

**OECD WORKSHOPS ON THE ECONOMIES OF INFORMATION SOCIETIES
REPORT ON THE ISTANBUL WORKSHOP
WORKSHOP No. 2
ISTANBUL, 14-15 DECEMBER 1995**

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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OECD WORKSHOPS ON THE ECONOMICS OF INFORMATION SOCIETIES REPORT ON THE ISTANBUL WORKSHOP

Preamble

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 second of the OECD Workshops on the Economics of the Information Society was held in **Istanbul, 14-15 December 1995**. It was hosted by TÜBİTAK-BİLTEN, the scientific and technical research council of Turkey, and was organised jointly with the European Commission and the Organisation for Economic Co-operation and Development (OECD) as well as the Turkish Government. The workshop was devoted to contributing to the OECD and the European Commission activity on the Economics of the Information Infrastructures.

The focus of the Istanbul Workshop was *networking*. Recently, the world has been observing the tremendous growth of Internet, on-line services, as well as of mobile phones and other new network services. Given the continuing development of network infrastructure, both wired and wireless, we will observe further growth of a wide variety of network services. Currently, the available indicators of the diffusion of advanced network services (the key element of the information society), show strong growth momentum.

However, neither the economic nature of these network services, nor the impacts on the economy and society by their diffusion, are well understood. Hence, the appropriate role of governments in managing the changes is not yet totally clear. The two-day discussion was devoted to the identification of the economic nature of networks and its implication for policy.

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 nature of the networks from various aspects, provided a stimulus for further research works 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 would like to gratefully acknowledge the support and enthusiasm of all those involved.

SUMMARY OF POLICY IMPLICATIONS¹

- The lack of appropriate data resources for measuring the effects and implications of electronic networks and networking is an impediment to effective policy-making. Governments must establish priorities in this area, clarify their specific information requirements, and support public statistical agencies in their efforts to create an internationally co-ordinated statistical system.
- Measurement of network phenomena requires a balanced analysis of social as well as economic statistics.
- In order to develop effective indicators of networking activity, it is essential to have a better understanding of the services environment. Demand forecasting for network services will become more difficult as market and industry structures change, and the quantity of new service types increases.
- Increasing the bandwidth available to customers on the network may stimulate demand for new services. Nevertheless, problems of supply and demand are unlikely to be solved by increases in capacity alone. The regulatory environment will continue to be a key factor in determining the conditions of network access and use.
- Significant increases in the adoption of new services will complicate the debate on the definition and market dynamics of 'universal service'.
- New service markets do not always require radical technical upgrades in the network. We should not underestimate the potential of voice telephony, for example, as a vehicle for the development of new services markets.
- Assumptions about the impacts of new service provision on the economics of networking must be made cautiously, as they will have profound implications for the development of indicators.
- SMEs are an important factor in networking, but the characteristics of SMEs present special difficulties for the collection and interpretation of data.
- Transactional networking has implications for the structure of commercial relationships. Legal and policy measures may be required to address the possibility of 'virtual' vertically integrated relationships.
- In order to monitor the effects of electronic networking on employment and skills, more research is needed on the changing characteristics of jobs as they migrate into networked environments, and on the reasons for the location of networked businesses.
- If cost-based pricing is to be realistic, increased attention needs to be paid to the question of how to calculate costs in a network. Approaches to this problem must take into account the interconnection requirements that exist in a 'liberalising' network market, and the implications that the multiplication of services offered might have for creating network congestion.

- Being able to harmonise access pricing principles internationally will be a critical factor in negotiating free trade agreements for trade in services.
- The market power of incumbent firms in the networking industries remains a significant factor. Policy-makers thus require more accurate assessments of the actual nature of competition in a market when determining pricing principles.
- It is important to understand the characteristics of existing and potential users of specific kinds of network services and to take into account the nature of the information they use.
- The characteristics of the information society may change the way we approach statistical analysis. Governmental and intergovernmental statistical agencies are still mainly oriented to the 'industrial age', and must learn to develop statistical systems that are geared to the new kinds of products and services of the 'information age'.
- Measurement systems must consider social and economic interactions in the formation of patterns of network communication.
- Macro data must be enhanced with sector and firm-specific data.
- The issues of consistency in data gathering and accuracy of data presentation acquire special significance given that public policy-makers are making more frequent use of data from private sources. Provided that the nature and origin of these data are explicitly recognised, however, they could complement data gathered by official bodies.

PROGRAMME

OECD WORKSHOPS ON THE ECONOMICS OF THE INFORMATION SOCIETY

Workshop Number 2, Istanbul

Thursday 14 December and Friday 15 December

Organising Institutions: European Commission
Tübitak-Bilten
Organisation for Economic Co-operation and Development (OECD)

Venue: THE MARMARA ISTANBUL
Taksim - Istanbul
Turkey

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 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 second in a series of Workshops, the Istanbul Workshop, is to be devoted to contributing to the OECD and the European Commission activity on the Economics of the Information Infrastructures. It is hosted by TÜBİTAK-BİLTEN, the scientific and technical research council of Turkey.

Objective of the Istanbul Workshop

Recently, the world has been observing the tremendous growth of Internet, on-line services, as well as mobile phones and other new network services. Given the continuing development of network infrastructure, both wired and wireless, we will observe further growth of a wide variety of network services. Currently, the available indicators of the diffusion of advanced network services (the key element of the information society), show strong growth momentum.

However, neither the economic nature of these network services, nor the impacts on economy and society by their diffusion, are well understood. Hence, the appropriate role of governments in managing the changes is not totally clear yet.

The focus of the Istanbul Workshop is *networking*. The two day discussion is devoted to the identification of the economic nature of networks and its implication for policy.

Overall structure of the Workshop

The Workshop is structured to shed light on the following questions:

- Session 1: What are the dynamics of building the network infrastructure?
- Session 2: What are the organisational and inter-organisational impacts of networking?
- Session 3: How should network services be priced?
- Session 4: What indicators are necessary to map, measure and diagnose the changes?
- Session 5: What are the implications for the future research agenda?

¹ The author is Prof. Richard Hawkins - Centre for Communication and Information Technologies (CICT), Science Policy Research Unit, University of Sussex, UK.

OECD Workshops on the Economics of the Information Society

Workshop No. 2, Istanbul

Thursday 14 December and Friday 15 December 1995

Wednesday 13 December 1995

18:00 welcome Cocktail: Sponsored by TÜBİTAK-BİLTEN

Thursday 14 December 1995

8:30 Registration

9:00 Welcome : Tosun Terzioglu, President of TÜBİTAK

9:15 Introduction :

Alain Servantie, Head of International relations in DG XIII, EC

Daniel Malkin, Head of the Economic Analysis & Statistics Division, OECD

- Results of the Toronto Workshop
- Objectives of the Istanbul Workshop
- Administrative matters

10:00-13:00 Session 1 : Dynamics of Network Infrastructures
--

Network construction is a key issue. This session is devoted to the economic perspectives of the dynamics of network building and implications for policy. Discussions will include;

- *Building the network*: What are the forces at work on competition, innovation, economics, and universal service obligation.
- *Scenarios for building the networks*: Externalities and their effects; competition among infrastructures and network service providers.
- *Implications for regulatory policy*: Universal service obligation, interconnection, market entry, competition between incumbents and newcomers.

(Chairman)

- Len Waverman, CIS, University of Toronto, Canada

(Speakers)

- Tadashi Kuriyama, Tohoku University, Japan.....*What is the recent development of "investment estimation in Japan"?*

- Sharon Eisner Garnett, MIT communications policy, United States....*A prospect of US development, ISDN vs CATV*
- Laurent Gille, Sirius, France....*Electronic Transactions: Facts and Trends*
- Cristina Murrone, Institute for Public Policy Research,....(?)*New issues for Universal services*

(Discussants)

- Daniele Bologn, Istituto di Economia dei Media, Italy
- Francisco Caballero Sanz, CEC DG II

(Session Rapporteur)

- Timothy Fenoulhet (?)

13:00 - 14:00 LUNCH

14:00 -17:00 Session 2: Organisational and Inter-Organisational Impacts of Networking
--

Both within and between organisations, networking is causing significant changes in organisational behaviour. This session is devoted to the identification of the possible changes, seen from an economic perspective, with the goal of drawing policy implications. Discussions would include:

- *Applications of the network to communication and transactions with and between organisations, including electronic commerce:* Introduction of several case studies.
- *Economic perspectives and implications of networking:* Organisational structure, the territorial dimension, human resource skills, transportation, industrial structures.
- *Extension of the policy implications:* to SME policy, industrial policy, skill development, and related regulatory issues.

(Chairman)

- Werner Herrmann, CEC, DG V

(Speakers)

- Meral Sayin and Mustafa Akan Fazlioglu, KOSGEB, Turkey....*Medium Enterprises (SMEs) and Euro Info Centre Network*
- Pekka Ylä-Anttila, ETRA, Research Institute of Finnish Economy, Finland....*The Impact of Structure and Competition on Employment in the Telecommunications Cluster - Case of Finland*

- Ian Courtney, United Kingdom....*On line banking*
- Jiro Kokuryo, and Yoko Takeda Keio University of Japan....*Role of Intermediaries in Electronic Commerce*
- Georges Ferné, OECD and/or Turkish expert....*ICT usage in firms, Case Turkey*

(Discussants)

- Robert Plasman, Université Libre de Bruxelles, Belgium
- Pascal Petit, Cepremap, France
- Hannu Jaakkola, Tampere University of Technology, Finland
- Ranald Richardson, CURD, University of Newcastle, United Kingdom

(Session Rapporteur)

- Timothy Fenoulhet

Thursday 15 December 1995

9:00-12:30 Session 3: Pricing of Network Services
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The objective of the session is to clarify the economic issues raised by existing and emerging network services. To do so, the debate will focus on one important economic dimension: the pricing of the network services. Discussion will extend to the overall economic impacts and implications for policy:

- *Existing and emerging network services, and their pricing options*: Survey of the current situation, including: services offered, their prices; forces at work upon players such as operators and regulators; potential problems and issues surrounding network pricing.
- *Theoretical approaches to pricing network services*: The agenda would include: definition of service, costing basis, effective resource allocation, competitive pricing, forward pricing, flat-rate, usage basis, etc. Theoretical bases for alternative network service pricing schemes.
- *Possible economic impacts of pricing options*: Demand side effects, supply side effects, consumer surplus, and total impacts.
- *Implications for policy*: Suggested directions for Regulators. How Regulators can manage change. Realistic paths that the Regulators could take.

(Chairman)

- Werner Neu, WIK, Denmark

(Speakers)

- Dale Stahl, University of Texas, United States.....*A Critical Survey of Internet Pricing Proposal*
- Chris Doyle, University of Cambridge, United Kingdom....*The Economic Principles of Pricing Access*
- Yves Smeers, Core, Université de Louvain la Neuve, Belgium.....*Access pricing rules*
- Ed Steinmuller, MERIT, Netherlands.... Network Service Structure and Pricing
- Mario Federico Saksida, European Space Agency....Pricing of On-line services

(Discussant)

- Sam Paltridge, OECD
- Gérard Pogorel, Ecole Nationale Supérieure des Telecommunications, France
- Alain Stekke, CEC, DGXIII

(Session Rapporteur)

- Christian Micas

12:30 - 14:00 LUNCH

14:00 - 16:00 Session 4: Data and Indicators for the Networked Economy

Monitoring economic developments is crucial not only for policy makers but also for other economic actors. Deciders increasingly require quantitative indicators for formulating, monitoring and evaluating policy and business strategy. Attention should be given to determining the appropriate data to be collected for the calculation of the indicators and the feasibility of collecting it. In the case of Networking, the focus is on the measurement of its diffusion, usage and impacts. The session will discuss the issues being addressed by different initiatives having as common ground "the networked economy", aiming at pointers to the design of such indicators and the required statistical data reporting systems. Discussion will include:

- *The front-runners*: Share the problems and views arising from different initiatives on data and statistical issues. Measuring network performance, technology diffusion, innovation activities. Developments in services industries which are closely linked in the networked economy.
- *Developing the frameworks*: Articulate and synthesise the issues, including the institutional issues raised with a view to developing an indicators framework necessary for mapping and monitoring the GII and the GIS.

(Chairman)

- Michael Minges, ITU or John Dryden, OECD, DSTI

(Speakers)

- Costas Courcoubetis, Foundation for Research and Technology-Hellas (FORTH), Greece....*Charging Principles in Multi-service Network*
- Kazuyuki Motohashi, OECD/EAS....*Network usage survey in Japan*
- Marco Lancetti and Olof Gärdin, Eurostat....*Statistics for the Information Society and the Networked Economy*
- Hande Keser, State Institute of Statistics, Turkey....*Front line of ICT statistics in Turkey*
- Viviane Bayar OECD/OCS....*OECD perspectives on official statistics initiatives*

(Discussants)

- Fred Gault, Bureau of Statistics, Canada
- Sait Ahtam, BILTAM A.S., Turkey

(Session Rapporteur)

- Christian Micas

16:30-18:00 Session 5: Panel: The Way Forward: The Research Agenda

Review and summary by the rapporteur of the four preceding sessions which focused on the economic impacts of networking, highlighting the issues raised in each session. This panel will attempt to recommend a prioritised research agenda and outline plans for subsequent workshops in the area of the measurement of statistical data and policy indicators.

(Chairman)

- Christian Garric, CEC DG XIII

(Panel)

- Session Chairmen

(Workshop Rapporteur)

- Richard Hawkins, SPRU, United Kingdom

18:00 Closing Remarks

- Alain Servantie, CEC DG XIII
- Daniel Malkin, OECD DSTI

18:15 Reception: Sponsored by TÜBİTAK-BİLTEN

OECD WORKSHOPS ON THE ECONOMICS OF THE INFORMATION SOCIETY

ISTANBUL, 14 AND 15 DECEMBER 1995

RAPPORTEUR'S SUMMARY²

The Istanbul Workshop was charged with the task of helping to identify a basis for the collection and interpretation of the kinds of statistical materials on networks and networking that would be necessary to support effective policy-making for the information society. The workshop was organised into four working sessions, concluding with a final panel discussion. Each working session explored a different aspect of electronic networks -- network dynamics, organisational and interorganisational impacts of networks, pricing of network services, and indicators for the networked economy. Papers were presented dealing with both theoretical and empirical matters covering a variety of network scenarios.

On the first day, the papers and discussions tended to focus more on the socio-economic characteristics and implications of network infrastructure and services. On the second day, attention was focused more on the more technical matters of service costing and pricing, and the development of statistical indicators.

Throughout the sessions, however, a number of key themes and issues kept re-emerging. The intent of this summary report is to transcend the session structure, and to bring together some of these common threads in a form that addresses the concerns of policy-makers with respect to refining the measurement techniques for assessing information society issues. Detailed summaries of individual sessions are included as an appendix.

1. GENERAL COMMENTS ON THE ISTANBUL WORKSHOP

The level of discussion in the OECD countries concerning electronic networks and networking has now reached an advanced state. Nevertheless, measurement of the specific characteristics and impacts of networking remains largely elusive. This lacuna is a major impediment to effective policy-making. In addressing this problem, the Istanbul Workshop adopted a positive and proactive tone. There was frank acknowledgement of the theoretical and practical difficulties in developing measurement systems for the information society, but there was also optimism that methods could be found, and many useful examples were presented of how this endeavour might proceed.

The Workshop identified many of the practical reasons behind the measurement difficulties -- ranging from the setting of priorities in governmental and intergovernmental statistical agencies to the special problems of collecting and interpreting data in the context of the information society. There were many interventions to the effect that, in many respects, the characteristics of the information society have yet to be defined and described specifically enough to permit adequate measurement of its effects, or prediction of its progress.

Perhaps the overarching theme to emerge during the Workshop was that a statistical basis must be developed that is broad enough to relate measurements of the social dimension of electronic networks and networking, to measurements of the effects of network phenomena on economic performance. It was very clear, however, that these social aspects would be as challenging to assess statistically as their putative economic implications.

2. FORECASTING THE NEW NETWORK ENVIRONMENT

In the context of the information society, the key element linking social behaviour and economic decision-making is 'services'. Electronic services are the points at which social needs articulate with the network infrastructure. The Workshop generated many diverse examples of the complex interaction between investment in network infrastructure and the development of the service environment. Many questions were raised about planning for infrastructure growth in an expanding network environment -- how best to forecast demand trends and assess investment requirements.

It was clear from the discussions that market development in this environment is sensitive both to demand and to supply. Network infrastructures and services can be responsive to market signals, but the seemingly endless range of capabilities proffered by information and communication technologies (ICT) can lead also to dubious assumptions about the kinds of services that markets will actually accept. Furthermore, commercial conditions in the ICT sectors are frequently distorted by the market power of large incumbent firms.

Much current thinking by policy-makers, economists and business leaders tends to favour the view that market growth in electronic networking will be fuelled by the uptake of new services. Inevitably, increased numbers of increasingly sophisticated services will require increased bandwidth. The essential problem becomes how to allocate the bandwidth to the customer in a way that is economically efficient, and that maximises social welfare (Stahl).

One aspect of the problem was highlighted in an investment requirements analysis for a major fibre-optic upgrade of the public network infrastructure in Japan (Kuriama). The 'infrastructure analysis model' employed indicated several interesting demand trajectories for mobile communications and INTERNET access, concluding that INTERNET use would peak in about five years, but that mobile demand would continue to increase. This analysis, however, was tied largely to assumptions based on existing market structures. New service environments may result in significant restructuring of these markets, and forecasting methodologies clearly require mechanisms to allow for the effects of these changes on service creation and pricing (Sanz).

