4: Data -- Measuring Network Transactions and Impacts

The transformations engendered by ICT in general, and electronic commerce in particular, make it even more difficult to track the economic activities discussed in other sessions over time, over different sectors and across countries. The introduction of electronic transaction necessitates closely monitoring two major areas in particular -- the firms' electronic transactions activities and the content to be transmitted over the network. This session examined the issues for data, indicators and quantitative analysis needed to measure the dissemination of ICT impacts.

Discussion:

-- New classifications of activities, products and services for the information society. General framework to viewing the industries.
-- Monitoring firms' electronic transactions activities. Can we measure how firms are networked?
-- Measuring and analysing transactions over the network. How is dissemination going on? How we can measure its impacts?
-- Frameworks for the measurement of digital content industry data. Measuring what is to be transmitted over the network.

(Chair)

- Dimitri Ypsilanti, Principal Administrator, Technology and Communications Policy Division, OECD

(Speakers)

- Kazuyuki Motohashi, Economic Analysis and Statistics Division, Directorate for Science, Technology and Industry, OECD "Use of Information Networks, Organisational Changes and Productivity: Firm Level Evidence in Japan"
- Hans van Meijl, Agricultural Economics Research Institute (LEI-DLO), The Netherlands "Measuring Intersectoral Spillovers from IT and non-IT Sectors: French Evidence"
- Takeshi Hiromatsu, Professor, Research Centre for Advanced Science and Technology, University of Tokyo, Japan "Analysis of Inter-sectoral Impacts Using I/O Table"

- George Sciadas, Head, Services and Technology Division, Statistics Canada, Canada "Linking Information Highway Infrastructure with Transactions"
- Mika Kawachi, Directorate for Science, Technology and Industry, OECD "Indicators for the Global Information Society: Review and Compilation of Available Statistics"

(Discussants)

- Hajime Oniki, Professor, Chukyo University, Japan
- Andrew Wyckoff, Principal Administrator, Outlook and Country Studies Division, OECD

16:00-17:00 Session 5: Future Research Agenda

The session summarised the two previous days of discussion which focused on the economic impacts of electronic transactions. The discussion in the last session attempted to identify a prioritised future research agenda and suitable topics for the subsequent workshops in the series.

(The Workshop rapporteur presented the key issues of the previous sessions. Discussion was led by the panel composed of the Chairmen of sessions 1-4)

(Chair)

- Ambassador Pasi Rutanen, Permanent Representative of Finland to the OECD

(Workshop Rapporteur)

- Guild Nichols, President, Nichols Associates, USA

(Session Rapporteurs)

- Eric Perraudin, Researcher, The University of Tokyo
- Christine Cunanan, Editor, The World Executives Digest

RAPPORTEUR'S SUMMARY

The Tokyo Workshop focused on the development of electronic commerce -- the usage of telecommunications networks for a multiplicity of electronic transactions -- and its impacts. It examined four sets of issues: (1) how investments in information and communications technology (ICT) change the configuration of the firm; (2) new perspectives and trends in the development of technology, platforms, infrastructure and business applications for electronic transactions; (3) the appropriateness of various institutional settings for electronic commerce; and (4) difficulties in measuring and analysing network transactions and ICT impacts.

Organised into four half-day sessions, the Workshop explored each of the above issues in detail and concluded with a final panel discussion summarising Workshop findings and suggesting issues and topics for further research consideration.

The intent of this Rapporteur's Summary is to bridge the structure of the individual Workshop sessions, identifying the threads of common themes and the coloration of different perspectives. Detailed summaries of individual sessions and brief outlines of Workshop presentations are included as an appendix.

1. General overview of the Tokyo Workshop

As Alice surmised on her adventures in Wonderland, things are not what they seem! Indeed, the discussions at the OECD Tokyo Workshop revealed a topsy-turvy world in which old and familiar paradigms were stood on their head. The rapid evolution of our knowledge-based economies and increasingly widespread application of ICT is facilitating the blurring of traditional boundaries, impacting conventional wisdom and assumptions, and challenging familiar notions. What is knowledge? What is the firm? Who are the strategic economic actors? What does 'skill' mean in a society in which codified information dominates? What is money? Is the Internet making our concept of nation/state obsolete?

To no small degree, many implications of ICT are still unknown. We simply don't know what we don't know. Knowledge itself is changing so fast that, as one Workshop participant noted, it looks more like a verb than a noun. This is reflected in new role reversals and process inversions: knowledge producers are becoming knowledge consumers (and vice-versa) and standards are being marketed as products. In fact, perhaps one of the more telling examples of this trend is the emergence of a new 'knowledge about knowledge' service industry, one based on the ability of 'infomediaries' to know where information is coming from and how to acquire it.

All this being said, the Workshop achieved its ambitious goal of delineating many central issues raised by the development of electronic commerce and of elucidating, to varying degrees, some of its major impacts.

2. Deconstruction of the large firm

Two very different visions of business change, as fostered by investment in ICT, were at the center of discussion in the Workshop. One was a top-down, centralised, controlled (and controlling) 'push' model as epitomised by Business Process Re-engineering (BPR) in the context of the large corporation. The other, a 'pull' model, was a bottom-up, highly-decentralised, disorganised and often chaotic individual communications model as exemplified by the Internet and associated small and medium-sized enterprises (SMEs). The former was considered an extension of departmental and enterprise-wide computing; the latter, a continuation of personal computing (Bresnahan). The first were members of the large and traditional, corporate manufacturing family; the second comprised the nascent children of the new information age, an aggressive band of bright, small and medium-sized entrepreneurial firms.

For the better part of the last decade, large corporations have invested heavily in ICT. They have employed BPR, which entails often fundamental changes in a firm's work processes and relationships, as a means of increasing productivity and improving their competitiveness. In some instances, as in the case of CALS implementation (Continuous Acquisition and Life-Cycle Support), this has meant that companies are becoming more like each other internally (Spinardi). Yet many appear to have failed to maximise the returns on their investments. Thus, a 'productivity paradox': as economist Robert Solow has quipped: "You can see the computer age everywhere but in the productivity statistics". To others, this 'failure' is more a reflection of the limitations of the data and our econometric techniques to measure productivity increases (Lehr). While still others have hypothesised that "the implementation of (ICT) takes time to be fully exploited (before) its influence on productivity growth becomes measurable" (van Meijl).

The successful implementation of large corporate ICT programmes (such as BPR and CALS) has been limited by a number of factors, including: the lack of top management leadership, middle management resistance to change, the impervious nature of 'legacy' IT systems; and the unwillingness to accept the employment reductions required to realise some of the gains of ICT investments (Lehr, Imamura, Spinardi). With respect to this latter point, cultural differences in management philosophy need to be taken into account when judging each company's methods of handling BPR and IT. As one participant noted, "It is not acceptable in Japanese society for profitable companies to lay off workers as is done in the United States." (Imamura).

Central to the second 'pull' model or vision is the de facto presence of a 'network of networks' (e.g. the Internet and everything connected with it) and the growth of a new kind of small and medium-sized enterprise -- 'infomediaries' -- that are more context-based than content-based (Sullivan, Joichi Ito, Morel). With the flourishing growth of these firms, new hopes have been stimulated to the effect that perhaps they might offer significant new employment growth opportunities.

Such hope is stimulated by the fearful prospect of further widespread layoffs that oftentimes are associated with the re-engineering of large corporations. Unemployment has been a sensitive political concern and central theme running throughout all the OECD Workshops to date. Tokyo was no different. What was different in Tokyo were the new questions being asked: how to obtain social value from the redrawing of company borders and boundaries (Bresnahan), how to develop new models for collaboration, interface and work distribution between large and small firms (Joichi Ito, Imamura); and how to promote lifelong learning as an asset, not just a cost (Dumort)? And, of course, the most delicate question of all: how to maintain social stability in light of the harsh realities of rapidly changing economic times.

Will demand for new electronic services and the proliferation of small economic units like SMEs be able to absorb displaced workers? Can these firms offer better job security than large companies (Rutanen)? What skill sets and retraining are required as we move into this electronic services

environment? Answers to these perennial and difficult questions were neither definitive nor direct. Yet, what the Workshop discussion did reveal was the emergence of a new organisational paradigm of the information economy, one whose central tenant is unification with enterprises, customers and suppliers aligning so closely that the boundaries seem to dissolve (Sullivan).

3. Knowledge and Know-how

If ICT is facilitating the blurring of traditional organisational boundaries, it is simultaneously enabling industry to (begin to) fully realise the spillover potential of the codification of knowledge, and thus to improve its economic value. Seen in this light, the distinction between tacit and codified knowledge is an important one.

Tacit knowledge is hard to articulate, acquired by experience, localised, transferred by demonstration, and context-dependent know-how. Whereas, codified knowledge by definition is reduced to a code, expressed in compact and standardised format, less context-dependent, and more easily and less costly acquired, transmitted, stored and reproduced (van Meijl, Foray). Both are complimentary. What makes knowledge codification so important in the ICT era is that it makes knowledge more meaningful and useful for other individual users and organisations (firms). ICT makes it technically possible and economically attractive to codify new kinds of knowledge which heretofore have remained in tacit form and at the same time allows for its transmission over long distances at very limited cost.

However, one of the main problems for the development of electronic commerce is 'knowledge dispersion' between users and producers, resulting in what one participant termed a condition of 'information asymmetry' (Foray). An illustration of this problem is trade in software, whereby users cannot often judge the quality of software until they have used it. Hence, trade in this field is today still inefficient and often requires face-to-face transactions, thus precluding the development of electronic commerce for software. Two potential measures to mitigate this problem were suggested: (1) the establishment of a common industrial platform to reduce buyer apprehension by insuring uniform testing procedures, warranties and legal liabilities and/or (2) the application of codification processes to establishing new, high-quality standards, reducing transaction costs, and facilitating software searches (Foray).

Another result of 'knowledge dispersion' is knowledge fragmentation. As one participant noted, just because knowledge is increasingly being codified does not mean that it is also coherent (Ferné). The need to address this issue of how to promote increased co-ordination was underscored.

4. Challenges at the Frontier of Electronic Commerce

In surveying the frontiers of electronic commerce, the Workshop explored several new electronic payment systems being used on open and closed networks and some of the many challenges that need to be overcome. Electronic commerce has appeared on the contemporary horizon for a number of reasons: the sudden and explosive growth in the volume of Internet transactions; the decline in technology costs permitting more people to conduct business remotely; the (eventual) eclipsing of mass marketing in favour of new retailing techniques targeting customer segments of 'one'; and the resultant re-engineering of distribution channels (Kenji Ito, Morel, Rudd).

An important distinction was suggested (Spinardi) between two types of electronic commerce: (1) intra- and inter-organisational commerce involving, for example, firms and government; and (2) commerce between individuals and information providers, e.g. information on goods/services (a form of 'home shopping/individual services'-type commerce). In the former, because commerce is conducted

between 'known' and trusting parties, the definition of 'money' is no issue. In the latter, however, the issues of what money is and the anonymity of parties (users) become very important. The Workshop discussion focused largely on this latter form of commerce.

Another helpful distinction was made (Kenji Ito) between two kinds of payment systems for on-line transactions; those that are adaptations of existing financial systems (such as telecom billing systems, encrypted credit cards and related intermediary services) and those that represent totally new financial systems (involving open and closed E-cash). An example of the latter is the Mondex system. Praised as a technology leader, it was described as offering a cheap and convenient E-cash solution, a stable platform unburdened by heavy infrastructure and accounting costs (Rudd).

However, the fact that none of the current payment systems under development are anywhere near full-scale deployment points to the difficulty of resolving several key classes of issues. First are the operational issues; providing a framework for agreement on the conduct of electronic transactions. One instructive approach to clarifying issues included: (1) setting common terms of reference for all parties involved; (2) identifying issues for negotiation between parties in a concrete, precise manner; (3) ensuring conformity to agreed-upon terms and conditions; and (4) defining, implementing and registering all payment receipts (Steinmuller).

The central substantive issues that were raised involved ensuring the security of payment systems, promoting wide availability, and protecting the privacy and anonymity of users (Rudd, Kenji Ito, Mansell). In addition, several participants suggested that it is critical that the transaction costs of such payment systems be kept at micro- and perhaps even nano-price levels in order to ensure that on-line transaction involving small amounts of money are possible. Although the Workshop did not delve deeply into any one of these issues, it is apparent that further developments in economic transactions are highly dependent upon their resolution. As one participant concluded, consumer protection itself may become a defining issue affecting the speed with which electronic commerce develops in the future (Ferné, Alt).

Two additional conclusions that can be drawn from this discussion are that no single payment system will dominate the market in the near future (Kenji Ito, Rudd, Morel) and that even in the best case scenario, actual implementation of a fully usable electronic commerce payment scheme will take at least five years, if not much longer (Keichi Ito, Alt). In addition, while up to now technology has been the driving force behind the development of electronic commerce, we now need to begin to focus on the social infrastructure issues. As session chairman Kenichi Imai concluded, it is terribly evident that many so-called 'technical' issues are inherently political in nature. For this reason, it is apparent that no single entity, public or private, can hope to 'go it alone'. And, while it was suggested that efforts to further concretise the ideas and options discussed in Tokyo should be developed at the subsequent OECD workshops, it is also clear that the OECD itself may not be equipped to resolve all these issues. Hence, the need for new mechanisms to distribute roles and responsibilities for the development of electronic commerce.

5. Regulation, standards and legal frameworks

In reviewing obstacles to the full realisation of electronic commerce, it is evident that the marketplace will remain fragmented for some time to come. This is due to the heterogeneity of institutional frameworks for organising (designing rules) and co-ordinating operations among firms (Brousseau), the absence of harmonisation in legal frameworks (Komukai, Uchida), differing attitudes toward security and acceptable risk (Mansell), and divergent views on the appropriate role of government in the development of institutional frameworks for electronic commerce (Alt, Kokuryo, Ferné).

While the point was made that there is no single institutional framework that is definitively superior to others, diversity in the design of rules and the co-ordination of operations for electronic commerce is not necessarily a 'bad' thing; survivability of institutions will be a function of their efficiency. Two insightful typologies were proposed (Brousseau) to describe the different institutional environments for electronic commerce and the institutions themselves. Of these, institutions created by a single dominant player (or 'club' of players) appear the more able to perform the two functions of designing rules and producing transaction services.

However, it is in the area of legal and regulatory frameworks where obstacles to electronic commerce are most intransigent. A study of recent multimedia applications currently restricted by Japanese laws and/or regulations (including tele-medicine, remote education, tele-commuting and on-line shopping) point to the need to upgrade national legal environments (Komukai). In many instances, these existing laws were framed and enacted long before legislators had any conception of multimedia applications, which of course did not even exist at the time. However, because of the difficulty of unifying domestic laws, it was suggested that widespread use of standard form contracts (with 'rational content') should be attempted (Uchida). Similarly, at the international level, a central issue that needs to be addressed is the harmonisation of laws concerning consumer transactions on the Internet between different countries (Uchida).

As in the previous Workshop session, the security of electronic transactions received considerable attention as a central issue with significant technical as well as economic and social (psychological) parameters (Mansell). As one presenter noted, although it is unlikely that the use of electronic money will result in an economic Chernobyl anytime 'in the near future,' public perceptions should not be dismissed (Alt).

The perception of security by the public is at least as important as the physical security itself of electronic commerce. In fact, if technical innovation fails to maintain security, "user trust and confidence will decrease, ...networks will be under-utilised, and investment in (needed) architectural innovations will slow down" (Mansell). A central point in this discussion concerned the need to design security into systems at the initial design stage. However, this is not simply a technical matter as it is raises critical public policy issues concerning consumer protection and privacy (Alt, Mansell).

In this respect, Workshop discussion about the role of public institutions in the development of institutional frameworks for electronic commerce led to some divergence of views. On the one hand, there was the view expressed to the effect that the role of government should be circumscribed by the need to tell the private sector what not to do, rather than to tell it what to do (Kokuryo). A countervailing view was that such market forces, if left unchecked, might lead to further market fragmentation, increased entry barriers, and inoperability between networks. Thus, it was suggested, the efficiency of the various private institutions relies on the behaviour of public ones (Brousseau), while, at the international level, public institutions were seen to have a major role to play in reconciling the actions of national governments (copyrights, authentication, etc.) with the need to promote universal harmonisation of practices and policies governing electronic commerce (Mansell).

Four additional justifications for continued government involvement were proposed: (1) ensuring transparency, fair practice and interoperability; (2) encouraging regulatory reform; (3) promoting wider government internal use of electronic commerce tools; and (4) encouraging broader consensus between public and private actors on the need to harmonise policies and regulations (Ferné).

6. Monitoring Developments in Electronic Commerce

The heterogeneity associated with the impact of ICT across industrial sectors and in various size classes of different firms was a major focus of statistical analyses presented in the last Workshop session. The discussion highlights both the mounting evidence that is becoming available in order to assess ICT impacts and new frameworks for compiling statistical indicators for the global information society.

Recent results from surveys carried out by the Japanese Ministry of International Trade and Industry (MITI), covering 23 000 firms, confirmed the widespread development and use of information networks in Japan (Motohashi). Although these findings reveal a significant impact on white collar jobs, the impact of ICT on productivity is less clear. Nevertheless, MITI was applauded for this ground-breaking survey work in the Japanese manufacturing and distribution industries (Wyckoff). These findings point to the need to further expand the scope of such national surveys to other service sectors, including finance, insurance and related business service sectors.

Additional research findings presented at the Workshop sought to explore the so-called IT 'productivity paradox' referred to earlier in this report. Based on the use of French INSEE input-output and sectoral data covering the period 1977-1992, the study focused on proving the 'lag' hypothesis, to the effect that it takes time for a new key technology (such as IT) to be fully exploited, and consequently, there is a delay before IT shows up in the statistics (van Meijl). The results of this study were impressive in that they indicated, fairly conclusively, that this 'productivity paradox' may be vanishing. Furthermore, the study pointed to the likelihood that IT has become a real general purpose technology, which can boost technological change in the whole economy (van Meijl).

Nevertheless, serious problems still confront researchers with respect to data availability, its classification, and contamination (Hiromatsu). A number of measures aimed at improving infrastructure data collection were suggested, including: software and Internet usage as well as new price measures to complement existing telephone price indices (Sciadas, Kawachi). Similarly, with respect to business and government infrastructure data, both supply side and demand side surveys of transaction flows need to be measured, as well as indicators for service availability (Sciadas).

Finally, a framework for the compilation and review of statistics for the global information society was presented which pointed to the need for broadening the scope of indicators (Kawachi). The two dimensions of scope suggested were (1) a vertical convergence integrating ICT and content sectors and (2) a horizontal expansion with an international dimension (Kawachi). In this context, it was also suggested (Bresnahan) that careful consideration be given to selectively drawing upon private market research data for the purposes of gaining insight into market dynamics (i.e. what users buy).

7. Conclusions about a Future Research Agenda

The OECD Workshop No. 3 in Tokyo revealed how unprepared society is today for the arrival of economic commerce. The discussions brought to light a number of areas and topics for further research. They also revealed several challenges to the pursuit of a common research agenda: how, for example, to maintain and harmonise global perspectives in view of oftentimes divergent national perspectives and also how to cope with international differences in institutional arrangements (such as those relating to tax systems and regulatory policies)?

Two additional concerns relate to developing more effective linkages between different types of research and to promoting more coherent approaches to the conduct of research. Thus, for example, the need was recognised to more effectively bridge the gap between micro- and macro-economic analysis,

especially with respect to assessing the productivity impact of ICT on the knowledge-based economy. Similarly, there is perhaps also a need to consider a more efficacious redistribution of roles and new partnership arrangements for the conduct of research involving both public and private research institutions.

Finally, it is also apparent that the pursuit of a common research agenda (and by this, one is referring simply to the pursuit of shared objectives) raises the question of what is an appropriate and feasible role for government. Clearly, the OECD itself is limited in the type and scope of research it can undertake; other intergovernmental organisations as well as public and private institutions have important roles to play. Redefining how research is pursued may be as challenging as the pursuit of research goals themselves.

