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Tenth Meeting of the

Voorburg Group on Service Statistics

Voorburg

11 - 15 September 1995

Session 8

Expected changes in Services Statistics: a look into the "Crystal Ball"

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Foreword

Predicting the future has always been a speculative activity even in the sciences. Nevertheless this paper is an attempt to analyse the future changes in the services economy, trying to assess their impact on statistics.

In the next two decades, scientists are promising spectacular changes. Are our systems able to follow and report on these changes? Not for the moment, because the means we have today are not adapted for following such rapid changes. We hope and strongly believe that Information Technologies will give statisticians the "information energy" to take up this challenge.

Written during holiday period our "look into the crystal ball" is really just a mere glance.

We hope that the Voorburg Group discussion will help us to consolidate our view.

Acknowledgements

Several authors helped us in scanning the future. They are referred to in annex.

Very short but fruitful discussions with some colleagues stimulated our work. They certainly have no responsibility for the speculative approach taken here.

We wish to thank particularly Ms. Benassi, Messrs. Albert, Depoutot, Gerardi, Jutte, Ludley, Roques and Wurm and especially Ms. Vançon for the excellent and patient typing of an ever-changing paper.

Expected Changes in Services Statistics: a look into the "Crystal Ball"

by Photis Nanopoulos and Marco Lancetti

"We are living through a transformation that will rearrange the politics and economics of the coming century. There will be no national products or technologies, no national corporations, no industries."

Robert B. Reich

Abstract

Services economy, like any activity based on information is at the heart of the big-bang of the Information Technologies (IT) and will be subject to tremendous modifications in the near future. The actors, the means and the purposes will be heavily modified. This will affect considerably the ways and means of services provisions, their market structure and competition.

Focusing on services changes and their impact on statistics needs to be placed in a broader context that will take into consideration information technology changes and their impact on the statistical systems.

Increasing capacities in the storage, treatment and analysis of data and their dissemination will give to the statisticians the opportunity to better serve users' needs: more, faster, better.

This evolution will have important consequences for official statistical systems allowing optimists to dream of "a golden era of official statistics" but at the same time it reveals important threats coming from competition from the private sector.

Services at present are lacking a comprehensive economic theory for their analysis. Nevertheless the emerging trends of some services characteristics can guide our analysis of expected changes

From the SNA and other sources we have elements to continue gradually building a comprehensive statistical system capable in the future of following the expected changes in the services economy.

Several interrelated multidimensional approaches have to be followed to cover a services economy that becomes more and more flexible and virtual.

Increased standardisation of administrative sources and registers will give to the statisticians the information energy necessary to answer user's requirements.

Statisticians have to find a new role by handling information concepts and values with flexibility and adaptability. They have to be able to find the necessary investment by better understanding the cost of statistical actions. Knowledge of the information market will be essential to survive.

I. INTRODUCTION

At its 10th meeting, the Voorburg Group on Services Statistics reacting to ongoing concerns, is devoting a session to interrogate the "crystal ball" on likely changes on the services economy, related technologies and their impact on statistics.

Predicting the future has always been a speculative activity even in the sciences. In our case, dependence on the rapidly changing technological context is two fold since, it changes both means and the subject matter. Therefore speaking about future changes in a perspective longer than ten years is hazardous and may look more like a science fiction novel.

Nevertheless this paper is an attempt to analyse the future changes in services and trying to assess their impact on statistics.

Services economy as any activity based on information is at the heart of the big-bang of the Information Technologies and will be subject to tremendous modifications in the near future. The actors, the means and the purposes will be heavily modified. This will affect considerably the ways and means of services provisions, their market structure and competition.

Changes in Information Technologies are not only deeply affecting the services economy but also the statistical system and more generally, the profession of Official Statisticians.

Focusing on services changes and their impact on statistics needs then to be placed in a broader context that will take into consideration information technology changes and their impact on the statistical system.

II. INFORMATION TECHNOLOGIES CHANGES, THEIR IMPACT ON THE STATISTICAL SYSTEM[1]

1. Technological trends

Certainly technological evolution is the motor of all kinds of changes in our world, as it allows the reorganisation of the economy, the remodelling of social relations and the way of living of citizens. The Big-Bang of IT has started and we are witnessing the first seconds of an explosion which will create a new universe on earth, an "Information" planet.

As can be observed in the latest report of the European Information Technology Observatory (see [8]) several technologies have now reached the stage where their application will deeply change our lives. Computers have grown so powerful and cost-effective that they can be found in a huge number of human activities all over the world.

In the US, President Clinton has launched a large programme to create the "information super-highways" that should bring the United States fully into the information age. The National Information Infrastructure (NII) is in three parts:

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1 Some of the expectations described in this chapter are taken from Photis Nanopoulos ' Expected Changes in record Keeping" [19].

- the "information super-highways" initiative aiming at connecting ministries, public agencies, business, universities, hospitals, libraries and schools;

- the High Performance Computing and Networking (HPCN) programme for the development of new applications in major social fields such as health, education, traffic, management and control;

- a programme for the modernisation of public administrations and public access to information.

Similar actions are being undertaken in Europe with the launch of three types of networks:

- trans-European networks between administrations;

- a European Integrated Services Digital Network (ISDN) devised as the successor to the telephone network

- broad band telecommunications networks to meet emerging requirements and pave the way to future telecommunications service networks

In Japan, the efforts in the IT field over the last decade is continuing through the new programme for Japan's economic recovery, where several measures are planned to promote the use of IT in major social fields and in ministries and other public services.

Information Technology evolution

The ways in which IT technologies will influence enterprises activities are manifold and they will have direct and indirect impacts. The main aspects that will most influence them are:

- Super computers

- Telecommunications

- Information Management Systems

Super Computers

The super computers available today in experimental laboratory forms will be the tools of record keeping of tomorrow. High clock speeds of more than 400 MHz and peak speeds of 6 gigaflops (10^9-floating point operations per second) with parallel processors will be able to handle and manipulate objects of high enough complexity to cover the majority of demanding statistical uses.