One influential view is that access to higher bandwidth is a precondition for the success of new applications. This echoes Say's law to the effect that bandwidth supply will create its own demand for services. Providing INTERNET access via CATV modems was presented as an example of how new technologies can suggest alternative solutions to the problem of increasing the bandwidth available to domestic customers (Gillet). A link was suggested between the pace and extent of network innovation and the degree of control exercised by the customer over the purchase of equipment. In discussion, however, attention was drawn also to the effects that the administrative (particularly licensing) conditions can have on the economics of CATV-based network access, and to the necessity of considering the costs of specific technological environments like CATV within the cost framework of the whole network (Sanz).

3. ASSESSING THE RELATIONSHIP BETWEEN CUSTOMERS AND NETWORK SERVICES

Exactly what constitutes an 'economic' or 'uneconomic' customer in an expanding network services environment is a significant theoretical and practical issue in the context of the information society.

In highlighting the social dynamics of the universal service obligation (USO), for example, it was suggested that we should consider those kinds of services used most frequently by 70 per cent of subscribers at any given time to be 'universal' -- i.e. guaranteed at low or possibly subsidised prices to everyone who wants them (Murrioni). This prompted questions as to whether the USO is related primarily to the price of the services or to the income of the purchasers -- i.e. is universal service provision a social problem with a solution that is not directly related to the provision of services as such (Sanz)?

This issue becomes especially interesting if we assume that the economics of the information society will be driven by the steady development of competitive markets for new services, presumably at continually declining costs and prices. Defined as the services most frequently used by the majority, the USO 'basket' could become very complex indeed in this environment, involving the co-ordination of many public and private entities.

But is this assumption of a network driven by new services requiring significant upgrading of network infrastructure realistic, especially in the short to medium term? At present, most of the new services directed at domestic consumers (the embryonic 'mass' market) that can be shown to have been both successful in the market, and significant in terms of their effects upon the nature of markets, are based on voice telephony in a public network environment (Richardson).

It is clear that assumptions about the impacts of new service provision on the economics of networking must be made cautiously, as they will have profound implications for the development of indicators.

4. PRODUCTIVITY AND MARKET CREATION

In developing indicators and data resources on the information society, many questions must be addressed about the changing nature of the productive enterprise. Most of these questions have direct social implications in that they affect employment, the nature of work and the form of the workplace.

Several presenters and discussants commented directly or indirectly on the significance of firm size on network implementation, and special significance was claimed for the problems of the SME (Sayin, Ferné, Atham, Keser, Gärdin). SMEs have a high profile, both as producers of networking products and as implementors of network services. Indeed, in the information society context, the proliferation of small economic units like SMEs, poses special problems for the development of practical and reliable measures. The small enterprise landscape changes frequently, and this makes it more difficult to collect data and to sustain the relatively large statistical samples that are required to yield generalisations about the role of SMEs in the information society (Atham).

A further problem was identified with the current emphasis on trying to measure the significance of networking in firms in terms of its impacts. An ongoing OECD study is yielding indications that distinctions need to be drawn between the level of 'informatisation' in firms, and the level of networking (Ferné). The two are not necessarily commensurate -- indeed networking appears to lag behind informatisation in many cases (particularly in SMEs). Furthermore, ICT implementation programmes in firms were found often to be driven by assumptions about the impacts of ICT on productivity and competitiveness rather than by analysis of the actual conditions of production.

The majority of the emphasis in the Workshop was upon market creation and not on productivity issues as such. The task, however, is to examine the links between production and market forces, and to balance pessimism and optimism in this endeavour -- it is as important to understand failures as it is to appreciate successes (Petit).

5. THE NETWORKED ORGANISATION AND THE CHANGING NATURE OF THE TRANSACTION

The increase in inter and intra organisational networking has been an important factor in contemporary re-evaluation of economic institutions. In the information society context, the importance of individual and organisational “learning” is achieving increased theoretical prominence. It may now be appropriate, however, to move beyond the idea of the ‘learning firm’ and towards the idea of the “learning organisational network” encompassing a whole range of relationships between production and demand processes (Petit).

An indication of the level of reflexivity that exists between markets and networked services is provided by the increase in demand for integrated service environments. Providers of travel services, for example, must link airlines, car rental companies, hotel chains, and insurance companies (among others) in order to attract customers. It was suggested that a major driver of network development will be ‘transactional’ services, involving multi-ended contribution and access to integrated and/or centralised databases (Gille).

A characteristic of transactional services is that they involve a degree of ‘intermediation’ -- the processing and co-ordination of transaction-related information by some concrete or ‘virtual’ entity that is set up between the partners in the transactions. This focus on new ways of managing transaction costs raises a number of problems for policy-makers. There may be new legal issues, and certainly there will be challenges for competition policy as new forms of ‘virtual’ vertical relationships flow from changes in the distribution structures (Sanz).

This evolving transactional structure may contribute to the proliferation of new kinds of intermediary businesses. The idea of the ‘platform business’ stems from the requirement to establish a basis of trust between participants in electronic transactions (Kokuryo). This is particularly important when the parties to the transaction are not predetermined. Encouraging such relationships may require a higher level of non-proprietary standardisation of data exchange protocols than would relationships between predetermined partners. The ‘platform business’ concept raises many significant issues for the development of policies aimed at ensuring competitive conditions of market entry.

6. EMPLOYMENT IN THE NETWORKED WORKPLACE

Discussion at the Istanbul Workshop of the effects of ICT implementation on employment concentrated less on the issues of productivity, as such, and more on the nature of work and the workplace in a networked economy.

The contemporary employment problem is frequently articulated in terms of the movement from ‘industrial’ work, to ICT-intensive ‘knowledge work’. The ICT industries, however, are themselves not immune from employment insecurities, many of them technology-related. The question here, as in all other sectors, is the extent to which jobs that disappear in one area, reappear as new job opportunities in other areas.

A study of the post-liberalisation employment patterns in the Finnish telecommunication sector indicated that although network operators shed 20 per cent of jobs since 1987, employment in the telecommunications 'cluster' (incorporating equipment and services) has actually grown (Ylä-Anttila). Given that the Finnish equipment sector is dominated by a single large, export oriented equipment supplier, however, there are problems in determining how closely the employment growth in the Finnish 'cluster' could be attributed to liberalisation of the domestic market. On the other hand, it would seem incumbent to encourage efforts to examine liberalisation in the context of the development of worker skills, and their dispersal throughout and beyond the telecommunications 'cluster'.

For purposes of developing measures of the effects of ICT on work and employment, a key question was raised concerning the 'equivalence' of employment and skills classifications as jobs move into an electronic services environment. The example was given of telebanking in the UK (Courtney). This enterprise involved targeting customers in higher socio-economic categories with a service environment that was qualitatively different from that of traditional consumer banking. As very different kinds of employee skills were required in this new structure, employee recruitment took place largely outside the existing banking sector. Emphasis was placed on 'behavioural' skills that were more attuned to the retailing sector than to the financial services industries.

Networking also raises the issues of job mobility and locational advantages in attracting and sustaining networked enterprises. Of interest were the findings that cost-cutting was only one of many considerations in the decisions of firms to change to a teleservice business environment. Telebanking in the UK, for example, pays above average wages. Similar findings were noted for decisions to locate teleservices operations in peripheral regions. Firms look for 'cheap' locations, but not necessarily the 'cheapest' ones, taking into account the suitability of the network infrastructure and the existing skills base of the local work force (Courtney, Richardson).

7. RE-EXAMINING COSTING AND PRICING CONCEPTS

Measuring and monitoring the information society would seem to be a questionable exercise in the absence of reliable data on the costs of infrastructure and service provision. Notwithstanding some insightful perspectives on the issue from workshop participants, it is clear that many problems remain as to how to determine historical and current costs (especially in incumbent firms), how to distribute costs equitably, and how to avoid wasteful over-investment.

In a 'liberalising' telecommunication market, with increasing examples of competition in infrastructure as well as in service provision, a new set of relationships emerges between network capacity and the pricing of network access and services. A central element in these relationships is interconnection, the terms of which have marked effects on conditions of market entry. But interconnection also involves loss of control by incumbent firms over the planning process for increasing network capacity (Steinmueller). This leads to questions about the economic conditions necessary for the sustainability of the network in the face of increasing demands for bandwidth.

Although the *bon mot* of network service providers is cost-based pricing, the calculation of costs is a perennial problem. Current access pricing models, which concentrate on making the access costs equal to marginal costs, suffer from the arbitrary nature of the cost allocations used to determine the marginal costs. The calculation of access costs will be considerably more complex, however, with the multiplication of network products and services (Smeers, Doyle). It was suggested that a better picture could be achieved by using Activity Based Costing (Smeers).

Access pricing rules have particular significance in the context of negotiating free trade agreements for services. These negotiations cannot proceed very far in the absence of internationally harmonised costing methods (Braga). This observation prompted a warning that the entire issue of cost based pricing is fraught with so many problems that we should be careful not to pursue it as a kind of 'scholastic' exercise (Steinmueller).

Much of the cost and pricing problem relates to the availability of bandwidth and its relationship to the growth of services. Network capacity tends to develop at an uneven rate that is not necessarily co-ordinated with the growth in the amount of information that is generated (Saksida). From the standpoint of dealing with costs and pricing, it may be a better working assumption that problems of supply and demand can not be solved simply by increasing capacity. At some point the cost of investment in capacity will exceed the benefits gained (Stahl).

Pricing INTERNET access illustrates the capacity problem particularly well. Pricing principles based on variability in the value of INTERNET services, could act to regulate access such that network congestion or failure is avoided -- i.e. the optimal price rises with the amount of congestion (Stahl). The problem, of course, is the extent to which congestion itself can be measured. Positive and negative discrepancies can exist between what economists think the capacity of the network might be, and what the network is actually capable of delivering (Courcoubetis).

In the liberalising network environment that either exists or is being promoted by policy-makers in OECD countries, interconnection is itself a significant element in determining costs and setting prices. Interconnection raises the issue of the market power that remains invested in large incumbent network operators and users. Should policy-makers and regulators assume too high a level of existing competition when determining pricing principles, the risk is run that market entry will be restricted and that the economic benefits of innovation will be captured disproportionately by incumbent firms (Steinmueller).

Finally, in addressing questions of service pricing, some attention clearly must be paid to the characteristics of existing and potential users in various kinds of markets (Saksida). The kind of granularity provided by 'marketing' data (as distinct from 'market' data) could prove very useful. Pricing principles should take into account the nature of the information accessed by specific users, and the optimality of different access methods in specific situations. Indeed, monitoring user responses to price incentives may even be a source of indicators of network use (Courcoubetis).

8. DEVELOPING DATA RESOURCES AND INDICATORS

For at least the better part of two decades, policy-makers have been pointing to ICT as potentially a major driver of economic growth. Given this emphasis, however, it is somewhat remarkable how few resources have been allocated specifically to building a statistical framework that is specifically oriented to measuring 'information society' phenomena. Much public sector data in this area continue to be derived from data collected for other purposes (Bayar, Gärdin).

Governmental and intergovernmental statistical agencies are still mainly oriented to the 'industrial age'. The implication is that they must learn to develop statistical systems that are geared to the new kinds of products and services of the 'information age' (Minges, Gärdin).

This implication, however, presents a fundamental challenge for statistical analysis, especially at an international level. Typically, economic and social measurements have been the products of statistical systems that were dependent on data gathered over long periods of time within relatively stable contexts (Bayar). The information society context, on the other hand, is characterised by rapid technical and

structural change, and the intrusiveness of ICT into all areas of the economy raises significant questions about how specific measurement parameters should be set. To a large extent, the measurement problem for the networked society/economy, is a problem of measuring technical change from the perspectives of both producers and users (Gault).

Aside from the normal problems of ensuring the harmonisation and commensurability of international data, attention was drawn to the relative lack of agreed definitions and nomenclatures for assessing the information society (Gärdin, Lancetti). Even the term 'information' does not have a standard definition in this context.

It is important to measure more than information characteristics and volumes, and levels of technology usage. In any event, these measurements may be made more difficult as the technical characteristics of data flows become more homogeneous and independent of specific network environments (Atham, Courcoubetis). Networking involves establishing patterns of communication, and, to a considerable extent, these are the products of social relationships and attitudes. Understanding these patterns requires the collection of social as well as economic statistics. Furthermore, communication patterns must be examined in terms of the interaction between public and private network environments (Gärdin).

It was suggested that for measurement purposes surveys of ICT use must be enhanced with sector specific information (Keser), and that a middle ground should be sought between the two extremes of having to depend either on case-study data, or on aggregated macro data (Motohashi). Survey data on network use in firms should be used to explain why the events depicted in more general forms of data occur. For example, a survey by MITI of network use in Japanese industry indicated variations in the extent and nature of networking that were related both to firm size, and to the particular characteristics of individual industries (Motohashi).

Nevertheless, there are questions about the degree of consistency and accuracy that can be assumed in data collected from firms. Responses to government surveys like the Japanese study are generally considered to have a high rate of accuracy. In a fast changing technological environment, however, much company information is highly sensitive commercially, and doubts about the confidentiality of surveys could have an effect on the willingness of firms to provide data (Gärdin).

The issues of consistency in data gathering and accuracy of data presentation acquire special significance given that public policy-makers are making more frequent use of data from private sources. Provided that the nature and origin of these data are explicitly recognised, however, they could complement data gathered by official bodies (Bayar, Mingos).

The present data collection and analysis mechanisms in public statistical agencies are directed at servicing the system of national accounts (SNA). Whether or not the SNA framework can be made flexible enough to yield useful data on the information society depends first upon national agencies continuing to increase their levels of co-operation such that there is international agreement on definitions and classifications (Gault). For these efforts to yield useful results, however, policy-makers must be able to clarify their information requirements with respect to information society issues.

9. ADVANCING THE RESEARCH AGENDA

In concluding the Istanbul Workshop, session chairs suggested a number of ways to operationalise the positive tone of the sessions, and to take the research agenda forward. Christian Garric stressed the need to interpret economic theories such that they could better inform the policy process. Attention was drawn to the need to be better able to monitor the effects of major policy decisions that have already been made.

Michael Minges concluded with some practical observations for advancing the research agenda. First, he stressed that the available electronic data is not being used as effectively as it could be, and that it could be targeted better to potential users. In order for research to proceed efficiently, however, the many national and regional classification systems should themselves be classified, and the existing store of definitions catalogued. Moreover, as data is needed right away, we should be prepared to investigate the use of data collected in the private sector.

Werner Herrmann re-emphasised the critical issues of human capital in the information society, and warned that we need to know much more about the distribution of costs and benefits from the information society, in order to avoid the possibility that new forms of social and economic exclusion could arise.

Werner Neu echoed the necessity to balance the research agenda to take account of social and economic factors, and noted the changing nature of policy in the information society context. The emphasis was changing decisively from regulation to competition policy.

Leonard Waverman warned that encouraging policy to respond to changing conditions was a continuous process, and concurred that economists are not always communicating their views effectively in terms of their policy significance. Regarding the problems of developing a theoretical and statistical basis for assessing the information society, however, he cautioned that efforts should not be suspended until the perfect framework is found. Rather, we should concentrate on developing ways to arrive at 'reasonable' figures that will address the immediate problems faced by policy-makers.

² Prof. Richard Hawkins, Centre for Communication and Information Technologies (CICT), Science Policy Research Unit, University of Sussex, UK.

APPENDIX

SESSION REPORTS OF ISTANBUL WORKSHOP

SESSION 1: THE DYNAMICS OF NETWORKS³

OVERVIEW OF THE SESSION

The overall aim of this session was to identify the key drivers of the information society in terms of infrastructure investment, networked service delivery systems, services, and user coverage/customer interface. The session was thus able to address the different levels associated with networking, namely infrastructure, services, applications and the user.

- **How much will infrastructure cost?**

Tadashi KURIYAMA (Tohoku University, Japan) presented his analysis of 4 scenarios for **infrastructure investment** requirements in **Japan**: mobile communications, the Internet, the common Public Telephone, and Video communications (video phone, video conferencing, video-on-demand).

He observed that the telecommunication market in Japan is being driven by high demand for the **Internet**, high demand for **mobile communications**, and effective use of the existing narrow-band **Integrated Services Digital Network** (ISDN). Demand for broadband ISDN is still quite flat and a number of ambitious investment plans for fibre to the home (FTTH) and universal optical fibre coverage have been announced in anticipation of rapid demand for optical communication in the future. In 1993, the Telecommunications Council estimated a 33 trillion yen investment to bring FTTH to the entire Japanese population by 2010. In 1994, NTT, the domestic Japanese operator, announced its plan to invest 45 trillion yen to implement FTTH by 2015, without government assistance.

However, these estimations have since been revised in the light of high growth in demand for the Internet and mobile communications (forecasted to be 32 million cellular, and 38 PHP subscribers by the year 2000). NTT has since announced that they would connect 20 per cent of the population to an optical fibre network by the year 2000, estimating the investment requirements to be much lower (2 trillion yen), and declared that they would be providing Internet services from 1997.

T. KURIYAMA concluded that, due to the introduction of new technologies, costs for telecommunications infrastructure are decreasing, and that computer-based communications are set to overtake telecommunications services, which are burdened by personnel costs (and regulation). He predicted that the Internet boom will die down within the next 5 years and that Internet users will switch to using the **high-speed optical fibre networks**. He forecasted that if a 6 per cent upgrading policy is adopted, penetration of the new telephone system (based on optical fibre networks) would be 60 per cent by 2010. He estimated that 100 per cent coverage by 2010 would cost around **10 trillion yen**.

- **Which System?**

Sharon GILLET (Victory Research, USA) identified the **Internet** as a key driver of networking and forecasted growth in demand for Internet access. This in turn would drive demand for high speed (broadband) networks in order to support multimedia, and especially the graphics/image-based services and applications which users find most attractive.

