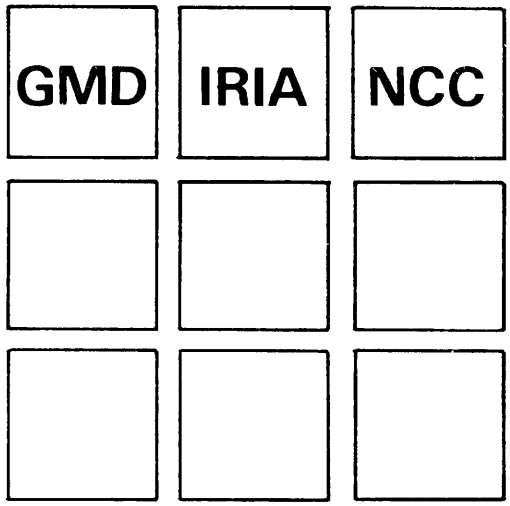


STUDY ON

DATA SECURITY AND CONFIDENTIALITY

FINAL REPORT

to the Commission for the European Communities

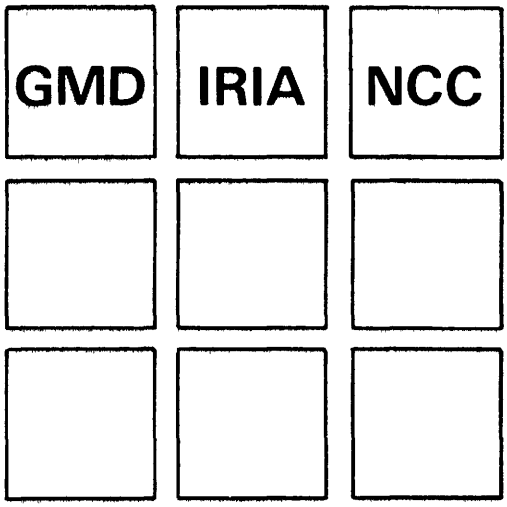
Volume 1 of 6

Section 0: Introduction

Section 1: Quality and quantity of transborder data flows

by J–P Chamoux
A Grissonnanche

JANUARY 1980



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Contents of all volumes

Contents of this section

0.1 Origin of this project

On 27 September 1977 the Council of Ministers of the Commission of the European Communities decided (decision number 77/616/EEC) to initiate three joint studies in informatics. The first of these, on data security and confidentiality, was described as follows:

> The main object of this study is to examine, in conjunction with the Committee of National Experts convened by the Commission, the chief problems relating to the harmonization of Community legislation covering the protection of private life and the development of codes of application and corresponding standards.
>
> The work will include analysis and classification of the problems and, in particular:
>
> - estimates of the quantitative and qualitative aspects of the movement of data across frontiers inside and outside the Community,
>
> - possible role of Community standards with a view to easier control of such movement, reduction of costs and opening of markets as a complement to effects of legislation - identification of priorities for the adoption of Community standards,

- preparatory studies with regard to cost estimates. Costs and possible distortion of competition which could ensue from different national legislations; costs resulting from Community harmonization; impact of costs borne by the public and private sectors and by individuals,

- identification of appropriate measures offering equivalent security at Community level,

- analysis of studies undertaken at national level in the Member States and other countries such as Sweden and the United States,

- analysis of problems relating to data security which could have an effect on confidentiality, legislation and standards, and a definition of the studies which should be carried out.

The continuation of work resulting from this analysis will be decided upon in the context of the multiannual programme.

Following this decision, three objectives were identified:

1. examining the need for harmonization of legislation, recommendations and standards on privacy;

2. improved control of computer data security including its technical feasibility and financial implications;

3. improved insight into the impact of privacy and security measures.

In view of these, six items were selected by the Steering Committee consisting of delegates from the three institutes (GMD, IRIA, NCC), in close consultation with the Committee of National Experts:

1. Quality and quantity of transborder data flow.

2. The character of the organization and the technical practice of Data Inspection Boards.

3. The natural person/other legal entity problem.

4. International economic aspects of data privacy regulation.

5. Technical aspects of the right of access.

6. Control, audit and enforcement of privacy requirements and their impact on security.

These items did not cover the whole area of the subject, but were considered to have priority because of their urgency, importance and general interest; the Council had foreseen that further work would be needed in the multiannual programme.

0.2 Motivation for the items in the study

The first item, on transborder data flows, is explicitly mentioned in the Council's decision. The possibility of frustration of data protection by processing personal data outside controlled areas, the distortion of competition which could result from this, and unease which had already been publicly expressed reinforce its topicality.

The second item, on data inspection boards, seeks to shed light on one aspect of data protection legislation which has been treated differently in different countries. Any attempt at harmonization of legislation will need to take into account not only the rules defining the powers and duties of such boards, but also their administrative practices.

The third item, on the natural/legal person question, relates to a topic which has been treated differently in the laws of different countries, and which has been the subject of international controversy.

The fourth item, on the cost aspect, is seen as an important practical matter about which further information is needed. In particular, the cost of complying with different, and possibly conflicting, national laws, and fears that international trade both inside and outside the EEC will be distorted by such differences, motivated the inclusion of this item.

The fifth item, on the right of access, relates to one of the central requirements of any data protection law. The possibility of efficient and economical satisfaction of this obligation, without prejudice to security and other aspects of data protection, and without undue interference in the legitimate work of the data user, is of interest to all involved in the subject.

The sixth item, on data protection inspection, is concerned with the problem of ensuring that data protection laws are observed; some measures in this area are considered necessary, and it is hoped that procedures can be defined which are useful in different countries and which will give confidence to the public that their interests are indeed safeguarded.

Although all three institutes bear responsibility for all six items, prime responsibility for each item was assigned to one institute as below, with the stated approximate manpower:

item 1	IRIA	3 manmonths
item 2	GMD	3 manmonths
item 3	IRIA	4 manmonths
item 4	GMD	6 manmonths
item 5	IRIA	4 manmonths
item 6	NCC	10 manmonths

The following are those who did most of the work in this study:

for GMD: H Burkert, E F M Hogrebe

for IRIA: F Bancilhon, J-P Chamoux, A Grissonnanche

for NCC: H H W Pitcher

This English version of the final report was produced at NCC.

0.3 Structure of this report

After this introduction, each item is treated separately in the corresponding sections numbered 1 to 6; the final section 7 describes the main features of the collaboration of the institutes in this work, and gives suggestions of topics deserving further study.

Pages are identified by main section number and serial number within main section. The sections and sub-sections are referred to by citing their number, e.g. 0.3 for the present sub-section.

The sources used in this study come from many lands in several languages, and it has not been possible to impose consistency throughout this report in the use of technical terms (data subject, operator, person, etc); when the precise meaning is needed (e.g. in interpreting a law), a definitive text should be consulted.

Contents of section 1

1 Quality and quantity of transborder data flows

1.0 Introduction

1.0.1 Aim

The aim of this first part of the study was to gather together information on the flow of data across the boundaries of countries, within the European Economic Community, between different member states, as well as between the Community itself and outside countries.

When this study began, the expression 'transborder data flow' (which we shall hereafter abbreviate to TBDF) was used only by a few experts, who had created this neologism to denote the whole spectrum of data which crosses national boundaries for the purpose of, data processing, or coming from such processing. The term 'data processing' should here be taken in the very broad sense of the French word, 'informatique' which is almost untranslatable: for instance, it includes not only the processing of data by the computer but also the acquisition of data to be input to the computer, the issue of micro film output from the computer, etc. But the concept that the expression covered was in itself very vague: neither the type of data crossing the boundaries, nor the media used, nor the quality and motives of the operators of these data flows were clearly visible. The aim of this study was specifically to throw some light on this question.

To this end, the technical annex of the Research Contract specified that three types of data should be collected:

1 Which media of transportation are used by TBDF.
2 What types of data are carried.
3 The relative importance of the different types of data which make up the flow.

The technical annex also specified that the study should strive to provide quantitative answers in response to these different questions.

The subject itself defined the most fitting way of conducting the study: initially, a survey to collect the raw information; secondly, analysis of the results to extract the essential elements.

1.0.2 Methodology of the survey

Following the course advocated in the technical annex, we have researched the media of transportation used by TBDF.

When the link is made directly between the transmitter or receiver and the computer, and medium used by the data is telecommunications: either by hired lines (private) or by the switched network (telephone), or just as well through the telex network. But when the data is recorded on a support medium data capture document, punched cards, computer listings, magnetic tape, discs or diskettes, etc., it is transmitted by post or by special delivery

service. Also it frequently happens that computer users or technicians themselves carry data when travelling (usually in the form of magnetic tape).

We shall see some examples of these different ways of transportation in the general presentation of TBDF in section 1.1. We shall return to this dichotomy between material and non-material data flow when we deal with the different criteria for classifying TBDF.

The survey should allow us to judge the relative importance of these different means of transportation, but its primary aim was to determine what data was thus transferred. It remained to define the way of going about the investigation. Four areas of research seemed possible:

- agents who transmit data, whether in a physical form (post and special delivery) or by a non-physical means (telecommunications).

- organisations who have the authority to exert control over the flows (Customs), or have trusteeship over a specific category of flow (scientific and technical data for instance).

- organisations or private businesses whose aim is to collect statistical information on facets of commerce, and on international exchanges in particular.

- Potential operators of these data flows themselves, that is to say any user of data doing business at international level, whether it concerns bureaux offering the use of internation data networks, or industrial businesses and financiers whose business extends to international commerce.

Of these four areas, only the last one has shown itself capable of shedding some light on our subject.

The survey has in fact established the following points:-

- It is impossible to discover the quality or the quantity of the flows of data across boundaries from analysing postal traffic or telecommunications, for two reasons:

  with regard to post, the confidentiality of correspondence forbids one from knowing its content,

  with regard to telecommunications, the carrier can only know of the existence of the fixed links or the timespan of a connection if the switched network is used, for the pricing of international communications in Europe is at present still based solely on the timespan and distance.

- The statistical information produced by customs organisations does not distinguish data exchanges (whether, by punched cards or magnetic tape), from computer materials.

- European countries do not produce comparable statistics of foreign business which can be linked to the concept of TBDF.

We shall have an opportunity to return in more detail to these comments later in this report, when the possible quantification of TBDF is discussed. For the present, we must point out that no global qualitative or quantitative information was available when we began this study on TBDF. Thus it was fitting to direct our survey towards the operators of these data flows themselves: public companies, multinational enterprises, holiday tour operators, etc. The trouble with this method of investigation is that, bearing in mind, on the one hand, our methods of working and the length of the task, and, on the other hand, of the diversity and multiplicity of potential operators of TBDF, there is no hope of gaining an extensive picture of the phenomenon. We decided therefore on a selective approach, concentrating on areas where TBDF is particularly significant, and on businesses where meaningful information could be obtained, taking care that our survey had an adequately broad geographical coverage on a European scale.

We wish to underline the fact that the collection of information from data flow operators presents a great difficulty, in our view caused by three main reasons, as follows:-

- the first is that the information that one intends to collect concerns very closely the heart of the business: its dealings, customers, products, organisation, the research it conducts, etc. Thus the data we were asking for was often considered confidential by those we interviewed who, in many cases, refused to give it to us, or demanded a written guarantee that we would treat the information in confidence.

- the second is that the Press, or rumour, has already made the existing or draft data protection laws reverberate in numerous European countries. The work of the Council of European and of OECD on the question have also been revealed to industrial circles.

  But this information was most often transmitted imperfectly, if not wrongly, and this usually produces in industrial circles a feeling of defiance stirs, made worse by ignorance. For this reason, the people we met were often not very inclined to supply information, as they feared what use it would be put to; on the contrary, they wanted to know what we could tell them on these questions.

- The third and final reason is that normally precise information details about foreign data exchange is not available in businesses, for numerous reasons: for example, the data flows are transmitted by

different and independent departments; in very large businesses it is sometimes difficult to get a complete list of even the departments concerned, for this would require a special internal survey; or it is difficult to distinguish between national and international data flows. We shall return to this point when considering the quantification of the data flows.