Multi-tasking operating systems like Windows 95, Unix and OS/2 offer access to remote, shared resources such as printers and databases. Once plugged into the emerging 'information highways,' the desktop computer becomes a 'window' on the IT world ([17]).

Current research in semi-conductors, like alloys of silicon and germanium, ([16]), can form the basis of exceptionally high speed transistors.

The computers of the 21st century will come in a variety of sizes, forms, and specialisations, and will be deployed in huge numbers. After the conventional portables are coming "personal digital assistants", and further ahead, computers which will act like intelligent sheets of paper spread on our tables

Wall-sized displays will serve a number of purposes: video screens for home use, bulletin boards, white boards. The active badge will be a computer communicating radio and provide to the wearer a number of services: automatically opening doors, automatic telephone forwarding, and computer displays customised to each person reading them.

Telecommunications

The key technologies for the developments in telecommunications are high-speed networks, cordless systems and satellites.

The wireless component of the global net will bear some resemblance to a cellular telephone network. Computers carried in trucks, ships or briefcases will be able to maintain connections and send and receive data wherever they go. Local Area Networks and Wide Area Networks will respond to the needs of service and functionality for the users. The Global Networks will allow for the communication of all kinds of information at low costs. Collection and dissemination of data will be done in a few seconds around the world. In this context it is important that communication costs fall in order to reach a full exploitation of the systems.

Information Management Intelligent Systems

In a continuous and interactive way, data structures and users needs have evolved together From simple flat files managed with general purpose programming languages, technology went to the more sophisticated structures used by relational and object oriented data bases, spread sheets and hypertext which are managed with specialised software such as Data Base Management systems; word processors and hypertexts generators; and in the last twenty years artificial intelligence languages like LISP and PROLOG and the development of expert systems for knowledge manipulation.

The emerging new infrastructure promises to open the door to many new applications. Intelligent agent software which can scan a network of databases, full-motion video, which can bring TV to the desktop computer, and neural networks which can unravel complex data input, promise to extend the boundaries of IT.

Some difficulties

While the new infrastructure makes many novel applications possible, it also creates a new set of problems. Distributing computer power is not enough. IT must also distribute functionality. This demands different approaches to building IT systems and the software which makes them work. Most important of all, IT systems must be tied closely to business needs. "Two features are essential to the development of the infrastructure needed by the information society: one is a seamless interconnection of networks and the other that the services and applications which build on them should be able to work together (inter-operability)." ([18] p.13).

2. *Possibilities in terms of collection and dissemination*

Data collection

Currently data collection is facing three problems: administrative costs, response burden, ethic attitudes. Certainly IT technologies offer potential solutions to these problems, but those solutions cannot be achieved without prior investment at the NSI and at the providers levels. The providers are not going to invest in IT just to be able to respond to statistical demands. Statistical response will be a by-product of the computerisation of companies and households for their own existing needs. We believe that within the next ten years all firms, including even the smallest ones, will have reached an appropriate level of computerisation and networking so that they will be able to provide and receive statistical information and meta-information at low cost. For this to happen we have to pave the technological and conceptual way between business information systems and statistical information systems. This is the objective of the SERT-BISE project of Eurostat. A project under development for the use of telematics for exchanging (statistical) data between firms and administrations (SERT = Statistique d'Entreprises et Réseaux Télématiques, BISE = Base d'Information Statistique de l'Entreprise).

Communicating with tens or hundreds of thousands of providers through networks is the new challenge for the NSI. This needs standards, rules, equipment, and knowledge which in other words means methodology, legislation, investment, and training. Several EU countries have already taken initiatives in data collection with EDI techniques. A recent study from Eurostat ([12]) done within the SERT project has reported on many of these initiatives (EDISTAT in Germany, EDIFIEE in France, etc.) taken by NSIs, often in co-operation with business associations, showing that statisticians are working towards the tools of tomorrow for data collection.

The Intrastat paradigm

An example of an important change in well established statistical systems which took place recently in Europe is the case of Intrastat. After the realisation of the single market, trade statistics between the twelve member states were no longer collected by means of customs declarations. Reporting is now done directly to the NSI by the firms. In order to facilitate the task for the firms, EDI techniques have been developed for filling the forms and transmitting the results electronically, either directly or on diskette. Thus the overall burden to the information provider has been reduced whilst still collecting adequate information on intra EC trade.

Enterprise statistical system

Integration of the various information systems will be the future way for all companies, small and large, giving them the same opportunities for effective communication and management. This will be achieved only if there is an inter-operability of systems. The first step in that direction is the harmonisation of the basic concepts used at enterprise level. "The business economist and others concerned about the quality of government data should work with accountants, controllers, and others in the company to make sure that

the internal data are in order and that government forms submitted provide an accurate picture and a sound estimate of the information being requested ([2] p.42).

Harmonisation of administrative or business concepts

The tendency in administrations is to create from scratch internal information systems coping with the specific needs of the administration. This is due to the differences of the nature of the information needed and from the costs of transforming existing information. Typically those systems are not accessible to other administrations.

New technology is an opportunity to change this situation because it has the capacity to introduce sufficient harmonisation of concepts at a low level to give the possibility of all kinds of aggregations. The more elementary the information is, the most useful it will be.

This implies that statisticians have to be present in all the international committees that are dealing with the harmonisation of administrative or business concepts in order to insure compatibility with statistical purposes.

Communication standards for statistics have been developed in the recent years within the Message Development Group 6 of the Western European EDIFACT Board (WE/EB MD6). More has to be done for the world-wide harmonisation of the concept used within the information systems. This is the role of the many international agencies, organisations and associations, dealing directly or indirectly with the contents of records kept by the various actors.

Data dissemination

It will be possible to disseminate statistics to a much wider audience in the future, as networks will directly connect users and producers. Entering the era of global networks by the end of this century, our market will be the whole world. Offering toll-free access to our product catalogues, we should be able to receive orders and prepare specialised customer oriented products.

Eurostat is at present evaluating the feasibility of making available some of its data bases via Internet and the World Wide Web.