S. GILLET based her presentation on a comparison between two Internet service delivery systems -- **able television v. ISDN** -- in terms of (fixed) costs and capacity (bits per second), and evaluates the technologies used. Her research was carried out on a cable company which offers an Internet access service, PSICable (Cambridge, MA) and on Internex (San Francisco, CA) which provides access to the Internet over an ISDN network.

On the basis of her research, S. GILLET identified the **cable system** as the most advantageous in terms of higher speeds, cost per subscriber, whilst also offering continuous connectivity. However, she also pointed out that a number of obstacles might delay its successful arrival on the market. Cable modem technology is immature and modems have not yet been developed or marketed as a consumer good. Furthermore, cable operators are able to discriminate between services and have complete control over service provision, unlike ISDN, where there is no control on traffic. Finally, Internet access over cable has not yet been commercially exploited and therefore no consumer markets have yet emerged.

- **Which applications?**

Laurent GILLE (Sirius, France) compared broadband requirements of transaction services with those of TV-like entertainment services. He argued that TV service requirements can be met by cable TV, hertzien, and satellite networks which are dramatically cheaper to use than the telephone network. He added that in the case of interactive services, cheaper off-line options exist in the form of CD-ROMs. From these observations L. GILLE concluded that it will therefore be some time before distributed TV-like traffic will be transmitted over switched networks.

L. GILLE identified **commercial electronic transactions** as the key drivers of advanced networks. He pointed out that transaction-based (data exchange) services are on the increase due to an evolution in demand from products to integrated services or "packages", leading also to the development of intermediation and the emergence of new intermediaries in an increasingly globalised market.

Integrated services are based on **transaction process centres** (TPCs) able to instantly process and transmit high volumes (capacity) of data in a variety of formats (text, images, voice, or combined as multimedia), and making use of intelligent network functions. Increasingly, broadband networks will be utilised to satisfy these requirements.

L. GILLE illustrates the use of TPC's with the help of an example from the textile sector (a small fashion design company in the south of France which dispatches fashion designs in digital form, stored in a design server, to the different employees involved in the production process), and another case study involving a real estate management system used by Veba, the German industrial group.

- **To Whom?**

Cristina MURRONI (Institute for Public Policy Research, UK) presented the results of her research into the definition of the **universal service obligation** in a competitive environment such as that of the UK. She identified the universal service obligation as an umbrella term comprising a number of different essential elements including: extensive geographical coverage; averaged residential tariffs; public telephones; and, targeted subsidies (e.g. for low income users, special users, free emergency calls).

On the basis of empirical research, C. MURRONI began by identifying those individuals and groups who would most benefit from universal service obligation.

Providing universal service obligation in a competitive environment raises a number of important socio-economic questions in relation to democracy, network externalities (social benefit to the customer not recognised in private context), and the two-way links that exist between network development and GDP.

C. MURRONI also identified the problems associated with the costing of the USO and how to measure costs versus revenues. Costing also depends on pricing requirements as this will change according to different tariff structures employed for different users and different locations, and there are difficulties in defining "affordable" prices.

She concluded that only **targeted schemes** can maximise access for particular groups, particularly the low income or needy (e.g. reduce connection charges, improve user control, revise disconnection policies) and that universal service obligations should be unbundled (different policy target for each obligation, different tools, different measurements). A number of principles such as the geographical averaging of tariffs and the provision of coin operated pay phones should also be part of the universal service obligation.

C. MURRONI also recommended that the universal service obligation should be defined by all services which are available to 70 per cent of telephone subscribers and used by 50 per cent of these, are characterised by network externalities, and are not substitutable.

DISCUSSION

Daniele BOLOGNA (Istituto di Economia dei Media, Italy) focused on transformations in the media as a result of digital technologies and **convergence** between telecommunications, TV, and computers. He referred to the changes taking place in the market such as the arrival of new entrants in the telephone business (computer companies, TV) and the introduction of new, interactive, services (e.g. tele-shopping).

He concluded with a warning against excessive **concentrations** in the media content and distribution industries (e.g. Microsoft + NBC, Disney + ABC, etc.) and info-isolation.

Francisco Caballero SANZ (European Commission) presented his analysis of the different presentations outlined above.

He pointed out that T. KURIYAMA had presented the viewpoint of a central planner and that his analysis was based on a number of major assumptions. The presentation did not take into account the effects of the **development of new applications** (giving rise to changes in demand and market structure) and failed to consider the impact of increased **competition** (bring down prices, acceleration of investment, increase demand).

F.C. SANZ observed that S. E. GILLETT's presentation confirmed the policy in Brussels to liberalise cable TV networks but failed to take into account or assess the scale of **operating costs**. He also pointed out that policies related to the licensing of cable TV operators for telephone services were a key factor and noted that in Germany there is currently only a single operator.

In relation to L. GILLE's presentation, F.C. SANZ agreed with the observation that telematics were beginning to have a considerable impact on the scale and distribution of **transaction costs** and are transforming economic processes. He wondered what implications these developments would have for **competition policy** in connection with their impacts on market structures with the integration of distribution and vertical functions of the firm and how this could affect the balance of **bargaining power** between producers and distributors.

He summarised the key issue at stake in the debate over the USO as presented by C. MURRONI by asking the question: is universal service a poverty problem (equity) or a service provision problem? He argued that it is essentially an **income** problem, not a price problem. He also pointed out the need to examine why people are left out of the market and how the re-balancing of tariffs (between local and international calls) might affect income. He also noted that 'light user' schemes can have perverse effects on users through the imposition of penalties.

C. MURRONI insisted that there was no trade-off between liberalisation and universal service and that it was crucial to examine how to calculate **costs** especially in the context of liberalisation where competition can reduce these costs. She also pointed out that figures for the 'untelephoned' were extremely difficult to calculate because of regular fluctuations due to disconnections.

Ronald RICHARDSON (University of Newcastle, UK) raised the issue of **distance-related tariffs**, and how calling across boundaries can be unrealistically expensive. C. MURRONI responded by pointing out the Internet model where the service is generally distance-independent.

L. WAVERMAN (Chairman) responded to D. BOLOGNA's presentation on market dominance in the media by raising the issue of **market-power** and how software companies could install codes allowing interoperability only with their own products and preferential interconnection conditions within a heavily vertically integrated structure. This was set against the background of the announcement of a deal between Microsoft and NBC to offer online news and entertainment over the Microsoft Network.

L. WAVERMAN also raised the problem of **congestion** in the network (e.g. Internet) and the creation of **bottlenecks** in the context of S. E. GILLETT's presentation on cable TV Internet access provision.

With reference to L. GILLE's presentation on electronic commercial transactions, WAVERMAN raised the issue of **security** and industrial espionage and the risk of professional computer hackers stealing confidential commercial information, such as designs. If this application were truly to become a key driver, then technological solutions, unsatisfactory today, should be rapidly introduced.

In response to F.C. SANZ, L. GILLE referred to the significant changes taking place in **production processes** as transactions between suppliers and customers become increasingly integrated. He pointed out that this had implications for **statistics** as new accounting systems are introduced for the transactional market so that production functions and transaction functions can be considered together.

Alain SERVANTIE (European Commission) spoke about the efforts of the **European Commission** to liberalise the telecommunications market and harmonise laws. These challenges included dealing with the major vested interests of the national telecom operators who in a number of cases are dragging their feet on forthcoming liberalisation. He also referred to the European Commission's work on **universal service** and the publication of a Communication in January. He pointed out that in Europe there existed a number of different concepts of universal service from Member State to Member State, and that considerable differences existed between the levels of **tele-density** across the European Union. He also pointed out some of the problems with liberalisation models, such as the one being implemented in Poland, where the local market has been liberalised, whilst long distance services remain in the hands of a monopoly provider meaning that local businesses (SMEs) are burdened with paying for the high interconnection charges.

Turning to satellite and mobile communications, A. SERVANTIE pointed out that a single licensing system had been proposed in Europe, but Member States continued to insist that frequency allocation is a matter of national interest and that there was a lack of co-ordination between the different licensing agencies. He concluded by stating that the greatest challenge for European governments and industry in terms of business and competition is the transformation of the existing fragmented national markets with national-based players into truly **trans-European networks** with trans-European operators and service providers able to compete on a global scale.

³ Authors are Timothy Fenoulhet and Christian Micas of the European Commission - DG XIII.

SESSION 2

ORGANISATIONAL AND INTER-ORGANISATIONAL IMPACTS OF NETWORKING

OVERVIEW OF THE SESSION

The aim of this session was to analyse the organisational impacts of ICT at different economic levels (industry, SMEs, new services) in terms of structural change, business processes and location, and employment (volume, organisation, skill levels).

The session also aimed to identify the role of government and policy at each level in terms of de-regulation, transition management, ICT diffusion, training, and labour market re-organisation (flexibility, part-time, etc.).

- **Employment**

Pekka YLÄ-ANTTILA (Research Institute of Finnish Economy, Finland) presented the results of his research using the **cluster model** to analyse the employment effects of liberalisation in the telecommunications cluster (equipment + services) in **Finland** since 1987 (date of liberalisation in Finland).

He observed that the telecommunication-cluster experienced a **4 per cent net increase in employment** over the period 1987-1993 and that a 20 per cent reduction in telecom operators employment in Finland has been more than compensated by high growth in the equipment industry.

However, his research shows modest labour mobility between different elements of the cluster (0.3 per cent of total cluster labour) -- to be explained by major differences in skill contents and levels associated with a move from the services and operations sector to the manufacturing sector.

These employment effects coincided with substantial **restructuring** of the Finnish TOs (47 per cent decline between 1985 and 1993) and with a severe **economic recession** affecting all sectors of the economy leading to a general increase in unemployment (reaching 20 per cent).

High growth in the equipment sector (based essentially on the performance of a single company: Nokia) has been essentially driven by exports and foreign demand -- the small size of the domestic market, despite the arrival of new players since liberalisation (investments in new infrastructure), could not support such growth. Future growth in the services area, particularly in value added networks (20-25 per cent p.a.), is expected to lead to job creation, but these effects are difficult to measure and so far have had little significant impact.

Digitalisation and competition are increasing demand for **higher skilled employees** in the low-skill jobs market and a higher degree of know-how in R&D. Generally, employment is concentrated at the low-skill level.

In conclusion, the cluster approach reveals that liberalisation, development of competitive clusters or agglomerations (internalisation of transaction costs), and co-operative ventures between public and private agents have led to employment growth in Finland. P. YLÄ-ANTILLA suggests that public policy should be aimed at promoting the formation of networks which favour **co-operative linkages** and **innovation transfer systems**.

- **Re-structuring**

Ian COURTNEY (University of Wales) presented his research on changes in the **retail banking sector** in terms of **re-structuring** of the industry and changes in work patterns and skill requirements and the use of information and communication technologies (ICT) to **reduce costs** whilst maintaining high levels of **customer service**. I. COURTNEY noted that the latter represents a key source of competitive advantage today.

He described how the re-structuring of retail banking in the UK following de-regulation of the financial services sector in 1986 gave rise, on the one hand, to **diversification** in the range of services offered by banks (e.g. insurance, mortgages, etc.) which was necessary to increase income levels and, on the other hand, a dramatic programme of **cost reductions** involving the re-organisation of the local banking network into satellite banking groups and the closure of local branches. This clustering has enabled management and supervisory functions to cover a much wider customer catchment area.

Another consequence has been the complete **re-structuring of employment** in the banking sector with a considerable drop in permanent staff (9 per cent decline in full-time male employment between 1986 and 1993) and a significant increase in part-time employment (12 000 increase in part-time employees between 1986 and 1993) and the introduction of 'flexible' contracts.

The results of research undertaken by the banks revealed the need for better quality services, lower prices and an increase in service levels. The research had also shown that customers attached little importance to face-to-face contact with the bank's staff.

Based on these results the banks faced the challenge of **raising customer service levels** whilst **keeping costs down** and identified the introduction of the **telephone** and **ICTs** as a medium for service provision.

COURTNEY illustrated his analysis using the example of **First Direct** which was launched in 1989 with the objective of reducing costs and increasing customer service, using 3 key technologies: ACD, CTI, and Intelligent Networks.

In terms of **employment** and **work patterns**, First Direct had begun by employing 150 people on a single site in Leeds and now employs a mixture of 1 850 full-time and part-time staff on two sites based in Leeds. One key observation was made with regard to **recruitment** requirements. Prior experience of the banking sector is no more essential with the emphasis being placed on **behavioural** (personality) skills and the ability to be adaptable and flexible in response to changing working practices.

- **SMEs and networking**

Meral SAYIN (Euro Info Centre, Turkey) presented her examination of the **impacts of networking on SMEs** and followed with an analysis of the results following the establishment of the **Euro Info Centre (EIC) Network in Turkey**.

SMEs are the primary beneficiaries of networking, be it at national or international level. According to EIC statistics, 25 per cent of information requests originate from companies with between 1 and 4 employees, and over 50 per cent by companies with between 5 and 50 employees, whereas only 5 per cent of requests are received from companies with over 500 employees.

M. SAYIN observed a number of **impacts** of networking on SMEs such as the **internationalisation** of markets and partnership links, improved awareness, access to global markets and **competition** which forces SMEs to change their marketing, packaging and advertisement policies as well as upgrade the **quality** of SME products and services requiring compliance with international standards and changes in production processes.

Among the **applications** used in SME networks are electronic matching systems (for company matching to support partnership formation, electronic commerce and transactions, ISDN applications (video conferencing, etc.), Electronic Data Interchange (EDI) systems, and the Internet.

The **Euro Info Centre** network, launched by the European Commission (DG XXIII) in 1988, covers a total of 33 countries in the EU, the EEA, and Mediterranean and comprises more than 250 EICs.

The main mission of the EIC network is to allow a cross-flow of information from the Commission to SMEs (Community programmes, projects, legislation), and from SMEs to the Commission to help the latter better understand the concerns and interests of small businesses and elaborate policies and actions accordingly.

An EIC was established in Turkey in 1994 providing information services and national and trans-national business co-operation services for SMEs.

KOSGEB EIC is the central node of the EIC network in Turkey but it has also established a **sub-network** comprising "Local Business Consultants" (unions, foundations, associations, banks, private consultants).

Most requests concern **imports/exports** and producers/distributors and answers are given either online (e.g. through access to online databanks providing information on companies worldwide) or on CD-ROMs. As well as company profile type information, KOSGEB EIC also provides access to **BC-NET** and **BRE** for firm matching, and important information on international standards enabling Turkish SMEs to upgrade their quality level on international markets -- even more important in the context of the **Customs Union** with the EU. Requests for EU legislation information are also likely to increase.

The KOSGEB-EIC also disseminates 200-300 business opportunities (offers) monthly from foreign companies to Turkish companies via the "Business Opportunities Bulletin" which is also provided on a diskette.

In conclusion, M. SAYIN noted that the implementation of SME networks has a number of implications for **policy** both at national and inter-governmental levels including adjustment of the regulatory framework (IPR, market liberalisation, standardisation, interconnection and interoperability, privacy, security, competition), the implementation of developed networks, basic services, applications, the introduction of social, societal and cultural measures, and the promotion of network utilisation.

- **SMEs and ICT integration**

Georges FERNE (OECD, DSTI) presented the results of his **survey of ICT usage in Turkish firms** in the context of the 15 case studies being prepared for the OECD's ICCP Committee Report to be presented next Spring.

Three firms are considered in the survey: one small printing company (50 employees); one medium-sized company (150 employees) offering integrated systems for management of energy use and automation; a

large bank (15 000 employees) with several hundred branches in Turkey and a growing number of branches and subsidiaries abroad.

G. FERNE noted that a number of **macro level forces** have prompted the informatisation and increased the level of ICT usage of Turkish firms: de-regulation (lifting of protection, increased domestic and foreign competition); increasing export orientation (greater awareness of foreign technological developments, increased Turkish demand for leading edge technologies); highly skilled potential workforce for implementation of advanced technological systems with relatively low salary levels; tight budget and deflationary policies have given rise to a search for cost effectiveness and reduced domestic demand (encourage exports).

One key finding of the survey was that there is **little demand** in Turkey at present for sophisticated network use such as electronic commerce --though there is some use of electronic mail communication with important clients and with foreign partners, and the bank makes use of an internal data communication network to centralise data processing.

The main **impacts** of ICT usage were observed to be either **structural** in nature (vertical integration -- direct access to clients, direct marketing and sales, also in-house software development in the absence of a Turkish software engineering industry), or related to **employment and work patterns** (saving on salaries, round-the-clock operations, more technical staff, in-house training, new career patterns as middle-level jobs disappear).

In terms of **policy challenges**, the following **bottlenecks** limiting further informatisation were observed: the weakness of the service sector (a big user of ICT); high interest rates and lack of venture capital (discourage investments); weakness of the demand for networking (absence of service sector, small size of firms); and the absence of a software industry (favour in-house software development).

Finally, G. FERNE pointed out that he believed that another key factor preventing further significant ICT integration is the apparent "**informatisation lag**" of **government** (weakness of network demands from public agencies) which is especially significant in view of the role of government as a significant potential user and platform for other sectors.

- **Electronic Commerce**

Jiro KOKURYO (Keio University, Japan) presented his research into the role of **intermediaries** or **platform businesses** in **electronic commerce** in the context of **open** computer networks, such as the Internet.

He explained that intermediaries have an important role to play in matching buyers and sellers who do not know each other and therefore have no basis of **trust**. He also pointed out that the availability of **standardised protocols** such as EDI and TCP/IP enable electronic trade beyond closed-user (firm-based) networks.

J. KOKURYO identified a number of important **functions** that are necessary for realising commercial transactions, and that can be provided by platform businesses: (1) provision of a partner-search function, (2) creation of trust among trading partners, (3) evaluation of economic value, (4) provision of standardised interfaces, and (5) integration of functions.