1.0.3 Analysis of the results

From information acquired on the spot, and thus sometimes fragmentary, our team has tried to build up a panoramic view of the current TBDF situation in Europe. This comprehensive view, and the proposed system of clarification, could clarify the debate on the problem of harmonization of European data protection laws. Moreover, this study constitutes an indispensible preliminary phase of a more detailed economic analysis.

The structure of section 1 of this report is therefore as follows. In section 1.1 we first discuss the different types of data flow, as they appeared to us during our survey: the differentiation we use is therefore essentially linked to the area of activity of the operators of these flows, but also in part to the nature of the data involved. Thus it is more a matter of presentation than of classification: for the distinction made between different data flows does not appear relevant to us from the point of view of the analysis, which, according to its objective, needs other

classifications. But this distinction allows a more rational, useful presentation for the first stage.

The aim of the second part (1.2) is to present the elements of a classification suitable for analysis of TBDF. We shall see that according to the aim of the analysis, the criteria of classification may be different.

Finally in 1.3 we present the problems of quantification of data flows, on which comments have already been made in this introduction. We explain why it was not possible within this study to quantify the results, and what problems must be solved in future to obtain quantitative information on TBDF.

1.1 TBDF: general presentation

1.1.0 Introduction

As the introduction has emphasised, the general presentation of TBDF, which is the object of this section, will be carried out using a classification which can be described as empirical. This classification is connected with the way in which the survey revealed the existing data flows: it follows closely the area of the data flow operator's activity, and, to a lesser extent, the nature of the data which is transmitted. As we have already stated, we need a suitable presentation for an overview of the whole; but it would not be a relevant classification. In 1.2 we see what can be said about a classification of TBDF which is suitable for analysis.

1.1.1 Computer networks

Among the many computing activities two give rise to international networks and therefore command our attention. These are batch processing (often bureau use, although this term can describe other services), and remote time-sharing.

1.1.1.1 Batch Processing

Batch processing meets a client's need, either for machine time, or for the use of certain programs, or, more often, both.

In itself, this is not international. The volumes of data input to and output from normal applications are usually substantial. Examples are a firm's payroll calculation, or its accounts. Very often the printouts are first produced at the premises of the bureau, since the cost of sending all the output, even a short distance, by telephone for printing at the client's property would be completely out of proportion with the cost of the service itself. Then the printouts are forwarded by the usual mechanisms: post, special delivery, courrier. Economics of seale, and the possibility of taking advantage of different working time zones throughout the world, can make such a system of working financially attractive. However, such a system is justified only for very special applications, or programs for which the potential market on the national scale is not sufficient to justify the use of the machine or the programs. Actually, most bureau applications are relatively ordinary, very often administrative system, for which the national, or even the regional, market is adequate.

During this survey, we have encountered only one business which has taken the risk of operating such a service internationally. This is a company of American origin, which has set up a computing centre in England, near London. This company then created a French subsidiary, with the aim of attacking the French market. This subsidiary in fact consists of an ordinary commercial branch, equipped with a terminal linked to the English

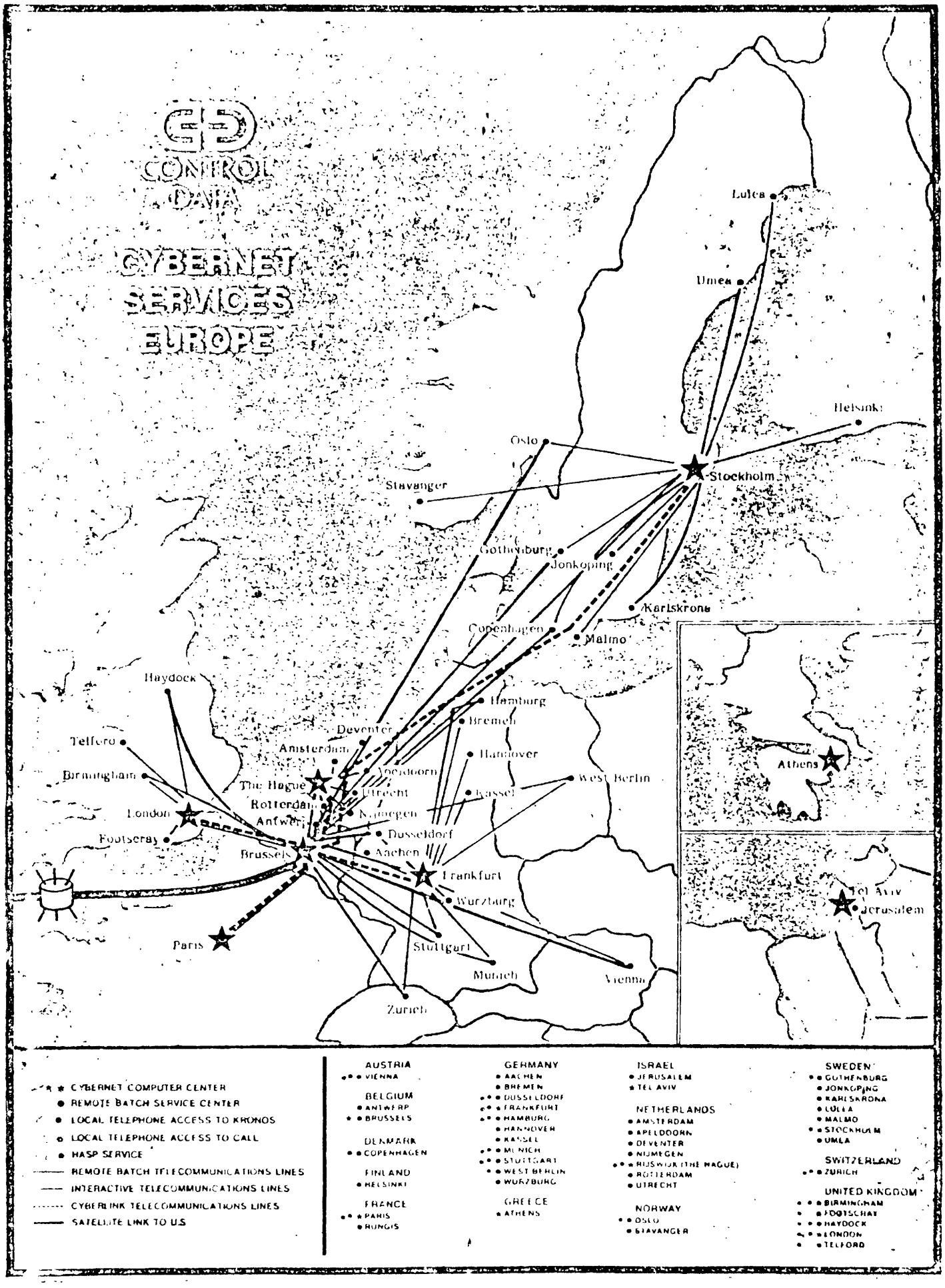
equipment by a special line. Then this company bought back the network of a German service company, which it then linked to its British centre. This network also covers Switzerland. Unlike the French branch, this network is concerned with the computing methods. To our knowledge, this company's power remains very isolated, and its growth during recent years tends to show that this type of activity is fated to remain on the fringe.

For completeness, we must mention here a special type of service that Control Data offers to its clients. In the majority of European countries (see the map on page), Control Data has a computer centre using batch processing. These different centres are linked by a network, CYBERNET, also consisting of a computer centre, which uses shared time, and is situated in Brussels. The batch processing is carried out in the country in which the customer works. But the clients who want to use both batch processing and time sharing, for updating files, for example, have the choice of transmitting all or part of their files from the national computer centre to the Brussels centre.

1.1.1.2 Timesharing networks

The use of computers on a timesharing basis meets two different types of need:

- a need for the use, at widely-spaced times, of a very great processing capacity, or of expensive software which does not justify the purchase of computing facilities or software (let alone both).


CONTROL DATA
CYBERNET SERVICES EUROPE
Luleå
Umeå
Helsinki
Oslo
Stockholm
Stavanger
Gothenburg
Jonkoping
Karlskrona
Copenhagen
Malmo
Haydock
Telford
Birmingham
London
Footscray
Amsterdam
Deventer
Apeldoorn
The Hague
Rotterdam
Antwerp
Utrecht
Nijmegen
Brussels
Hamburg
Bremen
Hannover
Kassel
West Berlin
Dusseldorf
Aachen
Frankfurt
Würzburg
Stuttgart
Munich
Vienna
Zurich
Paris
Athens
Tel Aviv
Jerusalem
CYBERNET COMPUTER CENTER
REMOTE BATCH SERVICE CENTER
LOCAL TELEPHONE ACCESS TO KRONOS
LOCAL TELEPHONE ACCESS TO CALL
HASP SERVICE
REMOTE BATCH TELECOMMUNICATIONS LINES
INTERACTIVE TELECOMMUNICATIONS LINES
CYBERLINK TELECOMMUNICATIONS LINES
SATELLITE LINK TO U.S.
AUSTRIA
VIENNA
BELGIUM
ANTWERP
BRUSSELS
DENMARK
COPENHAGEN
FINLAND
HELSINKI
FRANCE
PARIS
RUNGIS
GERMANY
AACHEN
BREMEN
DUSSELDORF
FRANKFURT
HAMBURG
HANNOVER
KASSEL
MUNICH
STUTTGART
WEST BERLIN
WURZBURG
GREECE
ATHENS
ISRAEL
JERUSALEM
TEL AVIV
NETHERLANDS
AMSTERDAM
APELDOORN
DEVENTER
NIJMEGEN
RIJSWIJK (THE HAGUE)
ROTTERDAM
UTRECHT
NORWAY
OSLO
STAVANGER
SWEDEN
GOTHENBURG
JONKOPING
KARLSKRONA
LULEA
MALMO
STOCKHOLM
UMEA
SWITZERLAND
ZURICH
UNITED KINGDOM
BIRMINGHAM
FOOTSCRAY
HAYDOCK
LONDON
TELFORD

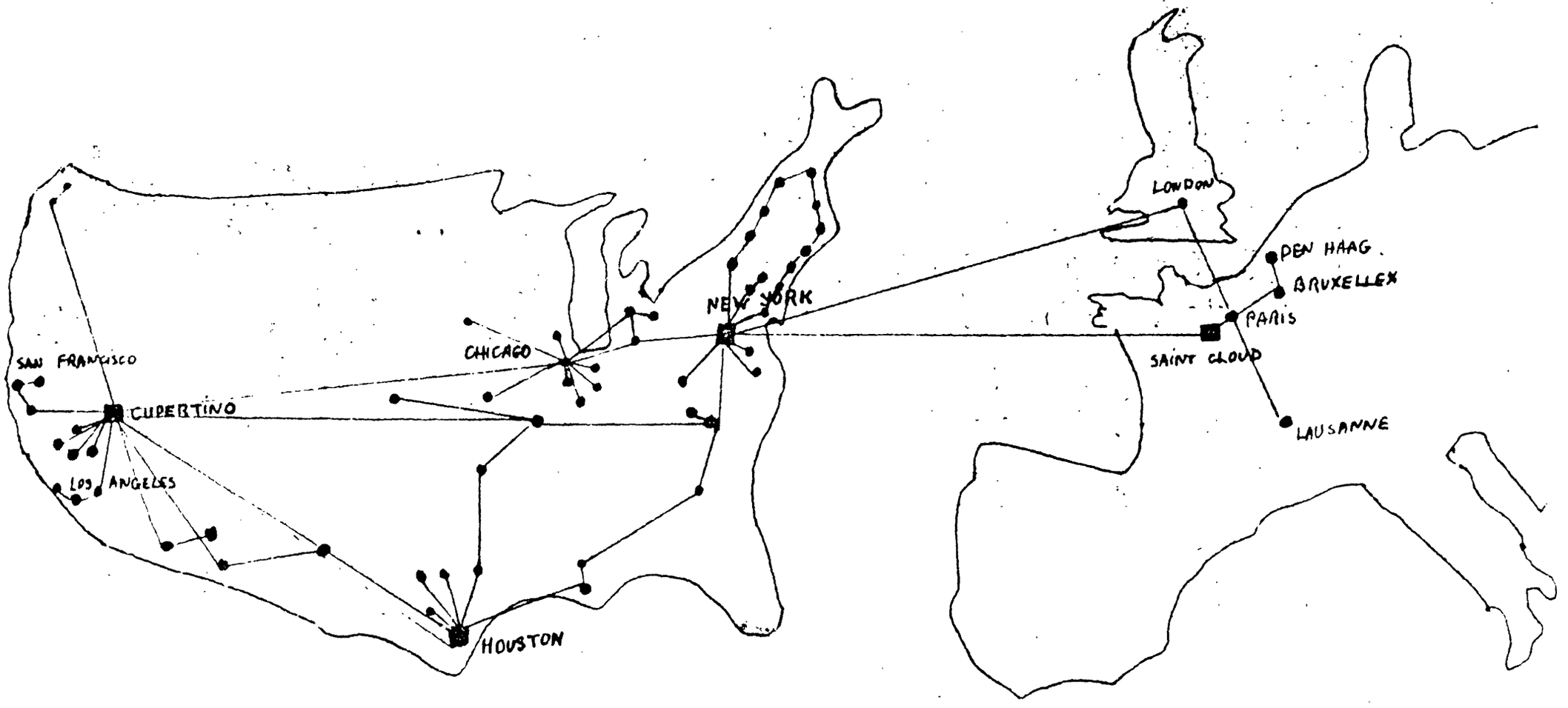
- a need to share either a single file or identical programs with widely spread users.