3. *The evolution of ethics*

Threats to privacy from technologies

Most of the times a person is interacting with his exterior world, his act is recorded. Telephone calls, ticket reservations, tax payments, are examples of individual information normally stored in computers. Purchasing of goods and services with electronic cards allows for the recording of individual information, with very strong implications for privacy. Theoretically the very same technological achievements that allows for the IT revolution are becoming a threat to the privacy of persons and companies. Super computers supplied with good algorithms can find a weak password in a few seconds. Networks may allow access to various data bases and thus link together dispersed information about an individual. Thus some

intruder can link the various records to obtain an overall picture on a person's life unless we adopt strong and rigorous safeguards.

The legislation

People are more and more concerned about such problems, and legislators are establishing rules on data protection that affect attitudes and procedures. Most countries are moving towards a more and more severe legislation on privacy rights. The European Union is on the point of adopting a special directive in this field. The Council of Europe is preparing a recommendation more specific to statistical record keeping. It seems that the activity of data protectors are in conflict with the needs of the normal users and of an informed society. The ethics debate on the nature of the public information and the balance between the needs of society for individual information and the rights of the individual for privacy, will be a central one in the " Information Societies" .

Confidentiality of information / Cryptography

A crucial problem with the management of statistics and communicating through networks is the security and the protection of the confidentiality of information. Access to the data has to be carefully controlled and the usage of passwords improved. Unfortunately password protection has many weaknesses, in part because they are often not chosen well (identification by guessing is easy) and in part because passwords are carried without special protection across the network and thus may be observed by those technically equipped to do so. One possible solution for this is cryptography, which has been developed extensively for military communications, and where several techniques can be used for an electronic signature.

Fortunately IT is not only a threat to privacy. It is also a precious aid for protecting privacy, and researchers are making substantial progress in this domain. Technology is moving towards almost sure (with probability one) protection in both areas: accessing the data and protecting the data.

Effects on statistics

There is a danger that data protection legislation may have negative effects on statistical activities because it will give less access to the primary sources, fewer possibilities in archiving and accessing archives, and fewer possibilities for data dissemination. It may make difficult the access to administrative sources. This danger has been foreseen by the DGINS of the EU countries which have proposed a special community regulation on the transmission of confidential data from the NSI to Eurostat, and they are following closely the legislative work on the EU level.

4. Research and Development in Statistics

Up to now official statisticians have had, with only a few exceptions, a passive attitude towards R&D activities in spite of the fact that they are intensive users of all kinds of technological developments. In Europe, with the second European Community R&D programme, Eurostat took the initiative to propose the DOSES (Development of Statistical Expert Systems) programme.

In the recently adopted Fourth Framework Programme, research activities on statistics now collectively referred to as DOSIS, will be carried out within the following subjects:

Information and Communication Technology

In this domain the objective is the development of integrated statistical environments for meeting user's needs particularly through the active use of metadata systems, tools to manage distributed statistical systems, tools for knowledge extraction, high performance data analysis, and finally tools related to statistical confidentiality, data distribution and data representation.

Telematic applications of common interest

The objectives are telematics for Distributed Statistical Information Services, Telematic networks between National Statistical Institutes and survey companies and Geographic Information Systems (GIS).

Environment and Transport

Use of new technological possibilities to create statistical systems in these two application areas.

Statistical research activities, by stimulating international co-operative research, should contribute to improving the quality of statistical information, which means among others, comprehensive coverage, high reliability, accuracy (precision and unbiasedness), timeliness (up-to-date), and comparability. They should also promote the accessibility and use of the statistical information.

Finally, research activities should provide scientific and technical support for the implementation of the statistical programme.

III. SERVICES ECONOMY CHANGES AND THEIR IMPACT ON THE STATISTICAL SYSTEM

A. Services at present

1. Growing attention to Services in the eighties

In the beginning of the eighties the perception that the industrial world was undergoing a profound transformation that was sometimes labelled the "third industrial revolution" or the beginning of the "information society", led economists, politicians and statisticians to pay more attention to services.

Sentences as

"Industrial countries are more and more dominated by the provision and consumption of services" [1];

"the transformation of our old world of agriculture and manufacturing towards services is changing what we produce and how we produce it; the economic and social implications of these changes will be fundamental" [1],

became very popular.

The attention paid by the politicians to the subject led to the inclusion of the International Trade on Services in the Uruguay Round. The General Agreement on Trade in Services (GATS) is now part of the World Trade Agreement managed by the WTO-OMC.

The White Paper on the completion of the European internal market contained, out of a total of nearly 300 measures, about 50 pertaining to services.

Whereas the internal market programme can be regarded as a decisive step towards the free movement of goods inside the European Union, it must be recognised that for services there is still some way to go. The White Paper that led to the introduction of the European internal market in January 1993, concerns primarily financial services, transportation, telecommunication and professional services. Work on other service areas is currently going on.

Following the interest of economists and politicians in the middle of the eighties, statisticians started work on services.

The Voorburg Group was established in January 1987, after an initiative by Statistics Canada and the United Nations Statistical Office (UNSO). This initiative came in response to the observation that service statistics were less developed than statistics on other economic fields, although services contributed already over half of the Gross Domestic Product in many countries. The first session of the Group was hosted by the Statistical Bureau of the Netherlands (CBS), in Voorburg, which gave the Group its name.

A document on statistics on services for the Conference of the Directors General of the national statistical institutes, held in Palmela (Portugal) in May 1986, started the work on statistics on services at Eurostat. Since then it has been known as the "Palmela document".

2. *What are services ?*

Wolfgang Ochel and Manfred Wegner in a report for the Commission of the European Communities written in 1987, in introducing their study on the role of services in economic growth, state : "our considerations are not based on a complete and consistent theory of the role of services in economic growth; such a theory does not exist" [1].

The analysis of the role of services in the economy began in the nineteenth century with the development theory of economic stages by the German historical school (List). It does not seem necessary in this paper to take up the debate concerning different theories and concepts elaborated by economists since then, but to note with Ochel and Wegner, that, "notwithstanding the many requirements of the different analysis of services economy, there are serious doubts whether a general and consistent theory of structural change exists which is able to explain the massive shifts towards services and the many inter-relations in the process of economic development."