Recent rapid change in ICT is reflected in the transformations of ICT infrastructure. On the supply side, we are witnessing the vertical disintegration of the ICT vendor industry structure with increasingly rapid product cycles, price instability, and performance unpredictability. While on the demand side, users are confronted with uncertainty over standards, the unavailability of common platforms, and issues of interoperability; all of which affect their ICT investment decision-making. Because this infrastructure will become the basis for new electronic commerce, qualitative measures of how that infrastructure is functioning are of paramount importance (Ypsilanti). Hence, one of the overarching goals of a future research agenda would be the identification of key infrastructure characteristics and functions for monitoring and the development of new qualitative indicators for their measurement.

Equally important to understanding ICT infrastructure developments is knowledge about users. As was emphasised in the Workshop discussion, we don't yet have very much in terms of analytical models of what users do (Bresnahan). In fact, user representation at the Tokyo Workshop was marginal. However, the presentation of original research findings on information network use at the firm level (Motohashi), coupled with insightful new indicators of on-line services and Internet use (Kawachi), provided Workshop participants with examples of the type of research and analysis that deserve further support and encouragement.

Who are some of the new players at the frontier of electronic commerce? What is their significance from a research agenda perspective? The most animated discussion at the Workshop focused on the role and function of a new breed of small and medium-size enterprises (SMEs) making themselves felt across the Internet. These so-called 'infomediaries' have emerged as one of the potentially more significant information service providers at the interface between ICT users and suppliers. Open ICT networks have also provided greater access to a host of other new players: witness the recent rapid growth of multimedia firms and new start-up software SMEs. Are there common characteristics (other than size and configuration) that these SMEs share? How do they relate to one another and to the larger, dominant ICT players? What lessons can be learned for the development of new models of industrial collaboration?

Interest in SMEs is not an incidental concern. Policy-makers today are facing a difficult and painful transition period of deep economic dislocations (Rutanen), a period that portends further job destruction, worker displacement and increased unemployment. If one of the responsibilities of government is to educate the public and dispel fears that ICT destroys permanently people's jobs and their future, then policy-makers need the facts to back up the assertion that ICT will, over time, create high-quality, better-paying, and more secure employment opportunities. That SMEs hold a key to the re-employment equation is a tantalising working hypothesis waiting to be proven. Research on the role of SMEs within the framework of ICT and the nature and characteristics of the employment opportunities they may present should be a key concern.

At the same time, several Workshop discussants emphasised the need to change the established culture of education and training, to promote more open-access, self-responsibility and true lifelong learning (Dumort, Lehr, Rutanen). While it was recognised that this issue has been the subject of discussion at several recent high-level Ministerial meetings, both at the OECD and within other international bodies, it was proposed that ICT-related aspects of skill development and training deserve further research consideration. In this context, a distinction was suggested, for example, between vocational and social skills; the former relating to technical know-how and the latter concerning social capacity (flexibility) to adapt to changes in the work environment. Or, put slightly differently, it is a distinction between the ability to know something versus the ability to learn (Joichi Ito). Thus, in light of today's rapidly evolving knowledge-based economy, this suggests one additional element of a future research agenda: research on the development of new ICT skills to enhance knowledge about knowledge.

Also highlighted at the Workshop was the need to upgrade legal and regulatory frameworks in relation to electronic commerce (Komukai, Alt, Uchida). Results of a review of Japanese laws limiting the development and implementation of multimedia applications for certain consumer services reveal a broad range of questions calling for further research investigation. These include such governance issues as: economic regulation, law enforcement, personal privacy and consumer protection, and freedom of information. Moreover, it was the question of how best to ensure the security of electronic transactions that was considered the more pressing issue, deserving priority attention. With respect to all of the above issues, technical components were identified as deserving further research investigation. However, what remained most evident and problematic were the social and political dimensions of these issues: the need for more effective international harmonisation in the creation of an institutional framework for a truly global electronic commerce network.

Finally, with respect to the overriding issue of monitoring network transactions and impacts, it was suggested that we need to spell out more clearly which indicators are required and why they are important (Ypsilanti). Broader decision-maker involvement in helping to focus statistical research activities on issues of special policy relevance was also encouraged. And, while it was realised that ICT provides an ideal opportunity for building more effective linkages between micro- and macroeconomic analysis (Nezu), caution was expressed about the danger of overlooking the potential impact of electronic commerce on the macroeconomy (Imai). A similar caution was voiced in response to the slightly 'heretical' notion that private market research data might be employed selectively in pursuit of some kinds of research objectives (i.e. determining what users buy). However, even that cautionary view was muted in view of the need to explore new and more imaginative approaches to understanding ICT and its impact on the knowledge-based economy.

APPENDIX

SESSION 1: RECONFIGURING OF FIRM'S ACTIVITIES USING ICT

In his opening remarks, **Timothy BRESNAHAN** (Stanford University, USA) clarified that this particular session would concentrate on users of information and communications technology (ICT) at the company/organisation level. He observed that new challenges to user firms are leading to a change in the traditional boundaries and structures of these units.

PRESENTATIONS

The knowledge-based economy

Dominique FORAY (Université Paris-IX Dauphine, France) cited the main characteristics of a knowledge-based economy as the complex interplay between the codification and standardisation of data and the utilisation of electronic commerce.

The development of a knowledge-based economy is encouraged by the continuous expansion of knowledge industries, the changing nature of the bias of the technological process, the acceleration of learning and change, and the cumulative expansion of the codified knowledge base. Through the codification of knowledge, traditional knowledge such as a paper, book, quality standard or software is transformed into a message in compact, standard knowledge format.

Mr. FORAY remarked that codification of knowledge provides a new technological base that enables the absorption of new types of knowledge, particularly those which were formerly regarded only as tacit knowledge. This process will also be useful in further developing electronic commerce into an efficient, low-cost, widely-accepted form of international transaction.

The information age

Barry SULLIVAN (Electronic Data Systems, Ltd., USA) elaborated on the distinguishing features and present circumstances of the information age.

He described the information age as an era of information transportation wherein producers of goods and services are operating on a market principle of globalisation and customisation. Future successful firms will make users beneficiaries as well in the creation of the new economy and both sectors will become beneficiaries in a new marketing system:

- Individuals are now the focus of marketing rather than mass markets.
- Quality of goods and services will increasingly matter less than the ability to create an audience for marketing.

- Marketing will focus on an audience of one person with:

  1) customised goods and services;

  2) goods and services that customers can customise to themselves;

  3) goods and services matched to individuals by infomediaries.

- Companies are now more concerned about tailoring marketing based on information rather than about the most efficient way to distribute goods to mass markets

- Individuals will now be able to get what they want instead of what is being pushed at them through the distribution system.

For individuals, the information age also changes the present notion of computer literacy to include being textually, numerically and communications-literate.

However, Mr. Sullivan also noted that the process of eliminating traditional data and information borders is on a collision course with the sovereignty of the nation-state and will eventually transcend these.

Business process re-engineering within Japanese companies

Yumio IMAMURA (Japan User Association of Information Systems, Japan) cited the two central objectives of Business Process Re-engineering (BPR): to reinforce corporate competition and to strengthen each company's market competitiveness.

At present, however, Mr. Imamura noted that in Japan, such reform is slow because of top management's concern over unemployment and for maintaining the Japanese corporate practice of lifetime employment for regular employees. Reform has also encountered opposition from white collar middle management. However, restructuring and deregulation are essential, he said, to a successful BPR of governments and industries.

Japanese companies that have successfully adapted BPR include: Yamaha Corporation, NKK Steel, and Yokagawa Corporation. Yamaha Corporation, for example, has upgraded its manufacturing technology and increased its market share for electronic devices and magnetic hard disk drives. NKK Steel is now using the Internet for communications, sales, and inventory management. Yokagawa Corporation shortened its inventory cycle from 3 months to 16 days, established an information system via the Internet, and reformed its corporate structure.

In concluding, Mr. Imamura noted that cultural differences in management must be taken into consideration when judging each company's method of handling BPR and information technology (IT). He also noted that while BPR and IT may not create new jobs, these elements will certainly improve productivity and efficiency.

CALS technology

Graham SPINARDI (University of Edinburgh, UK) spoke on the characteristics and benefits of Continuous Acquisition and Life-cycle Support (CALS) technology, the leading and most well-known programme for data product exchange.

Mr. Spinardi outlined the primary objectives of CALS as follows:

- to develop a standard to hold and store data that will avoid duplications of input, time delays and high costs;
- to provide on-line access for all design, manufacturing and logistical information; and
- to facilitate the move from hierarchical sequential organisation to simultaneous concurrent engineering.

However, Mr. Spinardi stressed that successful implementation of CALS requires that organisations standardise formats for data exchange, harmonise data held within organisations, and also co-ordinate internal working practices.

CALS will ultimately automate existing practices and consequently lower transaction rates. It will also allow for just-in-time management. In the process, however, organisations may encounter various setbacks to smooth implementation. For one thing, organisations are inherently resistant to change because they fear the unknown such as possible loss of power or unforeseen expenses.

Mr. Spinardi concluded by predicting that a global implementation of CALS is unlikely in the near future. There may be some sectoral implementation, but these will not be easily applied to other sectors. Therefore, firms must decide whether they will wait for a global CALS vision or go ahead and do what business demands of them now.

PANEL DISCUSSION

Is the IT industry moving in the right direction? Do companies involved possess an accurate and comprehensive understanding?

William LEHR (Columbia University, USA) noted that this session focused on the firm and its relationship to clients and other firms with respect to ICT. He pointed out that ICT is facilitating the blurring of traditional boundaries of the firm and that this calls into question our traditional focus on the profit-maximising firm as the relevant decision-making unit. He said that this raises important questions regarding the firm's incentives to employ ICT and even the very identity of the strategic actors themselves.

He added that most parties discussing ICT assume that all ICT investments are productive since rational, profit-maximising companies would not invest if returns were not productive. The real issue for debate, he said, is not whether companies can increase productivity, but why so many firms actually fail to maximise the returns on their investments in ICT.

Business Process Re-engineering (BPR), which entails changing work processes and relationships, as well as extending relationships and boundaries, would in theory enable firms to maximise productivity through reassessment of their management situation. But, quoting Robert Solow -- to the effect that we see computers everywhere, but in the productivity statistics -- he noted that this 'productivity paradox' is still very apparent. He concluded that the failure to measure productivity increases due to the widespread business adoption of ICT reveals, in fact, more about the limitations of the data and our econometric techniques than it tells us about the impact of ICT on organisations.

Nevertheless, referring to Mr. Imamura's research findings, Mr. Lehr noted that the general failure of Japanese firms to accept the employment reductions which are required to realise the gains of ICT has been a deterrent to BPR. This may explain why the gains have been harder to realise.

Mr. Lehr concluded his remarks by noting that since ICT-related progress appears to accentuate the gap between skilled, highly-educated workers and less-skilled workers, the realisation of (BPR) productivity gains will need to confront the larger question of equity and income distribution in society-at-large. Thus, he said, the organisational implications of ICT investment are truly political.

What should be the future approach to learning?

Alain DUMORT (European Commission) identified the main themes for developing an education policy within the European Commission as:

- developing an increasingly global, competitive and knowledge-based economy; and
- promoting learning as a lifetime vocation.

He explained that increasing trade liberalisation and competitiveness is encouraging business and manufacturing restructuring, as well as changes in peoples' attitudes. People must now think globally, but act locally. Information is also now recognised as a value in and of itself. Efficient production of goods and services is increasingly being based on non-material factors, such as the quality and quantity of information. It has also become necessary to constantly upgrade workers' skills and qualifications through education and training, although these are not guarantees for job security.

Mr. Dumort cited the ongoing trend in Europe towards more education and training on a lifelong basis and the efforts of many organisations to dramatically improve workers' ability to learn.

In conclusion, he proposed that skills not be considered as an operational cost but as an asset. Learning capacity must be significantly improved in order to transform the information society into a true learning society.

Does the IT industry have only one set of characteristics?

Joichi ITO (Eccosys Ltd., Japan) noted that the predominant viewpoints reflected in the session belonged to large organisations and mainstream establishments. He stressed that the structure, needs and characteristics of small and medium-sized enterprises (SMEs), firms which are heavily involved in IT, are very different from large organisations and governments.

He noted that the knowledge industry has several different meanings. On the one hand, there is the 'direct knowledge' industry that is highly capital-intensive with long depreciation cycles, comprised of large corporations with long-term perspectives, and is largely manufacturing-based. Then, there is the 'knowledge about knowledge' industry that is low capital-intensive, comprised of many rapidly moving, small and medium-sized enterprises (SMEs), that are more context-based than content-based. For these latter firms, they are in a 'pull market'. They have very short-term goals. They adhere to the notion enunciated by Barlow that 'knowledge is a verb, not a noun'. Because of these differences, discussions about ICT need to be carefully placed in the proper perspective.

Mr. Ito explained that for small, rapidly-moving, agile firms such as his, they are working very heavily in the codification and standardisation process; it is the central focus of their industry. He noted that the struggle (for his firm) is to be at the center of this standardisation process; this is what gives one the competitive advantage. Thus, the standard itself becomes the product and the market platform becomes the Internet.

He agreed with Mr. Sullivan that the Internet is putting in jeopardy the sovereignty of the nationstate. The other thing that is being put in jeopardy, he said, is the sovereignty of standards bodies. From this perspective, he concluded that the function and role of standards bodies should be to take what is going on in the ICT industry and make it understandable to others -- as an information dissemination function -- a service to those seeking entry, and not as a way of dictating what should be done.

GENERAL DISCUSSION

Rob MOREL (Oracle Corporation, USA) noted that the session focused almost exclusively on Business Process Re-engineering (BPR), which is only the initial phase in the development and application of ICT. Many companies, he noted, have already passed through this phase. He saw the transition as moving from BPR through re-engineering of distribution channels ('value chains') to the development of what he called 'value networks'.

Georges FERNÉ (OECD) emphasised that the codified knowledge industry is becoming very important. Yet, he asked, does this industry really have to take over all other kinds of knowledge? Must all information be codified? And, he asked, are we not underestimating what, historically, can be seen as 'codified knowledge' in earlier stages of our economies? He also noted that ICT and electronic commerce were too often identified as one issue when, in reality, electronic commerce is only one of many applications for ICT. Moreover, he hypothesised that with electronic commerce we are going to see not so much BPR of firms as we will see re-engineering of our markets on a global scale.

Mr. SULLIVAN agreed with the views expressed by Mr. Ito. He described information as data that enables action. If it does not enable action in the business context, it is just data. Information is not about what has been accumulated, but about what has been acquired that enables action. He further elaborated that codified knowledge implies information about information, while uncodified knowledge implies a yet-to-be-realised business opportunity.

How should 'skill' be defined?

Risaburo NEZU (OECD) questioned the traditional concepts of skill as the ability to read and understand versus skill as the ability that is acquired through years of repetitive experiences. He asked, in a society in which codified information dominates, what does 'skill' mean?

Mr. DUMORT proposed a distinction between vocational skill and social skill. He defined vocational skill as the technical background that enables people to manage the working day, and social skill as the capability to communicate with one's environment and to understand the working world they inhabit. This latter type of skill is the more valuable skill.

He saw the critical challenge of the future as one of improving the learning capacity of our institutions. We need to change the established culture of education and training, Mr. Dumort said. We need to move toward open-access, self-responsibility, and the development of true life-long learning pathways between education, training, work, and home life.

A workshop participant from Canada also pointed out that the session discussed the relationship between ICT and the entire economy -- how organisations could provide better core products to consumers and how ICT could fit into the organisation-customer relationship from a consumer, business and government perspective.

Session Chairman **Mr. BRESNAHAN** returned to the earlier discussion of BPR with this question: Will we need in the near-term to obtain economic value that comes from redrawing company borders and boundaries?

Mr. IMAMURA explained that, based on the case study experiences of BPR in Japan, it has become clear that top management prioritises the maintenance of the employment status quo in order to maintain social stability. However, although he anticipates that this situation will continue in the near future, he notes that there are already some signs of change. For example, increasing numbers of young Japanese employees are changing jobs more frequently and seeking jobs that can maximise and enrich their abilities.

What is the future scenario for the ICT industry? Does social stability mean enforcing the status quo or risking change for an improved system?

Edward STEINMULLER (Maastricht Economic Research Institute on Innovation and Technology [MERIT], The Netherlands) asked the workshop to consider where the ICT industry is headed. Will the future mean a situation where companies will become more like each other internally as envisioned by Mr. Spinardi? Will the status quo and maintenance of social stability prevail, with the large corporation intact or its dissolution into thousands of business units, as indicated by the findings of Mr. Imarura? Or, will it mean a situation whereby companies will become more specialised, a world comprised of very small, highly-differentiated, rapidly moving firms, presumably nibbling away at the larger enterprises, as suggested by Mr. Ito?

Mr. IMAMURA furthered this rhetorical question by asking participants to consider what exactly is 'social stability.' Does social stability necessitate keeping the status quo as dictated by large companies, or does it entail breaking up these large entities into smaller, more compartmentalised companies?

Mr. ITO responded by stressing that the ICT industry today is comprised of (at least) two components: a manufacturing industry comprised of large companies and an information industry comprised of small and medium-sized entrepreneurial firms. Both have very different needs and abilities and should not be treated as one industry. Until this point, it has often been mistakenly assumed that the situation of large companies is a reflection of the situation of the industry as a whole.

Mr. SPINARDI noted that based upon his analysis of large British aerospace companies, internal communication within these companies was often as bad or more difficult than communication between companies, leading him to conclude that splitting up the large corporations into several organisations might actually be a good thing because it would improve communication.

Mr. MOREL agreed with Mr. Ito's earlier point with regard to the composition of the ICT industry. He noted that based upon his experience in the Netherlands PTT, setting up a network of companies within the PTT was useful. He further noted that in today's ICT industry, producers are increasingly looking like (and acting like) consumers. And, the more that happens in the industry, he

asserted, the more effective the industry will be in producing goods and services in the marketplace. In fact, today on the Internet, consumers are becoming producers themselves.

Mr. LEHR added that the introduction of standards would facilitate the industry entry of smaller firms while codified forms would enable companies to protect their information.

Session Chairman **Mr. BRESNAHAN** described two very different visions of business change as fostered by ICT running through this discussion with different focuses of economic activity:

1) a bottoms-up, free-wheeling individual communications model as represented by the Internet, and

2) a top-down controlled re-organisation of economic activity resulting in changes in the supply chain.

He noted that the Internet and the business changes it permits as described in the former should be regarded as a continuation of personal computing; it is highly-decentralised, responsive to what individuals want, disorganised and chaotic. While the latter is a continuation of departmental computing and enterprise-wide computing. As such, it is highly-centralised, top-down, controlled and controlling.

Mr. FORAY added that the knowledge codification process always takes on new forms. The process is not a simple transfer from tacit knowledge to codified knowledge, since the codification of knowledge will never be complete. New tacit knowledge will always appear as the codification of one set is finished. However, he said that ICT will enable the industry to fully realise the spillover potential of the codification of knowledge and to improve its economic value and quality standard. However, firms that exchange data through the electronic network must have a common base to share and make use of knowledge. Yet, without the feedback through electronic commerce you cannot get the full potential of those information technologies.

A workshop participant from Finland added that data alone has no special value. Data only becomes information once it provides value to users.

Mr. ITO re-emphasised that, in his view, knowledge is a verb, that information is constantly changing. Because of the rapid depreciation rate of information, the codification of knowledge is becoming less important than the codification of streams of data. This is where the importance of 'infomediaries' becomes most apparent. From this perspective, much value will be placed on 'infomediaries' and their ability to know where information is going to be coming from and how to acquire this: a kind of just-in-time information.

This skill -- which is basically 'knowledge about knowledge' -- is hard to codify. And, therefore, looking at it as a service industry rather than as a database, packaged, manufacturing and distribution-style industry may be more helpful.

Mr. IMAMURA cited the example of the Yokogawa Corporation, which has begun to use the Internet in their business. He explained that through this internal network, each division could immediately see what other company divisions are doing and all employees can share the same information instantaneously. This, he said, has led to improved worker productivity.

How will the cost of information co-ordination be allocated?

Robin MANSELL (University of Sussex, UK) inquired as to who will bear the cost of future information co-ordination and how that burden will be allocated -- particularly for the cost of creating open business platforms and the use of intermediaries.

Mr. IMAMURA replied that any individual or party who profits must bear a corresponding burden. In the United States and Europe, users join open-system standard bodies and pay a fee. In Japan, users do not pay anything to promote the standard.