In each case, one sees that the fulfilling of such needs leads to a service which must be offered on an international level: if it is a metter of offering a large capacity of processing or the use of very expensive programs, the search for an adequate number of customers cannot be restricted to a national level, in Europe at least, because of the limited size of such a market. On the other hand, the expense of the use of telecommunications, even over a long distance, is not prohibitive for this type of application, compared to the income investment represented by such machines and programs.

In the case of a number of widely spread operators using the same machine, the international aspect goes without saying. Thus it is logical, from an economic point of view, for the great timesharing networks to operate on an international scale.

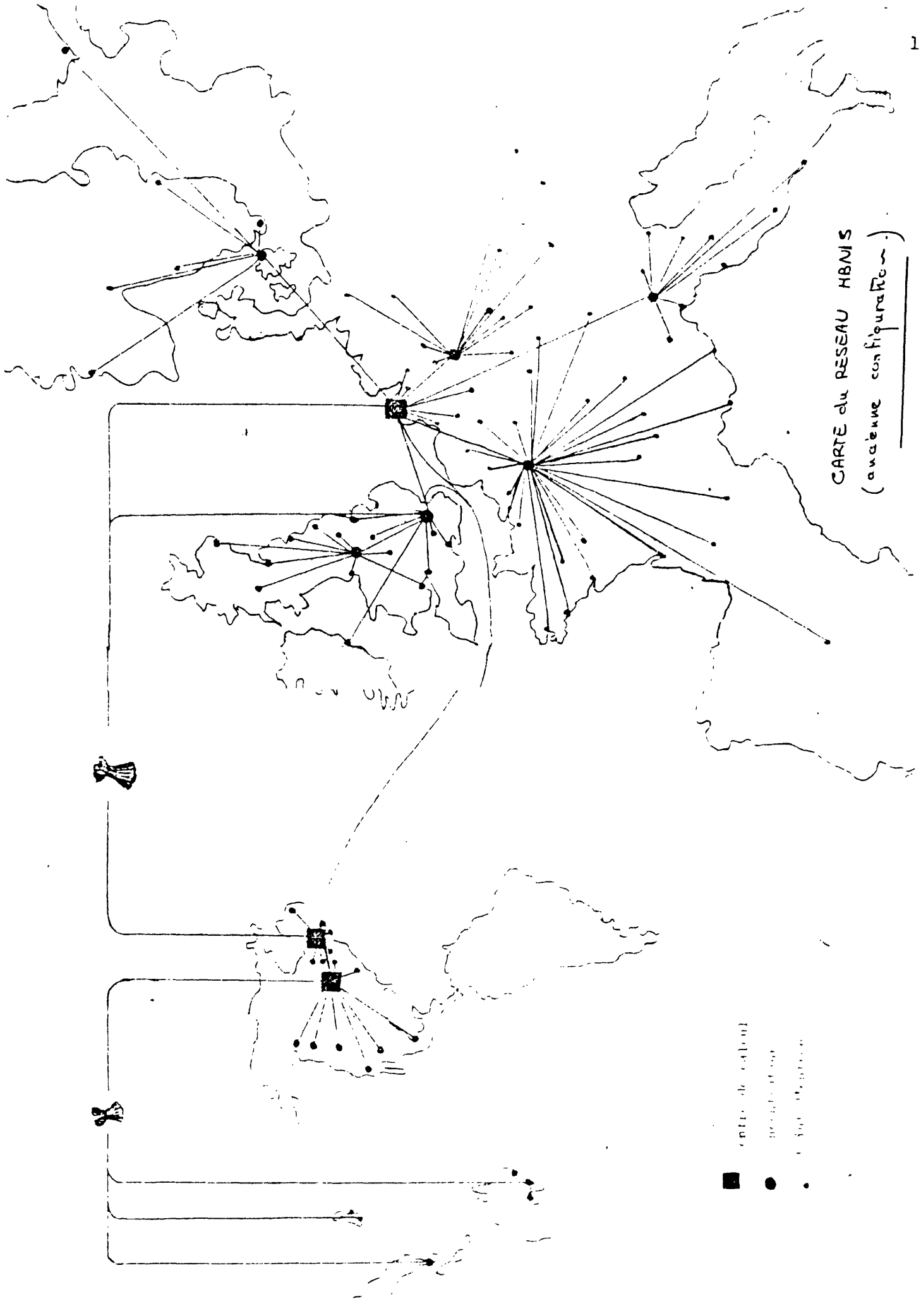
It is however interesting to note that it was in the United States that such networks appeared first, for reasons connected with the progress made in America in scientific, technological and business management fields; but also very likely it is because of the size of the national market, which, in itself, could bear such investment. The creation of the European networks has in general sprung from the inspiration of American companies

which have either intended to extend their market to European countries, and to do so without increasing their investment, thanks to different time zones; or to keep the clientele of multinational companies of American origin, by offering the service they require. The creation of European branches of these networks thus results, for a large part, from the setting up of American multinationals in Europe. In order to report back periodically to headquarters, for financial management, to carry out market research surveys, management and production studies, research and development, etc, companies neede to have available the same programs and the same files in Europe as the mother company in America. The extensions of these networks have been made either directly by the original company, or by the intervention of subsidiaries constructed sometimes after the buying back of a European computer bureau. Today one can name, among the most important networks: CYBERNET (Control Data), CEGI-TYMSHARE, CSS, GEISCO (General Electrics). Two examples of such networks are to be found on the following pages .
One should note that these networks have developed primarily in Europe from two places: London and Brussels. This location is probably linked to historical, legal and economic reasons: by tradition, London and Brussels were favourite location centres for the head offices of multinationals, and it is clear that the shared time companies sought to be near them; on the other hand, considerations such as language, geographical position, the cost of telecommunications, the ease of obtaining



CARTE DU RESEA CEGI-TYMSHARE

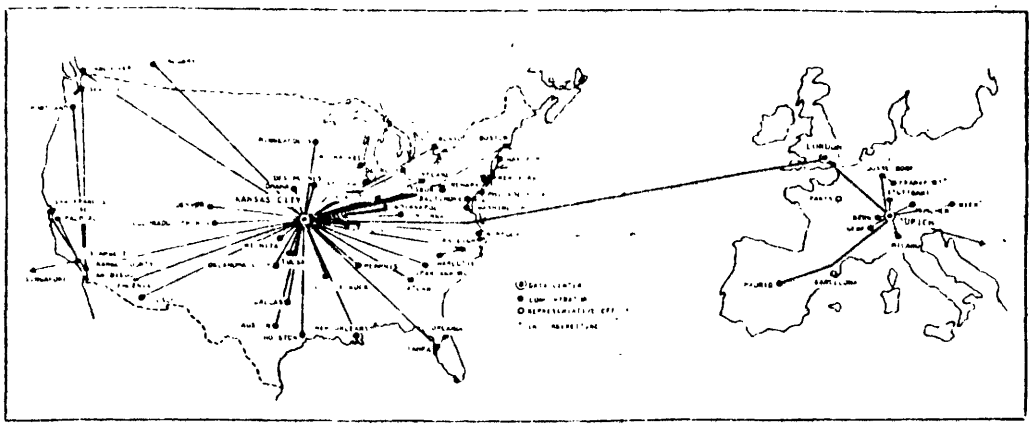
■ Centre d'ordinateurs
● Agence



CARTE du RÉSEAU HBNIS
(ancienne configuration)

connection lines and the quality of the telephone network, labour costs, conditions of purchase or hire of machines, the cost of credit, and even the price of offices have played some part in the choice of where to set up operations.

Thus, one can say that, up to the present time, data flows connected to the use of timesharing are, largely, operated across the Atlantic, and correspond to the use of machines situated in America. A recent notable happening is that today a completely opposite tendency is beginning. As the European extensions of the American networks have accompanied them, as we have said, the setting up of American multinationals in Europe, extensions of European networks are beginning to develop in USA, using for customers the multinationals of European origin. These networks are seeking, from the instant when their customers set foot on American soil, to develop North American companies, either by repurchase, or by agreement with American companies which already exist. For example we can consider the case of CISI, a company of French origin, whose network extends into England and into Belgium, and which, thanks to the repurchasing of an American company is in the process of extending its network into the United States. Another example is FIDES , whose network covers Switzerland, Germany, England, Italy, Spain, Austria, and soon France, and which by agreement with an American company, United Computing Systems, now is offering to America the same services as it carries out in Europe. It seems to us



LE RESEAU FIDES

that this occurrence is very significant: it shows clearly the logic of the economic system which led to development of the timesharing networks. It appeared to us to reveal an inclination towards restoration of balance, or, at least, towards a new geographical division which could, in the future, include the countries of the third world, who, at present, are a little left out of the timesharing industry.