We think this notation is still valid. A general accepted theory explaining the role of the different service sectors in economic growth does not emerge either by looking into the crystal ball.

Moreover there are no clear answers to the questions :

- What are services ?
- What are the general characteristics allowing a clear-cut definition of services and their separation from goods ?

- What are the distinct services industry sectors ?

Economists, politicians and statisticians are following "pragmatic" approaches that vary according contest and time.

During its first meeting, the Voorburg group examined the Services definitions proposed by Hill [2]. Services were defined "as a change in the condition of a person, or of a good belonging to some economic unit, with the prior agreement of the former person or economic unit". The participants to the meeting did not reach any global operational conclusions.

It was noted that Hill's definition is not immune to criticism. "For example, it has been argued that services devoted to prevent change (such as security services and preventive medicine) are not properly captured by this definition. For other services (e.g., insurance policies) the link between provision and the change in the condition of the consumer is not easy to establish. And unless one introduces the concept of a social contract, non-market services (such as national defence and the provision of law and order) do not seem to qualify, since the condition of "voluntariness" in the transaction between consumer and producer is not satisfied" [3].

The debate has been resumed by Martini [5], who has pointed out that "Services are consumed simultaneously with the production and they imply on extensive producer-consumer relationship. They are based on dialogue: they are "dialogical".

We are still very far from a comprehensive definition of services. Economic and statistical researches are more oriented to investigating services characteristics by exclusion, than in trying to define them.

Some of Peter Hill definitions have now been introduced into the new release of SNA published in 1993. Let us examine them.

3. Services in the SNA-93

The SNA-93 defines Services first by exclusion: "Services are not separate entities over which ownership rights can be established. They cannot be treated separately from their production" [4] Secondly by pointing out some of their characteristics: "Services are heterogeneous outputs produced to order and typically consist of changes in the conditions of the consuming units realised by the activities of producers at the demand of the consumers. By the time their production is completed they must have been provided to the consumers".

From this definition we can underline:

- Services are produced to order: they are "dialogical".
- They change the condition of the consuming units: Services are "demand oriented",
- Services are heterogeneous. They are characterised by numerous industry sectors of different structure and behaviour.

The SNA confines the production of services "to activities that are capable of being carried out by one unit for the benefit of another. Otherwise, service industries could not develop and there could be no markets for services".

The reference to service industries markets is then completed in the SNA: "it is also possible for a unit to produce a service for its own consumption provided that the type of activity is such that it could have been carried out by another unit".

A last characteristic pointed out by the SNA-93, is that "there is a group of industries generally classified as service industries that produce outputs that have many of the characteristics of goods [...]. The outputs of these industries, over which ownership rights may be established, are often stored in physical objects - paper, tapes, disks, etc. - that can be treated like ordinary goods".

We would like to note that as soon as a characteristic by exclusion is introduced into the definition: "services are not separate entities over which ownership rights can be established", we are obliged to have an exception: on output of some service industries ownership rights may be established.

SNA points out that there are different markets for services.

Own consumption can be carried out by another unit, this reminds us the need to pay attention to subcontracting and privatisation.

Services are intangible but some of them can be stored on physical object.

As we have seen, some elements in the SNA-93 can guide our work, but we are far from a comprehensive theory to refer at.

4. Services infancy

In spite of the work done by economists and statisticians in the last ten years, the study of services economy and the associated statistical system are still in their infancy with a lot of difficulties in producing quality information.

Official statistics lagged behind the economic and organisational reality in this field, and there is a great danger that the gap is going to increase as the "services structures" are subject to rapid evolution.

The coming "information society" is going to need more information on information.

Certainly the tools at our disposal today, such as activity and product nomenclatures or registers and statistical units, are not adequate for investigating services phenomena because they have been forged to serve national purposes in a manufacture based economy.

B. Some elements to start

As we have seen, services at present are lacking a comprehensive economic theory for their analysis. Some authors are working on services economy, others prefer to analyse different service economics.

The statistical system, of course, is facing similar difficulties.

Nevertheless the emerging trends of some characteristics can guide our analysis of expected changes.

1. Services are "dialogical"

As defined by Prof. Martini in the paper presented to the eighth meeting of the Voorburg Group, Oslo, 1993 [5], and as indicated by SNA-93, unlike goods, services are not the result of an activity of transformation but essentially consist of one unit acting on behalf of another.

The productivity of goods is seen from a technical standpoint as a process transformation thing (mass and/or energy) by things (manpower or machines) and from an economic perspective as the "transformation of merchandise by merchandise" (Sraffa).

The cycle of goods produced/consumed (offered/demanded, sold/purchased), that begins from "new materials" and finishes by "consumption" (final), make up the principle theme of economic thoughts.

This schema adopted for the activity of production of goods, is not appropriate to the production of services. The productive process of the service cannot be described as a casual and linear chain of means and ends, of input and output, essentially for not having any real output, excepted for services that can be stored in objects. There is no object (planed, produced, demanded, or used) at the core of a service, but a desire that is yet without form.

Hence, this cannot be defined in terms of a scarcity of a non-existent object, but must be considered in its indeterminate form of reason to act.

This is defined and specified through the interaction and dialogue of the client and the agent (service provider)

As explained by Martini and by several other Eurostat contributions to the Voorburg Group, focusing on the dialogical aspects of services production leads to the use of metaclassifications:

- to link in a coherent way the different international classifications of activities, products, functions, transactions etc. allowing to overcome present difficulties. As classifications are dinosaurs, difficult to change and obsolete by the time they have been agreed. A rapidly changing word need much faster adaptation of classifications;
- to collect and analyse data in a more flexible and less costly way by automatic classification techniques constructed directly from the information available on unit in administrative sources and registers;
- to classify enterprises listed in statistical register. The activities, (principal or secondary) and products may be exposed under items that, while respecting the language of enterprises, avoid pitfall of over- and under-extension, and therefore, enable the problems of defining the field of observation to be kept to a minimum. For register and administrative sources, metaclassifications may also be used for the textual analysis of their open declarations, carried out, ultimately, with expert systems.