He explained how in situations where trade partners trade regularly with each other alliances are based on

direct contractual relations established prior to employing electronic transactions. But he noted that business platforms have a role to play in cases where firms need to make **ad-hoc electronic transactions** with a formerly unknown trade partner by creating a situation in which all trade partners have prior contractual relations with the platform business if not directly with each other.

A number of impacts of platform businesses and open computer networks were considered in the context of two Japanese case studies: the **AUCNET** (which provides the electronic auction of used cars on a satellite-based multimedia system) and **MISUMI** (a wholesaler of dye and mould parts that actively promotes EDI).

One of the key impacts is the breach of traditional *keiretsu* relations or 'closed network of firms' as computer networks enable the creation of global relationships and the rising cost of domestic procurement prompts Japanese firms to review their traditional policy of maintaining exclusive networks of local vendors and distributors. MISUMI provides opportunities for small firms to sell to a large number of buyers **worldwide** rather than exclusively to locally based factories.

J. KOKURYO claimed that the business platform model challenges the popular notion that electronic commerce removes the need for "middlemen". His theory is based on the observation that the increased opportunity for transactions between formerly unknown trading partners increases the need for intermediaries. AUCNET has nationalised the distribution of used cars, which traditionally was localised. This expansion required strong intervention by the AUCNET to inspect and guarantee the quality of the cars. Also, a seller of a car only needs to trust the financial solvency of the AUCNET without knowing the buyer.

However, J. KOKURYO acknowledged that the advent of platform businesses may have a number of other impacts which could generate **resistance** from some. These included the **destruction of the status quo**, as traditional businesses are challenged (e.g. in the case of AUCNET, non-electronic auction firms), and the fact that in their relations with both buyers and sellers, platform businesses would make **price structures** and strategies (traditionally kept secret) more **transparent**.

- **Teleservices**

Ronald RICHARDSON (University of Newcastle) presented his paper which examines the organisational changes, particularly **spatial changes** in employment opportunities, occurring in the office-based service sector as a result of developments in ICT.

R (?) business tool, particularly in the area of **customer services**, which can be delivered more cost-effectively via the telephone. In the case of **British Airways**, booking and enquiry operations are being brought in-house with a focus on direct (tele)sales. The combination of lower distribution costs and the cutting out of costly (travel agent) commissions means that direct sales are worth 1.8 times the value of an indirect sale.

R. RICHARDSON identified some of the main impacts of the introduction of **teleservices** which have been developed to replace or complement 'face-to-face' interaction with customers.

One of the most significant effects that R. RICHARDSON had observed is the increase in the **locational flexibility** of firms. As production is separated from consumption many firms seek out locations in regions where production costs, particularly labour costs, are low, and then 'export' services to more wealthy regions. This trend is illustrated by the **British Airways** case where **telesales** operations have

been **regionalised** and located away from the South East core market and new or expanded offices have been established in several UK provincial sites (Newcastle, Glasgow, Manchester, Belfast) where labour turnover and salary levels are lower (reduced labour, training, and recruitment costs). The cost savings per employee have been estimated at £3000 - £4000 per year. Furthermore, such initiatives create employment and investment opportunities in peripheral regions with often high rates of unemployment. In the BA case, 12 call centres have been created in the Newcastle area with employment growing to 1500 employees in 3 years.

Among the main factors governing the location of teleservice firms, R. RICHARDSON observed that such firms require a region to have advanced and reliable telecoms infrastructure and services supplied at competitive tariffs and to be able to offer a well-qualified workforce at a reasonable cost. In some cases, more specialised skills, such as multilingualism are required, which are not present everywhere. This is the case, for example, with **Quarterdeck International** which has set up a **telemediated technical support** operation at its European headquarters in Dun Laoghaire (South of Dublin, Ireland). The company supplies service to clients throughout Europe and the US and employs 12 multilingual (each speaks 4 or 5 languages) staff to handle the calls. This example also illustrates the potential for firms to sell products and offer customer services across international boundaries. Cultural, regulatory, and technological factors may also reduce the locational flexibility of some firms.

R. RICHARDSON also examined some of the effects on **organisational structures** both within firms and across particular sectors. He pointed out how the introduction of teleservices is giving rise to **horizontal and vertical integration processes** as firms cut out intermediaries and place themselves 'closer to the customer'. However, there was evidence of the emergence of new **specialist third party teleservice firms** leading to the **outsourcing** of some telephone functions. This counter-trend is illustrated by the **Hoskyns plc** case whereby a "Business Process Outsourcing Centre" in the small town of Forres in the Highlands and Islands of Scotland has been established. The company acts as a third party company handling outsourced work (principally collecting money) from a range of organisations in both the public and private sectors (for example the collection of parking fines for three London local authorities). Calls to London are automatically flowed to Forres over the firms' private leased lines. In his reference to this example R. RICHARDSON pointed out the trend towards the **blurring of sectoral boundaries** as call centre workers handle customers from a range of different sectors.

The introduction of teleservices has been driven by factors related to changes in the way **production** is organised within and across business sectors. The increased **routinisation** and **standardisation** of front office and customer service functions have been cited as a key factor. He also observes that these functions, which are now being supported by the telephone, are being **concentrated** into "**call centres**" located at one or a few sites rather than at multiple branch offices close to the customer as was the case in the past.

In terms of **skill requirements**, teleservice firms tend not to be concerned with formal qualifications, but more with **interpersonal communication skills**, since specific knowledge is embedded in the technology. However skill requirements differ from sector to sector, and the more the workforce is skilled, the closer firms are likely to locate to the core market.

DISCUSSION

During the discussion questions were raised about the difficulty of gathering data on SMEs, the uniqueness of the Finland case study, the use of ICT for cost-cutting policies, and the factors influencing firm location. The emphasis of the session on development of the market was also noted, as was the importance of choosing the right technologies and responding to the needs of users.

Robert PLASMANN (Université Libre de Bruxelles) referred to the presentation by M. SAYIN and highlighted the **difficulty of collecting data on SMEs**, especially in Turkey, due to their often ephemeral nature, and the speed with which data is likely to change.

He pointed out that P. YLÄ-ANTTILA's presentation was an isolated case because of the dominance of a national champion, Nokia, in the telecoms equipment sector, whose growth had mainly been driven by **external factors** (exports), and not by de-regulation at home. He also raised the issue of **changes in skills** required (more relatively low skilled in equipment sector) and how this might have an impact on the labour market with high skilled people having to seek low-skill jobs.

With reference to I. COURTNEY's presentation on the banking sector, R. PLASMANN and W. HERRMANN (Chairman) both asked about the **employment conditions** of First Direct employees in terms of part-time work and salary levels. I. COURTNEY replied that competitive salary rates for the kind of work undertaken were offered, including performance-related bonuses, and that part-time work was welcomed especially by employees with children. The latter was regarded as a positive development in response to the increased demand of women in the labour market.

Pascal PETIT (Cepremap, France) organised the issues of the session into a model comprising Production Processes, Distribution, Demand Processes, and Industrial Organisation Issues. He pointed out that the discussion had focused on the development of the **market** and the importance of services. The importance of **inter-firm communication** particularly for SMEs has been raised as well as key problem in this context was not integration but **co-ordination**, especially as ICTs are having an impact on the **geographical location** of economic activities.

Referring to the presentations by R. RICHARDSON and J. KOKURYO, P. PETIT noted the impacts at the local level with the exploitation of **local synergies** in the context of teleservices and how these are affected by the emergence of business platforms.

With reference to the presentations about tele-services and tele-banking, PETIT also made an observation about the **skills** on the demand side and consumer needs in terms of qualifications and education as ICTs are increasingly used as the main customer interface.

Hannu JAAKKOLA (Tampere University of Technology, Finland), in reference to the presentation given by P. YLÄ-ANTTILA, observed two essential processes at work: the **re-engineering of structures inside the company** and the **re-structuring of businesses in the telecoms cluster**. He emphasised the importance of choosing the right **technology** and the **impacts** new technologies are having on markets. He observed that growth in **mobile communications** today was freeing up capacity in the fixed network whose operators are now introducing new services which can be integrated by intermediaries (as referred to in J. KOKURYO's presentation on business platforms). JAAKKOLA also commented that growth in **multimedia** products tomorrow would drive demand for **broadband** transmission using ADSL, HDSL, and ATM technologies, but the development of multimedia products should be based on applied research and on user needs. Finally, he remarked that the **integration** of different technologies (TV, telephone,

computer) was giving rise to the integration of existing transmission techniques and the integration or bundling of services.

A number of issues were raised by members of the audience. In reference to P. YLÄ-ANTTILA's presentation it was pointed out that **clusters could change** with time as businesses appear or disappear and further integration between sectors and functions takes place, and new production and distribution relationships emerge. As more networks are created, the clusters will increase in size.

In reference to J. KOKURYO's presentation, there were warnings about the danger of **market dominance** as intermediaries gain in power and develop special relationships with suppliers and customers, raising policy issues in terms of **competition** and adequate **policing** of business platform practices.

In response to G. FERNE's presentation, the role of **government** was emphasised as a major user of information (in services such as customs, procurement, etc.) and driver of informatisation, in terms of reforming the administrative and regulatory framework, and in its acceptance of critical interfaces and international standards.

M. MINGES (International Telecom Union) warned against the effects of using ICT in the development of successful **export-based industries**, such as software production in India, which can then leave other domestic industries behind --a challenge that might also be faced by Turkey, with its high-skilled and ICT-trained workforce, if domestic markets (particularly the services sector) are ignored. W. HERRMANN pointed out that Turkish SMEs would have to establish a *domestic sub-contracting network* before developing links abroad --especially in the light of SAYIN's research on the EIC network according to which Turkish companies are most interested in commercial relations with foreign firms.

SESSION 3: PRICING OF NETWORK SERVICES

In the current context of telecommunication liberalisation, one of the key issues is related to the pricing dynamics in the long run. What are the services to be regulated: access, end users services or bearer services? The globalisation of the economy is also another factor of change of the telecommunication sector and leads to the question of determining the relevant geographic market level to regulate.

Different approaches have been developed to modelise access pricing. The most known ones are the efficient component price rule (ECPR) developed by BAUMOLL and WILLIG, the RAMSEY pricing and the fully distributed cost (FDC) based on accounting. Yves SMEERS (CORE, Université Catholique de Louvain, Belgium) pointed out that all these three methods recommend access price to be equal to the marginal cost, or incremental cost, plus a mark-up. The difficulty to calculate the marginal cost makes it very difficult to implement these three methods and to provides good results. The difficulty is further increased when introducing the multiplication and differentiation of products and services. The FDC is the method the most used by the telecom operators but suffers from the fact that it follows arbitrary cost allocations that convey poor economic signals and hence may hamper efficiency. Y. Smeers stressed the need to have sound, implementable methodologies and proposed then to improve the FDC by using more appropriate accounting rules or by developing engineering based approaches for constructing marginal and/or incremental cost.

Chris DOYLE (University of Cambridge, USA) focused on how the different aims of the telecom regulation are affected by the various access pricing rules in a given industry structure. The aims of regulation have been identified as the allocative efficiency, the productive efficiency, the promotion of competition and the fairness and social obligations. The case of vertically integrated industry, which is the dominant case in Europe, is the focus of much interest since an incumbent operator is seen to have more of an incentive to tilt the playing field.

Y. SMEERS and C. DOYLE admitted that the multiplication of products and services and the product differentiation strategies will considerably complexify the cost calculation. A new way to calculate the cost of services, as proposed by Y. SMEERS, would be to consider it as the sum of elementary services.

The formulation of access charges requires in all cases detailed information about the structure of cost (C. DOYLE). This task is further increased by the difficulty to calculate the costs. Following OFTEL, the British telecom regulatory authority, Y. SMEERS distinguished two costing methodologies, namely the "top down" and "bottom up" approaches for arriving at adequate costs notions. The "top down" methodology is based on accounting data and the "bottom up" methodology relies on engineering models. It is possible, thanks to the Activity Based Costing notion, to deepen the understanding of the causal relations between activities and costs and consequently to improve the "top down" approach. Smeers wondered therefore about the acceptability of the two approaches with the cost orientation recommended by the European Commission.

Edward STEINMUELLER focused on the challenges faced by the regulators in the new environment of telecommunications, characterised by the privatisation of the European telecom operators and the process leading to a full liberalisation. The regulatory decisions will influence the development of advanced telecommunication services that represent the first step toward the information society. Considering that the size of the incumbent operator will continue to shape the entry, an emphasise is put on the need to define new regulatory approaches to assure that price competition does not become an instrument for creating dominant positions in network operation or service provision. Ceiling prices are considered as compatible with competition but do not address predatory issues. Interconnection, defined as mandating by-pass, is set as the key regulatory issue. Steinmuller stressed the fact that universal service is still viewed

as a voice telephony issue at a period where new end user services are developing very fast, such as the Internet-based information services.

The development of the Internet is a new field of investigation for the pricing of network services. Dale STAHL (University of Texas, USA) tackled this new area with proposals based on economic modelisation, in order to avoid "the tragedy of the Commons" related to the network congestion. Available network capacity is set as a core issue to modelise Internet pricing. In a context where capacity growth cannot keep up with demand growth, the question can be viewed as a problem of scarce resources allocation for which economic science provides many answers based on price regulation. When negative externalities resulting from network congestion are real possibilities, prices should exceed the marginal cost of production by the marginal cost of congestion. In this case, a consumer uses the resource if and only if his private benefit from use exceeds the social cost of that usage. Differences in how to implement this theoretical ideal separate D. STAHL's different proposals. Simulation modelling suggests that a pricing based on the approximate social cost of usage provides better efficient resource allocation than any other schemes such as flat-rate pricing.

Marino F. SAKSIDA addressed the pricing issue in a broader context of networked information services. Their provision requires the addition of three different kind of services, or layers, having themselves their own pricing structure. These three layers are : network infrastructure, on-line information services and content databases. The access pricing issue can be considered then between these three different categories of actors. They have each their own charging rules which will need to be radically rethought in the perspective of integrated digital networks. Charging on the digital network requires to take into account the nature of information and the category of the consumer. Some basic distinctions can be made between public information, professional information and consumer information. M. SAKSIDA identified two major requirements for the establishment of new pricing rules: (i) the possibility for a user to access all the information on the network services with one access code and one accounting reference, and (ii) the need for a content provider to make available its information from one point and to ensure that it is accessible to all users and that IPRs are respected and protected.

Starting the discussion, Sam PALTRIDGE (OECD) noticed that dial up access at peak rates is cheaper in countries where telecommunication service liberalisation has already been introduced. The same observation can be made for the provision of Internet access.

The second discussant, Alain DUMORT (European Commission, DG XIII) reported on the current process of liberalisation in the European Union. The consultation launched by the European Commission on the liberalisation of telecommunication infrastructure has indicated that all players agree on the need for regulation. The fast pace of technological innovation and the existence of contrasted national situations support the need for a flexible regulatory approach allowing quick adaptation. The Directive on interconnection proposed by the Commission suggests guidelines to cover cost accounting systems, accounting separation, costing and financing of universal service as well as national regulatory agency responsibilities.

The question of the future available network capacity has been perceived as a key parameter to modelise the access pricing. Although the technological progress is leading to almost unlimited capacity on the backbone network, the existence of a bottleneck at the level of the local loop (i.e. the last mile) generates the use of economical approaches to define optimal resource allocations.

Carlos BRAGA (World Bank) pointed out the fact that different access pricing rules implemented at national levels increases the difficulty to negotiate at the international level for the free trade of services and the universal service obligations. Such difficulties are further increased by the different costing methods supporting the access pricing modelisation.

SESSION 4: INDICATORS AND DATA FOR NETWORKED ECONOMY

The information society will be characterised by the widespread availability of new products and services that will change the way we work and live. The impacts on the employment and the economy as well as the interorganisational changes will be very important. Such mutations require considerable information for the policy makers but also for companies and users. Setting the stage, Michael MINGES (International Telecommunication Union) noticed that national statistics institutes seem to be still living in the industrial age. The information society will be characterised by immaterial services that are difficult to measure. New methodologies to appraise this new economy are still to be built.

Viviane BAYAR (OECD) focused on issues of international comparability and presented the work at OECD in the field of information and communication technologies (ICT) statistics. OECD faced several difficulties, which are inherent to the ICT, in the development of its work: (i) the constant evolution of this sector, regarding the average of 10 years as necessary to develop a statistical system; (ii) the constraints on statistical resources, since ICT requires work in the whole range of economics statistics; and (iii) the lack of work at the national level.

V. BAYAR recommended to complement national and international official statistics with data from private sources. Such data are not necessarily internationally comparable and designed for market intelligence may still provide valuable insight. This approach has already been chosen by OECD, through the *Information Technology Outlook* and the EC with *The European Information Technology Observatory*. Private consultancies provide far more detailed data on ICT markets than international classifications can. They are also more up-to-date and therefore better at capturing the latest trends related to new goods and services. They cover a large number of countries and their product categories are regularly revised to reflect new developments.

The problematic of international statistics can be expressed as follows: in national classifications, it is generally possible to arrange economic activities so that they virtually coincide with industries while in world-level classifications, categories are designed to be compatible with the national statistics.

Important work has been done by the Voorburg Group on service statistics. This group was initially constituted in 1987 to assist the United Nations in the development of the services part of the Central Product Classification (CPC). The Voorburg Group developed a framework for model surveys which serves for international comparisons. The OECD STAN databases, based on Industry Standard International Classification (ISIC) Rev 2, also offer some possibilities for analysis. Estimates fill the gap between detailed data on industrial activity and technology development collected through national industrial surveys and aggregate but internationally comparable national accounts data.