Mr. FORAY added that co-ordination of costs is possible without sacrificing knowledge dispersion or the open business platform. Codification of knowledge will also lessen the operating costs involved.

Session Chairman **Mr. BRESNAHAN** noted that traditionally the supply of and access to knowledge was paid for by advertising and commercial interests.

Mr. ITO suggested that information is a value that can be bartered for access. Any party with some value to offer can participate in a barter exchange because modern technology has lowered co-ordination costs considerably. The point is, he said, that if you can create a liquidity in the transaction of value in exchange for access, it becomes a potentially interesting solution.

Can smaller companies offer comparable job security?

Ambassador Pasi RUTANEN (Permanent Representative of Finland to the OECD) asked Mr. Ito how small, fast-moving companies can offer better job security than large companies.

Mr. ITO replied that job security depends on the industry involved and that skill itself was a form of job security. He referred, by analogy, to the rise of the small, independent movie producer in the United States. He noted that these independent producers have been successful in putting together teams of many different small companies and then negotiating with the very large movie studios for movie financing and distribution. This is how it works, he said: the independent producer gets the movie produced and the big studios get a percentage of the profits for their financing and distribution services.

Small ICT companies are based on constant change, allow for the development of a speciality, and regard the value of an employee differently. For small companies, Mr. Ito said, the skill of the employee is determined by his/her wide variety of contacts and the ability to learn quickly.

Can multimedia companies survive over the long-term?.

Mr. DUMORT asked the workshop participants whether or not multimedia companies are really profitable and whether these companies will be able to survive in this industry over the long-term.

Mr. MOREL replied that the multimedia market is very fragmented and changing its orientation from spatial segmentation to time-based segmentation. His firm, Oracle Corporation, is itself creating teams that concentrate solely on finding new ways to create other profitable, value-chain businesses.

Mr. ITO concluded that smaller companies have two abilities: they can take more risks in exchange for higher profits and can move much faster. For these companies, the product turn-around cycle is six-months. Large corporations, on the other hand, have a long-term view, while smaller companies are run on a short-term, high-profit scheme. At the outset, smaller companies create the ideas and absorb the

risks. These are eventually bought out by the large companies who, using their finances, act as packaging, distribution, and quality-control mechanisms.

SESSION 2: ELECTRONIC COMMERCE -- FRONT-LINE OF THE BUSINESSES, TECHNOLOGIES AND INFRASTRUCTURES

This session discussed the impact of new technology on a macro- and micro-economic level. The participants agreed that ICT does not automatically destroy jobs as commonly feared, but rather improves efficiency and therefore must be further developed for wider use and application.

In the opening session, **Kenichi IMAI** (Stanford Japan Center, Japan) compared the economic trends in recent years. In the 1980s, economic opportunities were based on technological and social change, which promoted innovation. In the 1990s, electronic commerce has gradually created new economic opportunities, markets, technology and institutions.

PRESENTATIONS

The development of information infrastructure in Japan

Mitsutoshi HATORI (University of Tokyo, Japan) sketched the key developments in the information infrastructure in Japan as follows:

1) the National Information Infrastructure (NII) and Global Information Structure (GIS) as set forth since 1993 have influenced greatly information infrastructure in Japan;

2) various multimedia experiments were subsequently conducted including: the medical information network, remote education, unification of communication and broadcasting using fibre optic cable, and local area trials;

3) the Open Computer Network (OCN) was constructed (to be completed by June 1996) by the NTT, using a high-speed computer network based on TCP/IP, for Internet providers and as the basis for a future infrastructure;

4) MITI organised a technical study association and a voluntary conference for the promotion of Continuous Acquisition and Life-cycle Support (CALS) in May 1995;

5) NTT has instituted the ANSWER service to provide on-line inquiry of account balance and money transfer services, as well as the CAFIS service to provide credit inquiry services.

Establishing electronic commerce for the mainstream economy

Mr. Kenji ITO (McKinsey & Company, Inc., Japan) detailed the scenario for a possible future payment scheme for consumer-oriented businesses via electronic commerce. He noted that, at present, the industry has yet to institute a safe and fully-efficient payment system that can protect consumer privacy and handle both small and large transactions.

He explained that detailed client information is necessary to further develop such a system. Effective security measures are also needed to ensure proper identification and authentication of parties involved and to verify transactions.

Existing payment systems for consumers include telephone bills, encrypted credit cards, and a credit card payment support system. A future possibility is a new system that will accept E-cash on an open or closed network. The development of the system, however, will entail updating the present infrastructure, establishing standards and regulations, and adequately briefing consumers regarding usage and benefits.

The network environment will also determine the appropriateness of the payment scheme. A closed network will mean a more lenient security regime as well as a possible facility for small-value transactions, while an open network may be required to ensure more rigid security measures.

In conclusion, Mr. Ito predicted that actual implementation of a fully usable payment scheme involving electronic commerce will take at least five years and that no single scheme will dominate the market in the near future.

Multimedia companies as profitable, pragmatic creators of new business

Rob MOREL (Oracle Corporation, USA) discussed multimedia activities as a form of re-engineering from a hands-on perspective.

He noted that the operations of established enterprises such as banks are becoming more electronic-based and, therefore, are moving towards a common platform with telecommunications companies.

Telecommunications companies are themselves changing to adapt to new situations and are moving from their traditional functions to be able to work more closely with other institutions and to keep up with the needs of the market.

These companies now have a more customer-focused marketing scheme that consists of a one-to-one customer profile detailing activity and the creation of a corresponding payment scheme. New business is also being generated by encouraging creative units within the company to create new profitable enterprises under the guise of a value-chain service. Each addresses the customer clock and becomes a distribution channel itself. Company revenue is generated by the total package of services rather than by a single system alone.

James RUDD (Wells Fargo Bank, USA) said that he expects electronic transactions to rise because of the increasing popularity of the Internet, falling transaction costs, and the change from a mass marketing orientation to niche marketing for the individual.

Electronic cash (MONDEX) will simultaneously be developed as an alternative to paper currency. Mr. Rudd asserted that MONDEX is convenient, quick and cost-effective. It will also provide merchants with lower operating costs and greater security.

PANEL DISCUSSION

Yasuhiro SENDA (Cyber Business Association, Japan) noted the importance of establishing a credible payment scheme for electronic commerce, as mentioned by Mr. Ito. He also agreed with Mr. Imamura that many Japanese companies are revising their current structures as part of re-engineering. Many Japanese small and medium-sized enterprises are providing high technology to big companies. He said he felt that the Japanese government must provide incentives to re-activate and keep the dynamism of the former.

What are the issues that need to be defined for electronic commerce?

Edward STEINMULLER (MERIT, the Netherlands) noted the various issues that need to be clarified for transactions via electronic commerce such as:

1) Terms of Reference -- parties involved should have common terms of reference. This cannot be established by the electronic system.

2) Terms of Negotiation -- identifying issues for negotiation between parties in a concrete, precise manner.

3) Requirements of Form.

4) Payment Receipt -- transactions should be defined, implemented and registered.

Mr. Steinmuller further noted that there is a need for changes in the idea of ownership of information. Traditionally, ownership has meant that rights of usage of a product are exhausted upon the sale or disposal of the product. The meaning of ownership in relation to information may have to be changed to protect intellectual property. He suggested that the following possibilities might apply:

1) making the use of information a public matter to avoid the violation of any copyrights;

2) creating a product that self-destructs after making itself available to the appropriate owner;

3) establishing a system of internal identification.

Will a new currency for electronic commerce be necessary and viable?

Mr. Steinmuller concluded by also questioning the concept of E-cash and Smart cards as multi-purpose by necessity.

Mr. KANG, Hong-Yol (KIDSI, Republic of Korea) stressed the importance of E-cash and the need for institutional and legal acceptance, and the institution of adequate safeguards. The physical flow of products based on electronic cash transactions should also be taken into account.

GENERAL DISCUSSION

A workshop participant from Japan asked if MONDEX will be feasible on an international scale and how the foreign exchange system will be managed.

Mr. RUDD replied that MONDEX can presently accommodate up to five different currencies. He also indicated that MONDEX will have different international working groups as well as an international oversight body.

A workshop participant from the OECD concluded that this session highlighted the concerns over security of payment via electronic commerce, although few references were made towards the protection of consumers. Therefore, globally-enforceable regulations to protect all parties concerned should be established before electronic commerce transactions are fully recognised.

At this moment, various types of electronic commerce are being undertaken between partners who know and trust each other. This system, however, is not possible in its present form on an open market. As is, the system also makes market entry difficult for new partners.

Mr. ITO pointed out that so far electronic commerce has been led by venture-type companies. From this point onwards, electronic commerce needs appropriate infrastructure to develop.

Mr. Akio ONISHI (OECD) noted that turning MONDEX into an internationally-accepted currency will involve a huge investment. He asked how this expense will be allocated and whether the market envisioned for the future can actually bear the infrastructure costs necessary for the transformation.

A workshop participant from France described the two-payment system as incompatible on both a technical and an institutional level. There must be an agreement between all users on the workings of the system.

Mr. RUDD clarified that MONDEX is targeted for the mass market that can afford a cheap and convenient device. At present, it is a stable platform largely unburdened by heavy infrastructure and accounting costs, but its deployment must still be worked out.

Mr. MOREL stressed the unequal balance of market share for current electronic commerce currency options. MONDEX and other electronic payment cards are, he said, all operating on varying standards that are mutually incompatible.

The workshop session ended with a general agreement to focus on the actual means to further concretise the various ideas and options discussed here in Tokyo at the next workshops to be held in Finland and in the Republic of Korea.

SESSION 3: INSTITUTIONAL SETTINGS FOR THE REALISATION OF THE GLOBAL MARKETPLACE ON THE NETWORK

The overall aim of Session 3 was to determine which institutional settings would favour the realisation of a global marketplace on the network. The session addressed the different issues linked to electronic commerce such as legal aspects, security, impacts on the monetary system, and standardisation.

PRESENTATIONS

What institutions should be set up to organise electronic commerce?

Eric BROUSSEAU (University of Nancy II, France) presented two typologies to classify the different institutions that will set up and enforce the rules necessary for the development of electronic commerce. The main conclusions of his analysis are twofold. First, in the near future, the electronic market will be fragmented because different institutions will regulate the market and different types of business transactions will take place in the marketplace. Second, the different systems proposed to organise the electronic commerce have their advantages and short-comings and no best system seems to emerge for the time being. The following paragraphs present the two types of typologies introduced by Mr. Brousseau.

The first typology classifies the different institutional environment for electronic commerce by the two main functions that the institutions may perform. These two functions are, first, rule design and, second, performing and co-ordinating services. There are four cases:

1) In the first case, the sole rule design is performed centrally by a collective body. The performing of co-ordination services is left to the economic agents. This is the case of the different EDI standardisation committees.

2) In the second case, only the performing of co-ordination services is centrally done. The collective rules have been *ex-ante* created. This is the case of airline computerised reservation systems in Europe.

3) In the third case, one or two collaborating institutions perform centrally the design of rules and provide communication and co-ordination services. Examples of such systems include the "D'Arva", a VAS designed for the insurance industry in France and the American Petrodex system.

4) In the fourth case, all the communication and co-ordination tasks are performed centrally. This case is not covered in the presentation.

The second typology is focused on the institutions themselves and their ability to perform both functions designing rules and performing co-ordination services. The typology distinguishes four types of organisations that can perform these tasks: a dominant player company, an entrepreneurial company, an association of users, or a club of users.

Different criteria are used to evaluate each system. The main criteria are: appropriateness of specifications, universality, completeness of the solution, quickness of the design, adoption probability and evolutivity.

Mr. Brousseau outlined each of these different typologies and explained the diversity of the different electronic markets.

Multimedia applications issues: regulatory aspects

Taro KOMUKAI (InfoCom. Research, Japan) presented an analysis of the restrictions currently imposed by the Japanese legal system on the development of new multimedia services. He proposed a methodology to clarify the conditions that have led to these restrictions and developed new points of view for making the necessary modifications to the current regulations.

Mr. Komukai presented a list of the multimedia applications that are currently restricted in Japan. His list covered a wide range of applications. Among them were: medical treatment (telemedecine); home security (telesurveillance); real estate; and on-line shopping for certain specified goods. Participants were not surprised to find items such as on-line banking, digitalisation of account books or administrative procedure on the list, but non-Japanese were surprised to find that one could not buy rice on-line.

He attributes the reasons for such a large number of restrictions to two main factors: first, legislators did not have an idea of the new possibilities that would be brought by multimedia when the laws were first conceived and, second, in many cases, Japanese law requires that a paper document be produced during the transaction and/or that the co-operating parties meet person-to-person. Remote interaction through networks were not foreseen.

One of the reasons why a paper document is required is that such a document guarantees the authenticity of the transaction because a paper document is unique. Another reason is that paper documents protect privacy; data on paper are easier to protect than digital data which can be copied easily or exploited to make computer databases which may in turn compromise individual rights.

Mr. Komukai also proposed a framework for analysing the incentives that different parties have (bureaucrats, industrialists and consumers) to seek modifications to the present regulations and the balance of power that currently exists between them. By analysing the objectives of the different parties concerned and their balance of power relationships, the purpose of the current regulations can be better understood. From this analysis, one can also make propositions to modify the regulations in order to promote the development of multimedia services in Japan.

Regulation issues for electronic commerce

Takashi UCHIDA (Faculty of Law, University of Tokyo, Japan) presented two classifications to clarify the legal issues involved in electronic commerce. These classifications identify three types of electronic transactions and four stages of legal problems posed by electronic commerce. Depending on the different stages, the solutions to the legal problems are of a different nature.

Mr. Uchida proposed that electronic transactions be divided into three types: (1) EDI transactions associated with closed networks between specific corporations (EDI); (2) electronic commerce in which corporations can select transaction partners from a range of unspecified corporations within a network (Open EDI); and (3) consumer transactions occurring within a network (E-mail-type consumer transactions).

He identified four stages for the development of electronic commerce. In the first stage, electronic commerce is defined as closed EDI. At this stage the typical problem includes how to deal with the legal concepts of writing, signature original and preservation of records. UNICTRAL commenced work on drafting an international uniform law in 1993, which is now largely complete.

In the second stage, in order to expand the possibilities of tie-up between corporations through the network, communications protocols and business protocols are being standardised by UN/EDIFACT. This standardisation may cause problems to smaller and weaker corporations that cannot afford the burden imposed by such standardisation.

In the third stage, Open Network-type electronic commerce, computer networks represent a new world in which it is possible to build new shopping malls and open retail business. In this context, it is virtually impossible to unify the different domestic laws that apply. In that case, the solutions would be to use standard form contracts with rational content and put in place schemes whereby the inevitable damage that occurs is covered by insurance.

In stage four, electronic money appears. However electronic cash is simply a metaphor and how to construct electronic cash in legal terms remains an unresolved issue. He concluded that the (eventual) appearance of electronic money will lead us to ask the fundamental question: What is money?

Standards, security and encryption: technical innovations, policy and standards

Robin MANSELL (University of Sussex, UK) presented a very detailed study of the different issues related to security. She began by outlining the crucial importance of security for the development of electronic commerce. Consumers will not buy on the network unless they are convinced that the network is secure. She also made an important point by declaring that contrary to common public opinion, security issues are not only technical but are mainly organisational issues. What is really important is the way public and private networks will be organised. Ms. Mansell concluded that a public debate should be opened on this subject.

Ms. Mansell observed that the different networks are still immature. In this context techniques to implement security and to enforce it have still to be developed. The security of a chain of transactions is defined by its weakest link.

She also remarked that the issue of security has a psychological dimension; the central issue is to have the public perceive that networks are secure. This perception of security by the public is at least as important as security itself for the development of electronic commerce. Public and private organisations have to work on that.

Ms. Mansell concluded her presentation by underscoring the importance of the first mover advantage for the implementation of networks. The existence of a strong incentive to move quickly in face of competition may, in fact, lead to unsecured environments because organisations may not take the

necessary time to implement the level of security necessary on the networks. Finally, she observed that there is a trade-off to be found between security of transactions and personal privacy; that is, increased security tends to have an adverse effect on personal privacy.

Public policy and regulatory issues posed by E-cash

Konrad ALT (United States Treasury Department, USA) discussed the public policy issues posed by electronic money for monetary authorities. First, he observed that sales using electronic cash will stay relatively low in the coming years relative to the total amount of commercial transactions. This will limit the scale of any problem that may appear.

He described several different sets of issues that may appear at different time horizons. In the near term, three main issues will appear. First, more information will have to be provided to consumers so that they can make good judgements and so that they will not become victims of fraud. Second, a system will have to be devised so that consumers are protected when they lose their electronic payment device and when issuers of electronic money may default. Finally, the privacy of consumers has to be insured.

In the intermediate term, Mr. Alt identified three main issues. First, law enforcement regimes need to be put in place to prevent counterfeiting, money laundering, tax evasion, and to insure privacy protection. Second, electronic payments need to be made safe and sound; procedures need to be put in place to deal with operational malfunctions, risk settlement, bank failures, user identification and authentication. Third, the overall organisation of the electronic cash system (i.e. the delivery system) will need to be better defined.

In the long term, which Mr. Alt perceived in terms of the next few decades, several questions will need to be dealt with. The central banks will have to cope with the loss of revenue through seignorage; a loss linked to the reduction of the amount of physical cash in circulation. The system will have to be extended internationally and new administrative structures will have to be created for that eventual purpose.

In conclusion, Mr. Alt insisted on the necessity of achieving a balance between the need for consumer protection and the promotion of innovation in light of the fact that both private and public institutions have a vital role to play in establishing the electronic monetary system.

PANEL DISCUSSION

Government encouragement of network development

Nagayuki YAMASHITA (NTT Data Institute of Management Consulting, Japan) outlined several roles that government has to play in promoting the development of networks.

He noted that in order to promote electronic cash, widespread computer literacy needs to be encouraged. In that regard, government has an active role to play in developing electronic environments. For example, government should promote the use of electronic networks everywhere it is possible, starting with the implementation administrative procedures, such as the electronic filing of citizens tax returns.

Government also has an active role to play in the development of standards and in creating the right institutional settings for electronic commerce. To illustrate this point, Mr. Yamashita cited the example of the role played by the credit agency Moody's, which serves an important institutional function

in providing financial credit rating services. He noted that in the same way that Moody's operates in the financial world, other private institutions should also have a role to play in the standardisation process affecting the world of electronic commerce.

Government's role in defining the business platform for electronic commerce should be limited

Jiro KOKURYO (Keio University, Japan) observed that the development of the electronic network involved one central issue: trust. How can strangers come to trust one another, he asked? He noted that today "we are moving from a network of buddies to a network of strangers." He presented a list of questions that he found of particular interest that were raised by the previous Workshop presentations. These included the following:

- How to create enforceable rules and perform network co-ordination?
- How to balance the need to protect the public interest with the need to promote innovation?
- How to begin to solve some of the complex legal issues in electronic commerce raised in Mr. Uchida's presentation?
- How can technology help to establish higher levels of trust on the network?
- How to deal with the fact that all these issues are global and not national?

Finally, Mr. Kokuryo observed that governments have little chance in defining the business platform for electronic commerce. It will be the private institutions that will take the lead in defining the future electronic commerce environment. He concluded by noting that government should tell the private sector what not to do, rather than to tell it what to do.

Government's role is to facilitate the development of electronic commerce

Georges FERNÉ (OECD) presented a more proactive role for government in the development of electronic commerce. Noting that government does have a role to play in the definition of business platform for electronic commerce, he referred to Mr. Brousseau's presentation which warned of the danger posed by many different types of institutions setting rules for electronic commerce. He said that this could lead to a fragmented market. On the other hand, he observed that companies who participate in several networks will push for a unification of the rules and protocols on these different networks in order to reduce costs. He also mentioned the federal role of government and especially that of public agencies in defining new standards. He cited the role of such agencies as the US Treasury Department, fiscal administrations and customs administrations that are co-operating under the direction of the OECD.

On the legal issues, he questioned whether laws restricting the use of electronic commerce will be really enforceable. He noted that legal problems started well before the use of the Internet with the use of the telephone and the fax machine for business transactions.