1.1.2 Specialised networks

By the term 'specialised networks' we mean the computer networks which include a transmission service, and in most cases processing of data, working on an international scale, but within a single sector of business, to meet its specific need to exchange working information. These networks are characterised by their cooperative nature. Three networks of this type exist today, which we are going to look at:

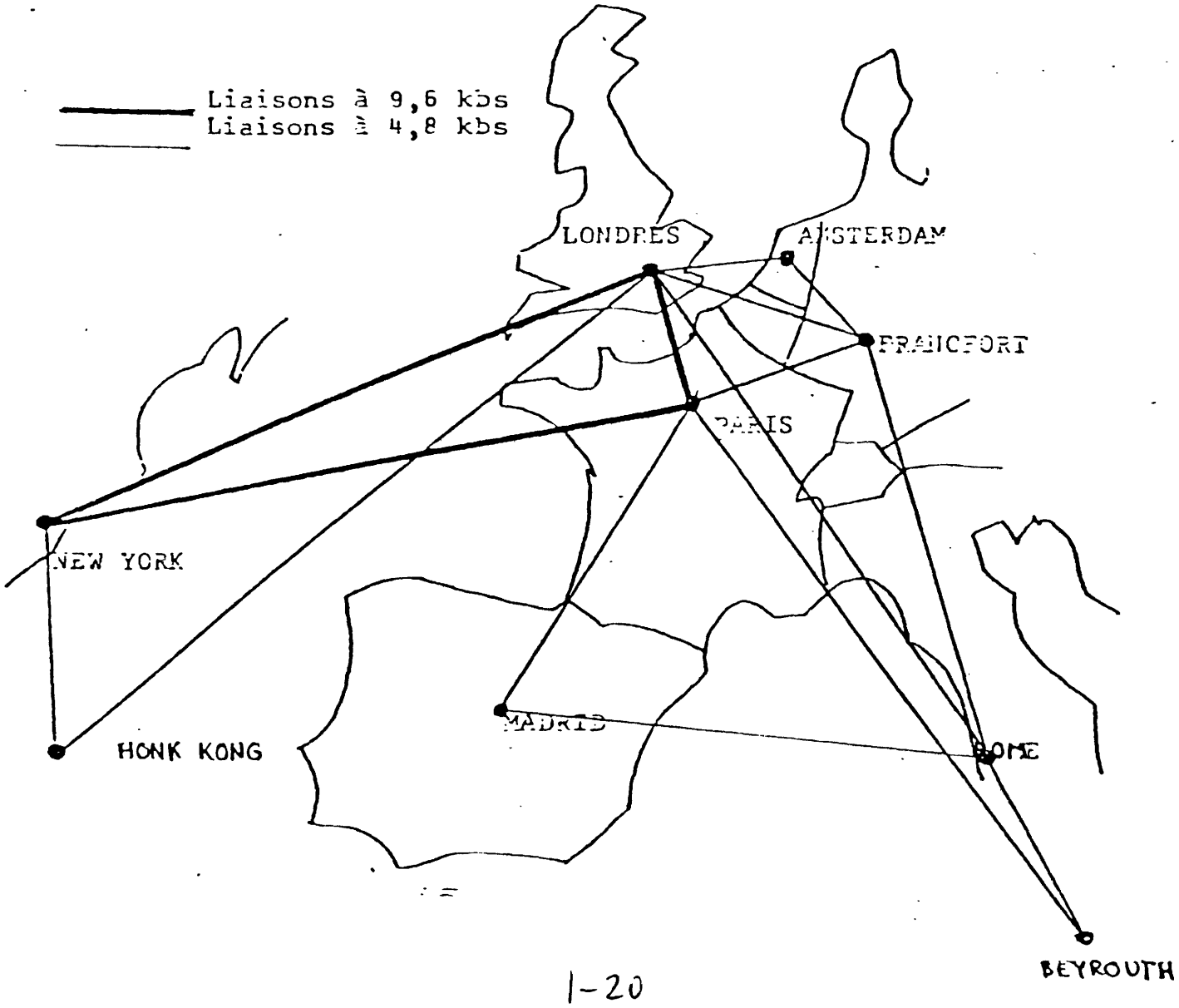
1 SITA, the network of the air live companies.
2 SWIFT, the bank network devoted to the exchange of financial information.
3 EUREX, European network dealing with stocks and shares.

The setting up of such networks, formed essentially with the purpose of mutual exchange of data, was explicitly foreseen and authorised by the CCITT, although the monopoly right of the PTT on circuit switching, messages and transmission is clearly recognised. The PTT however

reserves the right to impose restrictions on the formation of such networks. Specifically, an authorisation to exploit a private network is not automatically granted, and may be revoked subsequently.

On the other hand, the PTT can demand that certain equipment, belonging to a private network, is set up in their premises, and even supplied by them. Thus it is important to note that the PTT can authorise certain customers to form and exploit networks set up for message switching and transmission.

LE RESEAU SITA



However, they have, for different reasons, sought to preserve their monopoly as long as possible. But now most of the airline companies in the world face very considerable expense charges: the cost of telecommunications has risen to 1.5% of the operating expenses of the companies, and they can no longer neglect the lightest means of economy. For this reason, a growing number of companies will start to use SITA. In addition, there are possible new applications for this network, like stock control of spare parts for aeroplanes, luggage recovery, etc.

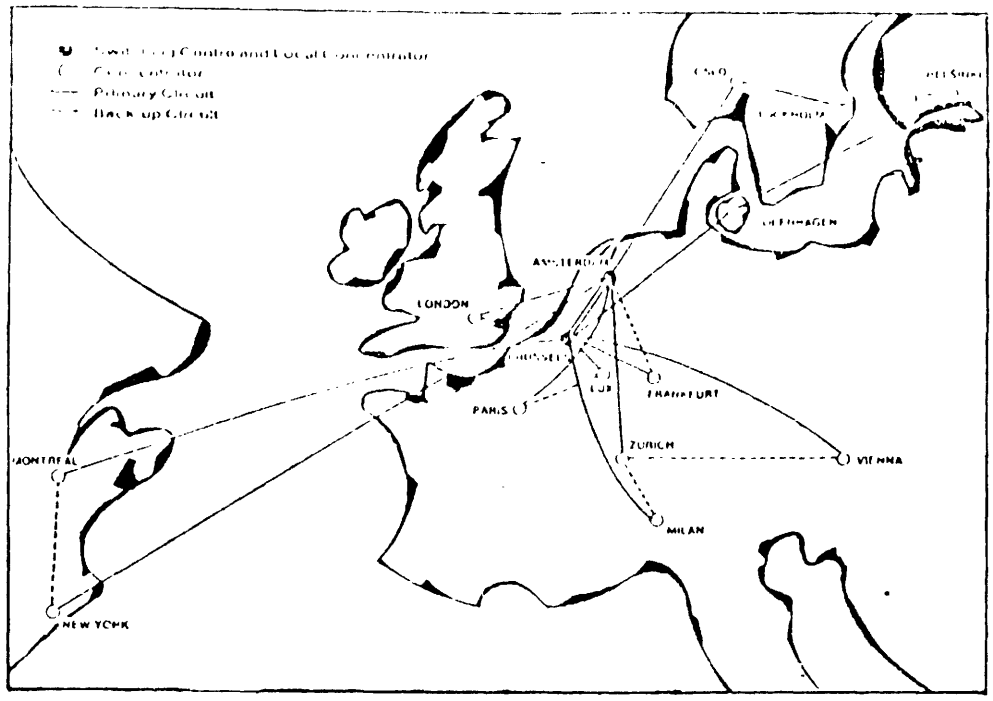
1.1.2.2 SWIFT

In order to exchange with their associates the multiplicity of data concerning international financial actions, the banks have until recently made use of the telex system and courriers. It is with the aim of improving these relations and facilitating the keeping of accounts that the SWIFT company was formed, a non-profit making Belgian cooperative company, with the aim of: 'study, formation, use and exploitation of the means that are necessary for the forwarding of international financial messages' between the 239 banks which are members of the company, and belong to 15 founder countries (USA, Canada, Sweden, Finland, Denmark, Norway, Netherlands, Great Britain, France, Belgium, Luxembourg, Germany Federal Republic, Austria, Switzerland, Italy).

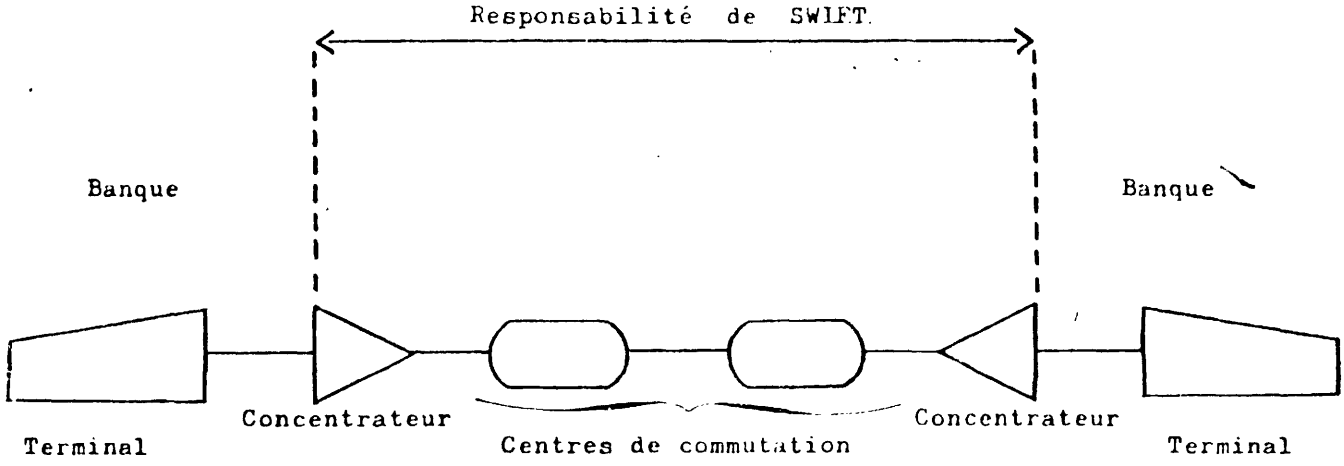
The network uses the message-switching technique. The structure of the network is made up of three stages, each national network is covered by a concentrator, itself linked to a switching centre. For security reasons, two switching centres have been set up: one is in Brussels, the other in Amsterdam. The selection of these locations was made following a commercial and legal feasibility study conducted by the English company LOGICA.

The diagram on the following page ( ) shows the network system as it will be in its final version. The connections drawn in dotted lines show the backup links used in the event of a breakdown of a switching centre or of the leased line which links it to the switching centre. The network has been planned to be capable, by 1980, of transmitting 250,000 messages (averaging 250 characters each) day. Different types of terminals (programmable terminals, low speed teleprinters, telex) can be connected to the concentrator, either by hired telephone lines, or by the lines of the public switched network.

SWIFT's responsibility covers the whole switching network, the concentrators, and the lines which join them together; the banks responsible for selecting the terminals and the terminal connection to the main link. SWIFT promises its members confidentiality between the concentrators: message encryption is used on the connecting lines, so that a listener wishing to eavesdrop cannot understand the messages. Users who want such



Le Réseau S.W.I.F.T.