2. Services are demand oriented

From what we have seen from the previous paragraph, it becomes very clearly that the services analysis can not ignore the demand aspect and its inter-relation with production. The SNA defines "the changes that consumers of services engage the producers to bring about, can take a variety of different forms - in particular:

- changes in the condition of the consumer' goods,
- changes in the physical condition of persons,
- changes in the mental condition of persons,
- changes in the general economic state of the institutional unit itself".

This typology combined with the differences between services produced for own, intermediate and final consumption, will permit the extension of the current analyses of service consumption, to examine the inter-relation between production and use of services in a better way.

Contrary to the case of goods, for which the distinction between acquisition and use is of analytical importance, in the case of services according to the SNA, this distinction is not relevant in a practical sense.

3. Services produced for own consumption/ancillary activities

After having made the distinction between principal, secondary and ancillary activities, the SNA is trying to give more precision to the concept of an ancillary activity by listing the kinds of activities that may be ancillary.

Conscious that this list is far from exhaustive and faced to the difficulties to define the borderlines between secondary and ancillary activities, the SNA recognises that "in some cases an enterprise may have a choice between engaging in ancillary activities which provide supporting services for its principal or secondary activities or purchasing such a service on the market from specialist service producers".

Vice versa: "an ancillary activity may grow to the point where it has the capacity to provide services outside the enterprise. For example, a computer processing unit may develop in-house capabilities for which there is an outside demand. When an activity starts to provide services to outsiders, that part which produces output for sale has to be treated as secondary rather than ancillary."

The SNA continues by recognising the difficulties of obtaining information about the role of ancillary activities in the economy system, "as the existence of ancillary activities is not explicitly recognised in the System".

"This may be regarded as a serious disadvantage for certain purposes such as analysing the impact of "information technology" on productivity when the processing and communication of information are typical ancillary activities.

However, it would be difficult and costly to obtain detailed information about the entire range of ancillary activities undertaken with producer units [.....]. However, for some types of analysis it may be useful and necessary to estimate and record these activities separately into satellite accounts."

We think that in spite of the difficulties recalled by the SNA, statisticians if they do not want to be left behind the economic and organisational reality, have to find solutions to this problem by establishing adequate methodologies of statistical analysis based on the assumption that the expected changes in statistical record keeping could reduce the response burden to a sustainable one.

4. Services are being carried out by one unit

As we have already indicated in § A.3, the SNA confines the production of services "to activities that are capable of being carried out by one unit for the benefit of another. Otherwise, service industries could not develop and there could be no markets for services."

Normally the unit on which European statisticians are basing their statistics is the enterprise. We have already seen, in the previous paragraph, how ancillary services can be purchased on the market from specialist service producers or, vice versa, as an ancillary activity may grow to the point that it has the capacity to provide service outside the enterprise.

The enterprise, which is at present at the core of our analysis and therefore of our statistics, more and more becomes a "virtual" concept characterised by mobile borderlines.

The Big-Bang of Information Technologies described here above, will push the enterprise to a state of continuous change of its components in the need to face competition by adapting to fast changing new conditions.

Flexibility of structures and pertinent information for immediate decision making are weapons for not loosing the battle.

5. Virtual enterprise

[Virtual: it disposes of all the capabilities to be real, to be virtually able to ....].

It does not seem necessary in this paper to give an exhaustive description of a virtual enterprise but to recall some of the trends that will change the enterprise from "real" to "virtual".

As described above, the technological changes leading to global networks will make possible the communication of all kinds of information at low costs.

This "information energy" will permit a growing development of tele-work (or distance work).

It is clear that distance work does not necessary mean a geographical de-localisation of the work. We can simply note that, because of the availability of information energy, distance will be no more a limit. Remove this constraint will be an opportunity to re-optimise the enterprises interests.

The observed recent trends to a growing externalisation of services, result not only from the use of information technologies, but also from the opportunity for enterprises to:

- better manage their fixed costs for high salaries,
- limit problem of hiring and managing personnel,
- re-balance the ratio between productivity and costs, which is very often more favourable in the case of subcontracting then in the case of temporary work,
- enlarge the choice otherwise restricted by required services not being readily available in the right quantities in-house or on local markets.

The information energy is not the only reason of externalisation, but it is a powerful means which catalyses the trend of the enterprise towards higher productivity.

This trend will change deeply the ways and means of working, the employment market, the office structures.

Enterprises will become smaller in term of direct employment, they will be linked in a knowledge oriented network of communication toward a particular objective. Changes in the objective will rapidly change the type of the work, the functioning and the number of partners in the network.

In the information society a virtual enterprise will be formed by a network of sub-units oriented to achieving a particular objective.

Information will be a strategic resource for business probably as important as capital and material and supplies.

Economic assets (tangible and intangible) of a virtual enterprise will be very difficult to measure. How to evaluate "information assets" will become a main issue. In evaluating information and economic assets, statisticians should work in close contact with accountants to use the same concepts at enterprise level.

Know-how sharing will increase the economic relevance of franchising.

Temporary objectives and tax regimes will push leasing to grow.

Employment will be characterised by greater mobility, contemporary presence of different part time work done by the same person.

Present shift from blue to white collars employment, encouraged also by the introduction of robotics (another aspects of the big-bang of information technology), will continue towards an after-white collars employment. A new type of employee will emerge: half subordinate worker, half self employed: he/she will be an active partner in a fast changing network of information: the virtual enterprise. Employees will be their own entrepreneurs. Labour legislation, policies, economics and statistical methodology will have to be adapted to this new situation.

6. *Globalisation/Subcontracting*

"Technological and economic progress are inseparably interdependent. By sharply reducing the costs of transport and communication, technology also creates the condition for internationalisation, the process in which economies are becoming increasingly interdependent" (Scanning the future [ref.1] in chap. II).

Globalisation is the new term for expressing the geographical extension of economic action, organisation of production, and market competition.

The globalisation of the economy and the new organisation of business at world level, the European single market, NAFTA, GATS are transforming the structures of enterprises and relation between them.

Externalisation of services production will be less and less limited by space. Production is not anymore a national concept.