Mr. Ferné compared the electronic highway with the traditional highway, saying that while improving security was important, zero risk was not an achievable goal, and perhaps not even a desirable target. Yet, absolute security is not the only issue to be considered; privacy is also important. He concluded that, after all, government was "a good partner" for the development of electronic commerce.

GENERAL DISCUSSION

Mr. BROUSSEAU said that there was an opposition between business practices that tend to foster a particular way to handle transactions in each different industry and the establishment of a universal solution for electronic commerce. As a result, he said that there will not be a single institution that will cover every transaction. There will be several networks regulated by several organisations, instead of only one network. With respect to which institutions will regulate the network, he predicted that there will be a mix of both public and private institutions. In some instances, public institutions will support private institutions in the regulation of networks. The central role of government and public institutions will mainly be to create an adaptive legal framework.

Ms. MANSELL noted the fact that at the international level, several different organisations are dealing with electronic commerce and their studies may overlap. For example, she cited that copyright issues are currently being addressed by the World Trade Organisation. Broadcasting issues are the province of the United Nations. Many other organisations are dealing with issues related to networks and multimedia, but no complete co-ordination has been established as of yet. There is already some overlap between these activities.

Mr. KOKURYO presented a positive perspective, saying that despite all the problems mentioned, electronic commerce will go ahead anyway. Regardless of what government may or may not do, he felt that the dynamics behind the development of the network are so powerful that networks will develop of their own accord.

Mr. ALT underscored again the importance of international issues and raised the following questions: Who will guarantee electronic money? Who will issue electronic money? He estimated that solving the international issues will pose the hardest challenge of all.

Expanding on this theme, **Mr. UCHIDA** insisted that for the time being, no legal framework exists for electronic money. An entire new legal concept and framework will need to be developed. Among the legal questions that need to be addressed, he mentioned the following two concerns: how to construct electronic money and what if the user goes bankrupt? He insisted that on these different points, the legal system of each of the OECD countries is different. This will be a most difficult legal problem to solve, he said: introducing harmonisation to create a global network.

Mr. ONISHI (OECD) asked what were the major legal issues to be resolved regarding electronic commerce. **Mr. UCHIDA** repeated that the major issues were international. He felt that a central concern was how to unify laws between different countries concerning consumer transactions on the Internet. He noted that each country has different consumer transaction laws and that no single organisation is currently working to harmonise these different laws. He concluded by saying that a considerable amount of work still remains to be done in this area.

SESSION 4:
DATA -- MEASURING NETWORK TRANSACTIONS AND IMPACTS

The focus of Session 4 was on presenting the status of activities aimed at monitoring electronic transactions and their impact on the economy. The first three speakers presented research results based upon recent statistical analyses; the two latter speakers focused more on the availability data.

PRESENTATIONS

Use of information networks, organisational changes and productivity: firm-level evidence in Japan

Kazuyuki MOTOHASHI (OECD) presented the results of statistical analyses of firm level data of the Basic Survey of Business Structure and Activities carried out my MITI in Japan. This survey covers a large sample of about 23 000 firms both in industry and services, with at least 50 employees and 30 million Yen in capital.

This study revealed that the information networks are now widespread in Japanese firms. 64 per cent of the firms have internal networks and 43 per cent of them use networks connected to the outside. On the whole, more than 80 per cent of the companies use networks. The use of networks is more widespread among large firms than small firms.

Mr. Motohashi emphasised the 'general purpose' nature of IT, noting that IT is not a sector-specific technology, but one that diffuses into a variety of industries. He pointed to strong evidence of the organisational impacts of network use. Regression analysis shows that use of business supporting networks has an impact on white collar jobs. Use of on-line ordering systems is strongly correlated with outsourcing activities. However, the impact of information technology on productivity was not clear in the survey data he presented.

Measuring intersectoral spillovers from IT to non IT Sectors: French evidence

Hans VAN MEIJL (Agricultural Economics Research Institute, LEI-LDO, The Netherlands) presented the results of his study of the R&D spillover effects, documenting the increasing importance of information technology. His statistical study was based on data on French firms provided by INSEE, covering the period 1978-1992.

The main conclusions of his study were:

- rent spillovers related to IT investments are important for productivity growth;
- the IT productivity paradox is vanishing in the most recent period, giving credence to the 'lag hypothesis', to the effect that it takes time for a new key technology to be fully exploited;
- increased codification in the IT era makes knowledge more meaningful and useful for other firms; and

- the intensity of IT spillovers has intensified in the recent years and a comparison of the 1985-1992 period with the 1978-1985 period shows that IT spillovers have doubled in the latest period compared to the previous period.

Analysis of Inter-sectoral impacts using I/O table

Takeshi HIROMATSU (University of Tokyo, Japan) presented the results of his study based on Porat analysis. He pointed out that although the size of the information industry in Japan is relatively small (4 per cent of the economy), in a narrow sense, the size of the 'inner information sector' is high. Using the method proposed by Porat (1977), Mr Hiromatsu found that: in 1985, 36.8 per cent of Japanese employees were engaged in information-related occupations.

If this 'inner information sector' is included in the information industry, the share of the information industry in total products rises to 18.1 per cent and the total output of the inner information sector (117 trillion Yen, equal to 14.7 per cent of total production) is four times larger than the information industry in a narrow sense (26 trillion Yen). Thus, he concluded that the share of the Inner information Sector plays a crucial role in the computerisation of the economy.

Mr. Hiromatsu further pointed out that it takes a considerably long time (5+ years) to collect data in Japan and that current classification systems are also inadequate; they are based on manufactured goods, not on information and related services. Although this latter problem has been recognised by the Government statistical standards department and a new classification system has been recently introduced, it will still take some time before up-to-date statistical analyses can be undertaken.

Linking Information Highway (IH) infrastructure with transactions

George SCIADAS (Statistics Canada, Canada) presented a series of recommendations for the measurement of transactions in the Information Highway (IH) structure and some statistics about the diffusion of IH infrastructure in Canada. His main recommendations for the measurement of transactions include:

Households

- infrastructure data collection should continue and become more detailed;
- measures should be expanded to include software and the usage of the Internet; and
- prices measures must be constructed to complement existing telephone price indices.

Businesses

- on the supply side, existing statistical infrastructures can be augmented to measure transactions;
- on the demand side, new surveys are necessary (for example, until recently, the telecommunication industry operated in a non-competitive environment and thus such measures were not deemed necessary); and.
- prices must be constructed preferably by firm size.

Government

- indicators are needed for the availability, use and application of government services;
- detailed infrastructure statistics for schools, together with costs and usage, need to be collected; and
- measurements are required for service availability by hospitals and other health care facilities; as well as
- quantification of services provided through libraries.

Indicators for the Global Information Society (GIS): review and compilation of available statistics

Mika KAWACHI (OECD) presented a framework for compiling indicators for the Global Information Society (GIS) and also reviewed some of the statistics she gathered. For the classification of the different indicators, Ms. Kawahci proposed the following framework:

1) equipment: a) equipment diffusion and use, b) service use and content consumption, c) user profiles;
2) communication infrastructure: a) level of digitalisation of subscriber networks, b) geographic availability of ISDN, c) cable access;
3) services and content: a) communication services, b) on-line services, c) Internet, d) packaged content.

Ms. Kawachi presented a series of indicators that were compiled for selected countries for international comparisons according to the framework.

PANEL DISCUSSION

Hajime ONIKI (Chukyo University, Japan), noted that the presentation of Mr. Motohashi, and more specifically, his reference to the emerging trend toward company 'outsourcing' provided an interesting approach to defining the boundary of a single firm. One way to look at this issue, he contended, was in light of whether a particular worker (labourer) was (a) hired on a permanent, full-time basis or (b) hired as a temporary employee on an ad hoc, contract basis. That is, being hired on a permanent basis defines the effective boundary of a firm. Thus, he noted that given the fact that this boundary is affected by the cost of ICT activities and since this cost has been dropping drastically, the boundary of business (and other) organisations can be changed quickly. He felt that Mr. Motohashi's paper demonstrated this point clearly.

On the issue of data measurements, Mr. Oniki raised a series of questions that he felt needed to be addressed in the future. These included, for example, the following: if the cost of ICT cannot be measured in terms of money, what measures should be used; how can one measure spillover effects of ICT investments within a single firm; how can one measure spillovers in the context of a group of firms like keirestsu in Japan; and, if ICT investments by firms are sub-optimal, what are the public policy implications regarding subsidisation to encourage investment in ICT?

Finally, with respect to the time delays associated with data collection (Hiromatsu) and difficulty of assembling international comparative data (Kawachi), Mr. Oniki proposed an innovative solution: why not use the mechanism of a 'Request for Comment' (RFC) and the Internet to establish an international forum on the World-wide Web (www) for the collection, review and comment on statistical data pertaining to ICT?

Andrew WYCKOFF (OECD) noted that Mr. van Meijl's analysis showed fairly conclusively how rent and knowledge spillovers from the ICT sector do have an observable impact on economic productivity and that this impact increases over time. He suggested that this analysis be applied to other countries. He also complimented Mr. Motohashi on his analysis, showing the heterogeneity associated with ICT both across sectors and size classes. He applauded MITI for its pioneering survey work and encouraged MITI to expand the scope of its surveys to other service sectors, such as finance, insurance, and other business service sectors. Mr. Wyckoff seconded Mr. Oniki's point about the need to devise creative ways to use the private sector to help leverage what limited resources the OECD has at its disposal for data collection and analysis.

GENERAL DISCUSSION

During the brief general discussion, a Canadian participant pointed out the need for closer linkages between policy-making and statistical analysis; analysts, she said, need to ask policy-makers what the key questions are that they need answered. Similarly, better linkages need to be forged between macro- and micro-economic analyses for policy-makers.

An OECD delegate from Finland also noted that national statistics can sometimes hide more than they reveal, especially if the country is large, such as the United States. Care should also be exercised in interpreting data concerning component parts of a given country, wryly concluding that "whatever California is doing today, other countries will be doing 'X' years from now, weather permitting."

SESSION 5 : FUTURE RESEARCH AGENDA

Ambassador Pasi RUTANEN, chairman of Session 5, opened the session by commenting on each of the sessions and the future research agenda.

He stressed that despite all grand visions that the ICT might realise, the OECD countries must immediately deal with a transition period of economic dislocation and the lack of sufficient knowledge base. To deal effectively with this transition period, improved indicators must be developed to assist policymakers in understanding what is happening -- to jobs and SMEs in particular.

He also emphasised the need for a better understanding of the implications of the development of electronic commerce and its impact on firms and on the business environment. In particular, the role of SMEs and resulting implications for job security need to be studied further.

For an effective transition to a knowledge-based society, the Chairman noted that companies must change and harmonise their working practices, but also that educational systems must be re-engineered to produce the educated labour force required.

It was also stated that institutional settings must be re-invented to ensure the security of electronic networks and electronic money in order to maintain public confidence in ICT. Standards for inter-organisational data security policy might be needed.

Lastly, the Chairman stressed that it is a new responsibility of governments to raise public awareness and dispel fears that ICT permanently destroys people's jobs and their future.

In response to the request made by the Chairman, **Guild NICHOLS**, the workshop Rapporteur, summarised the research findings and views presented as well as the discussions that took place in each session. (See workshop summary for details.)

Ambassador RUTANEN then asked the session chairmen to express their views concerning their session and/or the overall workshop.

Timothy BRESNAHAN, chairman of Session 1, said that the structural shift of ICT vendor industries from a vertically integrated stable structure to vertically disintegrated structure with excellent price-performance features and rapid product life cycles had made it more difficult to predict future developments. Mr. Bresnahan stated that one of the negative side effects of this structural change from the perspective of users and governments is the dramatic rise in hype, particularly concerning standards.

Mr. Bresnahan proposed some future agenda items such as the need to include users' representatives in the workshops and the need for using data from private sector sources.

In response, **Alain DUMORT** representing the European Commission, stressed that the objective of this series of workshops was to provide policy makers with up-to-date research on the

economics of the information society and that speakers should comprise of economists and researchers rather than users. He also stressed the difficulty of using private sector data.

Kenichi IMAI, chairman of Session 2, outlined the session by saying that the Internet-type networks and intra-firm networks are being combined and that many "experiments" are already taking place from which a number of economically important questions are being raised such as "what is money?" and "what impacts will electronic commerce have on macro economy?".

Mr. Imai then suggested the following items for a future research agenda: how to cope with international differences in institutional frameworks; who will pay for the investment required for electronic commerce; how can governments promote the creation of firms in electronic commerce; deregulation; and the use of IT itself and actual experiments/case studies for studying the impacts of the IT.

Dimitri YPSILANTI, chairman of Session 4, stressed the importance of developing indicators and the need for up-to-date input/output data that provide an important picture on how the inter-linkage between different sectors is changing. Mr. Ypsilanti also stated that we must be careful in using the term IT which has significantly changed in its meaning over the last decade. The developments in information infrastructures had important macroeconomic implications and it was important for researchers in this area to draw out these implications and link micro-economic developments with their wider economic impacts.

Ambassador RUTANEN then introduced the two upcoming workshops in Helsinki and Seoul.

Risaburo NEZU, Director of the OECD Directorate for Science, Technology, and Industry, commented on the role of governments and the linkage between micro and macro economic analysis.

Firstly, Mr. Nezu emphasised that the OECD countries such as the US, Canada, the UK, and Japan, are now at a stage where they can draw on previous experiences of regulatory reform, whose outcome has proved to be positive. In other words, a competitive model helps to maximise the benefits to consumers. Mr. Nezu stressed that future discussions can be developed on this basis.

Secondly, Mr. Nezu pointed out the importance of developing the bridge between micro analysis and macro analysis. While mentioning that the OECD does have a problem in bridging such a gap due to lack of good interactions between the two sides, Mr. Nezu emphasised that the IT would present a good opportunity for making a linkage and that in particular, one missing link is productivity. Mr. Nezu concluded by saying that this kind of workshop serves the purpose of bringing together both kinds of economists.

In summarising the future agenda, **Ambassador RUTANEN** said that one of the basic obstacles we are facing is that in today's world, business is increasingly global but politics stays local.

A suggestion by **Graham SPINARDI** for the future agenda was that we should consider two distinct kinds of electronic commerce separately. One is intra-organisational commerce (EDI, CALS) where the biggest issue is the co-ordination of standards. The other is home-shopping and services for individuals where the more important issue is "what is money?".

SUMMARIES PROVIDED BY SPEAKERS

REGULATORY ISSUES RELATING TO ELECTRONIC MONEY

Konrad Alt, US Treasury

Introduction

I am Konrad Alt, Chief of Staff and Senior Deputy Comptroller for Economics and Public Affairs at the Office of the Comptroller of the Currency. The OCC is a bureau of the Treasury Department, specifically, the bureau of the Treasury Department charged with regulating the national banking system.

The term electronic money gets tossed around a fair amount and can mean a lot of different things. For the most part, I'm not going to use the term electronic money to include the extension to the Internet environment of familiar payment technologies like credit cards. I'm going to be talking about electronic money in the sense of an electronic store of value, used by consumers and accepted by merchants in lieu of cash. In most of the developing technologies that I'm aware of, the value resides on a chip in the custody of the consumer. The chip may reside in a personal computer, on a plastic card, or in some other device.

The OCC's interest in electronic money stems from two sources. First, the banking industry we regulate quite naturally has a keen interest in this area. Second, Treasury Secretary Rubin has asked the Comptroller of the Currency, my boss, Eugene A. Ludwig to play a co-ordinating role for the entire Treasury Department with respect to the development of policy on electronic money. I should be clear that this is co-ordination in the weak sense of serving as a clearinghouse for information, analysis and concerns, not in the strong sense of telling the rest of the Treasury Department what to do.

The Treasury Department is a large, disparate organisation, with a lot of connections to and interests in the electronic money area. Our interests in the e-money area fall into three categories.

Treasury's Interests

Law Enforcement. First, Treasury plays a major role in law enforcement, and has a special focus on the enforcement of laws against crimes relating to money, like counterfeiting, money laundering, and tax evasion. We are therefore naturally concerned about the possibility that certain electronic money technologies could be used to facilitate such crimes or perhaps to invent new types of financial crimes.

Operations. We also have several operational interests in the electronic money area. For example, Treasury processes almost one trillion government payments a year. Any technology that can facilitate more efficient payment processing is therefore of interest to us. Also, Treasury currently manufactures both bills and notes and must therefore consider as an administrative matter both the extent to which electronic money might reduce demand for those products and the possibility of modernising its product line by becoming itself an issuer of electronic money.

Financial Stability. The third cluster of Treasury interests is in the area of financial stability -- more specifically, the stability of financial institutions, particularly banks and savings and loans. That's my home territory.

Two Quotes

So much for the introduction. Let me now describe why regulators like me around the world have begun to focus on what's going on in the area of electronic money. Consider these statements:

> "We are witnessing nothing less than the birth of a new industry -- the development, issuance, and management of private currencies." (Jon W. Matonis, http://www.isoc.org/in95prc/HMP/PAPER/136/htlm/paper.htlm#Prologue)

> "At worst, a faulty or crackable system of electronic money could lead to an economic Chernobyl." (Steven Levy, *Wired*, December, 1994)

Nobody in my position wants to be responsible for an economic Chernobyl. So we thought we'd better figure out what's going on.

Good News

Now the good news is that, having dug into this area fairly aggressively over the past couple of years, financial regulators around the world seem to be concluding that we probably are not looking at an economic Chernobyl, certainly not any time in the very near future. And, when you step back and consider the issue in broad perspective, it's pretty clear why not.

First, even at very extraordinary growth rates, the use of electronic money -- and here I'm using the term very broadly to include not only electronic cash but also various retail-level electronic credit applications currently in development -- seems unlikely to achieve within the next several years the sort of volume that would be required for catastrophic events to occur.

True, there are some fairly extraordinary predictions out there:

> "At current growth rates, estimated level at which everyone on Earth will be on the Internet: 2004."

Similarly, a recent Booz-Allen projection concluded that in the U.S., at least, 20 per cent of household spending would take place on the Net by the year 2005. Well, maybe.

But it would mean, conservatively, a compound growth rate over 130 per cent per year between 1995 and 2005. Not inconceivable, perhaps, but unlikely.

Just to give a couple of quick comparisons that might help put that kind of growth in perspective, sales of compact discs (CDS) between the years of 1986 and 1995, reached a compound growth rate of 30 per cent.

Sales of colour TVs increased at an annual compound growth rate of 10 per cent from 1970 to 1985.

But second, even should electronic commerce begin to account for a significant percentage of household spending, the likelihood of catastrophic failure -- an economic Chernobyl -- would likely remain small so long as alternative remote payment mechanisms -- like the combination of credit cards and toll-free telephone numbers -- are available in the event of a systemic shock in the electronic commerce environment. The economic costs of systemic failure in the world of electronic commerce will be borne largely by those whose businesses depend completely on the existence of electronic payment technologies. From the standpoint of their macroeconomic significance, that is an extremely small class of businesses today. Even assuming completely implausible rates of growth, it seems unclear at best whether this class of businesses will ever achieve macroeconomic significance.

Overview of Issues

So much for the good news.

The bad news is that while an economic Chernobyl does not appear to be imminent, emerging electronic money technologies do raise a number of important public policy concerns that will likely give rise to a variety of different types of government interventions in countries around the world over the next several years. I'd like to briefly discuss these issues during the remainder of my presentation. I have organised them into near-term, intermediate-term and long-term issues for ease of presentation, but in reality these categories are not distinct.

Near Term Issues

In the early deployment of electronic money technologies, the most important issues will involve consumer protection, and there are really two different kinds of consumer protection issues.

Disclosures. First, there is the question about what sort of information we think consumers should have in order to make intelligent decisions about the purchase and use of electronic money products. The application of rules devised for existing credit and debit card products to, say, stored value cards is not clear.

The goal of public policy in this area is to ensure that consumers have the kind of information they need to make rational economic decisions. Already, it seems pretty clear that, in the absence of government intervention, consumers may be systematically misled. Around the world, developers of electronic money are all marketing their products to consumers on the same basis -- cash. Just like cash. Electronic cash. Small wonder, therefore, if consumers come to view electronic money as just like cash. But the bits of a private issuer representing a claim on that issuer's assets are not as an economic matter equivalent to a claim on the assets of a sovereign government, unless perhaps the government backs the issuer's liabilities.