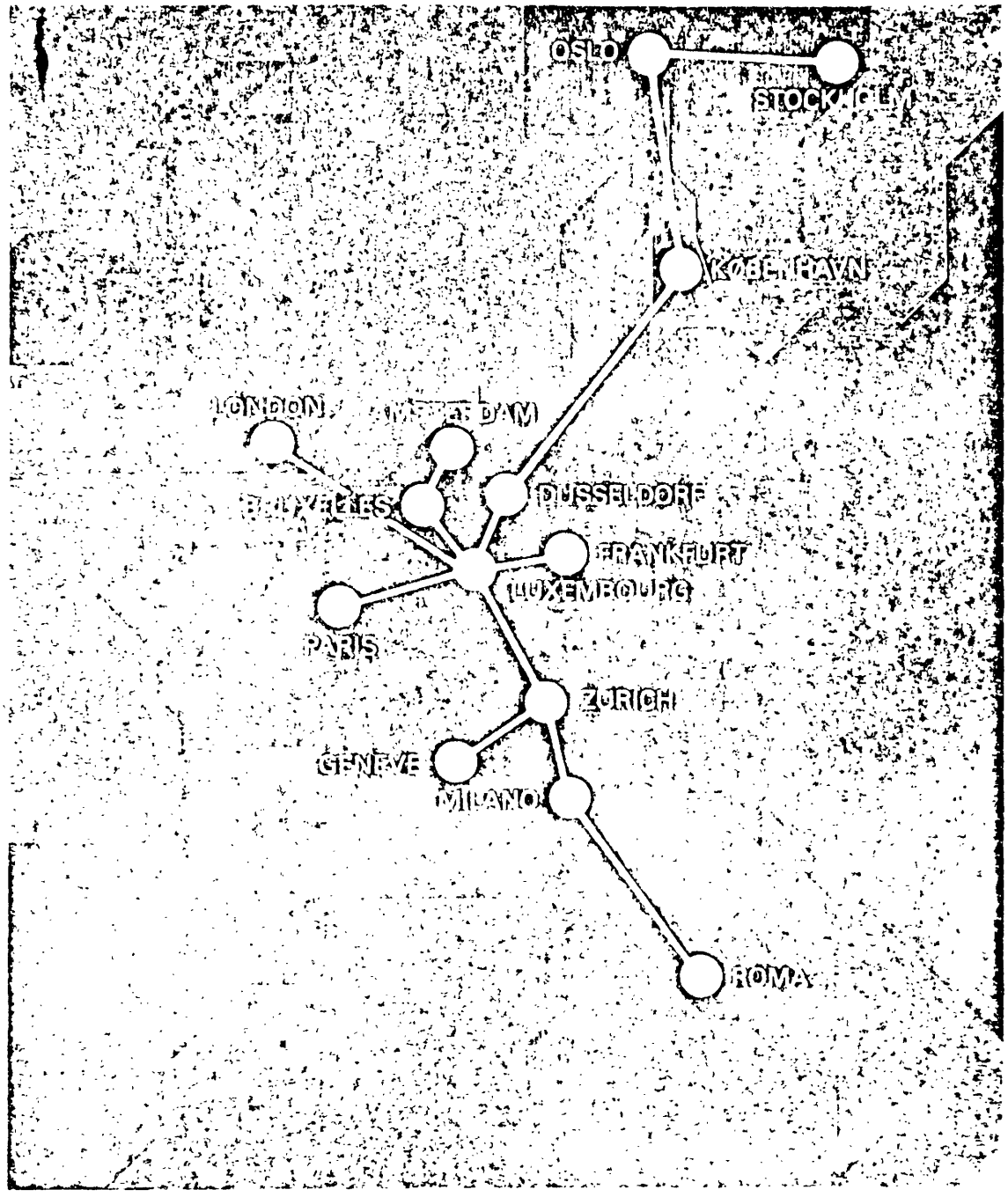
La responsabilité de SWIFT

confidentiality between their terminals and the concentrator should themselves take the necessary precautions, as the PTT does not accept responsibility for incidents taking place on the lines.

The European Post and Telecommunications Conference (CEPT) has given its agreement to the formation of SWIFT and its operation for a term of 5 years. As we noted earlier, the operation of the network in certain countries and particularly in France has raised problems between the PTT and the SWIFT company. In these countries, the PTT has ruled that equipment should be set up on their premises, and should become their property.

1.1.2.3 EUREX

Eurex is a recent network, whose constitution has been published in MEMORIAL, the official journal of the Grand Duchy of Luxemburg, on 29 November 1977 (issue no. 275). EUREX was founded by 33 banks and financial companies spread over 11 countries: Germany Federal Republic, France, UK, Italy, the Netherlands, Switzerland, Luxembourg, Belgium, Denmark, Sweden and Norway. The company was created as a limited company under Luxemburg law, with head office in Luxembourg. The aim of the network is to allow members (banks, financial companies, and exchange bureaux) to obtain information about the European stock market and to circulate among each other purchase orders for stocks, shares and financial securities. Above all the network handles the issue of loans in European currency. More than a forwarding and message transmission system, it consists of a real stock exchange, which is able to put a seller and a purchaser in touch.



LE RESEAU EUREX.

The network uses specialised connections, hired from the PTT (see the map of the network on page). Any user can be linked with a country that is linked by a means of his own choosing: connected network, specialised link, telex, etc. When EURONET becomes completely operational in 1981, EUREX will use its services.

EUREX is not a closed network, and a geographical extension of the network is foreseen in the medium timescale; in addition, new members can be admitted on the authorisation of the Administration Council. It is interesting to note that, unlike the SWIFT network which is in some ways very similar, EUREX has not encountered any serious problems between associated members and the PTT.

1.1.3 International business and the management of large groups

The increase of international business requires a rapid circulation of information. The amount of information to be distributed can become very substantial when the size of the company increases. To cope with this need, large European companies have powerful computing centres, and have organised systems for the rapid exchange of data between these centres and different points at which information can be acquired, and where it must be available.

This is particularly true for multinational companies. The international division of work and the specialisation of production and research establishments have given this problem a world dimension. The European setting up of multinationals engenders a great deal of data flow across the boundaries. The survey has led us to conclude that the data flow across the boundaries has six objectives in the large companies:

- Management of accounts and finance.
- Management of production and stocks.
- Purchase orders, sales orders, and freight.
- Statistics and business estimates.
- Research and development tasks.
- The existence of a large centralised filing system (customers, suppliers, personnel).

We shall study in more detail these six main applications to which the different types of international processing networks give rise. But we have also encountered applications which cannot be grouped into any of these six categories: they relate to products specific to one business or to one sector of work, and are therefore not amenable to general classification. Thus, IBM has a maintenance system operated on a remote basis, which can link a machine which has broken down to a computer in America, which examines it and compares its symptoms with the examples of breakdowns which it holds in its memory.

1.1.3.1 Management of accounts and finance

According to the internal organisation of the group, several cases can be distinguished:

The group is not centralised

The subsidiaries are equipped to be able to keep their own accounting records, or entrust this task to a supplier of such a service. The information exchanged is the data necessary for consolidation of the group's accounts. It usually occurs once a month. The exchanges take the form of documents, magnetic tapes, diskettes or telex messages.

The group is moderately centralised

The subsidiaries entrust part of their accounting work and management at the parent company: processing of salary, management control, administration of the funds, etc.

This assistance is regulated by contracts between the parent company and its subsidiaries, and leads to financial compensation in return. In the examples which we have collected, the contractual position is that of a supplier of a service and his customer. Such an organisation presupposes that large amounts of data are exchanged. Depending on their importance and frequency, these exchanges are carried out by magnetic tape (several tapes once a month), by diskette (1 to 4 diskettes a week), by telex or by direct connection of a terminal to the computer (daily exchanges).

A highly centralised group

The parent company carries out all the accounting tasks and financial business of its subsidiaries. All the group's data is centralised in the parent company. This is carried out every day, by telex messages, or a terminal link. Exchanges are effected by magnetic tape on different frequencies every month or every week. Such an organisation is difficult to set up: it presupposes the matching of accounting and of management of the different companies in the group. Complete standardisation is impossible in a multinational group, which has to take account of different national rules and regulations. Such a structure is difficult to control. It is clear that such a system is very expensive. We are only aware of a few examples in Europe.

1.1.3.2 Management of production and stocks

Here let us consider a detailed example from the observations we have made in different companies. It seems rather significant to us from what there is today in the sphere of production and stocks. Let us consider a multinational group that manufactures a large range of particular products (this example is based on four case-studies involving office equipment and cars). These products are made from components which come from different production units spread over Europe. The distribution is carried out by a network of subsidiaries which also covers all of Europe. The European management coordinates the group's functions, and defines the range of products. The parent company has a powerful computer

centre, linked to the processing systems of the different national subsidiaries by a network of leased lines.

Every year, the subsidiaries receive a complete summary of the range of products offered to the customers. For each product, the different options are specified: their possible combinations, their characteristics, price, delivery time etc. This huge updating is made using magnetic tape. More urgent updatings concern only one product or group of products, and are produced during the year; they are transmitted by the network.

Every month, each subsidiary sends its orders to the parent company through the network. The order consists of a collection of entries, each describing one product. When this order is received it is recorded in the system, and an acknowledgement is sent, always through the network, to the items in the order, to allow it to be verified.

A centrl database allows:

- determination of the production plan for each production unit, and to determine which unit will supply the order.

  determination of all production units which are concerned, and division of the order among them.

When the product is put into production, the subsidiary which has ordered it is informed by means of the daily exchanges, which allow each subsidiary to know the status of an order. Finally, when the product is dispatched, the subsidiary is informed of this, and of the method of delivery, as usual in international business practice (cf. 1.1.3.3). In this case, the data is transferred using the internal network.

1.1.3.3 Purchase, sales and delivery orders

International business, having developed considerably during the last twenty years to its present high level of activity, depends on exchange of information and documentation of all kinds: catalogues, price lists, orders and goods-received slips. After the dispatch of a product, the consignee is usually informed of its departure, of the train number, of the truck containing the product, and the invoice number; or the flight number, the freight order number of the certificate of air transport, etc. It has been possible to estimate that the total cost of preparing and forwarding all the information and forms needed for its delivery amounts to about 15% of the cost of the goods. Traditionally, such information exchanges are carried by telephone or telex. However, increasingly, these exchanges are handled by computer. For example, between a parent company and a subsidiary in a foriegn country, this type of exchange frequently represents an hours' linkage each day.

These specific exchanges have even given rise to the creation of specialist processing networks, such as the Scandinavian network 'OK-Data' whose geographical expanse covers Europe's large northern ports: Copenhagen, Rotterdam, Hamburg, Goteborg, as well as Marseille and Hong Kong. But it is important to note that these exchanges of data do not replace the traditional documents demanded by the law or imposed by usage; most often they are in addition to.

1.1.3.4 Statistics and commercial forecasts

In the large multinational groups, the parent company usually prepares the sales statistics for its subsidiaries, which it then uses in the preparation of its own forecasts. But it also happens that all the statistics and forecasts of the group are processed by the parent company in its European computing centre. As with accounting applications, this consists of the supply of a service, governed by a contract between the parent company and its subsidiaries, which results in payment. The data may be exchanged through the group's computer network, but it is more usually transferred by magnetic tape.

1.1.3.5 Research and development

These activities can give rise to different data being transferred between the research centres of the same group, or between several companies belonging to the same sector. Frequently a program produced by one company for its own purposes meets a need of other companies. The

first company can then offer this program concept to the others through a terminal. Such cases are rare at present.

Finally, very often, the research results from different centres of a multinational group are collected in a central laboratory, which depends directly on the parent company. In pharmaceuticals, the French testing centre of a large American company receives batches of products to test on animals each year. The results of samples used on the aminals are forwarded every day to the parent company's computing centre, where they are analysed using a model. These exchanges are carried out by a telephone switched network. During the following testing phase, one man, a thousand sick people are chosen and in different hospitals all over the world. The data describing their state of health and its development is regularly sent to the computing centre, to be compared with the model. These exchanges, like the former ones, use the switched network. This example shows two very different facets of teleprocessing applications. In the first case (tests on animals), the data flow results from an internation division of work; it concerns a choice based solely on economic criteria. In the second case (tests on man), on the other hand, the world-wide transfer of data allows a product to be tested on a much larger sample of sick people.

For certain rare illnesses, it would be impossible to find so many patients with the same symptoms in a single country. So it seems here that the justification of the TBDF is scientific, and that the possibility of such flows of data is an objective source of progress. But such data flows are regarded as very sensitive in European data protection laws.

1.1.3.6 Exploitation of a centralised file

Inside a very large company, the control of accounts often gives rise to regular data flows, by telex or by network when there is one. Indeed it goes without saying that even a multinational comany which divides its work internationally, will manage its customers', suppliers' accounts globally. Most large companies which issue credit cards (American Express, Diners Club, Master-charge, etc.) have their head offices in USA, and their customer files are held in their headquarters in the USA.

On the other hand, in the multinationals, personnel executive management is generally carried out at the head office. This central file consists of the collection of files of the different establishments and subsidiaries which can be spread out all over the world. Updating such files requires data flows relating to physical persons, and thus fall within the scope of data protection laws.

1.1.4 Hotel and travel bookings, car hire

The considerable increase in travel, whether tourism or business, is certainly one of the most notable tacts of our time. Moreover, it is very interesting to draw a parallel between this increased movement of men, and that of information and ideas, those automation and growing speed of exchange is going to drastically alter our life-style, modes of working and thought patterns. The two phenomena are closely linked, and inseparable. On a conceptual level, first: the free movement of men and that of ideas are two different examples of the same freedom, that of communication. On a practical level, next: the movement of men permits the movement of ideas; then on the physical level, the arrangement of a journey necessitates, in the reservation of hotel rooms and aeroplane seats, car hire, etc, a substantial amount of data exchange. Part of this flow is transmitted by the SITA network, of which we have already spoken (1.1.2.1). Another part of this flow uses the networks of hotel chains, such as Holiday Inn, or the UTELL network, used by a subsidiary of a large British hotel company. But a large part of the data is still exchanged effected by traditional means, like telephone and telex. These TBDF have also a strong personal side, since they permit identification of the movements of travellers across the world. A large number of these travellers live in EEC countries.