Swissair bookkeeping of aviation services is done in Bombay. At Castleisland, in Ireland, the American Insurance company "New York life" manages all its internal and external procedures. Real or virtual enterprises are not anymore limited by national boundaries.

Globalisation has an impact on statistics at different level:

- Methodology and concepts (a national reference framework is still valid?)
- in practice (how to collect data?)
- analytical (what is the pertinent analyses of results?)

In analysing "national" production should we add production of overseas subsidiaries of domestic resident enterprises and, vice versa, subtract the one of foreign subsidiaries in the domestic territory, as proposed by Statistics Canada [8]?

What about off-shore centres ?

What nationality is given to a service network with participation of different partners from different countries?

When ancillary services, as we have seen in the previous examples, are spread all around the world, will national statistical unit have still a meaning? How do we analyse these units without placing them in the larger context of their inter-relation with foreign units?

On-going development of International transactions in Services statistics based on Balance of payments, needs to be complemented by the study of international group behaviour, activities of foreign-controlled firms, intra-national enterprise trade, international subcontracting and other type of international agreements: joint venture, franchising licensing etc.

It is not the scope of this note to describe all the problems of globalisation, but to note the importance of this aspect in analysing the expected changes in services statistics. Conscious of this importance, Eurostat is preparing a document for the next meeting of the general-director of NSI to be held in September 1995, calling their attention on the subject and proposing a working plan which takes into consideration budget constraints and need to minimise the response burden.

7. *Market/non-market services*

In analysing the services economy, the attention of economists, politicians and statisticians has focus on service industry sectors characterised by a majority production of market services.

This priority approach has led to pay less attention to the analysis of services for individuals and communities.

Services as social security, education, health and social work, activities of membership organisation, recreation, cultural and sporting activities, other services to individuals and the community, can not be neglected any longer because of their economic and social status. They represent a third of the total employment of services.

The study of these service industry sectors needs to enlarge the investigation from pure enterprise statistics to include private non-profit institutions (which produces both market and non-market services) and public administrations.

The production of the household sector is also important in certain areas.

Statisticians will have to redefine concepts, methodologies and classifications necessary to merge market and non-market service analysis and cross referencing of different institutional sectors.

Statistical tools such as administrative sources and registers should be enlarged to cover not only business units, but also similar units in public administrations.

Because of policy information requirements, already today some elements of this analysis are urgently needed by information users.

The EU Commission White Paper on "Growth, Competitiveness, Employment" underlines the role of non-profit institutions in job creating [9].

The role of cultural services in social cohesion, the one of "sewage and refuse disposal activities" in preserving the environment, are examples of service industry sectors for which a priority approach might be necessary.

Other important reason for not postponing the study of services provided to persons and institutions is the growing privatisation of public services by administrations. This privatisation uses the form of subcontracting out services previously produced by the public administration, or the creation of new independent units exposed to the market competition. These units will tend to diversify their production to other market services.

Government fixed price policies will be replaced by free market policies with subsidies to consumers in unfavourable conditions, for example, telephone in remote location, difficult water supply etc

8. Services can be provided through physical objects/service markets/infrastructures

SNA points out that in spite of their intangible character some services can be provided via physical object that can be treated like ordinary goods: paper, tapes, disks, etc.

Also the provision of services needs appropriate infrastructures and/or of tools Rail road network, locomotives, tv broadcasting stations, tv sets, etc.

Service markets can also have a physical infrastructure: general stores, stock exchanges etc. or a virtual infrastructure: Internet or a Minitel network, remote email system, we could measure the volume of traffic in the lines, the number of points of sales, number of operators etc.

Our efforts to capture the service economy on its intangible and virtual aspects need to be complemented by a type of statistics based on physical and/or function indicators.

9. Services are heterogeneous / service industry sectors

As we have already seen, some economists are studying the services economy, as a global one, others by sector.

Services are very diversified and heterogeneous in many respects: in their relation to persons, goods, location, forms and conditions of production and their demand factors.

The heterogeneous nature of services is recognised by the SNA that defines services to be "heterogeneous outputs produced to order".

Searching for common characteristics among services, alternative classifications are used. Katouzian, for example, has proposed grouping services as new, complementary on old services [10].

Browing and Singelmann have suggested grouping services as distributive, producer on social and personal services [11].

Services have also been classified according to their technological content.

As shown in § B.1 and B.2, we could use activities, products and the service consumption classifications to examine the interrelation between production and use of services.

As shown in § B.1, the use of metaclassification and expert system techniques could open new possibilities for services classification.

In spite of our efforts for a global approach, a complete typology of services will always show that service industry sectors are many and characterised by different conditions of production and market structures.

As already indicated in the Palmela document in 1986: "in view of the wide range and variety of sectors, the statistical system should comprise two approaches:

- a global approach for general, flexible and rapid information;
- a specific approach by high priority area, for specific detailed information" [12].

Since the Palmela conference, the combination of these two approaches has been followed by Eurostat. The present EU statistical programme and draft statistical legislation follow these two approaches.

We do not see in any foreseeable future reasons to change.

10. Inter-related multi-dimensional approaches

As we have seen throughout this paper, at present we are far from a general agreed comprehensive definition of services. Nevertheless the lack of consensus should not be a deterrent for empirical analysis.

From the SNA and other sources, we have elements to continue gradually building a Comprehensive Statistical System, capable in the future of following the expected changes in services.

This system has to follow inter-related multi-dimensional approaches based on pre-existing statistical systems, by adapting them in a progressively but substantial way to respond to the present growing and ever changing information requirements.

In a period of deep transformation, using existing statistical systems as the reference could be considered to impose unnecessary limitations, slowing down our actions.

On the contrary, if not constrained by no-trespassing signs, the growing information energy at our disposal will cause the system to side-slip, like a grand prix car without brakes.

The line between flexibility and cacophony is very narrow.

IV. TOWARD A COMPREHENSIVE SERVICES STATISTICAL SYSTEM

A. The Statistical System

1. Several combined approaches

As we have seen in § B.9, in view of the number and heterogeneous nature of service industry sectors, the statistical system should comprise two types of approaches: global and sector-specific.