Protection Against Loss. This brings me to the second category of consumer protection issues: protections against the risk of loss -- and here we need to distinguish between protection against loss due to the fault of the consumer and loss due to the default of the issuer. Most electronic money developers take the view that if a consumer loses, say, a stored value card the consumer should bear the loss. That may be a perfectly reasonable approach, but consumers are unlikely to understand their liability in the absence of affirmative measures to make them understand since, in the United States at least, consumer currently enjoy a limit on personal liability in the event they lose products that will understandably be confused with stored value cards, like credit and debit cards.

Loss Due to Issuer Default: The protection of consumers against the risk of loss due to issuer default is an even trickier problem. Ultimately, this is a question about what sort of standards, if any, we should impose on issuers of stored value with respect to financial condition -- especially capital adequacy and liquidity. Interestingly, the European Union has already adopted the view that only credit institutions -- i.e. banks -- should be allowed to issue stored value, and its member countries are in the process of enshrining that view into their respective laws. But the issue remains unresolved in many other countries, including the United States where many non-banks are entering the marketplace as issuers of electronic money.

Privacy. A final issue likely to require attention from policy makers in the relatively near term is privacy. Currently, the world of electronic money developers is split. Some see their business case depending in significant measure on the attractiveness of anonymity to consumers. Others see their business case as dependent in significant measure on the attractiveness to merchants of certain kinds of transaction data, the collection of which electronic money technologies could permit. In the public sector, consumer protection interests tend to be concerned by the use of transactional data for say, cross-marketing, while law enforcement interests tend to be concerned that anonymous technologies may lend themselves too readily to criminal activities.

Intermediate Term Issues

When I say intermediate term, I have in mind a time when the use of electronic money as a medium of exchange is reasonably common. A significant percentage of retail merchants will accept stored value payments. A significant percentage of consumers use stored value on a regular basis. But coin and currency are still in very widespread use.

Law Enforcement. Counterfeiting, money laundering, and tax evasion are familiar problems in the world of physical currency. I think they are pretty well understood, so I won't dwell on them here today except to observe that they could also be substantial problems in the world of electronic commerce. The extent to which they will in fact become problems in the electronic realm depends largely on which specific electronic payment technologies prevail and, specifically, on the degree of audibility associated with these technologies.

Safety and Soundness. Should the use of electronic money grow to significant proportions, or should individual financial institutions become heavily involved in it, regulators like me will have to worry -- at least to the extent that electronic money is originated by regulated entities -- about the operational risks associated with the business and about the maintenance of adequate capital and liquidity to support redemptions of electronic value.

Access. A third set of issues that could become important in the intermediate term involves access to the financial system. Many financial and social welfare policy makers believe that significant benefits flow from having people participate in the financial system, and specifically the banking system. Broad deployment of electronic money products could affect access to the banking system services in two ways.

The direct effects on access can only be positive. To the extent that new access technologies become available, total access increases. But note that comfort with technological means of access to the financial system is probably not evenly distributed across income lines, and may, in particular, be weak in low-income populations. So while the direct effects are positive, they may be small.

The indirect effects are probably negative, and could be significant. In the U.S., many large retail banks believe they are at or approaching a point at which they will have to make the strategic decision whether, going forward, they will continue to access their customers through traditional branches or begin instead to substitute new electronic access technologies. To whatever extent banks begin to reduce or eliminate existing branch networks in favour of access technologies even less accessible to low-income consumers, we face the prospect that concerns about access to the banking system will intensify.

Long-term

Two additional issues deserve mention under the long-term heading.

Seignorage. To the extent that private-sector e-money substitutes for currency -- coins and dollar bill of various denominations -- the government loses out on two scores. First, there is seignorage *per se*. The government pays many of its bills by printing money and the difference between the cost of manufacturing currency and the face value of that same currency -- seignorage -- is income to the government. Second, the government gains from the fact that its currency, in contrast to other debt, bears no interest. The extent to which the public holds currency instead of bonds saves the government interest payments.

I have discussed the seignorage issue with officials of several central banks who have studied it in the context of current electronic money developments. Without exception, none of them believe the use of electronic money will become so widespread as to raise serious seignorage concerns any time soon, if ever.

International Issues. Now a word about international issues. All of the issues I have mentioned thus far are largely familiar. New payment technologies will force us to adapt our public policy solutions to these issues, and perhaps, in a few instances, force us to reconsider our policy prescriptions, but for the most part the policy issues with respect to these issues are incremental, not fundamental.

In the international arena, however, we may face issues fundamentally unlike any we have faced before. The observation that the Internet is borderless is by now very familiar. But the regulatory issues borderless presents are anything but familiar. There is no clear understanding among the world's financial regulators as to the allocation of responsibilities for monitoring and acting to prevent the commission of financial frauds on the Internet. There is no way for consumers to be sure, in the Internet environment, that the financial institution they believe they are dealing with is legitimate or that the transaction in which they are engaged is enforceable.

Since a full resolution of these issues would require the participation of all the world's nations, we should probably not expect a full resolution in our lifetimes. In the absence of full resolution, we should expect the Internet to attract a significant measure of criminal activity, possibly significant enough to retard the growth of electronic commerce itself.

Conclusion

The development of electronic money presents the world's financial regulators with the challenge of striking an appropriate balance between protecting consumers and promoting innovation. Striking that balance appropriately will require active co-operation from the private sector.

I’m a regulator and fundamentally our view is that the issues I have raised are not insurmountable obstacles. They're problems we need to work through, and I am confident that in the fullness of time we will work through them.

Thanks again for having me here today.

WHAT INSTITUTIONS TO ORGANISE THE ELECTRONIC COMMERCE ?

Eric Brousseau
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While remaining marginal, an increasing part of economic interactions is somewhat supported by electronic networks. However, the existence of telecommunication means is not sufficient to achieve transactions. Indeed, especially when communication is automated, communications rules have to be defined and communications management operations have to be performed.

For instance when two business partners want to exchange EDI messages, they have to use compatible communication protocols, message formats, communications rules. Moreover, they often want to secure their information exchanges, make them authenticated, (etc.). Performing transactions through the electronic networks not only requires rules and operations related to communication *per-se*. Rules and operations related to the transaction have also to be performed. For instance, payments have to be secured and authenticated, the actuality of transactions and the quality of the exchanged goods have to be verified, etc. Obviously, this second type of operations is not specific to network supported transactions, but they can be supported by the electronic networks. These indispensable rules and operations have to be designed and performed.

Economic agents can do it face-to-face by themselves through the signature of contracts and the implementation of bilateral "Governance structures". But, they can also follow rules stated by collective bodies and delegate to collective entities the performing of specific operations. These collective entities can be qualified as institutions, since they are administrative bodies that create rules, make them enforceable, and perform co-ordination operations. Obviously these institutions are not always supported by public and governmental entities and rely on voluntary membership.

The purpose of this paper is to try to get a better understanding of the institutions involved in the electronic commerce, taking into account that these institutions, specific to electronic transactions, are often private and voluntary.

The paper establishes two typologies. The first one is a typology of the different institutional environments for the electronic commerce based on the idea that these environments can be described through the main functions executed by the institutions. Two basic functions are identified. The first one is rule design. The second one is (co-ordination) operations performing. These two types of operations have to be performed to fulfil electronic transactions but they can be performed either decentrally by economic agents themselves, or centrally by an institution (even private and voluntary). As a consequence I distinguish the case in which there is only a standardisation institution, from the case in which there is only a co-ordination service performing institution, from the case in which institutions ensure the design of rules and the achievement of co-ordination services. These diverse institutional environments do not have the same consequences for economic agents. In the first case, universal solutions are designed, but they are implemented slowly.

In the second case, electronic transaction systems are quickly implemented, but they are not designed to fulfil the requirements of wide communities, generating an archipelago of incompatible "electronic markets". The third case is obviously the best compromise, but the probability is very low to harmoniously combine the opposite assets and competencies that have to be mobilised to perform each of the two functions.

The second typology is focused on the institutions by themselves. The question is to identify, from a constitutional point of view, the institutions that are best suited to perform each of the two functions. The idea is to establish a distinction between the institutions that are created by a single economic agent, whether he is a dominant player in its industry or a venture (transaction) service provider, and the institutions that are created by a business community, whether it is an open body (association) or a closed one (club). These diverse institutions differ from each other in terms of competencies (linked to the involvement in the industry), speed in generating operational solutions (linked to the number of founding members), ability to design universal solutions (linked to the heterogeneity of members), ability to create solutions that will be adopted by wide communities (linked to the behaviour and the identity of the members). For radically different reasons, institutions created by a dominant player or clubs seem to be the more able institutional form to perform the two functions of designing rules and producing transaction services.

The association is especially efficient to produce rules and standards, while the venture service provider is efficient only in performing transactions services. The crossing of the two typologies enables me to point out that the club and the dominant player are the best featured institutional environment to implement the electronic commerce. However, any type of institutions and institutional environment is definitively more efficient than the others.

All of them have their own strengths and weaknesses. As a consequence diverse types of institutional environment for the electronic commerce can emerge. This non-deterministic conclusion is reinforced when one takes into account the dynamic of the implementation of the competing solutions. There are strong first incumbent advantages, increasing return of adoptions, path dependency phenomena, (etc.), that play an important role in enabling institutional forms to win the competition process even if they are not "on paper" the more efficient forms.

SUMMARY OF COMMENTS

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Directorate for Science, Technology and Industry, OECD

First of all, one observation. In the course of this discussion, Electronic Commerce tools have generally been identified with multimedia. This is an excessively restricted view. Electronic Commerce is based on use of the full range of information and communication technologies, starting with telephone and telecopy and including electronic mail, teleshopping, etc. Its scope of application is thus extremely broad. Many of the problems that have been discussed -- for example the inadequacy of the legal framework -- arise as soon as users depart from the traditional paper-based practices and are very far from being limited to multimedia applications.

This being said, I should like to say a few words about the role of governments in developing the tools and institutions required for Electronic Commerce.

It is tempting to assume that Electronic Commerce development is primarily the function of the private sector and that public agencies have no role to play. In this view, Electronic Commerce is essentially market-driven: business will see to designing and implementing the necessary tools and institutions. Any intervention by government would merely disrupt the normal inter-play of market forces and would be dangerous.

This, in my view, simplifies the matter and overlooks some major points.

Earlier discussions have brought to light that market forces operate to generate an Electronic Commerce environment that is essentially fragmented into clusters of suppliers and clients that are brought into diverse alliances with leading firms. If left unchecked, this type of development would entail risks of barriers to entry of new users of Electronic Commerce, and of a constellation of networks that do not communicate with each other. The outcome would be very far from the kind of seamless open information infrastructure that we are seeking. Surely, in this respect, governments have some role to play in promoting transparency, fair practice and interoperability. The challenge is to define how this role can be filled without major disruption of market mechanisms.

The development of Electronic Commerce may be hampered, at national and international levels, by laws and regulations that have become obsolete. It is a responsibility of governments to undertake regulatory reforms to facilitate the new forms of trading.

Some public agencies are major potential users of Electronic Commerce tools, for example with respect to Customs, Revenue, social welfare transfers or payments of all kinds. As such, some public agencies may well become domestic and even international (i.e. in Customs) leaders in implementing Electronic Commerce practices. The potential benefits for government operations are so attractive that public agencies cannot be expected to wait passively for the private sector to map out the road to be

followed. This implies the full participation of many public agencies in the design and implementation of Electronic Commerce tools, with considerable impacts on the private sector. These impacts need to be anticipated and discussed with private partners to be taken into account in formulating an overall government stance that will assist the private sector in its move to the information economy.

There are many areas where the requirements of Electronic Commerce overlap -- if not clash -- with government concerns, as in the case of security. More generally, the development of global Electronic Commerce will have major impacts on government policies. One source of concern is the fact that it challenges established governmental practice in many areas (ranging from taxation to monetary supply and including law enforcement issues or the domestic regulatory environments of industry and services). Governments cannot ignore these developments and will need to adapt. New policies and regulations will eventually emerge and it would be in the interest of all public and private actors if these were based on consensus.

To sum up: Electronic Commerce opens many new opportunities for industry and services, but one should not overlook the fact that it also generates as many challenges and opportunities that call for active government participation in its design and in establishing a basic framework for its development.

INFORMATION INFRASTRUCTURES AND THE EMERGING PRACTICES OF "MULTI-CHANNEL KNOWLEDGE ACQUISITION"

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Most firms are still relying too much on the intramural production of knowledge and are not paying enough attention to outside sources of information. However, the emerging business practice of "multi-channel knowledge acquisition" is gaining ground.

There are three main reasons for adopting this new approach, as described by S. Barabaschi (in Technology and the Wealth of Nations, Stanford University Press, 1992):

- there is a lot of technical knowledge available, just waiting to be picked up and used;
- in-house R&D activities are more and more costly;
- new information technologies (data banks, on-line information services, and technical journals on CD-ROM) make it profitable to scan a wide spectrum of the available outside technologies and select useful data in the required form.

These three reasons will be discussed. Barabaschi is right in emphasising the role of information technologies in expanding the network of potential users for a given piece of knowledge. He is, however, wrong when he argues that the first reason listed above means there is a high probability of finding what you need outside. We will claim rather that while there is a high probability that what you need exists somewhere, there is also a high probability that you will not identify and retrieve it.

Indeed, the search for pertinent information which is adapted to specific projects is most often localised and rarely expands into the entire potential space in which the sought-after information may be located. But in an environment where useful knowledge may be generated in domains that are both professionally and geographically distant from the individual firm, the optimal allocation of knowledge among innovative firms requires a broadening of the knowledge-distribution process: the capabilities for identifying, selecting, and absorbing novel production technologies, equipment, and raw materials are becoming increasingly important given the exponential growth in the options available.

In this way, the "problématique" is to increase the probability to find the relevant information, which potentially exists somewhere. A vital strategic element for individual firm (or for an industrial association or cluster) is the implementation of an "industrial perception system". Information-processing systems such as the consolidation of general discriminating capabilities through the creation of reference standards and artificial agents will increase the productivity of the search processes for technological information.

In this view, significant policy orientations are: the enhancement of intellectual property registration systems to improve information disclosure features; the extension of information infrastructures to build universally accessible digital libraries; a more effective use of the standards setting process, as an important forum for the exchange of technical information both within each industry and with users and suppliers; and so forth.

INFRASTRUCTURE FOR ELECTRONIC COMMERCE

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1. Infrastructure

1.1 NII, GII and Infrastructure for multimedia communications

NII and GII by Mr. Vice-President Gore has been giving a great impact to the information and communication engineering in Japan since 1993.

MPT (Ministry of Post and Telecommunications) published a report "Reforms toward the intellectual creative society in 21st century" in May 1994. MITI (Ministry of International Trade and Industry) published a report "Informatization program" also in May 1994.

NTT announced the promotion of multimedia communications corresponding to governmental policy.

1.2 Experiments on multimedia communications

Experiments on multimedia communication services such as medical information network, remote education and remote collaboration for designing are executed at the BBCC.

Experiments on unification of communication and broadcasting using fibre optic cable are executed at the PNES.

Local area trials of full network, local government network and information feedback are executed in Okazaki, Hamamatsu and Tokyo.

NTT is experimenting multimedia communication services by co-operating with users and manufacturing companies. The high-speed wide band 150Mbit/s computer communication using ATM technology and computer communications of 1.5Mbit/s class using TCP/IP began in 1994. Applications are developed by users and manufacturing companies. Among them is an experiment of multimedia commerce by NTT data.

1.3 OCN (Open Computer Network)

NTT released the plan to construct the OCN in June 1995. The OCN is a computer network using TCP/IP, like the internet. IP packets are switched/rooted at the node points.

NTT thinks it should provide a new communication network of the best effort type and less expensive, in addition to the highly reliable usual networks. NTT aims at the network which can be interconnected openly with the networks of the internet providers by preparing various kinds of access points. The network is expected to be used by internet providers and also to be used as the infrastructure for the forthcoming electronic commerce.

NTT explained the interface specifications in January 1996, relating to the explanation of the new additions to its network functions.

Before June 1995, in January 1994, NTT announced the fundamental plan toward Multimedia Communications. At that time, the internet was not so popular as today and the OCN was not mentioned.

It is a high-speed computer communication connecting LANs.

Introduction of user friendly tariffs are stated in January 1994 and June 1995.

2. CALS/EDI/EC

CALS and EDI are related to EC. EC might be the commerce between an enterprise and consumers using internet, while EDI might be the sending and receiving of orders between an enterprise and another enterprise. The commerce-net belongs to the former and the services provided by VAN operators using MHS (Message Handling System) is the latter.

By the progress of authentication technology, cryptograph technology and security technology, the commerce between enterprises shall use internet. MHS uses now OSI type lower layer protocol such as ISDN/POTS, X.25 packet and leased line, but the progress of down-sizing of computers might adopt TCP/IP. EC and EDI will become nearly the same.

The importance of authentication, cryptography and security is pointed out in the report “A study on electronic information and network utilisation” in August 1995 at MPT. The report also pays attention to the rule which rejects commerce of illegal goods. CALS was supported by the Department of Defense in the USA and is strong in the military field, while EC is supported by the Department of Commerce in the USA.

CALS uses standards: STEP for description of data of products, and SGML for notation of documents.

EDI uses syntax: EDIFACT as an international standard, ANSI X.12 as a USA standard, and CII as a Japanese standard. They should be interpreted.

Corresponding to the commerce-net which is a voluntary association promoting EC on internet, commerce-net Japan was established last year.

The technical study association for CALS was founded in May 1995 by MITI, and a voluntary conference for promotion for CALS was founded at the same time.

There is also the cyber business association and EC services are experimented.

3. CAFIS and ANSWER

NTT data has set up the ANSER service which provides inquiry of balance and money transfer service using telephone terminals or computers.

NTT data has set up the CAFIS service which provides credit inquiry.

AN EMPIRICAL ANALYSIS ON JAPAN'S INFORMATION ECONOMY
-- RE-AGGREGATION OF 1985-INPUT/OUTPUT TABLE --

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In this paper, after a brief survey of empirical analyses on "Information Economy", we try to calculate the size of the "Information Industry" in Japan by making use of Input-Output Tables.

It has been more than 30 years since the so-called "Informatization" of economy was advocated. There are, however, only a few quantitative analyses on the impact of Information Technology (IT) on the economy during this period. This is a main reason why we try to evaluate the size of "Information Industry" in Japan and trace its growth by use of I/O Tables.

In 1990, the Statistical Bureau in the Management and Co-ordination Agency of Japanese Government published the 1985 Input-Output Table. The original Basic Table consists of about 530 rows and 450 columns. Although the 1990 Table, published in 1995, is the newest one, the data in this Table contains the consumption tax introduced in 1990, and it is impossible to subtract the tax from the published data. Therefore, we decided to adopt the 1985 Table for calculations.

The results of our calculations show that "Information Industry (in a narrow sense)" increased its share from 3.1 per cent in 1975 to 4.0 per cent in 1985. Although its share itself is rather small, its growth rates were higher than those of other industries.

From this fact finding, we may reach a conclusion that the size of information industry is much smaller than propagated.

This is partly true and partly not true. It is partly true in the sense that, at least in the middle of the 1980s, the sum of shares of "Information Industry" and "Information Supporting Industry" is 13 per cent, which is small compared with that of the manufacturing industry, although its growth rate is high. In this sense, we cannot expect the information industry to be too much the engine of the macroeconomy although it may have huge potentials. This is closely related with the problem whether the information industry will be able to become a leading industry in the 21st century or not.

At the same time, the above conclusion is not true, because the output of the information industry is mainly used for increases in efficiency of production (Factory Automation) and office work (Office Automation). Therefore, in order to evaluate the size of the information economy properly, we have to consider the "Inner-(Inter-organisational) Information Sector," which is analogous to self-consumption of electricity by industrial plants and non-business (within-organisational) transport.

But it brings a very difficult problem into our calculations because "Inner-Information Sector" performs information activities within the organisation, and such activities are not evaluated by the market.

In order to overcome this difficulty, we adopted the method proposed by Porat (1977), and have the following tentative conclusions:

1) In 1985, 36.8 per cent of employees were engaged in information occupations, and the rest in non-information occupations (from the Population Census). And, even in the information industry, around 30 per cent of employees engaged in non-information occupations.

2) If we include "Inner-Information Sector," the share of the information industry in total product rises to 14.7 per cent.