1.1.5 The Press

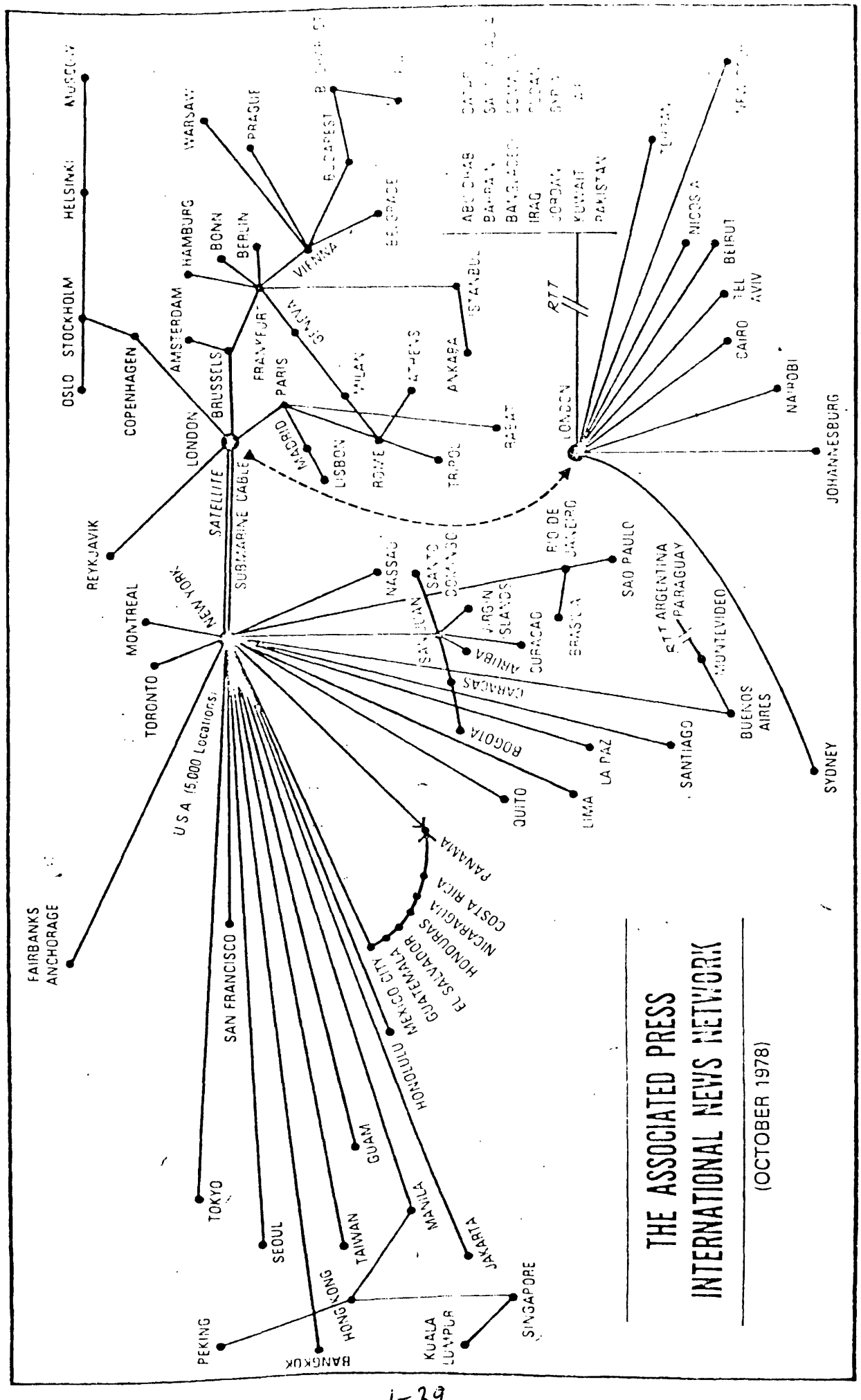
Of all the data flows which we are considering in this study, press information is by far the most visible and the best known, at least in its traditional form. Press information is tending to become computerized and therefore difficult to distinguish from the other data flows mentioned here. More than 50 countries have a general press agency, but only 5 of these agencies work on an international scale. The French (Agence France-Presse, and Agence Havas) is the oldest; the Russion (TASS) is the newest. But the two most important are of American origin. These are first Associated Press (AP), and second United Press International (UPI). The English agency Reuters comes third. As examples we have studied the networks of two of these: Associated Press and Reuters.

1.1.5.1 Associated Press

Associated Press, like the specialized networks described in 1.1.2, is cooperative. Since its formation in 1848 by six New York dailies, Associated Press has kept its position as a cooperative organisation, which is non-profit-making and has no government aid or subsidy. Its members are American newspapers, who pay a token contribution depending on the number of copies they print, and gain a voting right proportional to their contribution. In addition, more than 2,000 radio and television stations have associate member status, without voting rights.

Associated Press today covers 45% of the 1770 North American dailies. To the telegraph is added the distribution of the financial agency Dow Jones and the circulation of press photos by a specialist subsidiary: AP Wire-photo serves 700 newspapers and radio and television stations in America, and 2,000 in other countries.

The network (see the map on page) consists of two main centres where processing and switching of press dispatches are carried out: New York, the head office of the Agency, which controls the regions of Asia and North and South America, and London, which controls all of Europe, Africa, and the Middle East. London and New York are connected by a permanent double link: cable and satellite. Each mode of the network has a switching computer for dispatch and aural or computer reception with the local offices. All the messages stay in the central store and can be accessed by all the editing offices. The permanent lines are used at the same time for the telephotographic circulation service. The system is entirely computerized. All the editors work and type straight into a video terminal; there is a portable model terminal which allows the reporter to dispatch his text to the computer from anywhere where there is an electrical supply and a telephone.


THE ASSOCIATED PRESS
INTERNATIONAL NEWS NETWORK
(OCTOBER 1978)
SATELLITE
SUBMARINE CABLE
USA 15,000 Locations
NEW YORK
LONDON
PARIS
FRANKFURT
BRUSSELS
AMSTERDAM
COPENHAGEN
OSLO
STOCKHOLM
HELSINKI
MOSCOW
WARSAW
PRAGUE
BUDAPEST
VIENNA
BERLIN
BONN
HAMBURG
GENEVA
MILAN
ROME
MADRID
LISBON
ATHENS
ANKARA
ISTANBUL
TRIPOLI
RABAT
REYKJAVIK
MONTREAL
TORONTO
NASSAU
SAN JUAN
CARACAS
ARUBA
CURACAO
VIRGIN ISLANDS
RIO DE JANEIRO
SAO PAULO
BRASILIA
BOGOTA
QUITO
LIMA
LA PAZ
SANTIAGO
BUENOS AIRES
MONTEVIDEO
ATT ARGENTINA PARAGUAY
SYDNEY
JOHANNESBURG
NAIROBI
CAIRO
TEL AVIV
BEIRUT
NICOSIA
TEHRAN
ABU DHABI
BAHRAIN
IRAQ
JORDAN
KUWAIT
PAKISTAN
QATAR
SAUDI ARABIA
SYRIA
YEMEN
ATT
FAIRBANKS
ANCHORAGE
SAN FRANCISCO
HONOLULU
MEXICO CITY
GUATEMALA
EL SALVADOR
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
TOKYO
SEOUL
GUAM
TAIWAN
MANILA
JAKARTA
SINGAPORE
KUALA LUMPUR
HONG KONG
BANGKOK
PEKING

Information is transmitted across the network in English, except in South America where it arrives from New York in Spanish. The dispatches are translated on their arrival in each capital, before being sent out on the national circuit.

1.1.5.2 Reuters

The Reuters agency is a British company whose head office is in London. It belongs to four associations:

- the Newspaper Publishers Association, which represents the United Kingdom's national press.
- the Press Association, which represents the United Kingdom's regional press and the newspapers of the Irish Republic.
- the Australian Associated Press, which represents Th Australian press.
- the New Zealand Press Association, which represents New Zealand's press.

Reuters offers two special services:

a) a press dispatch service.
b) an economy service.

a) Press dispatch

This service is restricted to subscribers (newspapers, radio, television). It covers the daily world events of importance, and, regionally, events of particular interest. Reuters also offers a more detailed

information service. This acts as back-up to the press dispatches. It also offers a reporting service of pictures, forwarded by cable, for the needs of television channels.

The collection and dispatch of information is supported by a very important network, consisting of three message storage and switching centres - London, Hong Kong and New York - and a communication system consisting of four subsidiary networks:

- the TATPAC network (Trans-Atlantic Pacific) which connects London, Montreal, Sydney and Hong Kong to Tokyo, and has branches to New York, Singapore and Auckland.
- The Eureplex network, which joins the European centres: London, Paris, Geneva, Frankfort, The Hague, and Brussels, and two branches: one from Paris to Madrid, the other from Geneva to Rome, via Milan.
- the Unipler network, which links 1,600 cities within USA.
- the Nyzlo network (New York, Zurich, London) which links London to New York via Zurich.

This broadcasting service for press dispatches is a loss-incurring section of Reuters, subsidised by the department of the company which we describe in the next section. But it is considered to be an essential basis for the operation and image of the Agency.

b) Economic and financial information

This is in fact the primary activity of Reuters. Like the previous one, this service also is open to the media (newspapers, radio, television). But above all it acquires its resources from the clientele of the business world, where it has a very wide distribution: management, industrial companies, banks, brokers, etc. The information concerns the whole range of economic activity, particularly:

- the financial markets (rates of exchange)
- the market of stocks and shares and security
- the raw materials markets, metals, cocoa, sugar, coffee, wheat, oil, rubber, wool, etc.

The information is centralised in New York and transmitted from there within the United States and to London. London in its turn transmits the information to centres equipped with mini computers: Paris, Amsterdam, Zurich, Frankfort, Sydney Pretoria.

The transmission of information is carried out by different methods: daily information letters, teleprinter messages, and in conversational mode, which is possible due to video terminals.

1.1.6 The acquisition of data and transfer of programs

As we stated in the introduction, the definition of TBDF is very wide, and includes:

- the flow of raw information to be processed by the computer, and whose preparation, independent of any other processing, is done abroad.
- transfer of programs to be used for the processing of information.

It is these two types of data flow, which usually take place in a material form, that we are concerned with in this section.

1.1.6.1 Data preparation

It is for financial reasons that data preparation companies carry out the coding of data on cards or on magnetic equipment for their customers abroad. Indeed they seek to make a profit from the noticeable difference in the labour cost as much as a factor two between North Africa and the east Eeuropean countries on the one hand, and EEC countries on the other.

One should note that the data transferred does not undergo any processing, and that it is the same information that is ciculated both inwards and outwards.

Raw information is carried by aeroplane in a material form: data capture documents going out, punched cards or magnetic equipment on return, and this transport adds an extra delay in the processing of the information. In order to use a data preparation service abroad, one must not only be able to space the necessary time, but also have substantial quantities of data to record, if the

operation is to be financially viable. These conditions make these applications dubious for the ordinary user: they could apply in the setting up of personnel files, salary files, industrial accounting or commercial files etc. The problems which threaten to arise have a bearing on the confidentiality of data concerning people and the security of the files. Indeed, in the case of serious trouble in the country where the preparation is carried out, one must fear that the data in question may be lost or destroyed, and contractual liabilities are involved. These problems are not very serious, when one considers the unimportance of the flows, but they would matter if data preparation abroad became common, which does not seem at present to be the case. One item of our survey confirms this tendency, namely the fact that such flows exist only between Europe and North Africa or the east European countries, and between the United States and Asia. South east Asian countries have offered their data preparation services to the Americans with whom they have had close economic links, but they did not consider the European market interesting enough to attempt to get into it, although the physical distance is not larger than that separating them from America.