Olof GÄRDIN (EC, Eurostat) focused on the new statistical needs and issues arising from the development of the information society and presented the work done at Eurostat. The existing statistics are based on concepts, definition and theories whose frame of reference is the agricultural and industrial society and economy. Some general directions in which the statistics for the information society should be developed are: a better coverage of SMEs; clear definitions of information and services products; emphasis on human resources; information on geographic patterns and localisation, communication patterns, emphasis on use and demand. The converging trend among industries participating in the information revolution also complicates the work, as it blurs the traditional frontier between these industries.

Eurostat has in partnership with Directorate General XIII (Telecommunications, Information Market and Exploitation of Research) of the European Commission (EC) launched a project called COINS for developing information and communication statistics. The target is to establish a basic set of reliable,

comparable regular European statistics. The statistics for more detailed data for analysis of special topics should be done through special surveys. This project takes into account the results from on-going activities within the framework of the General Agreement on Trade and Services (GATS) and the World Trade Organisation (WTO).

Confidentiality is also an important issue in the development of statistics in the field of ICT services. There is an obvious risk that the economic operators become more and more reluctant to submit statistical data on their activities. Effective and fair competition requires increased transparency. In particular, the small actors claim equal information. It is therefore necessary to find a balance between the legitimate interests of the operators to protect their investment plans and the equally legitimate need to make it possible to provide a clear picture of the situation.

Marco LANCETTI (European Commission, Eurostat) emphasised the impact of the information society on the development of statistics. The nomenclatures are not adequate to report how the information technologies are modifying the whole activity. It has also been observed that, so far, there is no clear definition of what "information" is. In these new conditions the need emerges for a transition toward a flexible statistical system. The framework for action at Eurostat is based on a Council decision on service statistics, but the budget does not follow the proportion of the services sector in the economy.

Kazuyuki MOTOHASHI (OECD) reported on network usage survey in Japan. Data on network use can be a strong tool for information infrastructure policy formulation but few of the existing surveys addressed how ICT diffused to over-all economy and how ICT products are interlinked. K. MOTOHASHI presented some findings of a 1991 survey on network use initiated by the MITI. The survey was sent to all firms with no less than 50 employees and no less than Y30 million capital, instead of doing sampling survey. Being a governmental survey, it ensured a high response rate and accuracy of data. The survey covered the retail industry as well as manufacturing sectors and some service firms.

The MITI survey provided very interesting results as well as the confirmation that big companies have a greater use of information networks. In term of inter-firm network, the automobile industry shows the highest figures, followed by transportation and communication service. The so-called "just in time" work organisation generates high network ratio use in the automobile industry, with the implementation of ordering systems between assemblers and parts suppliers. In contrast, electronics industries use information network in their production control. It is also interesting to observe that manufacturing and service sectors show completely different use of IT networks.

Hande KESER (State Statistics Institute, Turkey) presented work undertaken by the State Statistics Institute of Turkey to measure the IT industry in Turkey and suggested further research in the future. The work showed that production of office, computing and accounting machinery (OCA) fell by 1.8 per cent from 1988 to 1992 while employment decreased by 7 per cent. When considering ISIC 3000, ISIC 3210 and ISIC 3220, the picture of the IT sector changes remarkably. The comprehensive study of the IT sector showed that SME, with 10 to 100 employees, plays an important role in the office, accounting, computing machinery and electronic components group. In addition to information and the IT equipment industry, a 1992 service sector survey has been carried out.

In conclusion, H. KESER stressed the need for the State Institute of Turkey to enhance the use of surveys with sector specific information and to give special care to the measurement of IT diffusion and impacts, in line with developing international experience. All this national effort is closely connected with international studies and particularly the work done at OECD.

Costas COURCOUBETIS (Institute of Computer Science, Greece) presented the results of work on charging principles in multi-service networks. This work, undertaken by the Computer Science Department of the University of Crete, is partially supported by the EC R&D ACTS (Advanced Communication Technology and Services) programme as part of the project Cashman, in association with European partners. The objective of the Cashman project is to develop adequate pricing models to be used for experiments with real user traffic. This project demonstrates how the new network technologies such as ATM allow to develop new approaches for pricing models. The guaranteed service network concept proposed to use pricing as incentive for users to provide more accurate information about traffic profile. At macro level, this conception allows better traffic management.

Fred GAULT (Statistics Canada), discussant, focused on the main challenges for statistics systems raised by the development of the information society. Some new ways to look at data on information economy have to be defined. The social dimension of this new information economy is very important and requires new kinds of measurements to appraise for instance the very important question of human qualifications. In this new information age, international comparable data are necessary. A solution proposed by F. GAULT is the integration of international organisations' work programmes.

The second discussant Sait ATHAM (Biltam A.S., Turkey) emphasised the need to have updated and revised indicators. SMEs should play a more important role in the information economy than in the industrial world characterised by economy of scale. In reference to O. GÄRDIN's presentation, he pointed out the necessity to identify the localisation of activities. This kind of measurement would be very interesting for Turkey, the country being characterised by an important concentration of activities in core regions.

SESSION 5: PANEL, "THE WAY FORWARD: THE RESEARCH AGENDA"

The Chairman, Christian GARRIC (EC, DG XIII), pointed out the issues faced by the regulators to avoid negative effects resulting from the network development and the necessity to anticipate their social and societal consequences. The economic theory is far from being clear and easy to use. The European Commission is paving the way for the full liberalisation of telecommunication infrastructure and services with the ongoing preparation of the regulation in four different, but inter-linked areas that are the interconnection policy, icensing, the Open Network Provision and the universal service obligations. Concerning the social aspects of the information society, the Commission has created two groups composed from personalities of the political and academic worlds to make recommendations on the main social and societal issues of the information society. The Commission has also released a proposition to the European Parliament and the Council for a series of guidelines to foster the development of trans-European telecommunication networks in the field of public interest telematic applications.

L. WAVERMAN, Chairman of the first session, pointed out the fact that regarding the agenda faced by the regulators, economists cannot spend too much time solving the problems. He raised two other crucial regulatory issues that are costing and pricing on the one hand, market power versus competition on the other hand.

W. HERRMANN, Chairman of session 2, raised the key issue of the human capital in the information society. The technology is neutral, not its use by humans. We do not know very much about the impacts of new innovative services allowed by the ICT on labour and employment. Nor do we know the long term impacts of delocalisation resulting from the use of ICT. What will be the work place of the future information society? ICT will also considerably destructure our way of living by re-allocating our available time. How will people cope with this question ?

W. HERRMANN referred also to the new flexibility required by the labour market and the way ICT could make some contributions by increasing its transparency. In reference to the required skills for working in the information society, Herrmann expressed that new technology skill will be as necessary as behavioural skills. Concerning education, W. Herrmann focused on the need to bring ICT closer to the new generation and to introduce them at school. Public-private partnerships might be a way to increase the use of multimedia in the education system as well as in the training sector.

Werner NEU, Chairman of session 3 on pricing on network services observed that the fully distributed cost approach is pushed by the telecommunication operators over the regulators. In this situation, he expressed the need for additional research on socially and economically optimal based pricing rules. W. NEU observed the current trend for telecommunication policy to move from regulation to competition policy.

Michael MINGES, Chairman of session 4 described the situation in statistics as being suited for industrial society, not information society. M. MINGES distinguished three concrete steps for the future work in statistics: (i) new classification of the existing data that had previously been classified sectorially; (ii) the necessity of cataloguing existing definitions; and (iii) the use of surveys and partnerships with private companies specialised in market intelligence.

SUMMARIES / OUTLINES PROVIDED BY SPEAKERS

STATISTICAL INITIATIVES ON ICT-PERSPECTIVE FROM THE OECD

Viviane Bayar

OECD

The relative advantage of the OECD in the area of science, technology and industry statistics is its contribution to the international comparability of data collected by national statistical offices. In addition to maintaining, developing and disseminating statistics and indicators, the OECD contributes to the development of methodological manuals for new indicators, written by and for national experts who collect and issue national data. The OECD itself, of course, also uses these data.

When the need for ICT statistics for policy makers became acute in the early 1980s two options were considered. A full methodological manual that would have consisted of a conceptual framework within which policy-relevant and viable statistics could be developed by Member countries and of guidelines for a standard practice for the collection, compilation and analysis of a comprehensive range of statistics within MCs and a firm basis of comparison of data between these. This approach to ICT was rejected because both the need, by the late 1980s, to generate indicators in the short-term and resource constraints made a large, internationally co-ordinated and specific ICT survey highly unlikely.

A more modest approach was taken, consisting of the development of a scaled-down manual making recommendations for a conceptual framework and minimal practical guidelines for the collection of ICT statistics primarily through the derivation of data on the ICT field from existing official statistical surveys, originally developed for other purposes, and possibly from the addition of a limited number of questions to these surveys. In parallel with the methodological work, data was collected from MCs and an experimental database was developed.

This work was interrupted in 1991 for a number of reasons many of which are still valid :

- Developing new indicators is at best complex and time consuming. It requires extensive knowledge of how a system works and even in the case of relatively stable phenomena may take as long as 10 years to produce results. The ICT field is in constant evolution and as such constitutes a moving target. Its impacts are felt throughout the economy, thus compounding these difficulties. Even if users' needs are urgent and a modest approach is taken the lead time cannot be shortened beyond a certain point.
- The constraints on statistical resources are particularly acute in a field such as ICT which requires work in practically the whole range of economic statistics, from production through trade and prices to employment, on both goods and services, as well as diffusion, use and impacts. It therefore requires the participation of a broad range of experts over a long time.
- The timing of efforts to enhance the international comparability of new indicators is very important. Such work is best undertaken before development is too advanced in individual Member countries' national statistical offices so that adjustments may be made for international comparability. However, a certain amount of work should have already been carried out in Member countries to benefit from the experience gained in developing the national systems. This was not yet the case in the late 1980s and is probably not the case today for the networked economy.

One of the outcomes of the exercise was an experimental database where data covering the years 1982 to 1988 were classified according to the latest versions of the then ongoing revisions of standard international classifications. A broad range of variables (production and employment by economic activity, production and trade by product, size of firms in ICT sector, expenditure on ICT by various sectors, an occupations by industry matrix) was covered but there were big gaps. The database was archived when the exercise was halted. Even today, very few countries are transmitting data to international organisations on the basis of the latest (third) revision of the International Standard Industry Classification of all economic activities (ISIC), for example.

The biggest gaps in the database are revealing. They refer to ICT services. This, however, concerns the broader issue related to services statistics which are less developed than statistics on other sectors of the economy although in OECD countries services contribute more than half of GDP. Work in this area has picked up in recent years with impetus from the Voorburg Group (on service statistics) and is producing, amongst others, results relevant to the ICT field. Data was also lacking on ICT diffusion (sectoral expenditures on ICT products). Again, other work, notably OECD work on international I/O tables, has produced some relevant information. No data by type of computers (mainframes, PCs, etc.) existed. While this is still the case in most national statistical offices, data on markets for ICT products are available from private sources. More generally, data on a product basis were (and are today) only available for a small number of countries in national statistical offices.

The reasons why there were these gaps are also revealing. In addition to problems not specific to the ICT field there was also the lack of a clear conceptual definition and boundaries of the field, confidentiality in countries where there was a small number of producers, and difficulties in transforming data collected on the basis of national classifications not necessarily compatible with international ones that were not even finalised. A first draft of the Manual made some progress in providing a definition and boundaries.

Many questions are being asked today in relation to the availability and development of statistics and indicators that may support decision makers in the areas of the information infrastructure (II) and information society (IS). If data are sparse on ICT, the situation is no better in relation to II and IS with their emphasis on services and content. Given that the obstacles mentioned above are still relevant, it is unlikely that current focus on information infrastructures would stimulate a major statistical initiative of international scope. Such systems would need to accommodate continuous evolution of this field.

It is therefore necessary to make the best possible use of all available data as well as of new data as soon as it becomes available. Data from national and international statistical offices must be complemented by data from private sources (consultancies, consortia of enterprises, trade press etc.). Data from private sources will be required even over the longer term, as the latest developments cannot be captured in official statistical systems. Furthermore, data that are not necessarily internationally comparable may still also provide valuable insight. In using such heterogeneous data, users, more than ever, must take into consideration the characteristics of each type of data in the context in which they are using them for analysis.

This kind of approach has already been taken for a few years. Sweden did not hesitate to use private consultancy data in the absence of official data on ICTs. The *Information Technology Outlook* of the OECD makes use of a broad range of private sector data, including market statistics from IDC and Dataquest, in addition to available official statistics. The EC, the OECD and a consortium of industrial federations and trade fairs co-operate in a joint product, *The European Information Technology Observatory*, which provides analysis of recent trends, special studies and basic market statistics from both official and private sources. Currently IDC provides the bulk of the data tables.

Where available, official statistics are preferred for economic analysis, being originally designed for this purpose. It is therefore particularly important to ensure that the results of ongoing methodological work and surveys in various fora be adequately disseminated. In the absence of major, internationally co-ordinated, specific surveys, such dissemination may encourage comparability.

The following are some examples of relevant and ongoing methodological work and of data that have been available over the last few years.

Standard international classifications are one of the building blocks for internationally comparable data. In national classifications, it is generally possible to arrange economic activities so that they virtually coincide with industries. However, in world-level classifications, such as ISIC, categories are designed to be compatible with the situation in a large number of countries at various stages of economic development and various economic structures. These categories, as well as the variables to which they are applied, can therefore not be as detailed as in national classifications. They are likely to include a larger proportion of secondary activities, those that produce goods and services that are not characteristic of the category. For example, part of computer maintenance and repair activities and of software packages would be in the office, accounting and computer production category. An additional problem with activity classifications, whether national or international, is the fact that ancillary activities, those undertaken to support principal and secondary activities of the unit, and not for sale on the market, such as bookkeeping, purchasing, sales promotion, but also communications and computer services, are considered as intermediate consumption and not attributed to their own activity category.

The interest in *private data sources* arises partly from the type of issues encountered with activity classifications, which need to maintain a certain balance in covering the various sectors of the economy. Private consultancies, for example, which focus on specific sectors, provide far more detailed data on (revenue) market size of the ICT sector than international classifications can. These are also more up-to-date and therefore better for capturing the latest trends related to new goods and services. They cover a large number of countries and their product categories are regularly revised to reflect new developments. They are therefore not as comparable over time as data from national statistical offices, and using complementary data from different sources is difficult as the categories vary. They are designed for market intelligence purposes, essentially.

Until recently *data classified by products* were not generally available on the basis of international classifications. Such a classification existed only for trade in goods. There have been two favourable developments (in the context of the recent revision of the international system of classification). The European Community has established a new survey of industrial production to serve both the needs of policy makers and companies. The production recorded will be defined by the new list of products known as Prodcom. Also the United Nations has established the provisional Central Product Classification (CPC) as the principal tool in the integration and harmonisation of international economic classifications relating to activity, production and trade data. The Voorburg Group on service statistics was initially constituted to assist the UN in the development of the services part of the CPC.

The significant advances made by the Voorburg Group in the area of *services* go well beyond such development and are particularly relevant given the emphasis on services in the information infrastructure/society. The Group has developed a framework for model surveys which serves for comparisons among countries and can also be used to test the adequacy of the CPC. It consists of 11 modules to be adopted as desired according to the specific needs of each country. The very first industry targeted was computer services. A model survey on Telecommunications services has also been developed since, reflecting the recognised importance of these two as producers of advanced technology

and as crucial service inputs into all other industries. A particularly interesting development is the Group's idea that the CPC should be subject to progressive improvements through regular updates.

While data classified according to this classification and the new revisions of existing classification are not yet generally available except for trade in goods, the OECD STAN databases, based on ISIC, Rev 2 offer possibility for analysis. Estimates fill the gap between detailed data on industrial activity and technology development collected through national industrial surveys and aggregate but *internationally comparable national accounts* data. More particularly, internationally comparable data on sectoral expenditures on ICT goods and services fill the gap in ICT *diffusion* data in 10 OECD countries (G7, Aus, Dnk, NH).

Surveys of *use* of selected new technologies generally reveal the extent to which innovations in the form of new technology are used in production. Repeated measurement also provides a measure of diffusion. These surveys are relatively easily done, and they are considered a relatively straightforward way of obtaining information on diffusion of innovations that is relevant to policy and can also be designed for specific industries. They currently cover use in the manufacturing sector only.

Surveys of *computer use* look into the extent of changes in this technology and some also assess impacts. Their focus may vary. Canada's focuses on the workplace, Australia's on households, and that of the United States covers households, educational institutions as well as the workplace. Japan and Sweden also carry out such surveys. Finland is considering one for next year.

CHARGING ISSUES FOR SERVICES IN BROADBAND NETWORKS

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SUMMARY

Charging and accounting in modern high-speed networks are extremely vital for their successful operation. Tariffs and pricing schemes are needed for the network to recover its costs in a fair way from the diverse population of users, and to effectively allocate network resources. It is widely believed that pricing mechanisms which use feedback can play a part in effectively managing congestion.

Charges will of course be partially determined by the competitive strategies of service providers. However, it is unlikely that a good charging strategy should be wildly out of line with a desire to charge in a manner that reflects user's relative uses of network resources. Although in the case of a traditional circuit-switched telephone network it may be relatively simple to charge for use in a manner that reflects a customer's actual usage, it is not so clear how this can be accomplished in current high-speed networks, where the trend of current developments is towards systems which will allow a number of widely disparate traffic streams to share the same broadband channel. A call, which might be a mixture of voice, video and data, would appear to the network as a stream of cells, and the hope is that calls with a broad range of burstiness characteristics can be efficiently integrated, through statistical multiplexing, to share a common resource. In recent years a number of papers have provided some basis for this hope, by showing that it is possible to associate an effective bandwidth with a source type such that, provided the sum of the effective bandwidths of the sources using a resource is less than a certain level, then the resource can deliver a performance guarantee, expressed in terms of the probability that delay exceeds a threshold or that a cell is lost.