3) Total product of Inner-information sector (117.2 trillion yen, which is equal to 14.7 per cent of total product) is 4 times larger than that of "the Information Industry in a narrow sense " (26.8 trillion yen).

From the above tentative conclusions, it can be said that we cannot ignore the activities of the "Inner-Information Sector," which plays a crucial role in "the Informatization" of the economy.

Case Study: BPR in Japan by Adopting Information Technologies (IT)

Yumio Imamura
Japan User Association of Information Systems

1. Japanese Industry Current Investment in IT

In Japan, when the real GDP growth rate dramatically decreased from 4.8 per cent in 1990 to 0.2 per cent in 1993, the ratio of IT investment to total equipment investment increased only 4.6 per cent. In comparison, in the US when the real GDP growth fell 66 per cent from 1988 to 1990, its IT investment ratio increased 28 per cent. It is said that Japanese industries should reform their structure and revitalise the economic dynamism by using advanced information technologies. Reforming Japanese industries' structure requires a drastic change in traditional Japanese corporate management systems and drastic deregulation.

2. BPR maintaining Employment

It is the top priority for Japanese management to maintain employment for their employees. Although this Japanese management's effort reduces the effects of BPR, it causes lower unemployment in Japan, and it also creates the low labour mobility in Japan since WWII. In reality, it is said that many Japanese corporations retain more employees than they need. Actually, some corporations introduced early retirement incentive measures with an increased retirement allowance.

When Japanese corporations implement BPR, they reduce the excessive labour by not filling the position held by retired employees or by reallocating employees in the newly created business. BPR is implemented in Japan for the purpose of production cost reduction by reducing time and materials and coping with changing market needs.

3. Case Studies of BPR Utilising IT

3.1 Yamaha Corporation's Entry into Electronics Industry

Yamaha Corporation is well known as the world largest manufacture of musical instruments including pianos and electronic organs.

Yamaha Corporation also experienced a decrease in sales and profits due to recession since 1990. However, the electronic device business has grown and is expected to be close to 30 per cent of all sales in 1995.

The share of a magnetic hard-disc head increased to be the second largest in the world as use of multimedia technologies and PC expanded. The number of employees working in electronic device business increased from 780 in March 1991 to 1 600 in September 1995. Most of them were reallocated from the other business units.

3.2 Steel Industry Betting EDI

NKK Corporation will use Internet for purchasing law materials according to Japan Economic Journal (February 2, 1996). NKK will observe operations status of overseas mines and shipping status (location of tankers) of raw materials by using Internet, and they established just-in-time systems for steel materials, aiming at optimising the level of raw material inventory and stabilising the product supply.

NKK imports 120 types of raw material including 30 million tons of iron ore and coal annually from abroad. The number of trips of tankers reaches 250 annually. This new way of purchasing raw material via Internet will enable the most appropriate inventory level and reduce the number of employees in purchasing.

3.3 Yokokawa's BPR by Sharing Corporate Information

Yokogawa Electric faced increased competition in the overseas market with the movement to build new plants overseas by Japanese petrochemical, steel and chemical industries as well as price competition with imported products in domestic markets due to the appreciation of the Japanese yen. Market changes progressed faster than efforts to maintain their business, and its profit has fallen in 1990.

Yokogawa Electric focused on product standardisation and reducing inefficiency in business transactions in order to cut costs. It reached the conclusion that it is necessary to improve communications between sales, R&D, and production and to establish a cost-efficient production management system.

Yokogawa Electric focused on network computing that enables use of information across sales, R&D, and production. By re-engineering the information systems, Yokogawa Electric proceeded BPR and they succeeded in reducing the lead time of their business cycle. For instance, its stock term was reduced from three months to 16 days.

The BPR also achieved the productivity increase of white-collar workers. The excess labour created by increased productivity was adjusted by not filling the positions held by retired employees or by reallocating employees in the newly created business in 1993, including the systems integration business and information equipment business.

4. IT and Productivity Increase

One characteristic of Japanese management after WWII is the life-time employment system. Many managers emphasise the importance of having common values among employees, which is achieved through long-term employment contracts. The current recession has forced corporations to increase their productivity by improving and reforming their business processes, but the fact that the corporations are not able to lay off their excess labour reduces effects of the reform. The reallocated employees also had to bear some psychological burden, but it is difficult for them to change jobs due to low mobility on the labour market in Japan.

It does not seem meaningful to discuss whether IT will create new jobs. However, there is no doubt that IT will create productivity improvements. The new business creation and productivity improvements through IT will revitalise the society and develop new perspectives. Whether or not management should link improving productivity to laying off their workers depends on the standpoint of each corporation and on the level of employees' efforts to challenge the new job environment. This must be discussed as one business oriented issue. This is not the matter that the government is involved. The government should only concentrate on proceeding with deregulation.

NEW PAYMENT SYSTEMS AS THE KEY TO NEW MULTIMEDIA BUSINESSES

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Electronic commerce -- the on-line trade of service/information -- is expected to continue to grow rapidly because it provides consumers with a major benefit -- the ability to access a wider range of IPs (Information Providers: information on services/goods). And it provides IPs with an enormous advantage: it does not require shop rent/labour costs or printing/mailing costs that are incurred in the catalogue shopping businesses.

For electronic commerce to take root and develop in society, there are many challenges to overcome. The most important issue to resolve is whether it is possible to establish new payment systems that are appropriate for on-line transactions. This is because when information on services or products is delivered from one party to another on a network, payment transaction should also be made on the network.

There are several requirements for on-line payment systems. The most important is to secure the level of security necessary for the delivery of money over a network. Internet is a very open network where any "defenceless" information could be viewed and even modified.

The second issue is payment transaction costs. Traditional payment methods, including bank account transfer, credit cards, and checks, involve specific payment processing activities, such as the handling of various papers/statements, at banks, credit card companies and retail shops. The cost of these processing activities is not directly proportional to the value of the transaction. There will be strong user demand for information exchanges which cost only several hundred yen per transaction. The present economics of settlement processing will not support the profitability of these transactions, which will probably become the mainstream of information delivery services. For this reason, it is critical to establish a payment system, which we call a "micro payment system," that can make a small amount of on-line transactions possible.

From the viewpoint of the consumer, availability and anonymity are critical issues.

Regarding availability, credit cards can only be used by people over 18 years old. However, many users will be children. On-line payment systems should be so developed that they can be used by a wide range of users. Furthermore, to protect privacy, on-line payment systems should provide the same anonymity as cash payments.

From the viewpoint of IPs, it is critical to provide payment systems that can guarantee easy billing. Unfortunately, under the current system it is difficult for individuals or small companies to become member shops of a credit company .

To summarise, it is desirable that payment systems should have a broad user base, and secured anonymity, and be available to a wide range of users and IPs -- in addition to basic requirements such as security and profitable payment costs -- to facilitate recent developments in multimedia.

Much trial and error is involved to establish desirable payment systems for on-line transactions. Some of them are applications of those used for traditional transactions in the off-line world. Others are totally new ideas invented exclusively for use over networks. Adaptations of existing financial systems include:

- utilisation of telecom billing systems (phone, VAN, etc.);
- encrypted credit cards;
- credit-card-based intermediary services (e.g., First Virtual).

Totally new financial systems are:

- E-cash (open): can be used between individuals and corporations and converted to money;
- E-cash (closed): can be used only in a specific community.

Among these, one or two major payment systems will not grow fast enough to establish dominating positions. Instead, it will be possible for users to select the most appropriate payment method from multiple options based on their purposes or needs.

The appropriateness of a payment system depends on the network environment -- loosed (Nifty, American On-line, etc.) or open (Internet). In the open-network environment, the payment system should ensure security and provide individuals with IDs that make mutual confirmation of identification possible (as for credit-card-based systems in the off-line world). Therefore, payment systems on open networks require encrypted credit cards, credit-card-based intermediary services, such as First Virtual, and electronic cash. On the other hand, on closed networks where individual users make a contract to use the network, payments are only made between a gateway service provider (i.e. network-operator), member consumers and member IPs. For this reason, requirements for payment systems are relatively lenient. IPs and gateway service providers are able to select the most appropriate payment method for each member, based on his credit strength. These include automated funds transfer, original prepaid methods and credit cards.

In the emerging electronic commerce channel, the key strategy will be collecting and accumulating consumer information and attracting customers by effectively using the information for developing and marketing new products. Although corporations have to engage in transactions with faceless customers on electronic commerce networks, they can collect and accumulate a wide range of information, including the customers' comments or complaints about promotions, in addition to commercial information (who purchased what) and customer information (what the customer is like). If they are capable of processing this information in a useful way, the effectiveness of marketing and product development will greatly improve. This means that marketing efforts in electronic commerce can shift from mass marketing to individual marketing.

Regarding information acquirers, there are three possible winners: gateway service providers, IPs, and payment system providers. At this point, it is difficult to predict who will be best able to acquire a wide range of necessary information. However, it is likely that gateway service providers will win on closed networks and payment system providers will win on open networks.

INDICATORS FOR THE GLOBAL INFORMATION SOCIETY - REVIEW AND COMPILATION OF AVAILABLE STATISTICS

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With the prospect of an approaching Global Information Society (GIS), it is essential that indicators are available to assist policy makers in formulating policies, monitoring the progress, and assessing the effectiveness of regulatory reform. Statistics and indicators developed and reported so far do not fully or accurately represent what is actually taking place in the OECD area. In particular, the international comparison has been difficult as a result of different practices in data collection and classification as well as different frameworks employed in each country. Therefore, a common framework for the GIS indicators and standard definitions needs to be developed, tested, and shared among the OECD countries for better understanding and comparing the progress made towards an information-based society.

In comparing the GIS development across countries by putting together available data from dispersed sources and by rearranging them according to the experimental framework, the following conclusions have been derived. It should be noted that the scope of the GIS development here is limited to how individuals and households are taking part in the GIS, and other policy concerns such as the growth of the information and communications technology industry and the impact on economic activities are not included in the scope.

Overall conclusion: The development of indicators for the GIS requires broadening the scope along two dimensions: the integration of computing, communications, and content sectors (vertical convergence), and the international dimension (horizontal expansion). At present, statistics do not represent the entire picture of the GIS: national statistics tend to put emphasis on the vertical convergence within a country whereas international statistics stress international comparison but for a certain sector such as telecommunication. To overcome such limitations, international effort should be initiated in developing a comprehensive set of indicators that sufficiently captures both dimensions.

For such statistical work to be undertaken in the future, it is proposed that the GIS framework for international comparison consists of three elements: 1) equipment, 2) communication infrastructures, and 3) services and content. For each element, the current statistical situation, major issues, and recommendations are described in the following.

1. **Equipment**: Data on the diffusion of equipment such as PC, cable TV set-top box, game console, and telephone are available from official household surveys and market research reports. Information on the use of equipment as well as user profiles is relatively scarce, and when available, it often fails to provide insight into how households are actually using their equipment, what services and content are consumed, and how networking is taking place. In-depth user surveys such as those conducted by governmental agencies in Canada and the U.S. should be widely promoted.

2. **Communication infrastructure**: Indicators related to main telephone lines are extensively provided by the ITU for a large number of countries in a comparable manner. As a critical aspect of the communication infrastructure is the 'quality' rather than the quantity, the key indicators concerning the quality of the infrastructure should be available such as the level of digitalisation of subscriber networks, the geographic availability of ISDN, cable access, and the degree of fibre optic cabling. These will contribute to the better comparison of the quality of network infrastructures in different countries.

3. **Services and content**: Aside from other numerous objectives, the GIS is about improving the quality of people's lives by providing various services and content. Therefore services and content deserve much attention, but have often been neglected compared with physical aspects of the communication network that involve expensive investments on fibre optic cables etc. As the GIS development should be driven by 'applications' and not by the 'hardware', statistics should assist policy makers in putting services and content in the right perspective. Ensuring consistency in the scope and framework for services and content that differ from country to country is indeed one of the most indispensable tasks.

Services and content can be broadly classified into four categories: a) communication services, b) on-line services, c) Internet, and d) packaged content. While on-line services and Internet are parts of the communication services in a broad sense, these are selected for closer analysis.

a) **Communication services**: Statistics are abundant for telecommunication services provided by public telecom operators, and data on relatively new services such as mobile communications and cable have been compiled and compared across countries by international organisations such as the ITU and OECD to effectively monitor the market development. Detailed indicators are required for such communication services as leased lines, ISDN service, and packet switching by different data transmission rates. Tariff comparisons, such as those undertaken by the OECD, are increasingly complex as a result of different pricing practices adopted by service providers, and remain one of the most significant challenging tasks in this area.

b) **On-line services**: Statistics are available fragmentally, explaining only parts of the overall market. As on-line service is a broad concept, a framework needs to be established which takes the form of a matrix of channels and types of services and content. Different channels for providing services and content -- such as commercial on-line service packagers, videotex service providers, direct links offered by original content providers, and Internet -- need to be considered all together. For each channel, the number of subscribers, sales, and available services -- e.g., publishing, retailing, stock trading, home banking -- need to be gauged. This will require analysis for a large number of service providers in each country.

c) **Internet**: One of the channels for end users to obtain various on-line information and services, the Internet still remains a 'blind point'. At present, only 'physical' data on network development are available, and the way of measuring market development such as the user size and network usage is just being developed. To assess market development, it is necessary to look at both sides -- providers of Internet access services and users. The measurement of the provider side should include not only Internet Access Providers but also commercial on-line service providers and various other companies entering the market. User profiles and the use of different services on the Internet need to be identified from market research data and in co-operation with the access providers.

d) **Packaged content**: This is often treated separately from information and services transmitting over a communications link. They are, however, related in that they compete with each other for the same content to be delivered in a different format or that they can serve distinctive markets. Data are compiled by trade associations but are based on different definitions and thus lack comparability for detailed analysis. Comparable data on the sales of CD-ROMs for PC platform, all CD-ROMs regardless of platforms, and other software as well as their breakdown by category should be made available.

It is intended that statistical issues identified here provide a basis for a more comprehensive and reliable set of indicators to be developed in the future. Various efforts are already being initiated and undertaken by national and international organisations. Governments and responsible agencies of the OECD countries are encouraged to review the statistical work in their countries and to promote greater availability, accuracy, and comparability of data for better policy discussion and formulation.

MULTIMEDIA APPLICATION ISSUES: REGULATIONAL ASPECT

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Numerous multimedia applications have recently been developed and many new services have become technologically possible. Yet many still remain unavailable in practice because of restrictions imposed by law and/or regulations.

No comprehensive study has ever been conducted for a group of applications where each individual application is prohibited by corresponding law. We would like to propose a new theoretical framework that would enable us to take a systematic approach in coping with such a group of individual cases. (There is a list of multimedia applications currently restricted in Japan at the end.)

Where there are regulations there are interests protected by law. To take retail medicine, for example, the legislator must have concluded that the presence of a licensed person for direct consultation could guarantee the minimum safety. But the legislator had no concept of on-line shopping which did not exist at that time. In other words the legislator gave no consideration whatever to the validity of on-line shopping services for the sale of medicine. There is a need to compare possible merit and demerit which would be caused by the introduction of new services. And we need to take into consideration the original interests that the law in question was designed to protect.

We are defining multimedia services as services made available by networking and digitalisation. The legislator had no idea of multimedia service when most of the existing law were enacted. Laws do not explicitly prohibit networking or digitalisation. The reason why multimedia services are not allowed is that existing laws read that "actual interaction" or "paper document" be required for those services. When "actual interaction" and/or "paper document" are so superior to alternative methods, it stands to reason that multimedia services should be prohibited.

There are notably two advantages that actual interaction has over virtual interaction on digital network: quality of transmitted information and the presence of a human being. We will examine those two factors more in detail.

“Paper document” also has advantages. Paper is a more effective safeguard against an alteration or a deletion or a leakage of information.

Theoretical analysis is not sufficient by itself to find a path along which applications prohibited by existing laws would come to be allowed. Just as important as theoretical analysis, is the need for analysing who has what incentive to realise those applications in the Multimedia Era.

It is important to clarify what would be essential for developing an appropriate policy, especially if such a policy means amending social standards as binding as laws. We hope that our new theoretical framework would give us a new point of view over such situations which were not envisaged by

legislators. We should not hesitate to set ourselves to seemingly difficult tasks but should make efforts to make necessary modifications to existing laws that have become too old-fashioned to cope with today's realities.

List of multimedia applications currently restricted

1) Medical treatment/ Security: Tele-medicine, Home security

2) Administration/ Trial/ Election: Computerisation of administrative processes, ex. resident registration work/ Election campaign

3) Education: Availability of remote lecture in compulsory education

4) Working: Tele-commuting (Applicable only to limited types of occupation)

5) Shopping: On-line shopping (specified goods), Banking/Electronic transfer, Electronic currency

6) Business activities: Digitalisation of account books, Board meetings via TV conference.

STANDARDS, SECURITY AND ENCRYPTION: TECHNICAL INNOVATIONS, POLICY AND STRATEGY

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The security of advanced information and communication networks is an issue which has received unprecedented public attention in recent years. This is due in part to the need to provide security for sensitive data that is increasingly distributed through organisations using personal computers and databases. It is also due to the need to protect data in increasingly complex network environments. Security and encryption techniques are regarded as being pivotal for the development of electronic trading networks of all kinds. Considerable public debate is focused on new applications and implementations of encryption. It has been argued that, in the absence of major advances in the techniques available to secure networks, electronic commerce will fail to expand globally to encompass all sectors of the economy.

The aim of this paper is to review developments in the use of a range of technical means of securing advanced information and communication networks and to assess their implications from the perspective of suppliers and users of applications. The paper is based on recent research which assesses the economic and social impact of moves to implement open generic network environments for business transactions and electronic commerce.

Most leading-edge network security technologies were available ten years age, although cryptographic techniques have advanced a little since then. The perceived need for their use, however, has grown immeasurably as a result of international electronic trading, e-mail, Internet applications, and technical improvements, in the cost-power ratio of information and communication technology equipment. Nevertheless, Automatic Teller Machines, Point-of-Sale and bank clearing networks have been handling millions of transactions within a secure environment that has not changed markedly over the past ten years. In the case of these applications, the network system designer has followed an industry or national specification for standards, purchased a secure hardware encryption box and attached it to a network and implemented a system. In the future it is expected that a variety of means of encryption, authentication, public-key cryptography box and reliable certification procedures will offer real hope of extending private networks into the public domain.

This hope is unlikely to be fulfilled in the absence of widespread changes in institutional practice. Issues of security and privacy in advanced network environments are as much matters of management, social ethics and public policy as they are matters of technology. Many of the key problems and debates are concerned with the institutionalised means of establishing and maintaining trust relationships among those involved in information exchanges and electronic transactions. A wide range of social, economic and political issues surround encryption debates. These will need to be resolved if the promise of a global seamless world of secure advanced communication networks is to be realised.

Recent experiences of the need to engage in extremely costly network re-engineering have highlighted the need for secure initial network designs. For example a large British cellular telephone operator has had to invest million of pounds retrofitting message authentication to the network to prevent

fraud. However, secure network design is not simply a technical issue. Intense public debate, mainly in the United States, surrounding issues of public key escrow and the Clipper chip has created unique groupings of suppliers, users, network operators and civil rights activists. The outcomes of these debates, and those in other countries, will shape the environment in which new legislative and regulatory conditions emerge. They will shape the network and determine the relative balance between private (special purpose) and public (open access general) networks.

National laws and international agreements which have been regarded as satisfactory when networks were either private or restricted to national or industry sector frameworks are being challenged by innovative technologies and applications, many of which are in their infancy. The rapid increase in the use of digital control techniques is giving rise to a class of name-linked data whose value, and need for protection, has not yet been fully appreciated by those involved in public policy, litigation, and the development of innovative advanced communication technologies of *metadata*, the acceptable conditions surrounding its safe-keeping and use, and the acceptable norms governing the commercial trading of name-linked data will require greater consideration than they have received to date if electronic commerce is to develop fully.

Interwoven with these technical developments are issues concerning the prevention of crime, the rights and freedoms of individuals and the ability to prevent eavesdropping, and the role of public and commercial third party escrow system. While these issues are being debated in private and public fora, new announcements on secure systems appear regularly and arguments and counter-arguments are made. The alliances and partnerships between information technology and communication companies are mirrored in the encryption and security business. There are potentially enormous economic rewards to be won by the company or consortium that produces the world's first widely accepted and secure trading system. Similarly, there are enormous risks compromised by their lack of security.