Consider also that this survey has enabled us to observe the same type of data flow within the European Economic Community itself. But the motives are still more technical: the flows are intended to take advantage of optical data preparation on large machines for this service, still rare in France, is already offered in

Belgium and England by the equipment manufacturers themselves, or by leasing companies. The amount of data transferred for this purpose is at present tiny compared with other data flows.

1.1.6.2 Program transfers

Original programs are developed by research organisations, diverse business or service companies, and are passed to other companies. Transfers of large programs are carried out in material form (usually magnetic tape).

Program transfer can take several forms:

a) Sale of program products by a bureau.
b) Transfer of programs by a research organisation to a company.
c) Transfer of programs between companies of the same group.

a) Sale of programs as products by a bureau

This is one of the services offered by most big computer bureaux. It concerns in general programs developed by the leasing company itself: but there are also examples of programs developed by a client and bought back by the bureau to be offered to other clients. The leasing company generally offers a complete assistance service with regard to program maintenance.

b) Transfer of programs by a research organisation to a business

This type of transfer is carried out between many countries, even if it is more common with American universities. In fact it concerns a policy of hoping to make their work known by these exchanges, and to enhance their reputation. However this phenomenon can be seen also among the common market countries. It is the case, for example, with numerical control, where the European industries can use the knowledge of an English centre which has an international reputation in this subject.

The areas in which these transfers are most numerous are chemistry, analysis of data and economic forecasts. A number of American universities have a reputation in these areas, and many researchers go and give training in these universities, and come back with a magnetic tape in their bags.

With the support of engineering companies (IBM, Hewlett-Packard, etc) certain universities, particularly in chemistry, have formed engineering companies; chemical and oil companies are their main customers.

c) Transfer of programs between companies of the same group

The transfer of programs between the parent company and the subsidiaries is very frequent, even in relatively small companies.

For instance, an industrial company, which has made a subsidiary of its Paris computer centre, supplies its European subsidiary distributors and factories with programs for commercial and industrial management; these programs are usually dispatched abroad in the form of cards or magnetic tape.

Although there is no general rule on compensation for such services, the tendency of the large industrial and financial companies seems to be to unify their computer services. The services are then invoiced to the subsidiaries at the market price. We shall return to this point in 1.3.4 when we consider the evaluation of the flows.

1.1.7 Scientific and technical cooperation

Scientific and technical research is probably one of the areas in which international collaboration is the most established in the second half of the 20th century. The great ease with which men can today travel all round the world, and the principle of the free exchange of ideas, unfortunately not applied everywhere, have enabled researchers to bring about their applications for free and universal collaboration. The progress of processing and telecommunications are not alien to this development of international scientific and technical cooperation. Many examples of researchers in all areas show that exchanges between researchers have become easier in all areas, and have increased dur to teleprocessing. The exchanges may have a bearing either on the data, which represents the results of a survey, or on the programs, which embody a methodology. It must also be noted that these exchanges are not limited to the public sector, but also affect the private sector. We have given examples of such exchanges of private research in 1.1.3.5. Now we shall give some representative examples of this cooperation. These examples are of course not exhaustive.

1.1.7.1 Meteorological forecasts: the World Meteorological Organisation

The World Meteorological Organisation has a computer network called GTS (Global Telecommunications System), which links the national meteorological centres of the member countries. This network is made up of special 2400 baud connections. There are plans for equipping this network with 4800 baud lines soon. For security, most of the links are duplicated.

The network is used to transmit meteorological data between the different member countries of the Organisation. The METEOSAT project, although only experimental, is an example of the use of this network.

The METEOSAT satellite, which is a result of European scientific collaboration, was set in geostationary orbit over the Gulf of Guinea, in December 1977. Its main aim is to photograph the atmosphere 3 times every half hour. The geographical zone concerned covers Europe and Africa. The photographs are transmitted to the Darmstadt computing centre, and comparison between those taken at the same time in different frequency bands enables the altitude of the clouds to be estimated. Comparison between two successive photographs (one taken half an hour after the other) enables wind speed and direction to be calculated, by observing the cloud movement. These calculations call for very complicated processing of data,

which is carried out at the computing centre in Darmstadt. After the manual checking of these results by an operator, the Darmstadt centre transmits this information to different meteorological services in Europe and Africa. Observing the atmosphere by satellite enables air movement above the oceans, mountains, desert regions, Antarctic, the Amazon forest etc. to be determined. This is impossible by normal methods. Observation programs such as METEOSAT have achieved important progress in meteorological forecasting, increasing their span from one day to two or three. The making of longer term forecasts however requires meteorological surveillance on a world scale, which is being organised by the World Meteorological Organisation. This will enable specialists to constantly have available an overview of the planet. As well as METEOSAT, four other satellites, two American, one Japanese, one Russian are supplying a regular flow of photographs covering all the land, except the polar zones. The information collected by satellite, and that which comes from other sources such as sounding balloons, aeroplanes, sea and land signals will be collected together into a summary, which will be circulated to all the meteorological services. In order to assure the validity of the models they use to process the data, the different national meteorological organisations have been testing these models since 1978 on the same data. From such tests, which imply much TBDF, as we have just emphasised, we shall in a few years be able to make reliable predictions a week ahead.

1.1.7.2 An example of collaboration in computing: EIN

EIN (European Informatics Network) is a project which arose from the discussions of a committee which was formed in 1969 by the EEC, and chaired by Mr Aigrain. The agreement to the creation of this project was signed in February 1973, and a specification of the network was published in June 1973. Through a contract signed on 17 October 1974, the building of the network was entrusted to SESA (Paris) and LOGICA (London).

The objectives decided on originally for this project were threefold:

a) To facilitate the exchange of ideas between research centres and computing centres of member countries.
b) To create a discussion framework for the comparison of the different schemes proposed by national computer networks.
c) To create a model for the formation of future networks.

The appendix to the agreement summarised as follows the aim of the project: 'as a result of the project, the knowledge acquired should enable the study of the feasibility and the profitability of an international fixed network, which can be exploited for commercial purposes; the equipment and the software developed during the course of the project could thus be used as a base for such a network'.

EIN links a certain number of research centres, spread over 8 countries: France (IRIA), Yugoslavia, Italy (The Euratom Research Centre at Ispra and Milan Polytechnic), Norway, Portugal, Switzerland (Zurich Federal Institute of Technology), Sweden and the United Kingdom.

The map on page shows its initial configuration made up of full duplex links of 2400 words, or 19.2 K bits' per second.

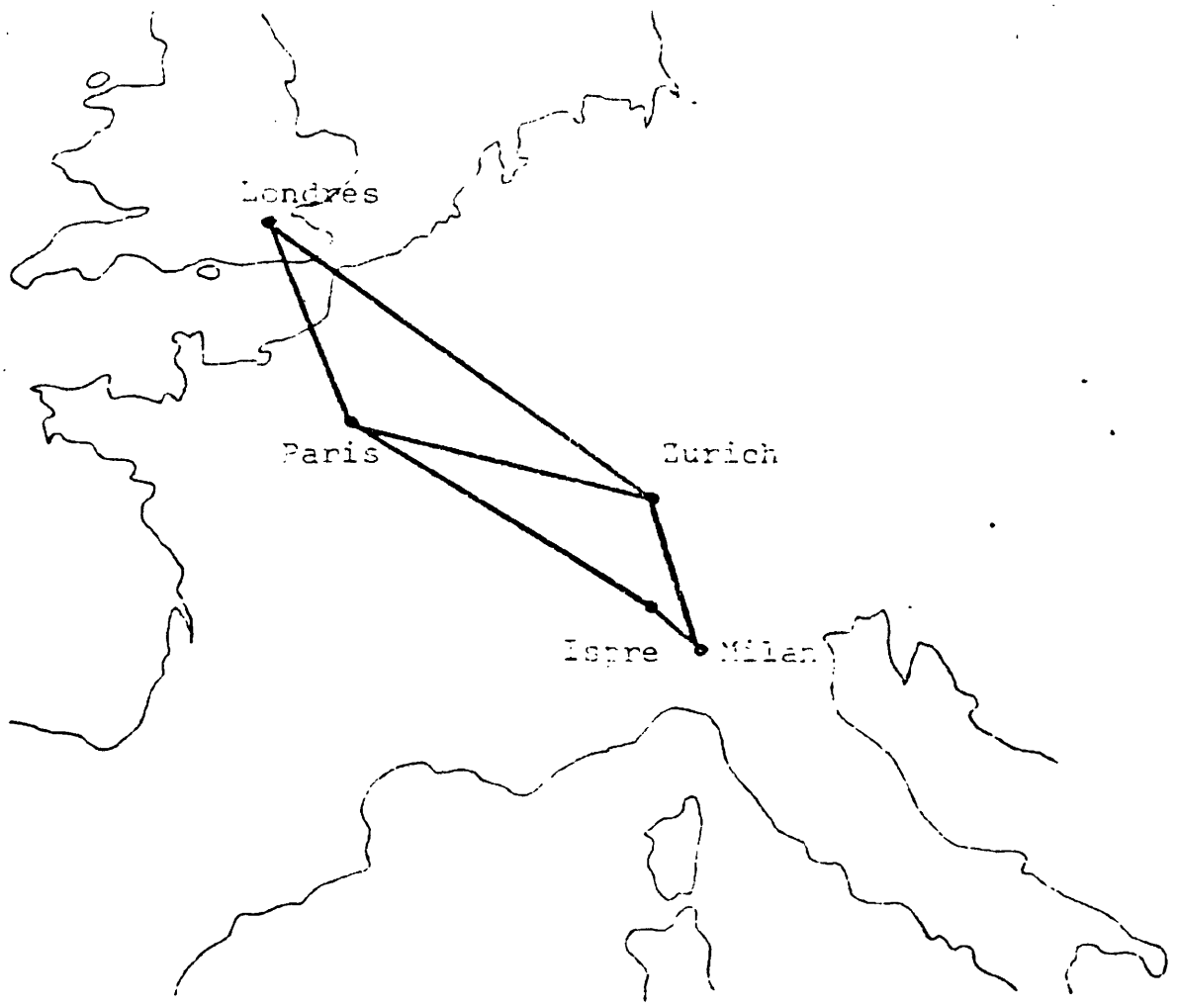
The host computers have a specific form of exchange protocol, using the datagram. The other users must obtain an adaptation unit to make the interface. In its present state, the network is not directly accessible by terminals in character mode. The European Post and Telecommunications Conference suggested that access should be made across public networks, when these exist.

1.1.7.3 Some examples of data banks

We shall now give a quick description of some public data banks, formed from collaboration between different research organisations on an international level.

Geode (Earth sciences)

Geode was formed from collaboration within the International Union of Geological Sciences. This cooperation started in 1968, through an agreement between the Geological and Mining Research Office (BRGM), in France, which published a documentary report (le bulletin signaletique - bibliographie des sciences de la terre) and



LE RESEAU E.I.N.

Noeuds du réseau dans sa configuration initiale :

- ISPRA : Euratom
- Londres : National Physical Laboratory
- Milan : Polytechnic
- Paris : IRIA
- Zurich : Institut Federal de Technologie

the Czechoslovakian National Geological Survey. In 1970, an agreement was signed between the BRGM and the Bundesanstalt fur Bodenforschung, which had adopted BRGM's thesaurus in 1969 to make its own data bank. Then agreements with Hungary and Finland arose in 1972, and Spain in 1975. USA is not a member of this organisation, but a very close agreement exists between the BRGM and the American Geological Institute.

IFIS

IFIS (International Food Information Service) is an international organisation, which has 5 members in 4 countries: Great Britian, Germany, USA and Holland. The data is supplied by 7 other institutes who collaborate with the system. IFIS is an original system, for its use is shared between two centres: the centre in Great Britian is responsible for the acquisition of data, the production of reports and indexing; the German centre carries out the processing, produces the periodic documentary report and runs the data bank. IFIS has been operational since 1969, and today it is financially independent. Interrogation procedures have been developed.