The effective bandwidth depends on characteristics of the source such as its mean and peak rate and there is by now a large amount of literature on methods for policing the peak and mean rates of a call. The underlying idea is that at call admission a contract would be made between user and network specifying in more or less detail the statistical properties of the call, and that policing mechanisms would enforce the contract. Unfortunately policing may limit many of the advantages of a high speed multi-service network, such as the network's inherent flexibility to deal with a call composed of varying and uncertain mixtures of voice, video and data. What is needed is a mechanism that trades off the user's uncertainty about a commencing call against the network's requirement to statistically multiplex calls in an efficient manner.

An effective pricing mechanism should also protect the network from users who seek to gain unfair advantage by 'malicious' tactics. One such tactic might be for a user to misrepresent his intended use. Clearly, this is unwelcome, since if users provide accurate estimates of their prospective utilisation of the network resources, it should be possible to increase revenue by more efficiently loading the system. Therefore the tariff structure should encourage users to improve the accuracy of their estimates and thereby reduce their cost. Network services will be organised in a layered fashion, with the lowest layer being the bare network services. This hierarchy of services motivates a hierarchical structure for the corresponding tariffs and pricing mechanisms.

If a pricing mechanism is to be feasible and practical it must be based on information that can be obtained from the network. This information should be useful in determining the effective bandwidths of the traffic streams or any other statistical information needed for charging. Moreover, the cost of implementing a pricing mechanism must take into account limitations due to the size of the network, the large number of its users, and the communication costs of retrieving the necessary information. The architecture of the accounting system implementing pricing and accounting is a non-trivial subject. It is anticipated that such a system must interact with the user in order to set the initial contract, and from that point on, monitor the traffic to detect possible contract violations. Besides the added security features that must be deployed, the above functionality imposes certain non trivial real-time requirements to the accounting management software.

We will introduce the basic concepts in network services and network technology, and describe the currently proposed approaches for charging guaranteed quality services and best-effort services in networks such as ATM networks and the current Internet.

**REINVENTING AN INDUSTRY AROUND INFORMATION AND COMMUNICATION
TECHNOLOGIES;
A CASE STUDY IN THE USE OF ADVANCED NETWORKING
SOLUTIONS FROM THE PERSONAL BANKING INDUSTRY**

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SUMMARY

For all the discussion concerning the creation of "virtual organisations" many of the reported phenomena appear to be more apparent than real (for a discussion of the issues see for example Womack and Jones 1994). This paper investigates the circumstances in which electronic information processing and transfer has been used by one firm fundamentally to transform the shape of an industry.

Traditionally a career in personal banking has largely been thought of as one of the most secure. However a job in banking can no longer be regarded as a job for life. Following the labour shedding and restructuring that was faced by large parts of the manufacturing sector in the first half of the 1980s the service sector has undergone the same experience in the first half of the 1990s.

A programme of pro-competitive legislation has resulted in the introduction of new market entrants, particularly from mutual organisations, which have historically served the lending market for house purchases. Facing this prospect handicapped by overcapacity, pressure on margins and a poor profits performance the banks were in no condition to respond to their new rivals. A typical reaction on the part of the banks has been to re-organise local branch networks into "satellite banking groups". This clustering of branches has ensured that management and supervisory functions now cover a much wider geographic area and bigger customer base. However these changes have not been accomplished without casualties. For instance the banking trade union has estimated that in excess of 100 000 job losses have occurred in the last five years.

As banking orthodoxy's disappear a different and more complex form of inter-firm competition has emerged. While the old "Fordist" model emphasised the importance of price-based competition, secured via economies of scale associated with mass production, the new model reflects changes inspired by new patterns of production and consumption. In this model commercial success is frequently dictated by the ability of firms to exploit economies of scope and meet highly discriminated consumer preferences. For the banks this has spelt a number of harsh lessons. In particular consumer surveys indicated declining levels of satisfaction amongst account holders combined with expectations of increased levels of customer service.

The banking sector has been one of the more avaricious consumers of information and communications technology (ICT) hardware. For instance ICT has been critically important in enabling back offices to be located remotely from the main customer service locations and for satisfying account enquiries and transactions via retail branch outlets.

The case study of the bank First Direct indicates how a new "green-field" site banking operation has moved to exploit sophisticated network and switching technologies and the integration of computers and the telephone, carving out new channels for dealing directly with account holders from a single site. In the

process the bank has modified the geography of banking provision while enhancing customer service and broadening the scope for "cross selling" customised financial products.

The features of the First Direct operation emphasise the importance of the assets that are technology and people. Not only has the bank's experience been emulated by its competitors within the financial services industry, but it is being copied by companies from industries as varied as computing, car repairs and hotels within call centre complexes. The final part of the paper considers some of the issues raised by this trend for local employment promotion.

THE ECONOMICS OF ACCESS PRICING

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This paper is based partly on a report commissioned in January 1995 by the *Competition and Consumer Policy Division* at the OECD. Much of the material draws on work undertaken by the authors on the research project *Regulation and Incentives in Telecommunications*, funded by the ESRC (UK) grant number L114251026. We are grateful to the ESRC for providing research finance. The views expressed herein are those of the authors and do not necessarily represent the views of the OECD nor of its Member countries.

INTRODUCTION

The information society is based on a platform of users interacting across physical and virtual networks. In such networks there is a mix of transmission media and switching centres and in many cases some of these components will exhibit natural monopoly characteristics. That is to say it would be an inefficient use of resources to have more than one operator constructing these parts of the network. For example, historically at least, the local area networks (LANs) have been natural monopolies. When there exists competition in a network industry offering information and communication services, rival firms will often need to gain access to these *bottleneck* facilities. For example, the production of information services transmitted over networks is regarded as competitive, but the firms competing in this sector require access to subscribers based in LANs, the largely naturally monopolistic sector.

This paper is concerned primarily with regulatory issues and access prices in a network industry containing bottleneck facilities. The discussion focuses exclusively on static efficiency conditions.

- ***The aims of regulation***

Where competition has been introduced into a network industry, the existence of bottlenecks usually calls for the regulation of the terms of access. As with regulation more generally, the aims and objectives of regulators concerning access pricing are varied and sometimes contradictory. These include:

- ***Allocative efficiency***

The economic benefits of having retail prices close to marginal (or incremental) costs are well known. In most markets this is achieved by means of effective competition. In industries characterised by firms with market power, however, there is often a need for intervention by regulators. Since the access charges which rivals pay will be a crucial determinant of the prices

they offer consumers, the control of access charges can be used as an effective instrument, albeit indirect, for steering prices towards costs.

- ***Productive efficiency***

Another important aim of regulation is that production should take place in the most cost-effective manner. Ideally, services -- or inputs to services -- should be provided by those firms having the most efficient means with which to do so. Moreover, regulation should ensure that economies of scale are not lost by excess entry into some markets. Since access charges will influence the form and degree of entry which will take place, they will be a powerful tool for achieving this aim. If productive efficiency were the sole objective of regulation then access charges should be designed in such a way that entry in a market takes place if and only if that entrant is more efficient than other firms.

- ***The promotion of competition***

Many regulatory bodies are required by their constituent statutes to promote competition. The reasons for this include a recognition that competitive markets are a powerful means by which to obtain the above two objectives. In addition, effective competition brings the benefits of product diversity, increased customer responsiveness, and technological innovation, among other things. Finally, though, it may be because regulation cannot always be relied upon to carry out its aims successfully that competition has some long-run advantages. For instance, regulators are often in an unequal battle with monolithic *incumbent* firms who may be able to influence the regulatory process. Because of this view it could well be that regulators will choose to encourage entry beyond the level which is implied by considerations of short-term notions of productive efficiency, and to this extent it could be in conflict with the second aim above. Since the amount of entry will be a decreasing function of the level of access charges, the regulator can use low access charges as a means to encourage competition.

- ***Fairness and social obligations***

The desirability of allocative efficiency notwithstanding, pricing policy in regulated industries in practice has been influenced heavily by notions of *fairness* or equity. These are illustrated by the prevalence of geographically uniform prices for services which have non-uniform costs and by the provision of some services which are not *economically viable*. While it is not obviously *fair* to charge two consumers the same for a product whose supply to one consumer uses more scarce economic resources than supply to the other, for political or other reasons such policies seem likely to be important for the foreseeable future. Because of this, and because these loss-making activities are rarely funded by direct state subsidies, incumbent firms are required, in practice, to fund these services by cross-subsidies from elsewhere. In these cases great care must be taken to ensure that entry into an industry does not take place only in profitable markets which leave the incumbent unable to finance its social obligations.

The interaction of access charging policy with social obligations is perhaps the most contentious aspect of policy in this area. The telecommunications industry in the UK provides an example where this has resulted in much controversy. The regulator Ofcom operates a policy which allows the incumbent (British Telecom) to fund social obligations through a component added on to the fully allocated cost of providing the various access services. This component is known as the *access deficit contribution* and it is based on the relative profitability of British Telecom's different retail services. In the course of pursuing this policy several difficulties have arisen, including complaints from the buyers of access services

competing against British Telecom about the cost of the universal service obligation and controversies surrounding the methods used for calculating the profitability of British Telecom's individual services.⁶

Finally, it is worth making the point that regulation in general, and access regulation in particular, is likely to be more effective and more credible if it takes place at arm's length of the government of the day.

The vertical structure of the industry

Access pricing cannot be discussed in detail without considering the vertical structure of the particular industry. There are at least five possible industry structures: (i) integrated monopoly, where a single firm supplies all services; (ii) structural separation with liberalisation, where there is competition in the non-bottleneck sectors and the bottleneck provider does not operate in the competitive markets; (iii) vertical integration with liberalisation, where there is competition in the non-bottleneck sectors but the bottleneck provider is permitted to operate in these areas; (iv) accounting separation, which is similar to (iii) except that the bottleneck provider is required to keep separate accounts for bottleneck and competitive services, and (v) joint-ownership, where bottleneck provision is undertaken by a firm owned jointly by firms in competitive markets. In all cases because of the presence of monopoly power over vital inputs, access terms will need close scrutiny. The crucial difference between (ii) and (iii) is that no matter what access price regime is chosen under structure (ii) firms in competitive markets are all symmetrically placed (there is a *level playing field*) whereas with vertical integration this is not so. Because of this point, with vertical integration access price regulation needs to be more carefully designed in order to guard against possible anti-competitive conduct by the bottleneck provider. This paper, like most of the literature on the topic, will therefore be chiefly concerned with the analysis of access charges when there is vertical integration with liberalisation.

The plan of the paper is as follows. In the next section we discuss structural issues in greater depth, and we consider the setting of access prices in all industry structures other than that of vertical integration. In section 3 we discuss four approaches to determining access charges when there is vertical integration. This is extended in section 4 to allow for such complicating factors as product differentiation, entry assistance, more complex access charges and the possibility of bypass. Concluding comments are in section 5, and in an appendix we give a glossary of technical terms.

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⁶ For more discussion of the conceptual issues surrounding social obligations and access pricing, see Armstrong and Doyle (1995), and for a discussion of the practical difficulties arising in the UK telecommunications industry, see Oftel (1994a, especially chapters 3 and 12), Oftel (1994b). Recently Oftel (1995b) announced that it was scrapping the setting of access deficit contributions and replacing them with a more transparent universal service fund levied proportionally across all operators.

ICT USAGE IN TURKISH FIRMS: CASE STUDIES

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SUMMARY

The study of two small, and one larger firm, in Turkey brings to light the conditions under which Information Technology (IT) Platforms are being rapidly developed in industry and services. The driving forces stimulating this process include the increased export-orientation of the Turkish economy, growing competition and search for savings as well as enhanced quality of products, and --for the larger corporation --trade-offs between salaries and IT investments.

Networking remains at the infant stage, and is mostly driven presently by the demands of foreign partners, limited electronic commerce possibilities for some service providers, or internal rationalisation requirements of the larger firms.

It is suggested that timely measures might be needed to safeguard interoperability of emerging systems, but that effective take-off of networking might require more forceful informatisation efforts within government departments as well as the concomitant development of an adapted legal and regulatory framework.

THE EXCHANGE PROCESS IN QUESTION

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This paper was originally written for the 1995 report of the IDATE Foundation and is reproduced here with IDATE's kind permission.⁸

SUMMARY

At the end of the 70's, in the midst of the world oil crisis, the telematic revolution (clearly identified in the Nora-Minc report) was perceived as capable of providing a project to transform French society, by anchoring it to the major worldwide poles of development. Fifteen years later, the revolution brought on by information and communication technologies has effectively taken place: telematics *à la langue française* -- in particular, the Minitel -- has brought a form of development that is not yet appreciated at its true value; new models prolong these initial manifestations of the power of telematics, such as the explosion of the Internet world or the irruption of multimedia. But the relationship of telematics to growth; to the economic crisis, to labour, to the way telematics, in all its usages, modifies our economics, still remains vague: telematics is emerging at the heart of a profound mutation of our economic and social systems, which it accompanies, no doubt, rather than provoking it, which makes it difficult to appreciate with precision its contribution to the transformations underway.

The economy is often perceived primarily through the mechanisms of production. Growth and economic crisis are first analysed as positive or negative adjustments between production and demand. The telematic revolution has thus been approached mainly from the angle of productivity: What effects will the marriage of information processing and telecommunications have on production functions, on business productivity and competitiveness and, by ricochet, on their organisation; how to maintain demand in economies with significant labour surpluses?

This accent placed on production phenomena limits the field of analysis. Our economies certainly know better how to produce than they know how to consume, and this tendency is not about to be reversed. Our liberal market economies have transformed production surpluses into labour surpluses. And it is paradoxical to note that the better we know how to produce goods, the more our systems get bogged down in crises. To take the example of health care, in the United States, where 15 per cent of the GDP is spent on health care, or in France, which consecrates 10 per cent, the highest percentage in the European Union, the level of health, measured by a variety of indicators, is markedly inferior to that in countries that consecrate a lesser portion of their wealth to health care. Production is no longer synonymous with well-being. In a sector like health care, supply creates an abusive demand which drags our economies into overconsumption, and even useless waste.

Generally, the implicit hypothesis is made that exchange exists because there is specialised production. Is it not possible that, on the contrary, specialised production occurs when exchange has been rendered possible, and that thereby production makes sense, or has value? It is not our intention here to discuss that issue, which calls into play numerous and complex dimensions. However, we are proposing here a certain problematic reversal by which progress in the productive sphere depends more on the exchange sphere's capacity for development than the contrary. The issue in this case is no longer putting technology in the service of production, but in the service of exchange, distribution and repartition of resources and values.

Of course, the productivity, competitiveness and profitability of production activities will remain important in a competitive economy, and it is not a question here of minimising them. But, to pursue via the laws of markets the ever greater performance of our production systems would only increase the tensions that today plague our economies. It is the very structure and functioning of the markets that is at cause, their inaptitude to correctly redistribute the wealth produced. And, if there is a domain in which the telematic revolution is sure to be able to contribute, it is in the mutation of exchange mechanisms. Such is the hypothesis that we would like to introduce here: the markets have liberated the forces of production, now how can transactional mechanisms, which appear as brakes to growth, be freed, in order to continue the development and specialisation of production?

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**CONNECTING HOMES TO THE INTERNET:
AN ENGINEERING COST MODEL OF CABLE VS. ISDN**

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SUMMARY

This paper compares the shared-bandwidth approach of cable networks against the dedicated-bandwidth approach of ISDN, as infrastructures for delivering faster Internet access to residential users. Based on U.S. case studies of the PSI Cable deployment in Cambridge, MA, and the Internet over ISDN service offered by Internex, Inc. in the San Francisco, CA area, the paper develops a capital cost model for each technology. Results from the models are presented showing the superior economics of the cable approach. For example, 4 Mbps Internet access over cable can provide the same average bandwidth and thirty-two times the peak bandwidth of ISDN access for 40 per cent less capital cost per subscriber. The economy of the shared-bandwidth approach is even more evident when comparing the per-subscriber cost per bit of peak bandwidth: \$0.30 for the 4 Mbps cable service versus close to \$16 for ISDN. Cable-based access also has better service characteristics, such as the ability to support full-time Internet connections. Despite cable's advantages, ISDN-based access is more widespread. The paper describes barriers to deployment of cable-based Internet access, including business and policy factors. It finds that the closed market structure for cable subscriber equipment has not been as effective as the open market for ISDN equipment at fostering the development of needed technology. Furthermore, monopoly control of residential communications infrastructure limits business opportunities for Internet service providers. The paper concludes with policy recommendations intended to reduce these barriers and thereby foster more widespread and affordable high-speed residential Internet access.

FRONT LINE OF ICT STATISTICS IN TURKEY

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SUMMARY

This presentation is about efforts made by the State Institute of Statistics to measure the Information Technology industry in Turkey. It describes the experience of working on the available data for IT industry, draws conclusions about the industry and suggests directions for further statistical work and analysis.

In the study, existing data which are compiled by the manufacturing industry survey, industrial production survey, survey for the service sector and by foreign trade statistics were reviewed, and some international comparisons were made. The results of this work provide a general view of the IT industry in Turkey by analysing production, value added, employment and trade data. In addition, the study on 1992 data using a more detailed classification system, ISIC Rev.3, gives more information about the IT equipment sector, service sector and their R&D activities.

The results of this study give limited information for ICT in the overall economy and only point to the performance of the IT industry itself ignoring the indirect and spillover effects. This underlines the need for a comprehensive approach to the measurement of ICT. The compilation of data to measure the diffusion of the IT equipment and related services across the economy and the continuity of existing data series on IT industry should be considered. Common international standards should be stated regarding the definition of ICT industry and the identification of IT products and activities.