Global and sectorial approaches will be applied to all the other dimensions of the system, for example we will follow an enterprise supply side global approach, complemented by sectorial approaches to distributive trade, financial services etc., a global and sectorial approaches to services products, to employment and so on.

Global approaches will use statistical methods which are common to other statistical systems and which are used more generally at the macro-economic level, in particular in the framework of national accounts.

Linking the different approaches to a comprehensive system such as the SNA, will prevent risk of cacophony. On the other side possibilities offered by analysis of satellite accounts of the SNA, should allow for the moment, the flexibility requested by the changing aspects of services economy.

The use of satellite accounts will give the necessary feedback for more frequent revision of SNA; a system that we think, in spite of its 1993 revision, is still too close to a model developed for national purposes in a manufacture based economy.

In going from the macro level to meso and micro levels we can use several approaches based on existing statistical systems:

- services supply
- services products / demand
- services employment
- services function, physical and location indicators

Development of these approaches will be increasingly based on administrative sources and registers, made available by the standardisation induced by the information society.

2. *Services supply*

Enterprise based statistics are at present at the core of the measure of services supply.

As we have seen in the previous chapter this approach must change substantially to cover the whole range of services supply.

Industry sectors characterised by the production both of market and non-market services need to enlarge their investigation from pure enterprise statistics to include private non-profit institutions and public administrations.

Referencing of different institutional sectors at a meso/micro level need to include statistical units for the public sectors similar to the ones used in enterprise statistics.

Concepts, methodologies and classifications will need to be redefined to merge market and non-market analyses.

As described in the previous chapters, we must also redefine the basic concept of an enterprise.

Contrary to a manufacture based economy, in an Information Society, it will be difficult not explicitly recognise the role of what at present are defined as ancillary services.

To day economic determinants are based on objective elements. In a fast changing services economy, they will be more and more based on subjective elements (anticipations). Taking into consideration anticipation will be a great challenge for statisticians.

Information on enterprises financing is already a main issue. In the future, the quantification of risk taking and its relation with investment and R&D will have also to be studied.

The growing externalisation and de-localisation of parts of an enterprise, the globalisation of activities at world level and all the other aspects that we have indicated as virtual enterprises, require recasting the hierarchical concept of group/enterprise/KAU/local units/establishment. This revision should introduce some intermediate concepts to better merge geographical and nationality analysis.

Methodology to compare virtual enterprises in various industry sectors, at different locations and time has to be established.

Methods of aggregation of different virtual enterprises at meso level needs to be defined.

In general, the continuous change and replacement of enterprise components described in § B.5, requires more dynamic concepts then the present ones to capture the accelerated trends of future economies.

Similarities that could be found between modelling of energy network engineering and enterprises networking could help our research of more dynamic systems.

3. Services products / demand

Following the supply side approach and trying to subdivide sales by products will not give a complete picture of services production.

Services products are not necessarily produced only by service industries, goods producing sectors also frequently provide services in their industrial operations and sell them to consumers as a separate service or (more often) packaged together with goods.

It is evident that present systems of services products statistics need to be enlarged to cover the whole range of industry sectors.

This system should cover production and cross-border transaction on services. As indicated in the previous paragraph, direct international transactions on services will be studied through the merging into the system geographical and nationality analysis.

Information necessary to manage agreements on international transactions in services will then be available by combining supply and product approaches.

As indicated in § B.1 and B.2, because of the dialogical nature of services, in establishing a statistical system on services production, we can not ignore the demand aspects and its inter-relation with production.

Contrary to the case of manufactured goods, quality information on services production require establishing own, intermediate and final consumption statistics to complement the supply side approach.

Of course at present it is difficult and costly to obtain information about the entire range of services consumption. We expect that the growing information energy coming from IT will reduce the cost and response burden to a sustainable one, particularly where statistics can be collected as a by-product of the service. At present, some limited pilot studies could begin testing the feasibility of the approach.

The study of products quality and prices measures and related classifications needs to be speeded up.

4. Services employment

As described in § B.5, a new type of employee is emerging: half subordinate worker, half self employed. Employees will be their own entrepreneurs.

The observed trend of enterprises becoming smaller in term of direct employment, will reach the limit in one-person entrepreneur enterprises.

The employee could then be consider the smallest unit on which to build enterprise statistics.

In the 21st century statistical system, the supply and employment approaches will merge in a comprehensive single system based on multiple, network activities based on individual persons.

Employment qualification analyses will be vital.

5. *Services function, physical and location indicators*

As indicated in § B.7, our efforts to capture service economy on its intangible and virtual aspects can and have to be complemented by a type of statistics based on physical and/or function indicators.

This type of statistics comprises:

- physical object holding services that can be treated like ordinary goods,
- physical or virtual market infrastructures,
- single location economic activities: fair, exhibitions, shopping centre, cultural centre, entertainment park, museum etc.

Sectorial statistics on Tourism, Transport, Communication, Audio-visual, Distributive Trade etc. covering function, physical and location indicators are already available. Introduction of IT should help in enlarging and consolidating the data. For example, EDI techniques are already being tested for capturing physical movements of ships in the EU ports.

6. *Administrative sources and registers*

Administrative sources and registers are fundamental tools for record keeping as they identify the units concerned: they follow their evolution, they allow checking of their relation with the collector and they allow linkage of information among different producers and collectors.

New technologies will improve the availability and quality of administrative sources and registers, as their updating will no longer be a problem, even for very small enterprises and employee/owner entrepreneurs that are the difficult units to capture.

The global approach for establishing a main enterprise register (to be enlarged to cover private non-profit institutions and public administrations units, see § A.2) should be complemented by related specific registers for high priority areas.

The inter-relation of global and sector specific registers will improve the information coverage and quality of the whole system.

The Information Society can only function with a greater element of standardisation: EDI, business accounts bases on statutory bookkeeping to be implemented in larger and larger geographical area, laws relating to professions, stock exchanges and securities, banks and credits institutions, taxation, consumer prices etc.

Information Society will be achieved only if there is an inter-operability of systems.

A comprehensive services statistical system, able to satisfy future information requirements, can only come about through the ongoing efforts of standardisation in the business and in the administrative sectors.