Systems which historically have been seen to require security appear to have security implemented as part of their initial design specification. Examples include Automatic Teller Networks, the SWIFT financial network, and government and nations security environments, where the security of the information and the need to preserve confidentiality of information is seen as vital. In other areas, however, such as electronic data interchange, bank clearing, foreign currency interchange and settlement, and the suppliers of third party specialist networks, encryption is not seen to be necessary and is therefore not widely implemented.

With older closed financial Automatic Teller Networks or Electronic Funds Transfer at Point of Sale networks, suppliers and users could specify all aspects of the system including hardware, software and communication protocols. This provided end-to-end-control over the system design and operation and enabled users to feel secure. Today's vision of global seamless open networks generate visions of loss of data and control.

If technical innovation fails to maintain the security of messages flowing through the world's electronic trading networks, then user trust and confidence will decrease, advanced information and communication networks will be under-utilised and investment in architectural innovations will slow down. At present, as the technical marketing manager for Internet security at Digital Equipment put it, we have a whole bunch of companies with solutions fighting to make one [solution] the standard. The evolution of standardised secure systems technologies within, and peripheral to, global information and communication networks, is closely linked with issues of trust of those who use networks both for commercial gain and non-commercial communication activities.

As the European Electronic Messaging Association (EEMA) argues, in order to avoid the necessity of having to establish multiple bilateral security agreements between organisations and in order to avoid having to tailor each organisations security systems to a different agreement, it is necessary to establish *a common, published agreement for a standard inter-organisational security policy and to specify all the mechanisms required to be used to support it.*

This is very tall order in a world in which networks intersect internationally and across industry sectors. The paper for this session will review and comment on the economic and social implications associated with the production of common systems standards (e.g. those supported by Visa/Microsoft, IBM/Netscape/Mastercard and other consortia), the future role of financial services and EDI suppliers on the Internet, co-operation between network providers in providing and managing secure gateways, and the role of governments in allowing strong encryption and managing trusted third party arrangements or escrow.

MEASURING INTERSECTORAL SPILLOVERS FROM IT AND NON-IT SECTORS: FRENCH EVIDENCE

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This paper investigates the influence of information technology on productivity growth and whether R&D spillover effects are becoming more important during the IT era.

An important feature of the knowledge creation process is the existence of externalities or spillover effects. When firms are unable to capture all the benefits of their innovations, a part of the created knowledge spills over to other firms. Representatives of the "new" growth theory and especially these of the evolutionary economics of technological change stress that the generation of these spillovers differs among sectors or among technologies. Especially, key-technologies or general purpose technologies are expected to create important spillovers for the economy. In van Meijl and Soete (1995) we studied the existence and magnitude of spillover effects related to the current general purpose technology: Information Technology (IT) and found a statistical significant influence of IT-related spillovers on productivity growth. This paper extends this study by investigating the magnitude of these spillovers' effects over time. This is an interesting extension because in this way we can investigate the hypothesis that the implementation of a new general purpose technology takes time to be fully exploited and for its influence on productivity growth becomes measurable.

Despite the expected large influence of IT on productivity growth, empirical studies haven't found a statistically significant relationship. This became known as the "IT productivity paradox". David (1992) followed Freeman and Soete (1987) by assuming that the implementation of a new key technology during a paradigmatic shift takes time to be fully exploited and that it will therefore be a long time before you find IT in the statistics. The other empirical studies are based on data sets which cover mainly the seventies and early eighties. Our database, which uses mainly French INSEE input-output and sectoral data, covers the period 1977-1992, so that we can investigate this "lag" hypothesis. We investigated this hypothesis by splitting the various spillover effects in IT and non-IT spillovers and studying the importance of IT and non-IT spillovers over time.

In this paper we use the spillover model developed in van Meijl (1995). In this model the productivity growth of a firm is dependent on its own R&D expenditures and three kinds of spillover effects. These are *rent spillovers* related to investment and intermediary goods. Rent spillovers reflect on the one hand that externalities may occur because downstream users who do not pay the full value of the input and on the other hand reflect that some knowledge is coming along with the good purchases. Besides these two kinds of rent spillovers there are "*pure knowledge spillovers*": ideas discovered in one sector that can be used by research teams in other sectors and that are not related to input purchases.

The empirical results indicate that especially rent spillovers related to IT investment goods are important for productivity growth. The estimated magnitude of these IT spillovers is also growing over time. Especially since the late eighties the influence of IT spillover is growing very fast. The influence of

IT knowledge spillovers and rent spillovers of IT intermediate goods is smaller but also growing over time. Therefore it seems that the "IT productivity paradox" is vanishing in the most recent period. This supports the "lag" hypothesis -- it takes time before the new general purpose technology (IT) has a measurable influence of non-IT spillover which stayed more or less constant over time.

A possible application of this spillover model exists in the field of the nature of knowledge. Knowledge can be divided into tacit knowledge on the one hand and codified knowledge on the other. Tacit knowledge is experienced-based and therefore local and context dependent (Polyani 1966). Codified knowledge is concrete information that is less context dependent and can be codified in ways more meaningful and useful for other firms as well. Dasgupta and David (1994), Ergas (1994) and Arora and Gambardella (1994) point to the growing importance of codified knowledge. They argue that knowledge generated in firms becomes *more meaningful and useful for other firms* through advances in the theoretical understanding of the problems, instrumentation and computational capability. One of the implications of the increased codification is that spillover effects will become more important in the IT period.

Our estimation also supports the view that spillovers are becoming more important in the IT era. The growing importance of spillovers can be separated in using more spillovers per unit of output and in a higher marginal productivity of the spillovers. It turns out that one-third of the increased influence of spillovers is caused by the use of more spillovers per unit of output while two-thirds are caused by the increased marginal productivity of spillovers. The increased marginal productivity of knowledge spillovers indicates that the usefulness of a piece of knowledge generated by other industries for the own industry has increased. This finding supports the hypothesis that the increased codification in the IT era makes knowledge more meaningful and useful for other firms.

A final result is that the estimated influence of "own" or internal R&D remained more or less constant over time. In combination with the empirical result that the influence of spillover effects has increased, this indicates that external knowledge sources are becoming relatively more important in the knowledge generation process.

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INTERACTIVE MEDIA SERVICES AND ELECTRONIC COMMERCE

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Recent progress toward re-engineering of the electronic distribution channel through partnerships, ownership and control, will eventually lead the telecommunication, broadcasting and computer industry into the age of electronic commerce. Convergence, with intelligence and functionality pushed further out onto the network, will have a profound effect on business and home consumers electronic business. Real-time control of time-based media combined with powerful applications and tools will create an innovative matrix of networked interactive media services. The next step, the Multimedia Bank, issuing multifunctional smartcards, e-cash, and high interest rates for integrated savings, loan and current accounts on internet and on-line services will be realised. In summary, electronic commerce has appeared on everyone's horizon.

USE OF INFORMATION NETWORKS, ORGANISATIONAL CHANGES AND PRODUCTIVITY: FIRM LEVEL EVIDENCE IN JAPAN

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This paper sheds light on economic aspects of information technology (IT), particularly, information network use and impacts on intra and inter-firm organisations as well as firm level productivity measurements, based on firm level data of Japanese manufacturers and distributors. Among various kinds of technological contents, a novel part of IT is its characteristic of "general purpose", that is, this technology is not a sector specific one, but diffuses into a variety of industries. At the same time, it should also be noted that a general purpose nature does not mean a unique way of use, but its application varies significantly by its industry and inside firm function. At a workshop level of a manufacturing firm, IT can be used as a tool for an inventory control system or a flexible manufacturing system. In contrast, a typical application of IT in commercial banks is an ATM system, which can make 24-hour banking systems possible. In this sense, it is important for researchers on economic analysis of IT to keep in mind the heterogeneous nature of IT.

The heterogeneity of IT use is also related to the "Solow's paradox", which comes from Robert Solow's famous quip that "you can see the computer age everywhere but in the productivity statistics". Brynjolfsson (1993) raised four factors to explain this paradox, measurement errors, lags, redistribution and mismanagement. Measurement errors are likely to happen in service sectors, since quality adjustment output is difficult to come up with (Griliches (1992)). Different ways of IT use between service sectors and manufacturing sectors may explain differences of "measurable" productivity performance. In addition, the impacts of other factors such as lags and mismanagement is hard to evaluate unless micro evidences on various kinds of IT use are investigated, since the institutional capacity of firms to adopt IT depends on the way IT is applied. For example, an e-mail system can be managed by intra-firm human resources, while an on-line transaction system needs re-organisation of the relationship with suppliers or customers.

This detailed analysis of organisational aspects and performance impacts is done, based on the firm-level dataset from the Basic Survey of Business Structure and Activities (BSBSA) by MITI. This census survey of Japanese firms activities covers broad areas of survey items such as the basic financial statement, employment by firms function, outsourcing activities and R&D activities as well as use of information networks desegregated into its application. Although this survey has started in 1991 and only one year's data are available, cross section analysis at the firm level provides new evidences to grapple with economic analysis of information technology diffusion.

The following are some findings:

- Among all samples of BSBSA, about 23 000, 64.6 per cent of them have introduced intra-firm information networks, and 43.8 per cent of them have inter-firm ones. In addition, about 80 per cent of firms use either intra or inter-firm networks. These figures imply that information technology is widely spread in Japanese firms, and its industry distribution

supports the idea of “the general purpose nature of IT”. In contrast to the industry distribution, a strong size effect of network adoption is observable. According to cross tabulations of industry and size monotonical increases in network adoption rate can be seen in almost all industries, and irregular patterns can be observed only in consecutive smaller size classes.

- As for the organisational impacts, both intra-firm dimension by occupation mix and inter-firm dimension by outsourcing are investigated. In both aspects, strong evidences of organisational impacts of network use are found. Regression results show that business-supporting network use such as management planning systems has particularly strong impacts on white collar job augment. On the other hand, business operating use such as on-line ordering systems is strongly correlated with outsourcing activities.

In contrast, productivity impacts are not so clear. Only one network use in technology information management shows a significant positive relationship with productivity of manufacturing firms. But, this finding leads us to the fundamental question of what a firm invests in information technology for, and how to measure it. As is mentioned above, there is a strong association between ordering systems and outsourcing but, if a firm’s intention of outsourcing comes from seeking more flexible business operation, are conventional productivity measures as pursued above appropriate? In this sense, R&D activities are linked with productivity more directly, and positive coefficient of its management makes sense.

MONDEX: ELECTRONIC CASH FOR THE NEXT GENERATION

James Rudd
Wells Fargo Bank

A. The U.S. payment system is changing dramatically

1. Today, approximately 85 per cent of all consumer transactions are made with cash and checks.

2. In the coming years, electronic transactions are expected to increase rapidly for several reasons:

   a) explosion in Internet commerce;

   b) falling technology costs -- cheaper, more functional technology will result in more people doing business remotely;

   c) new techniques for retail marketing -- as marketers look to target customer segments of ”one,” more efficient distribution channels will develop.

B. New types of money, like electronic cash, will form as electronic transactions grow

1. Electronic cash is essential for the development of new markets on the Internet. Many Internet services are currently free because no efficient mechanism exists for charging customers small dollar values. Once such a payment vehicle is developed, high volume low dollar value markets -- for example, information and computer access providers -- will proliferate.

2. Dozens of financial and technology companies are just beginning their attempts to develop a secure electronic cash solution.

3. Mondex, which has been under development and testing for over five years, is ideally suited for electronic cash transactions in the “virtual world.”

C. Why Mondex

1. Mondex is a highly developed electronic cash solution.

   a) *Mondex is a technology leader.* Mondex implementation of chip-based e-cash technology is several years ahead of other programs. At launch, Mondex will deliver an array of services including person-to-person, telephonic value downloading, and Internet payment.

b) *Mondex is a highly secure, cost effective system for micropayments.* Mondex accomplishes these objectives by aggressively exploiting the power of emerging smart card technology. Secure chip-to-chip transactions enable Mondex to operate over public communications networks. In addition, the security design obviates the need for centralised data collection of every single purchase transaction.

c) *The Mondex technology is proven.* To date, over two million transactions have been completed with the Mondex card, more than with any other program. In England, National Westminster Bank conducted extensive employee pilot programs during 1992-95. In July 1995, a full scale town pilot was initiated in Swindon. In August 1995, Wells Fargo became the first bank in the U.S. to implement an employee pilot.

d) Mondex is a global reality. Mondex will be an internationally recognised payment product. Participants already include the UK, Canada, and Asia-Pacific.

2. Mondex is a technology platform for applications beyond electronic cash

   The Mondex chip and operating system have the potential to become the smart card industry's standard technology platform upon which to build other applications. Additional applications might include loyalty programs, mass transit, or building access.

D. Mondex will revolutionise today's payment system and spearhead the charge into the brave new world of electronic commerce.

FUTURE RESEARCH AGENDA
CHAIRMAN'S REMARKS (EDITED FROM VERBAL PRESENTATION)

Ambassador Pasi RUTANEN
Permanent Representative of Finland to the OECD

The discussion in this *last session* should identify:

- future *research agenda*;
- topics for the *subsequent workshops.*

General Background

The OECD experts are convinced that the new ICTs (*Information and Communication Technologies*) are a fundamental driving force for the globalization of industry and services and the associated restructuring of OECD economies.

As the saying goes, technology venture capitalists sleep like babies: they sleep two hours, then wake up and cry.

We are living in the era *of internet-working*, when the Internet is a dominant force and the network is the computer, i.e. connecting computers to networks.

Two early *warning signals* to this new era:

1. The increase in the traffic. 160 00 new net-users a month means that everyone on this planet will be wired by the year 2004. This development has been so tremendous that some experts think the *Internet might collapse* under its own weight.

   The Internet is now being used by more than 80 00 companies for *electronic commerce activities*, which is the special topic for this workshop.

   Using the Net is becoming painfully slow. Some experts envision already a broader, all-embracing data network that will use wireless communications.

2. If the security issues are not resolved, the trust in electronic commerce will disappear, public confidence will be eroded.

However, there are still people who would like to see *the world according to Bill Gates*:

A networked world will make people wealthier, happier, healthier and more sociable. The world will be safer, more efficient. Above all, the world will be "smart". The brain, the smart part, will be the network itself.

The "imperfections" and inefficiencies of the market will virtually disappear. Total communications will give us what Gates calls "friction-free capitalism".

On the other hand *politicians* are also running far ahead *with grand visions*, leaving economists and experts behind to find out and explain what the implications really are; what are the policy solutions to cover social consequences and possible damages.

Before we enter the brave new world of Bill Gates & Co., we have to deal with a *transition period of deep economic dislocations* and the lack of a sufficient serious knowledge base.

How to Measure

Traditional tools for forecasting the pace and nature of future technological change and resulting markets are notoriously bad.

However, progress has been made since our meetings in Vancouver, Toronto and Istanbul.

In Toronto it was realised that *improved indicators* and *international co-operation* are needed to predict *inter alias* the number of *jobs* created or lost through ICT.

. Rapid adaptation of ICT may increase structural unemployment until the skills-mix acquired is in place.

SMEs are an important factor but there are still difficulties in collecting data. More research on the characteristics of jobs as they migrate into *networked environments* is needed.

There is also a gap in understanding the link between technical capacity and organisational capacity. Perhaps there is a need for totally new industry categories.

For mapping, measuring and monitoring we need new sets of indicators. It is important that these indicators are policy relevant and comprehensible to the political decision-makers and to the general public.

Mika Kawachi's work points out the need for international co-operation. She has developed an excellent *framework for new indicators*.

(See the paper titled Indicators for Monitoring the GIS (Global Information Society) Development).

Without further OECD work there is still a danger that action is based more on collective intuition and visions rather than on solid economic analysis.

I would like to repeat here a proposal I made in Toronto.

We might have reached a stage when an *"Interfuture" study on ICT* is needed. The 1997 "Facing the Future" (Mastering the Probable and Managing the Unpredictable) was a masterpiece of joint economic analysis among the OECD countries. In the new analysis, the business community should be more heavily involved, as it was repeatedly said in Toronto.

Electronic Commerce: Front-line of the Businesses, Technologies and Infrastructures

The ability to apply the new ICT *applications* might be the major asset in the fiercely competitive *globalized world economy*.

Global networks with new partnerships based on the use of common ICT platforms are emerging. They acquire a dynamism of their own: each new member making the network even more attractive, constantly re-organising firms and groups that lead them. Firms are shifting away from traditional models and virtual firms/malls are emerging.

CT/BPR (Business Process Re-Engineering) have reorganised business around processes bringing in flexibility, skills and slimmer and flatter companies. For these new "lean and mean" companies the question is: is it better to be on the bleeding edge, the cutting edge or the trailing edge of technology.

Although more precise data needs to be collected on *electronic commerce, impacts* within firms and their business environment have already become noticeable. These impacts will appear also in the OECD/ICCP report on GII/GIS to the Ministers this May. This workshop has added valuable new elements to those lists of implications and consequences, including the strategic importance of SMEs.

New SMEs were interestingly described by *Joichi Ito*: very small, very high-speed companies with massive market projects in the centre of standardisation processes. SMEs of new industry: knowledge about knowledge realising that the standards are changing fast: Netscape might not be a standard next year.

Perhaps more data is needed on the claim that job security is greater in the network of those small companies than in the large companies.

Greater efforts must also be deployed to improve public understanding of ICT and its implications.

The fears of social "exclusion" must be dispelled, possible erosion of government influence should be studied, stock must be taken of the relevance of existing legislation, practice and government regulatory policies, etc.

What is government's role?

Is it to regulate, stimulate, facilitate or watch? Is it an enlightened regulator to tell what is wrong, not what is right? Will it have an active role in updating and anticipating legal systems?

Defining Re-engineering

1. Reconfiguration and re-engineering of firms' activities:

   What kind of companies are needed in the knowledge-based societies using ICT? An ever-changing endless chain of continuously developing companies in consumer centric, thematic marketing of 24 hours a day?

   Companies have to change, harmonise their internal working practices. They face two major obstacles: middle management reluctance, inter-organisational hierarchies.

1. GIS/ITC require highly educated labour force with motivation for lifelong learning. Hence: restructuring and re-engineering the educational systems and institutions in the transformation into true learning societies. On this development it would be useful to read the expert material from the OECD Education Ministerial of last January.

2. The basic problem in the OECD countries remains: business is increasingly global but politics stays local.

Institutional Settings: Re-inventing Institutions

What are institutional responses and legal solutions to avoid economic "Chernobyl", as someone said. How to rebuild public confidence in the ICT?

I was disappointed that the role of public institutions was not developed further.

In re-inventing multilateral institutions, one study (which was not mentioned in our workshop) suggests that a *World Interconnection Forum* (WIF) should be created to serve as a focal point for co-operation under the auspices of the WTO. This new body would provide networked access to information on domestic regulations and other rules and procedures pertaining to trade. (William J. Drake: The New Information Infrastructure: Strategies for U.S. Policy/A Twentieth Century Fund Book).

As Robin Mansell said, securing electronic networks has received public attention: "A chain is as strong as its weakest link."

Electronic money may lead us to open Pandora's box: "What is money"? What is the authority of a central bank in this virtual reality? As Konrad Alt said: "At the worst, a faulty or crackable system of electronic money could lead to an economic *Chernobyl*."

To avoid this and to standardise business protocols, an agreement on a "standard" inter-organisational security policy might be needed. *Takashi Uchida* proposed an *Internationally Uniform Model Law* on Electronic Commerce.

To sum it up: There are not that many multilateral solutions available.

Data

Behind this meeting room, in the reception area, there is a display of *45 OECD publications on* GII/GIS/ICT, each containing anything between 50 and 300 pages -- all together, perhaps, at *least 5000 pages.*

Today, we have to add to these documents workshop reports: Toronto 145 pages, Istanbul 95 pages, plus individual papers, in this workshop alone, 18 of them.

Are we now better off than we were at the joint OECD/APEC meeting in Vancouver a year ago?

Although there is certain repetition in discussions, we are moving ahead, towards better knowledge of the knowledge business. In these efforts we should, of course, use the ICT itself to study the ICT in its impacts.