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THE ROLE OF “PLATFORM BUSINESSES” IN ELECTRONIC COMMERCE

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SUMMARY

In this paper, we discuss the roles of intermediaries, which we call platform businesses, in electronic commerce. Intermediaries will play important roles because electronic markets are likely to create trade partners that are far apart and that have never traded with each other before. The intermediaries supply necessary elements of trade such as "trust" to convert "potential" matches between buyers and sellers into "real" done deals.

While the electronic forms of commercial transactions existed from as early as the 1960s, an emergent trend exists which stimulates a renewed interest. That is, the creation of the "open" computer networks. Electronic Data Interchange (EDI), which adopts standardised business protocol, as well as such communications technologies as TCP/IP, provide an opportunity for realising commercial trade over computer networks that goes beyond the boundary of the closed club of firms.

Computer networks by themselves, however, lack some important functions that are necessary in realising open commercial transactions. Trust is just one example. Platform businesses provide, on an open computer network, functions that are essential in trade. We categorised the functions into the following five:

- (1) provision of partner search function,
- (2) creation of trust among trading partners,
- (3) evaluation of economic value,
- (4) provision of standardised interface, and
- (5) integration of functions.

Platform businesses enable firms to utilise the emerging open computer network as a means of commercial activities.

Implications of the platform businesses are many. First, they have special significance in the Japanese context. Platform businesses and open computer networks jointly have the potentials for dissolving the traditional “keiretsu” relations which can be characterised as "closed network of firms." Many Japanese firms now face increasing costs of domestic procurement. This is prompting them to wonder whether their old policy of owning exclusive networks of local vendors and distributors is now obsolete. Computer networks seemingly give advantages to firms that aggressively seek for the most capable partners globally and openly.

Secondly, the popular notion that electronic commerce "eliminates middlemen" needs a second thought. Our research suggests that increased opportunities for formerly unknown trade partners to transact actually increases the need for intermediaries.

At the same time, we should not think that the *status quo* will remain unchanged. Instead, we should recognise that the establishment of the electronic distribution systems often involve the destruction of *status quo* in many industries. Players that enjoyed profit and created jobs may lose their grounds for business.

Thirdly, the power of platform businesses in facilitating trade among "strangers" is likely to help platform business customers to operate in a much greater geographic area.

Expanded geographic coverage and an increased number of accounts mean that small manufacturing firms can now concentrate on relatively few products and enjoy the economies of scale for the production of each. This is a departure from the old style of accepting a diverse range of orders from a few customers. Now they can focus on a small range of orders from a diverse range of customers. This way, small firms can focus and develop on a particular technology and be globally competitive.

RECENT DEVELOPMENT OF INVESTMENT ESTIMATION IN JAPAN

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SUMMARY

In Japan, the information communications industry is expected to play an important role in launching economic restructuring and infrastructure of information communications networks provides various merits. Developing an interactive/broadband information communications network is a project requiring much time and money. In this paper, we build an econometric model of explaining demands and supplies for interactive/broadband telecommunication services, and estimate the amounts of investment to construct the infrastructure.

Investment estimations for Broadband ISDN have been done by NTT (Nippon Telegraph and Telephone Corporation) "VI&P Information Service" plan (1990); the report about 'Broadband ISDN' (1991) with 33 trillion yen construction cost; Oniki and others (1992) with 72 trillion yen; and Kuriyama, Oniki and others (1994) with 90 trillion yen before 1993, when NII concept of the Clinton Administration was disclosed.

Since 1993, a race has begun. Telecommunication Council's proposal (1993) advised to set the target period of infrastructure construction at 2010 when Japan will have a peak total population. The estimated investment cost is 33 to 53 trillion yen, with a calculated 123 trillion yen for telecommunication's related markets and 2.4 million yen for employment. NTT's policy changed from 45 trillion yen plan(1994), to 2 trillion yen plan (Dec. 1994), and to an introduction of the Internet services (1995).

In 1994, the Internet and mobile communication demands began to increase. Ministry of Posts and Telecommunications (MPT) disclosed the '10 trillion' project. In May '95, the Telecommunication Technical Council estimated the mobile communication demand and forecasted 32 million cellular and 38 million PHP (Personal Handy Phone) subscribers.

The telecommunication market in Japan is developing due to (1) high demand for the Internet, (2) high demand for mobile communication, (3) effective use of the existing N-ISDN, (4) rather opaque demand for the so-called B-ISDN, and (5) steady spread of optical fibres in anticipation of rapid demand for optical communication.

In our model, with a given demand, investment which satisfies demand is estimated. Potential revenue is calculated under the present tariff system. Using the learning curve function, it does consider the effect of lowering the price of facilities and equipment as a result of mass production. Demand involves mobile communication, the Internet, conventional public telephone, video conference, visual telephone and VOD (video on demand).

Four cases are compared to help understand the effect of the policy which promotes the installation of optical fibres in telephone system facilities. Case I concerns installing conventional wire line when updating common public telephones. Case II concerns installing optical fibres in the neighbourhood of the

resident when updating (6 per cent updating rate). Case III concerns the increase in video conference, visual telephone and VOD with an increasing consciousness of quality time by people. Case concerns the MPT's Policy to construct telecommunication infrastructure before 2010. It corresponds to 20 per cent updating rate.

Conclusions obtained from the analysis are as follows:

- 1) Investment costs for telecommunication infrastructure are decreasing because of technical progress. But progress in computer technology is faster than that in telecommunication, which is burdened by personnel costs.
- 2) Mobile communication is a primary growth business. Demand for mobile communications (105 million subscribers) will continuously increase for a relatively longer period. Investment for mobile communications will increase for several years. Accumulated total investment cost to 2005 is 11.9 trillion yen and accumulated total revenue is 55.8 trillion yen.
- 3) The Internet is a very promising business. Its users will reach 22 million in 2000, but its boom will be over in 4 or 5 years. In 2000, investment for the Internet will be 120 billion yen and revenue from the Internet services will be 6 117 billion yen. The basic charge rate for the Internet will decrease drastically and cease to be a burden on family budgets. N-ISDN networks will supply the Internet services.
- 4) Demands for The Internet and mobile communications can produce surplus funds which may be appropriated for a telephone system replaced by an optical communication system.
- 5) Investment and revenue on B-ISDN are as follows:

AVERAGE INVESTMENT EXPENDITURE PER YEAR (BILLION YEN)	<u>Case 1</u>	<u>Case 2</u>	<u>Case 3</u>	<u>Case 4</u>
1996 / 2000	1 089	1 606	1 597	4 117
2001 / 2005	1 782	2 062	1 772	3 091
2006 / 2010	1 785	1 974	1 536	2 956
Total: 1996 / 2010	23 280	28 210	24 525	50 820
AVERAGE ANNUAL TOTAL REVENUE (BILLION YEN)	<u>Cases 1, 2 inc. Internet</u>		<u>Case 3 inc Internet</u>	
1996 / 2000	3 961	9 837	3 960	9 837
2001 / 2005	4 725	12 312	4 911	12 684
2006 / 2010	6 927	17 013	9 910	22 827
Total: 1996 / 2010	78 065	195 810	93 905	226 740

- 6) If a wire line is renewed by optical cable, the investment will be less, compared to the case of replacing with a wire line. Penetration rates of the new telephone system will be around 60 per cent in 2010, if 6 per cent updating policy is adopted (Case III). If we want to prepare 100 per cent information infrastructure before 2010 for universal service and so on, we will need a policy to invest in unprofitable area (Case IV). Its financial cost will be between 10 and 25 trillion yen, depending on the policy.
- 7) The value of time will increase for people with large commuting time, and the time-saving limits on mobile communication and popularity of handling the Internet will lead demand toward B-ISDN. Consequently, from about 2005, demand will largely shift to B-ISDN. But the building of infrastructure to cope with Japanese economic and social difficulties will not be in time for 2010. The infrastructure accelerating policy will begin after present Internet and mobile communication booms. Investment for B-ISDN will accelerate from about 2000.

STATISTICS FOR THE INFORMATION SOCIETY AND THE NETWORKED ECONOMY

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SUMMARY

Against the background of the concept of the Information Society, a common information area and the Action Plan for Europe's way to the Information Society, some conclusions are drawn on the direction in which services statistics in general and telecommunications services statistics in particular should be developed.

It is noted that collecting and processing information and transforming it into know-how and competence take more resources in the modern enterprise than the actual manufacturing.

The Information Society is shaped by two networks: the telecommunication networks and the social and economic networks. Some factors that influence the needs for statistics are indicated. They are relocalisation of activities, the need for new knowledge and competence, mobile communication and flexibility and new ways of organising enterprises and production.

The production in the Agricultural and Industrial societies and economies is stationary and the products material. In the Information society and the networked service economy the production is mobile and the products immaterial.

Information can be used by many at the same time in different places independently of each other. The information is not consumed or worn by usage. Its depreciation depends on other factors.

The existing statistics are based on concepts, definitions and theories whose frame of reference is the agricultural and industrial society and economy. The statistical framework, i.e. the concepts, definitions, variables, data collection and survey systems etc., has to be developed in order to study and understand the information society.

The existing economic statistics are basically supply or production oriented. The statistics for the information society should focus more on the demand or use.

Some general directions in which the statistics for the Information Society should be developed are: a better coverage of SMEs; clear definitions of the information and services products; emphasis on human resources; information on geographic patterns and localisation, communication patterns, emphasis on use and demand.

The telecommunication statistics project is divided into four sectors and eight domains of variables.

- Telecommunication Networks sector comprising Infrastructure statistics.
- The Producers, i.e. network operators and services providers, comprising Structural indicators and Enterprise economic statistics.
- The Services, i.e. Transmission services and network value added services, comprising statistics on Volume, Quality and Price information.

- The Users and Usage, i.e. organisations, e.g. enterprises, and persons, comprising statistics on Demand and Usage.

One problem is that there is a lack of common understanding of what should be confidential and a lack of awareness even among regulators about what kind of information should be available. It is crucial for the different parties concerned to reach an understanding on what statistical information should be provided and that all the operators contribute on equal terms.

The private networks are important and their importance increases. Statistics on the private networks would therefore greatly increase the possibilities to describe and analyse the networked economy.

To be able to describe and analyse the developments of the telecommunication services markets, it should be possible to split the revenues according to the different services produced.

A crucial element in the development of statistics on the telecommunication services is the definition of the services and the creation of a classification system.

Data on the telecommunication services should be collected from both the supply -- the producers side and from the demand -- the users side.

The telecommunications services as defined according to CPA should be covered by statistics on Traffic/volumes, Price information and Quality.

Statistics or studies of business usage are often compiled by investigating user panels. This gives good information for marketing purposes -- customer care etc. But it is not of very much help for policy makers -- they need information and statistics for the universe of businesses. The non-users are obviously of as great a relevance and interest as the users.

We are interested in concerning persons, as users, with the question of *who* uses the networks, the *extent* of the use, *spending*, and the use of *different services* and applications.

Examples of existing or planned surveys that can give information people's usage are Household budget surveys, Time Use surveys, Computer Use Surveys and Communication Pattern Surveys.

FIRM LEVEL SURVEY OF INFORMATION NETWORK IN JAPAN

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1. INTRODUCTION

The use of information technology is a driving force of productivity growth in OECD countries in the sense that IT use may improve the efficiency of industrial activities as well as enhance quality of outputs, especially in service sectors. On the other hand, at the micro level such as an individual firm which introduces information technology, it needs a proper organisation to accept new technology, and only investing in IT capital products, typically computers, does not always assure superior business performance.

The other difficulty of information technology from the economic viewpoint is the heterogeneity in way it is used. Since information and communication technology can be used for various kinds of business applications as discussed in this paper in detail, simple gross diffusion statistics such as how many computers are introduced into workplaces does not give useful implications for policy makers or business users.

In this sense, this paper on information network survey by MITI, Japan, which is a part of a comprehensive census survey on various kinds of business activities, stresses the importance of how an information network is used, and statistical interlinkage of networks with other business activity variables such as organisational structure and firm innovation strategy.

This short paper consists of two parts, an introduction of this firm level survey of Japan focusing on the use of network questionnaires, and some findings from the survey of 1991. The first part contains three sub-sections, motivations, features and survey items, and will be followed by the second part containing basic results and concluding remarks.

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UNIVERSAL SERVICE OBLIGATION IN UK TELECOMMUNICATIONS

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SUMMARY

The concept of Universal Service Obligation is dynamic: it has changed over time, and will continue to do so. A number of different policy issues, responding to needs of economic and social nature, are often combined under the umbrella term of USO:

- widespread network coverage
- geographically averaged prices
- free emergency calls
- public pay-phones
- targeted subsidies

We need to spell out these policies, cost them separately and allocate them separately. Each policy target should be measured and monitored with ad hoc indicators. The entire telecommunications industry should contribute to a USO fund, if we are to strike a balance between efficiency and equity in pricing and universal provision of telecom services.

Telephone ownership is also dynamic: nearly half of today's "untelephoned" had a telephone before. Poverty is the main reason for being off the telephone network, and only schemes designed for the specific needs of low income users can successfully increase penetration rates among the needy.

Simple voice telephony is the object of USO today. In time USO should be extended to other telephony services. How are we to ensure that the existing gap between haves and have nots does not widen as more sophisticated services become available? We propose the formulation of a systematic criterion to elect services as candidates for the USO. Investments in IT literacy and education are a better response than an early commitment to USO for broadband services to inequality arising from the Information Society.

THE IMPACT OF STRUCTURE AND COMPETITION ON EMPLOYMENT IN THE TELECOMMUNICATIONS CLUSTER - THE CASE OF FINLAND

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SUMMARY

We have examined the development of employment in the Finnish telecommunications sector over the period 1987-94 that experienced full liberalisation of the market. The boundaries of the study have been extended to cover the whole telecommunications cluster which embodies the telecommunications equipment industry, operation, and value-added network services, as well as the input industry, related services, and associated industries. Moreover, the concept of telecommunication competition has been defined to incorporate the equipment industry as well.

It was approximated that in the cluster of operation, equipment industry and distribution alone, the amount of jobs had increased by 13 per cent over the period 1987-94, while in the whole economy employment fell by 16 per cent. It was observed that employment did not fall below the 1987 level in any of the subsequent years.

The fall in the direct operator employment, owing to the restructuring process, was more than compensated in the booming equipment industry. Behind the success of the equipment industry lies the long tradition in competitive domestic market conditions. The positive multiplier effect was manifested in the input markets, especially in the electronics and electrical industry.

Value-added network service provision has grown yearly by 20-25 per cent in the 1990s. This sector employs an ever increasing group of people, whose number is ultimately difficult to estimate. But the turnover from value-added services will exceed that accrued in basic services in the near future, and the sector contains notable employment potential.

The Finnish evidence strongly supports liberal market conditions in all the industries of the telecommunications cluster. Generally speaking, technical progress saves human work, but development in telecommunications seems to rather create new job opportunities. Their materialisation depends, however, crucially on competitive market conditions, and investments in technology and education.

Hence, it is not only liberal market conditions and competition enhancing policies that matter. The study indicates that the rapidly growing telecommunications cluster is an outcome of various co-operative ventures based on explicit or implicit contracts between private and public agents. Competitive clusters of firms and industries seem often to emerge as parts of (national) innovation systems. These are characterised by reduction of transaction costs due the internalisation of transactions involving external economies. From the point of view of industrial and technology policies it is important to recognise innovation activity as a process of systemic nature. As technological knowledge is to a large extent tacit, much of the communication and diffusion of technological knowledge takes place in various kinds of networks. It is the task of public policies to enhance the kind of institutional set-up that promotes the formation of networks.

NETWORK TECHNOLOGIES, ORGANISATIONAL CHANGE AND THE LOCATION OF EMPLOYMENT:

The Case Of Teleservices

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SUMMARY

This paper is concerned with organisational changes occurring in the office-based service sector as a result of developments in information and communications technologies, including network technologies. The paper is particularly concerned with the spatial changes in office-based employment opportunities resulting from that organisational change.

The paper first suggests that whereas in the 1980s large firms were primarily concerned with using computer and communications networks for reorganising internal activities they are now turning to consider ways in which these technologies can improve their interface with customers.

The paper argues that, within this context, and contrary to the observations of some commentators, pronouncements of the 'death of telephony' are premature. The paper shows that for a number of reasons telephony is still a very important strategic business tool and that its importance is increasing, particularly in the area of customer services. The paper suggests that firms across a range of sectors are increasingly using developments in office and network technologies, particularly public network technology, in a strategic manner to deliver customer services, cost effectively, via the telephone.

The paper argues that the changing firm-customer interface around telephone technologies often leads to new organisational structures within firms. It also briefly argues that this new customer interface leads to new organisational configuration within particular sectors and across sectors with processes of horizontal and vertical integration becoming apparent, as major players exploit new opportunities associated with these technologies to cut out intermediaries and position themselves 'closer to the customer'. At the same time, however, new specialist, third party, teleservice firms are emerging, which is leading to outsourcing of some telephone functions.

The paper argues that customer interface functions or 'front office work' are becoming increasingly routinised and standardised as new technology is introduced. Just as the previous rounds of technological investment lead to an industrialisation of back office work, a new round of technological investment is leading to the industrialisation of the work process around customer services. This has a number of implications for the work process. Specialist skills in a particular product area become less important. Instead it becomes important to be able to extract and input information about the product from a computer quickly. In teleservice work there is an additional requirement to be able to 'smile down the telephone'.

The main focus of the paper, however, is the new spatial divisions of labour emerging as the result of the growth in teleservices. The argument runs as follows. First, the growth in teleservices is resulting in a process of concentration of work, with firms moving their customer related telephone operations out of

branch networks and into one or several “call centres”, which then operate on a regional, national or, even, international basis. In establishing these centres firms hope to gain economies of scale and better control over the training and work processes, in order to offer a high quality, cost-effective, and standardised service. Economies of scale can be further enhanced by outsourcing production to third party specialist firms.