This system will have then two main pillars: the SNA for concepts and definitions and standardisation derived from international accounting and administrative planning for companies, persons and administrations.

V. CHALLENGES FOR THE OFFICIAL STATISTICAL SYSTEM

A new role

The evolution foreseen in the previous chapters will have important consequences for official statistical systems as they indicate the possibilities for important developments, allowing optimists to dream of a "golden era of official statistics". At the same time they reveal important threats that permit pessimists to ring alarm bells for official statistics. It is true though, that most of the foreseen changes are major challenges to the statisticians, who will in the future have to fight to remain relevant..

On this new data market, the role of the statistician must change. He will need to continue checking the validity of the data, transcoding it and making sense out of it. As the data will be made widely available, he will need to provide conceptual frameworks which will make it possible to integrate in a coherent way the existing pieces of information. He will be asked to judge the relevance of conclusions based on specific data, to balance evidence. His role will partly switch from a data collector, to an information extractor and maybe in some cases a referee. He will need to educate and to model.

Competition from the private sector

Probably in the future, the number of collectors/producers will increase, especially within the private sector which will compete with public collectors, will have to compete with them, as in many countries the attitude towards the statistical services is pushing them to work on a more competitive basis. This certainly is going to be a major challenge for many of the NSIs.

As information tends to be more and a more a market product, we will have to better define its value. The providers may ask for payment in order to give information.

Raw information will be like raw materials. The ones who can transform it into the best products will win in the market competition. Certainly after the full development of networks and standards, we will witness a proliferation of collectors and disseminators of information services. Being quick, fast, and pertinent will be the characteristics of the competition.

Handling information concepts and values. Flexibility - Adaptability

The existing data will serve different administrative or technical purposes. They will probably be exchanged and stored according to international and agreed standards. The content will be heterogeneous. However the need for concept harmonisation will rapidly appear and the statistical use, by linking these different sources, will make some type of harmonisation indispensable. Increasingly, the statistician will have his say in the design of information systems.

As information proliferates and is easily available to many users, the problems of harmonisation will be crucial, especially to those handling multinational sources. Although standardisation will be higher for the concepts belonging to the same information systems, e.g. exchange of information between *companies*, there is a danger that similar concepts in different systems will not coincide. In an extremely fast moving

world with an explosion of information concepts, harmonised statistics will become an essential reference framework.

Certain statisticians argue that as structures are changing so rapidly, there is no point in trying to follow an ever changing system. We believe they are wrong in the sense that our professional objective is to reflect the evolution of the society, and thus if socio-economic systems are changing, statistical systems must change correspondingly. Think of the future revolution in information services. In the next two decades, scientists are promising spectacular changes. Are our systems able to follow and report on these changes? Not for the moment, because the means we have today are not adapted for following such rapid changes. This has to do with the fact that most of the collection is done on paper questionnaires implying large resources for the collection and storage at the administration level and important burdens to the respondents etc, etc. We hope and strongly believe that technology is going to solve these current problems and in the future we will be able to work differently.

Be able to find the necessary investment

As technologies keep changing so rapidly, investment will be needed to follow them up and to remain competitive with the private sector, which certainly will move into statistics activity with new ambitions and more flexible financial constraints. Will NSIs have to move into market competition? This is very plausible, unless a change in the political climate continues to insure exclusivity of official sources. In any case the challenge for NSIs will be to convince their public authorities that they have to make the new investments needed in the next five to ten years by proving the advantages of doing so on the basis of cost-benefit analysis.

In order to succeed in this accounting operation we have to understand better the cost of a statistical action. Costs to the administration for creating and maintaining the system, costs to the respondents for providing the information, collection costs, etc.

Anticipation of the future needs and estimation of the costs in alternative situations will also be additional elements in their evaluations.

Total Quality Management systems are used to assess the production process, the final products quality and related costs.

These systems are already in use in some NSI more open to private competition.

Quality assessment is an important part of Eurostat corporate plan.

Follow-up of users' needs

As competition grows and the users' needs become more diverse, knowledge of the market will be essential for surviving. This will impose pressure within the NSI to devote more resources to the investigation of the market and the follow-up of user needs. Productivity will push towards activities offering maximum use. For example, data collection on production and trade of products together with production and consumption prices, may serve, through sufficiently detailed nomenclatures, for market analysis.

Production of simply figures will not be enough to fulfil user's needs for information of complex structures mixing data with other "essential" information such as meta-data.

In order to be competitive we will have to use the statistical information for as many purposes as possible in relation to the demand. An illustrative example is "forecasting", a forbidden activity for official statistics, yet with a high demand.

VI. CONCLUSIONS

The technological trends, the evolution of ethics, the changes in the organisation of international systems will deeply modify the context of statisticians work. Changes in administrative, business and household's record keeping will influence the statistical record keeping, the date structures and methodology. Changes in the collection of data should reduce the response burden.

Increasing capacities in the storage, treatment and analysis of data and in their dissemination will give to the statisticians the opportunity to better serve users' needs for more, faster and better information.

This evolution will have important consequences for official statistical systems, allowing optimists to dream of "a golden era of official statistics" but at the same time allowing competition from the private sector to create significant threats.

Services at present are lacking of a comprehensive economic theory for their analysis.

Nevertheless the emerging trends of some services characteristics can guide our analysis of expected changes.

From the SNA and other sources we have elements to continue gradually building a comprehensive statistical system capable in the future of following the changes in the services economy.

Several interrelated multidimensional approaches have to be followed to cover a services economy that becomes more and more flexible and virtual.

Increased standardisation of administrative sources and registers will give to the statisticians the information energy necessary to answer user's requirements.

Statisticians have to find a new role by handling information concepts and values with flexibility and adaptability. They have to be able to find the necessary investment by better understanding the cost of statistical actions. Knowledge of the information market will be essential for surviving.

In the next two decades, scientists are promising spectacular changes. Are our systems able to follow and report on these changes? Not for the moment, because the means we have today are not adapted for following such rapid changes. We hope and strongly believe that Information Technologies will give statisticians the "information energy" to take up this challenge.

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