Future agenda and the subsequent workshops

The expected product of this series of workshops: a report including policy recommendation with evidence, overview and vision, and with suggestions for a further role of the OECD.

There will be two more workshops this year:

In Helsinki 6-7 June, 1996 the general topic will be human resources. *The new features of the ICTs in human resources development* are described in the OECD document "Technology, Productivity and Job Creation" which is a response to the request expressed at the March 1994 G-7 Detroit Jobs Conference. The same theme is developed in the OECD document, "The OECD Job Study: Pushing Ahead with a Strategy" and, of course, in the expert report on GII/GIS prepared for the May ministerial.

The October workshop in Seoul will discuss *the role of government.* This theme has also been discussed in the above mentioned documents, e.g. "assisting the development of new ICT applications in the *public services* and diffusing them". The OECD ministers are discussing this same topic in Paris, today and tomorrow, in a meeting organised by the PUMA Committee.

While pushing ahead with their strategy on employment/unemployment, the governments are taking up enormous responsibility to educate and dispel public fears that the new ICTs permanently destroy jobs and future.

Finally, I would like to thank the host country, *Japan,* for the excellent arrangements and for the interest and seriousness it has always shown in the work of the OECD. In October 1994 I was in this same building, in the Keidanren Hall, in the Headquarters of Corporate Japan, on a panel discussing the future of the OECD.

HOW DO ICTS AFFECT ORGANISATIONS ? : PRODUCT DATA EXCHANGE AND THE CONTINUOUS ACQUISITION AND LIFE-CYCLE SUPPORT PROGRAMME

Graham Spinardi
The Research Center for the Social Sciences, University of Edinburgh

Product Data Exchange (PDE) offers the prospect of electronically transferring R&D, design, manufacturing and product support data between companies. The US Continuous Acquisition and Life-cycle Support (CALS) programme is the most prominent of several initiatives with this aim. CALS seeks not only to develop standard formats for the digitisation and exchange of data, but also to restructure inter-organisational relationships to facilitate concurrent/simultaneous engineering.

However, PDE technologies like CALS have impacts not just on the inter-organisational relations of organisations, but also on the way they handle data internally. For electronic exchange of complex product data to work effectively requires the exchange formats to map seamlessly onto the formats in which data is held internally. However, these internal data formats and the IT systems in which they are used have been designed to match the company's internal working practices. Developing universal data exchange formats thus also requires the harmonisation of working practices which are embedded in existing IT systems, a process which will be very costly.

Incremental rather than radical change is thus most likely to occur. The extent of business process re-engineering (BPR) brought about by CALS will be limited by the resistance of organisations to change. On the one hand, the emphasis of CALS on data sharing threatens existing hierarchical inter-organisational relationships and the retention of proprietary knowledge. On the other, the complex nature of the data to be exchanged will in many cases require companies to change their internal systems to be compatible with the standards, and this again constitutes a barrier to the use of such standards.

This means that the development of standards for PDE will be necessarily political, both in the sense of governments having competing interests, as well as in the differing requirements of military and civil users and of different industrial sectors. Companies will be faced with a difficult choice between implementing their own proprietary, non-standard approaches to achieve immediate benefits or waiting for the outcomes of programmes such as CALS (which may result in universal standards which are inappropriate for specific needs). Most importantly, companies must address the concept of BPR with a realistic understanding of its limits in practice.

PERSPECTIVES ON THE INFORMATION (NOTES)

Barry Sullivan
Electronic Data Systems, Ltd.

Information Superhighway Convergence

- Automatic banking systems.
- Home security monitoring services.
- Infrared parking meters.

Provides for on-line services:

- marketing;
- upgrades;
- staying connected with consumers;

Product/Service Companies, Governments

Competitive Principle

1800s - Product transportation - shipping, railroads.
1900s - Personal transportation - automobiles, airlines.
21st century - Information transportation - multimedia, digitised content.

Speed.

Global - Works two ways, must be global to be competitive, others will be entering your markets forcing you to be more competitive.

Relationships: Staying connected to customers.

Economic Model

An economy: Total cost
Industrial economy: Total cost=Variable cost+Fixed cost
where fixed cost<30 per cent
Information economy: Total cost=Fixed cost
Example-software
Access to capital-->Access to information

Organisational Model

Organising principle of the information economy is the opposite of that of the industrial economy/Industrial economy was the breaking up of work into its component parts to allow for mass production; the information economy central tenant is unification, enterprises, customers and suppliers aligning so closely that the boundaries seem to dissolve.

Cultural Model

Learning organisations (who learns the fastest-1/4 second example).
Empowerment.

- "Purposeful activity but much less central control".
- Implies competency, knowledge, continuous sharing of a vision.
- Requires personal accountability and responsibility, can't just say it, must provide tools.

Infomediaries

Content creation vs audience creation.
Audience creation is in part applying filters (analysis, objectivity, opinion, comparison) to data. A value added activity will be capturing and providing the warrants underlying the data.
"Economics of attention".

The unpredictable use of information.

Education (Bringing out something potential or latent) (dbIntellect)

Data mining, harvesting.

Provide Context

It is not the content but the context that will be most valuable; the scarce resource will not be stuff but will be a point of view.

Visualisation

Virtual reality (Electrolux).

Network of networks

The elimination of data and information boarders is on a collision course with the sovereignty of the nation/state.

Two popular visions of the information highway:

- extension of the Internet, focus on gathering information and exchanging it via mail like network.;

- more robust interactive TV network, focus on videoconferencing, home shopping, entertainment on demand.

This is an oversimplification, driven by those with narrow self interests.

GII Priorities

In the US telecom liberalisation includes issues such as: safeguards (competitive industry vs monopolistic), universal access (subsidising supplier or *consumer*), regulation (bandwidth, spectrum allocation).

Encryption: Thorny issue between law enforcement, national security and the free market.

Individuals

Demanding, sophisticated.

Sociology

The sociology of the information superhighway:

> few years back high-tech innovation was shaped by those who knew a lot and demanded a lot, now it is the opposite in that innovation is being driven by those that don't want to know a lot.

Expectations

Excitable, Affordable, Compelling, Usable.
"Visual, Intelligent, Personal".

Behaviour

Empowered individuals: Pull vs push distribution systems (En Passant).

Summary - CSFs - Being Successful.
Break through technology is that technology that responds to the way people want to behave. (i.e. enables behaviour change vs users' behaviour change?).

- Information literacy: Traditional, computer, media, network.
- Constituencies: Users, sponsors, beneficiaries.

Infrastructure/superstructure

- Beware of de facto standards that are in place in the market being targeted or served.
- If interfacing with other systems, have a program to engage them all an ISV program.
- Training.
- Must have support system in place. The need for support can be greatly affected by the quality of the product, ease of use and training.

Case Studies

Document

Delivery system for the superhighway when something of value must be delivered to the customer. Sales can be part of the transaction (as is the case with event tickets), or the sale transaction may take place elsewhere (as is airline tickets).

Initially the ATM like machines will be installed in upscale supermarkets, to be followed by shopping malls, office complexes, etc. A number have been installed, we will be doing several a week shortly.

ITP - Interactive Transaction Partners

EDS, US West, France Telecom. Home banking, electronic billing/payment. Touch tone phone, ADSI screen phone, PC interfaces. Systems from France telecom were used as the basis, although almost all was rewritten to meet US requirements. France telecom's role was one of the investment, leverage on work they had done, possible entry into US market, no immediate plans to deploy in France. Beta began in December, 7 financial institutions and a selection of their customers. Merchants have been signed up as market needs dictate. Beat is winding down, successful beta.

TaxConnect

System allows businesses to submit income, revenue, sales, excise, etc. tax returns for states to a single location (EDS). EDS then transmits the returns to the appropriate state and/or state department. The system will also perform the funds transfer function. The challenge is to get the vendors who sell the tax preparation software to implement the necessary interfaces.

National Institute of Government Purchasing

EDI system tailored to meet the needs and regulatory requirements of government entities. Purchase orders, remittance orders, invoices, payments, etc.

dbINTELLECT

dbINTELLECT is a tool kit for managing massive data bases and mine them for knowledge. The management component includes scrubbing capability, for example to standardise addresses from multiple sources, use soundex technology to match names, etc. Also included in management is a rule based capability to select desired information from massive data bases, creating an information warehouse. The decision support component includes capability to perform data analysis, reporting and data visualisation.

PREMISYS

PREMISYS is an EDS subsidiary providing security alarm monitoring services directly to the consumer and to alarm protection companies. Services include sales support, installation and service, monitoring, billing and remittance, networking and telecommunications support, etc.

AMOA

Amusement & Music operators Association has about 1 700 members in the coin operated amusement and music industry representing about 1 million game terminals. Ability to conduct nation-wide tournaments, handicapping. Also generates advertising revenue.

First Virtual - EDS, First USA, National Direct Marketing Corporation

Internet authorisation and payment system. Facilitates electronic commerce by allowing suppliers to participate who could not qualify as merchants under traditional credit card processing, low registration fee. Buyers and sellers initiate and confirm transactions “above the line”. Banking and financial operations take place “below the line”. The process starts by a buyer enrolling through the Internet, providing credit card information via a 800 number. The buyer is given a code, like a PIN.

To execute a transaction the buyer makes a “buy” over the Internet, providing the First Virtual PIN. This PIN is transferred below the line to the financial system to index into credit card information. An Email message is sent separately to request confirmation of the transaction (“above the line”). Upon confirmation the settlement is transacted “below the line”.

En Passant

Dow Jones

Global News Management System replaces the news gathering and story development process for the Wall Street Journal and Barron’s. Provides capture and customised searching of news wires, faxes and other electronic information.

Future opportunities include the re-use of WSJ content into an interactive Journal.

Electrolux

The system immerses the user in a kitchen by using a head mounted display and three dimensional mouse. The user can interact -- opening drawers, moving tables and chairs and appliances, etc.

REGULATIONAL ISSUES FOR ELECTRONIC COMMERCE

Takashi Uchida
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1. Introduction

The expansion of electronic commerce has the potential to fundamentally transform both the structure of markets and the framework of corporate organisation. Today, when developed countries have entered a mature phase of economic growth, the need to increase business efficiency and also to expand transactional opportunities has made it difficult to resist the transforming current. However, whether this transformation will progress smoothly depends on the state of the institutional environment. In particular, insofar as a feature of electronic commerce is that it is not confined within national boundaries, it will be necessary to maintain international harmony as we proceed with provision of an institutional environment for electronic commerce.

This paper focuses on provision of an institutional environment as an issue that is posed by the expansion of electronic commerce.

2. Three Types and Four Stages in Electronic Commerce

Electronic transactions are many and varied, and the institutional issues they pose are not identical. Ordinarily they can be divided into the following three types, according to the parties to the transaction and the mode of formation.

First, EDI transactions associated with closed networks between specific corporations (Closed EDI). A classic example is the manufacturer and retailer who are directly linked through ECR (Efficient Consumer Response)-type electronic commerce.

Second, electronic commerce in which corporations can select transaction partners from a range of unspecified corporations within a network (Open EDI). For example, in the manufacturing sector, this kind of Open EDI is sought in order to procure cheap materials from around the world.

Third, consumer transactions occurring within a network (Electronic Mall-type consumer transactions). Consumer transactions that use the Internet are already occurring, but there is a strong likelihood that with the expansion of users connected directly to networks, and the development of Electronic Mall stores, this kind of transaction will expand rapidly.

These three transaction types represent, to a certain extent, the order in which electronic commerce has developed and at the same time responded to institutional problems which emerged during the process of expansion. Below I consider the growth of these institutional problems by dividing them into four stages.

3. Stage One

Electronic commerce began as Closed EDI. At the time, individualised communications networks were established through a series of links between specific corporations. At the very earliest stage of electronic commerce the first institutional issues revealed were the problems accompanying the shift to paperless transactions. In other words, legal systems that had been developed with paper-based transactions in mind were identified as potential obstacles to electronic commerce and the central question was how to remove such obstacles. Typical problems included how to deal with the legal concepts of documentation, signature, originals and preservation of records in an electronic environment.

In principle such problems ought to be dealt with under the domestic law of individual countries. However, when electronic commerce data crosses national boundaries it must abide by different regulations, and this hinders the global expansion of electronic commerce. For this reason, an UNCITRAL Committee commenced work in 1993 on drafting an internationally uniform Model Law that would address this problem. The draft of the UNCITRAL Model Law on EDI is now largely complete, and it is hoped that it will be adopted at this year's General Meeting of UNCITRAL. In all it comprises just 14 provisions, and embodies the minimum rules necessary for removing the problem of legal impediments to electronic commerce.

What was really brought home to us in the course of Committee work on this Model Law was the difficulty of unifying the commercial laws of various countries. Considering UNCITRAL's mandate, the focus should have been restricted to international transactions, but in light of the peculiar characteristics of electronic commerce, we decided to draft a Model Law that did not distinguish between international and domestic transactions. For this reason drafting the Model Law became that much more difficult. We spent three years just reaching agreement on these rules, and we anticipate more difficulties when it becomes legislation in each country. When we consider this kind of difficulty, it seems prudent not to rely solely on legislation to remove institutional impediments, but to look for alternative strategies as well.

From this perspective, Electronic Notary Systems is a valuable case to bear in mind. At the first stage of development, many institutional problems originate in the fact that electronic data, unlike documents, appears comparatively simple to tamper with. Technically even if it is possible to create electronic data that is harder to forge or falsify than a document would be, the problem is the difficulty in proving that the electronic data in question has been stored in a state that protects it from forgery or falsification. One effective means of avoiding this difficulty is to establish a so-called Electronic Notary System. On the Internet there is a commercial corporation already providing this service and it would be worthwhile to consider its establishment as a public system in some circumstances.

4. Stage Two

Within Closed EDI, in order to expand the possibilities for tie-ups between corporations which are linked through a network, standardisation of communication protocols and business protocols is necessary. The trend toward standardisation has made people realise that, from this point onwards, EDI is the infrastructure for transactions between corporations. In particular, the standardisation of business protocols that can be seen in UN/EDIFACT can be expected to change the structure of markets and as it does so, standardise industry transaction practices. This will inevitably provoke numerous problems, both legal and practical, particularly in markets such as Japan that have complex distribution structures and numerous variations in commercial practices between industries.

For example, when standardisation of transaction forms involves cost, and smaller, weaker corporations cannot absorb the burden, they are likely to be excluded from the network. In some cases, this may be regarded as an `unfair business practice' of the kind that would breach the Antimonopoly Law. While it may be that the movement toward standardisation is inevitable, the issue of how to bolster the ability of industries to cope with electronic commerce is an important one for economic policy.

5. Stage Three

Within Closed EDI, too, the trend is toward the electronic contracting, electronic movement of goods and electronic settlement of accounts (Financial EDI). In this way, when we reach the stage of completing the so-called EDI loop, the number of parties connected to a common network increases, and the effects of any breakdown in the network become that much greater.

The same problem occurs on a larger scale once electronic commerce expands into Open EDI and Electronic Mall consumer transactions.

In Open Network-type electronic commerce (Open EDI/Electronic Mall consumer transactions) computer networks are not merely a means of sending information; they are virtual reality. They represent a new world, in which it is possible to build malls and open retail businesses. Commercials are shown, negotiations proceed, goods are transported, and banks open retail shop fronts.

However, computer networks involve a variety of latent risks. The risk that the data you send does not arrive; the risk that the data changes form; the risk that a third party deliberately attacks the data; the risk that the network goes down physically and many others. Because networks are vulnerable to these kinds of risks, it becomes a difficult question to determine who should bear responsibility and under what conditions, when a network party incurs damage.

Of course, a real shopping mall can also be destroyed by earthquake or fire. However, the complexity of the computer network situation is that the parties to the contract are stratified. For example, in the case of an electronic mall consumer transaction, before the consumer arrives at the store of their choice, he or she must proceed via contractual relationships with multiple parties. First is the connection with network provider (of whom there can be more than one), which is a contractual relationship. In the case of a dial-up connection, the contractual relationship with the telephone provider also intervenes. Next, when the consumer connects to the electronic mall, a standardised contractual relationship is created between him or her and the party who establishes the mall. Finally, a sales or other kind of contractual relationship is established with the desired store.

When the consumer incurs damage as a result of a reason attributable to the fault of one of the parties who form part of this strata, the question of who bears responsibility and according to what conditions is, at present, determined by a standard-form contract of which the consumer may not be aware, or by the domestic laws of particular countries. For example, where a store conducts a fraudulent transaction, whether the network provider or party establishing the mall bears any responsibility toward the consumer depends on the standard form contract between these parties, or the content of the individual country's consumer protection laws.

However, when we consider the borderless character of open network transactions, it is hardly appropriate that the measures to deal with such disputes must be governed by the choice of law in private international law, and the varied measures adopted by individual countries. Accordingly, in addition to exchanging information about the content of individual countries laws relating to information, we also need a forum in which to debate the unification of standards.

But in practice it is virtually impossible to unify domestic laws. Even in the process of drafting the UNCITRAL Model Law we considered this difficulty and avoided debate on the question of liability by deeming it to be a problem for individual countries' domestic laws.

We need then, to look for choices beyond the unification of domestic law. The first would be the widespread use of standard form contracts with rational content, so we should attempt to draft and work on rational model contracts of this kind. Second, it would be profitable to put in place schemes whereby the inevitable damage that occurs is covered by insurance.

Once information about a transaction partner is accumulated through electronic commerce, processing or cross-referencing that information is simple. Protecting the amassed data becomes a question of the trade secret protection between the two corporations, and in the case of electronic mall consumer transactions, a privacy problem. The extent to which data amassed in this way can be used freely calls for an institutional response which establishes guidelines.

6. Stage Four

At the cutting edge of electronic commerce we see the arrival of completely new transactional techniques using an electronic medium. Those currently under debate are the electronic negotiable instrument and electronic money.

In the first instance, in the field of electronic negotiable instruments we can note that electronic bills of lading are already at the trial stage. The 1990 International Maritime Committee's CMI Rules have been adopted as legal rules governing these. Further, from 1996 the UNCITRAL Working Group on EDI has commenced work on legal rules relating to Bills of Lading and the computerisation of related documentation. Transfer of title, which was not the focus of the CMI Rules, is likely to be included within this.

If this is realised, it will signify a new form of transfer of title. Technically, if we create a central registry and put in place supervisory mechanisms for the key, we can computerise a transfer of title. For example, computerisation of promissory notes or cheques will be possible. In this case, it will also be necessary to consider an institutional framework for protecting distribution, such as that which currently exists in relation to negotiable instruments.

By utilising encryption technology, it is possible to transfer title electronically without using a central registry. The strongest possibility for realising this rests with electronic money, for which practical trials have already been carried out. It will be possible to use it to transfer large monetary amounts between corporations, but in the meantime its use for lower value consumer transactions is also recognised.

In relation to the so-called computerisation of money, we can point to the Mondex-type which utilises smart cards, and to the e-cash type which aims at settlement of accounts via the Internet. However in each case electronic cash is simply a metaphor; how to construct this in legal terms remains an unresolved issue.

One means of resolution would be deal with this as an analogy for existing settlements systems. In other words, if we conceptualise Mondex-type electronic money as “that which has the highest incidence of use among widely-used prepaid cards”, a legal construction as a right or as a liability becomes possible. By extension, a similar construction of e-cash type electronic money is also not without possibilities. In other words, it would be construed as a right as against the originator.

However, if this kind of construction is possible, then actual cash would cease to be an obstacle when construing a right as against the state or the central bank. This, in the end, leads unavoidably to the fundamental question. “What is paper currency?”. One of the most important functions of paper currency is regarded as being the finality that it brings to settlement of accounts. However, if this is a right as against the central bank, it provokes the question of how this differs from a right to savings which involves an obligation of payment, and reopens the question of what finality means.

In this sense, electronic money may lead us to open the Pandora's Box marked “What is Paper Currency”. This will also lead us to fundamentally question the authority of the central bank to regulate the volume of currency. In reality, it is also conceivable that if credit can be established within the network using electronic currency, it will invite a flood of currency that completely overwhelms the breakwater of national borders and causes disorder in the regulation of currency.

At present, legal evaluation of electronic currency is taking place at the national level, but before we invite its use in a damaging way without trial, it will be necessary to create an international forum in which to debate an appropriate response.

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