Secondly, once face-to-face contact is replaced by telephone contact, and assuming the requisite telecommunications infrastructure is in place and that telecommunications service tariffs can be shown not to be prohibitive, the locational repertoire of teleservice firms is enhanced. The paper illustrates that in establishing call centres many firms will seek out locations, often in peripheral cities and regions, where production costs are relatively low, where labour is plentiful and of good quality, and then ‘export’ production over the wire to wealthier core markets. The locational flexibility of many teleservice functions is enhanced because of the nature of the skills required in the industry. Teleservices are not homogeneous, however, and some of the skills, such multi-lingual skills, required by some firms may not be present everywhere. Such factors will act as a constraint on the locational flexibility of some firms, as will cultural and regulatory factors.

The paper illustrates these points using three case studies of firms operating in the UK and Ireland.

PRICING FOR "AND-OR-NOT" THE INFORMATION

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SUMMARY

Society today is being exposed to two arguments, the Information Society on one side and the Information Superhighway on the other.

The way and speed by which the present society will evolve into an Information Society will depend on the ability of the four crucial elements in the equation to recognise the issues involved and implement the required changes.

The four elements can be identified as:

ONE. Institutions in the form of:

National governments
ECO
ECD
UNESCO
Etc.

which should identify the common denominators which represent the foundations for the evolution of an Information Society, agree on them and implement a set of programs that will lay these same foundations including the necessary pricing guidelines.

The institutions are the only ones capable of leading the changes and ensuring that the correct infrastructures are in place in order to create the necessary synergy for the market forces to do the rest.

TWO. Network service providers recognise that making available an Information Superhighway is not just a technical problem and that the current high level and complex pricing structures do not apply to an all digital environment. If they want to speed up the development of the multimedia market and the emerging potential that Virtual Reality premises then the historical pricing practices must disappear and new pricing concepts be introduced. Without the Network Services there is no Information Society as we have conceived it today.

THREE. Information Services providers, old and new, should consider that in a global marketplace they cannot continue with the limited vision of today with a vertical approach to services and user population and competing for them with other services. The market is big enough for co-operation as well as competition or to coin a new term CO-OPETITION. In the future the information services must be both retailers for the information delivered to their users and wholesalers of the information available on the servers connected to them and delivered to the users of other information services with whom they have a

distributed interconnection agreement. This being one of the fundamental principle underlying the EINS (European Information Network Services) concept.

FOUR. Information/content providers, such as information services, should not only think globally but how, from a single access point, they can make available their information to all users with a guarantee of royalties and IPR protection without having the added administrative/accounting overhead. They will also expect to have their content uniquely identified on a global basis by all the interconnected information services.

- Last but not least, **the user**, professional or consumer alike, will make great demands on the technology or what is being promised that the technology could do. He will expect it to be natural to be able to;
- Have a **single access** agreement;
- Receive a **single invoice** for all the information accessed;
- Have a **global access code** and be able to use this code globally using the nearest access point and still receive the accounts from the point where the original access agreement was signed;
- Have **access to all the information** on the networks.

The paper in its analysis of the elements that today make up the pricing structures for information and network services underlines the factors required to fulfil the dreams of an information society as promoted by the EC over the last 15 years, starting with the creation of EURONET. The urgent requirement is now not just for content creation but for integrating the developments made to date into an adequate information dissemination infrastructure meeting the criteria laid out in the paper and exploiting all the investments made by the EC, the private sector and the network providers leading to the establishment of tomorrow's Information Society.

Keywords

Information Society Network Services Access Content Provider EC OECD Tübitak Bilten Economics Workshop Pricing Charging Digital Analogue Consumer Multimedia Virtual Reality Public Private Online User Professional Highway Superhighway EINS

Abstracts

The Information Society requires adequate Network Services to become a reality, in addition the pricing structure at all level of the information dissemination chain must be carefully developed as this more than anything else will affect the speed of its becoming a reality. The paper examines the current realities and structures and points the way forward in pricing for a digital network environment.

**IMPACTS of NETWORKING on
SMALL and MEDIUM ENTERPRISES (SMEs)
and EURO INFO CENTRE NETWORK**

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SUMMARY

The main focus of this study is on the impacts of networking on Small and Medium Enterprises (SMEs). Recent revolutionary changes in information technology (IT) have become an important basis for the internationalisation of SMEs and globalisation of business relations. SME networks at any level (LAN or WAN) have various effects like creation of a global market place with an open and non-discriminatory exchange of information.

Another effect of networking in addition to being a tool for increasing the productivity of a firm, is provision of an overall improved environment. Moreover, it presents a marketplace where barriers of distance, time and geographical borders do not exist.

The Networking on a global scale; with electronic firm matching, electronic trading, EDI systems, Internet facilities and ISDN applications, hence creates an economy.

All of these effects and impacts of networking are the policy implications of some acts, measures and initiatives to be taken at a governmental or inter-governmental level. Establishment of a regulatory framework (such as; protection of intellectual property rights, market liberalisation, standardisation, interoperability, privacy, security and protection of information, media ownership) is one of the necessary actions which should be considered as the result of policy implications of networking.

ACCESS RULES AND PRODUCT DIVERSITY IN NETWORK ACCESS

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Summary

It is generally admitted that access to the network constitutes an essential element of the development of competition in network industries. Networks, or parts of them, are commonly considered as natural monopolies and hence regulated. Network companies supply services that are inputs of final products offered on a competitive market. Finding an adequate price for these inputs is considered of the essence if the final market is to operate efficiently.

Different approaches have been proposed to deal with access pricing. They differ by their underlying assumptions and recommendations and are sometimes reported, by economists themselves, to be complex to implement. The difficulty of choosing good, yet still implementable access pricing rules may have damaging consequences on the network liberalisation process. First, because there are several contending theories, there is a tendency to rely on a somewhat minimal concept of « cost orientation » for pricing network access. Second, because the notion of cost itself maybe a difficult one, a wide liberty can be left as to exactly which cost notion to apply. Because of these different degrees of simplification in the construction of access tariffs, it is reasonable to wonder whether departing from the more sophisticated access pricing methods may effectively be detrimental to the overall efficiency of the market. In a similar vein, one can wonder whether the efficiency of cost oriented prices may be significantly affected by the underlying cost concept used. These two questions are further complicated by the large number of products and services that these access rules may have to deal with in the information society. Will access be offered with the necessary diversity and with the adequate pricing? Can the cost orientation principle provide sufficient guidelines for a monopoly and its regulator to create the necessary variety of network services and to price them adequately? The paper discusses these questions along the following lines.

The different access pricing rules (marginal cost, fully distributed cost, Efficient Component Pricing and Ramsey Pricing) are first recalled together with related pricing principles (incremental and stand alone costs, price cap...). All rules are presented as composed of two elements namely a cost component and a mark-up. Their implementation through the appraisal of these two components is then discussed. In particular two different ways of computing these components are recalled namely the top down and the bottom up approaches. The former basically relies on cost accounting, the latter involves engineering models. The possible application of these approaches is investigated in relation to the computation of both the cost element and the mark-up.

Diversity of access services is introduced in two steps. One first distinguishes differentiation of access in terms of the equipment and functions that this access requires. The adaptation of the top down and bottom up approaches to accommodate service differentiation is then discussed. Basically accounting based methods will be of relatively limited use for constructing differentiated access pricing mechanisms. In contrast, engineering models can be extended provided one can find an adequate way to unbundle the services in elementary services.

A second type of product differentiation is introduced next. It deals with priority and reliability of network services. This new extension further complicates the problems of access pricing and ways to tackle this issue are examined. The same type of comments as before applies: accounting based methods cannot do much while engineering models can be extended at least to some extent.

These considerations lead to a wide variety of approaches for assessing access pricing. They range from the most complex to the simplest. It seems difficult on the basis of current evidence to make any judgements as to what constitutes acceptable simplification in access pricing. It is thus quite possible, but not at all established, that being practical can have devastating effects on the economic efficiency of access. In contrast, it is also possible that the application of the more sophisticated rules is an unnecessary luxury. The paper concludes by arguing that a meaningful action would be to assess the quality of access prices obtained by different rules and degrees of simplifications through a few case studies.

A CRITICAL SURVEY OF INTERNET PRICING PROPOSALS

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SUMMARY

We provide a critical survey of a number of proposals for pricing Internet transport services. As a benchmark for comparing these proposals, we begin with the theoretical ideal of optimal dynamic priority pricing. Our simulation modelling suggests that this approach may indeed be practical. Stepped-pricing is introduced as a simplified approximation to dynamic optimal pricing that might be much easier to implement in the near term. By making users face the approximate social cost of usage, it would provide much better incentives for efficient resource allocation than any other scheme such as flat-rate pricing. The two serious shortcomings of flat-rate pricing are its inability to discourage demand during times of congestion and to redirect demand away from congested servers. We also find that smart-market proposals have serious flaws both theoretical and practical.

The goal of public policy should be to promote the full realisation of the potential benefits of the network for the society as a whole. In a country where the entire network is owned and operated by a government entity, that entity could (and should) directly impose the best approximation to socially optimal pricing as is feasible. In countries with privatised networks, economists and network experts know very little about how the private market will perform, but it is unlikely that socially optimal pricing will prevail. To prevent a tragedy of the commons, a well-designed effective public policy such as regulation and/or taxation will be required. However, we strongly recommend simulation studies of alternative public policies before their implementation.

NETWORK SERVICE STRUCTURE AND PRICING

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SUMMARY

The realisation of the expectations that price will decline and service variety will improve in the current restructuring of telecommunications is complicated by the economic and institutional features of telecommunications, which is not now, nor is likely to soon become, a perfectly competitive industry. This paper examines the need for new approaches to regulation to assure that price competition does not become an instrument for creating dominant positions in network operation or service provision and to secure better outcomes in the emergence of new services.

There are important trade-offs between price competition and service provision which are shaped by the historical development of existing information and media services. These trade-offs and historical features suggest that there will be significant variety among nations, among the member states of the European Union, and even within nations, among regions in how new telecommunications services evolve.

Finally, there are important “framing” concepts in how performance in pricing and service availability are viewed by the public and policy makers. The two issues considered here are 1) the architecture of information services in relation to user equipment and interfaces, and 2) the definition of universal service. Neither of these areas is likely to be effectively addressed through market mechanisms, and alternatives are examined.

If the optimistic goals of OECD nations with regard to the “information society” are to be achieved, regulatory issues cannot be ignored for long. The likely outcomes from the new forms of competition engendered by the decisions to restructure telecommunications, the trade-offs between price competition and service provision, the inertia from past developments in information and media services, and the role of “framing” concepts in assessing performance of evolving telecommunication markets are key foundations for a new regulatory approach to telecommunications.

BIOGRAPHIES OF SPEAKERS AND CHAIRS

Vivian Bayar has worked as an Administrator on a range of issues related to information technology in the Directorate for Science, Technology and Industry at the OECD since 1987. Her responsibilities have included the creation and management of a database on internationally comparable statistics and indicators, the development of methodology for the compilation of these, the analysis of trends in the information technology industry as well as of the economic implications of legal policy in information and communications technologies.

Francisco Caballero Sanz was born in Albacete-Spain on September, 30th 1956. He got his Licenciado in Economics, from the University of Valencia in 1978 and Ms.A. in Economics from the University of Michigan in 1982. His main study fields were on Industrial Organisation (including the Economics of Regulation) and International Economics during his graduate education. He got his Doctor degree in economics with Honours and Special Distinction from University of Valencia in 1983 and Ph.D. in Economics from the University of Warwick in 1992. After being Professor of Economic Analysis at the University of Valencia, he is working as an economist in the Directorate General for Economic and Financial Affairs.

Costas Courcoubetis was born in Athens, Greece. He received his Diploma (1977) from the National Technical University of Athens, Greece, in Electrical and Mechanical Engineering, his M.S. (1980) and Ph.D (1982) from the University of California, Berkeley, in Electrical Engineering and Computer Science. He was a Research Assistant in ERL (Electronic Research Lab) in U.C. Berkeley, an AMTS (Associate Member of Technical Staff), Summer 1981, Bell Laboratories, an Adjunct Assistant Professor in the EE department, Columbia University, Visiting Lecturer at the EECS department, U. C. Berkeley, 1986, from 1982 until 1990 Member of the Technical Staff (MTS) in the Mathematical Sciences Research Centre, Bell Laboratories, Murray Hill, NJ, and since 1992 Associate Professor at the Computer Science department, University of Crete, Heraklion, Greece, and researcher at the Institute of Computer Science, FORTH. His interests are performance analysis of computer systems and high-speed (ATM) networks, network management, formal methods for the specification and verification of concurrent and real-time systems.

Ian Courtney currently acts as an independent advisor to Europe's largest management consultancy partnership on information and communication technology and economic development issues. He is also an external examiner at the Department of City and Regional Planning, University of Wales College, Cardiff. He has previously worked in higher education and as a corporate planner in both the private and public sectors. He has previously contributed to OECD conferences on the topic of network applications in the service sector and has published articles for a number of independent public policy think-tanks based in the U.K.

Chris Doyle is a Senior Research Fellow at the London Business School, attached to the newly established Regulation Initiative headed by Professor David Currie. Chris's interests lie in the field of applied microeconomics, particularly the areas of regulation and telecommunications. He has presented numerous papers at international conferences and has written widely on regulation. Recently he has been focusing on the issue of interconnection. He has undertaken consultancy for the OECD and the UK treasury on the topic of interconnection, and is currently working in liaison with Professor Mark Armstrong on further work in this area.

Alain Dumort joined the European Commission in 1991, Directorate "Telecommunications, Information market and exploitation of research". He has been involved in the preparation of strategy documents on the political and economic development and impacts of the information society and trans-European telecommunications networks. Since December 1995, Alain Dumort is responsible for the new sector "New technologies in education and training", reporting directly to the Director General on "Education, Training, Youth" on the development and uses of multimedia educational software. Alain Dumort has also specialised in the economic evaluation of transnational R&D and energy projects and programmes within the Commission. He read and taught economics at Grenoble University where he prepared a Doctorate in the economics of energy and a diploma in political sciences.

Mustafa Akan Fazlioglu, taken his B.S. degree from Industrial Engineering Department of METU in 1991, has started to work at KOSGEB in the same year. He is now serving as Responsible from the Section related to Information Services. He is experienced in Information Systems Analysis, Design and Planning. He has also concentrated on EU SME Support and Development Programs.

Timothy Fenoulhet was awarded a B.A. degree by London University with First Class Honours in French in 1990. In 1991, he obtained a post-graduate scholarship from the Economic and Social Research Council (ESRC) to study international economics and politics, with particular reference to the European Union, at the London School of Economics and Political Science. He was awarded a Master of Science (Economics) Degree in November 1992. Since completing his studies at the LSE, Mr Fenoulhet has had over two years' experience at the European Commission. Since October 1993 he has been attached to DG XIII's unit for economic and strategic aspects (a horizontal unit in the immediate staff of the Director General). In his work for DG XIII, Mr Fenoulhet has been responsible for providing briefing notes on economic, political and strategic aspects of telecommunications in support of the Commission's policy on advanced communications, trans-European networks and the *Information Society*. As part of the activities of the economic and strategic unit, Mr Fenoulhet has also participated actively in the European Commission-OECD joint reflections on the socio-economic impacts of information infrastructures.

Georges Ferné is French. His training was in Law and Political Science. He has been with OECD since the late 1960s, working on a number of science and technology related questions, including Information Technology Development Policies, University/Industry Research Policies, Social Sciences Policy, etc. Duties involved in particular the preparation and subsequent publication of numerous studies on national science policies and various other aspects of science and technology policies. Recent work has addressed questions relating to the economics of standardisation in information and communications technologies. He has also conducted a series of case studies on the impacts of information technologies on employment. He is currently involved in policy analysis of the implications of the emergence of the Global Information Society. Georges Ferné is the Executive Secretary of the International Council for Science Policy Studies (ICSPPS), a body under the aegis of ICSU.

Mr. Christian Garric is Advisor of the Director General of the Directorate General "Telecommunications, Information Market and Exploitation of Research" in the European Commission. He was born in 1931 and has a degree in Physics. Having entered the European Community in 1961, he was first of all, until 1970, responsible for projects in the nuclear domain (EURATOM). He then transferred to the Directorate General for Industrial Affairs, where he has successively held responsibility for divisions charged with industrial policy in the transport domain, then for Community policy in informatics and microelectronics. From 1983 to 1993, he was head of unit for the "Telecommunications Market and Network Equipment" in the Directorate General "Telecommunications, Information Industries and Innovation".

Fred Gault is the Director of the Services, Science and Technology Division at Statistics Canada and is responsible for the collection and publication of statistics on telecommunications, broadcasting, leisure and personal services, accommodation and food services and non-financial business services. He is also responsible for Canadian statistics on science and technology and has worked extensively on the measurement of technological change. He is a Vice-Chairman of the OECD Committee of National Experts on Science and Technology Indicators (NESTI). He holds a Ph.D in mathematical physics and a B.Sc.(Econ) from the University of London.

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Laurent Gille is an economist and CEO of the French telecommunications consultancy, Sirius. During his 16 years of experience in technico-economic, financial and strategic studies in the telecommunications field, he has developed original approaches to the evolution of markets and industry structures and has extensively explored the growing interdependence of telecom and socio-economic networks, while proposing strategies for the industry. He is particularly recognised for research in the transformation of transactional mechanisms and in electronic commerce. Author of numerous articles on these themes, Laurent Gille conceived and continues to develop Stratlas, the strategic telecommunications atlas. Laurent Gille was graduated from the Ecole Nationale de la Statistique et de l'Administration Economique (ENSAE, 1974). He began his career as a research assistant in the French Ministry of Transportation and later joined Air France. He was Head of the Economics Department and Scientific Director of IDATE for 10 years before founding Sirius.

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