INIS

INIS (International Nuclear Information System) is an international system used by the IAEA (International Atomic Energy Agency). Research centres spread over the 49 member countries supply data to the system. The processing is carried out centrally at the computing centre at Vienna (Austria). A periodic bulletin is issued, as well as

copies of the data bank, on magnetic tape. There also exists a conversational interrogation procedure.

IRRD

IRRD (International Road Research Documentation) is a documentary system formed by OECD, whose participants are 12 member countries: Austria, Belgium, Canada, Denmark, Ireland, Japan, Holland, Norway, Portugal, Spain, Sweden, Switzerland, and three coordinating countries: Germany Federal Republic, France and UK. Each of these latter three is responsible for the creation and use of the data bank in one of the three official languages of the system. The coordination of the whole system and the distribution of products are carried out by OECD. No descriptive report is published, but magnetic tape is issued, as well as other derived products.

MEDLARS/MEDLINE

MEDLARS/MEDLINE is a biomedical documentation system of American origin, formed and used by the Naional Library of Medicine. It is certainly one of the most important documentation systems in the world. Agreements made with different national centres of the biomedical documentation, by the terms of which these centres put data into the system in exchange for copies of the data bank give it a world dimension. There is a conversational interrogation procedure, which can be used anywhere in Europe or USA via the TYMNET network. A descriptive report is also issued, but the most common research method is conversational interrogation.

SDIM

SDIM (System of Documentation and Metallurgical Information) is a data bank created by the EEC Commission in cooperation with 8 centres of member countries. The member laboratories supply the data to the Community centre which runs the bank. The theosaurus exists in three languages: English, French and German. Distribution is by micro fiche. The member countries finance their own data entries to SDIM. The cost of using the central system is covered by the EEC funds.

1.1.8 Data banks and data bases

Improvements acheived over the last 20 years by computing have made the creation of data banks and data bases possible on a world scale, at the same time as telecommunications enabled verbal access to data bases on an international level.

It was in USA that the new possibilities offered by teleprocessing were first understood and put to profitable use: numerous data bases and banks were formed at the same time as powerful data distributing systems were created. The evolution is so marked that it is possible to speak of a 'computer revolution', and some American economists have conceived a group of 'quaternary' activities, comprising the manufacture of 'information machines', the production, the processing, transmission, distibution, and the sale of knowledge and information.

Most of these data banks and data bases are now accessible across the research systems of the SDC and LOCKHEED companies. For two years, certain of them have been accessible through the ESRO system of the European Space Agency. In the area of economic processing, the main manufacturers are: Data Resources Inc (DRI), chase Econometrics (subsidiary of Manhattan Chase), IP Sharp.

On the other hand, let us note that the EURONET network planned by the EEC Commisssion, aims to offer a fixed substructure giving direct access to every user who has a dialogue terminal, to different bases and banks in the member countries of the Community, and to legislative, social, economic and legal banks.

We next describe one after another the main documentary systems at present in operation, or whose development is sufficiently well advanced. In turn we examine:

1 The American private documentation systems.
2 The documentation network of the European Space Agency.
3 EURONET.
4 The econometric network DRI.
5 The economic data network of Chase Econometrics, subsidiary of the Chase Manhattan Bank.

1.1.8.1 The American systems : DIALOG and ORBIT

The two main American scientific documentation systems are derived from a private development subsidised by significant public funds. In these two cases, it is a question of a large, technical, administrative and commercial substructure, which distributes various data bases, whose ownership does not belong to the operator of the system. Thus LOCKHEED makes available the Chemical Abstracts to its clients, without having the copyright of the works. These same bibliographical references are also available on the SDC system, with nearly the same conditions of copyright and cost.

As an example, a list of data bases and banks accessible via the LOCKHEED DIALOG network is given on the .
A large number of these documentary sources are also accessible on the ORBIT system. One should note here that the two computers are in California: Palo Alto, next to the Stanford University, for LOCKHEED-DIALOG, and Santa Monica for the SDC-ORBIT.

One should also note that the invoicing principle of these systems consists of the following three factors, which are independent:

- The user of the terminal must of course pay the price of the telephone communication between the location of th terminal and the computer. In practice, for European users, this price is partly included in the subscription contract.

LOCKHEED INFORMATION SYSTEMS
DIALOG® INFORMATION RETRIEVAL SERVICE

SCIENCE

- BIOSIS PREVIEWS ($65/hr) – Worldwide coverage of the life sciences (1972 to present).
- CA CONDENSATES ($45/hr) – Bibliographic data and keywords for chemistry and chemical engineering from Chemical Abstracts Service (CAS) (1972 to present).
- CA SUBJECT INDEX ALERT ($60/hr) – Subject index headings and CAS Registry Numbers for CAS documents (1973 to present).
- CA CHEMICAL NAME DICTIONARY ($60/hr) – CAS Registry Numbers, CA Index Names, and molecular formulas for CASIA.
- CLIN ($25/hr) – Worldwide coverage of agriculture from the National Agricultural Library (1970 to present).
- COMPREHENSIVE DISSERTATION ABSTRACTS ($55/hr) – Doctoral dissertations from accredited universities (mostly U.S.) (1861 to present).
- SCISEARCH® ($70/hr) – Index to the literature of science and technology from the Institute for Scientific Information (1974 to present).

SOCIAL SCIENCES

- AIM/ARM ($25/hr) – Abstracts of Instructional and Research materials (1967 to present).
- ERIC ($25/hr) – Complete data base of educational materials from the Educational Resources Information Center (1966 to present).
- EXCEPTIONAL CHILD EDUCATION ABSTRACTS ($25/hr) – Literature of education of handicapped and gifted children (1966 to present).
- LANGUAGE AND LANGUAGE BEHAVIOR ABSTRACTS ($55/hr) – Coverage of speech and language pathology (1965 to present).
- PSYCHOLOGICAL ABSTRACTS ($50/hr) – Literature in psychology and other behavioral sciences (1967 to present).
- SOCIAL SCISEARCH® ($70/hr) – Multidisciplinary coverage of the social sciences (1972 to present).
- SOCIOLOGICAL ABSTRACTS ($55/hr) – In-depth coverage of sociology and related areas (1963 to present).

TECHNOLOGY/ENGINEERING

- CLAIMS®/CHEM ($150/hr) – U.S. chemical and chemically related patents plus some foreign equivalents (1950 to present).
- CLAIMS®/GEM ($90/hr) – U.S. general, electrical, and mechanical patents (1975 to present).
- COMPENDEX ($65/hr) – Worldwide coverage of engineering literature from Engineering Index, Inc. (1972 to present).
- INSPEC-PHYSICS ($45/hr) – Worldwide coverage of physics from the Institution of Electrical Engineers (IEE) (1969 to present).
- INSPEC-ELEC/COMP ($45/hr) – Electrical engineering, computer science, and control engineering from IEE (1969 to present).
- ISMEC ($45/hr) – Coverage of mechanical engineering and engineering management (1973 to present).
- METADEX ($80/hr) – Coverage of metallurgical literature including Metals Abstracts Index and Alloys Index (1966 to present).
- METEOROLOGICAL ABSTRACTS ($50/hr) – Worldwide meteorological and geoastrophysical literature (1972 to present).
- NTIS ($35/hr) – Complete Government Reports Announcements data base covering government research from over 240 agencies (1964 to present).
- OCEANIC ABSTRACTS ($55/hr) – Coverage of marine biology, oceanography, and the related literature (1964 to present).
- WORLD ALUMINUM ABSTRACTS ($50/hr) – Coverage of technical literature ranging from ore processing to end use (1968 to present).

BUSINESS/ECONOMICS

- ABI/INFORM ($65/hr) – Coverage of business, finance, and related fields (1971 to present).
- CHEMICAL INDUSTRY NOTES ($90/hr) – Coverage of the chemical process industries from Predicasts, Inc., and CAS (1973 to present).
- FOUNDATION DIRECTORY ($60/hr) – Descriptions of over 2500 foundations from the Foundation Center (maintained on current basis).
- FOUNDATION GRANTS INDEX ($60/hr) – Cumulation of grants records from U.S. philanthropic foundations (1973 to present).
- PTS DOMESTIC STATISTICS ($90/hr) – Time series and forecasts on U.S. economics, demographics, finance, and production (1971 to present).
- PTS EIS PLANTS ($90/hr) – Data and classification of industrial plants in the U.S. (maintained on current basis).
- PTS F&S INDEXES ($90/hr) – Citations to articles relevant to business research (1972 to present).
- PTS INTERNATIONAL STATISTICS ($90/hr) – Time series and forecasts on foreign economics, demographics, finance, and production (1972 to present).
- PTS MARKET SEARCH ($90/hr) – Complete coverage of Chemical Market Abstracts and Equipment Market Abstracts (1972 to present).
- PTS WEEKLY ($90/hr) – Current and extensive coverage of chemical and equipment market information; related to Market Abstracts File (1972 to present).

- For each data base, the time of the connection with the computer is charged to the user, according to a price list depending on the base. These prices vary between about $40 and $150 an hour, and they partly depend on the copyright right transferred by the operator to the owner of the data base.

- Lastly, the user must pay a unit consultation price for each document taken from the data bank, either by terminal, or by delayed printing. This consultation right is about $0.10 for one document on average.

Finally we must emphasise that these data banks, like all similar ones, can give advice on 'profile', the printed result of which is forwarded by post, so this case again is one of material TBDF.

1.1.8.2 The European Space Agency

The ASE documentation system comprises two services:

- the computer belonging to ASE at Frascati, near Rome.
- the Thermodata base, at Grenoble in France.

The user can gain access to the bases from a terminal similar to a teleprinter. Eleven - and soon twelve - sites of about 5 million references are accessible for an average price of F223 for each hour of connection. To this cost one must add the fees necessary for certain files (on average F26 per hour), management costs (F300 per access through the Cyclades network), printing fees (F0.26 per reference); the prices do not include VAT. The user is responsible for the costs for connection to his own terminal, as well as for telephone links to the nearest connector. The documentation bases which are accessible are described in the diagram (page).

In future years there are plans for connecting other data bases or data banks. The SDS/ASE should be one of the first of the EURONET network to be linked.

1.1.8.3 The EURONET Network

EURONET is a programme organised by the Commission of the European Communities, whose aim is to enable:

- direct access, from all processing terminals in the EEC, to diverse banks and data bases, of scientific,

Fichier	Citations	Dénomination sujet (abrégé)	Depuis
NASA	720 000	« STAR — IAA » : aérospatiale, géophysique, électronique, ressources terrestres, biotechnologie, thermodynamique.....	1962
METADEX	160 000	« Metals Abstracts » : métallurgie et secteurs scientifiques associés.	1969
COMPENDEX	380 000	« Engineering Index » : génie civil, ingénierie, pollution, transports...	1970
NUCLEAR	420 000	« Nuclear Sciences Abstracts » : sciences et techniques nucléaires...	1968
NTIS	250 000	« Government Reports Abstracts » : disciplines techniques et sociales.....	1964
INSPEC	530 000	« Physics Abstracts A, B, C » : physique, électronique, ordinateurs.	1971
CHEMABS	1 728 000	« Chemical Abstracts Condensates » : chimie industrielle, scientifique.....	1969
ESCI	40 000	« Environment Sciences Citation Index » : sciences de l'environnement, pollution.....	1971
ELECOMPS	16 200	« Banque de données sur les composants électroniques » : fichier ESA.....	1970

NOTA. — Ce tableau est extrait d'un document de présentation du service de Documentation spatiale de l'Agence spatiale européenne.

technical, and socio-economic nature, set up in the member countries, and the legislative, social, economic and legal banks of the EEC.

- The sharing of other computer services offered to users, with the aim of reducing the duplication of information, and encouraging inter-European cooperation in each sector of activity (agricullture, medicine, etc.).

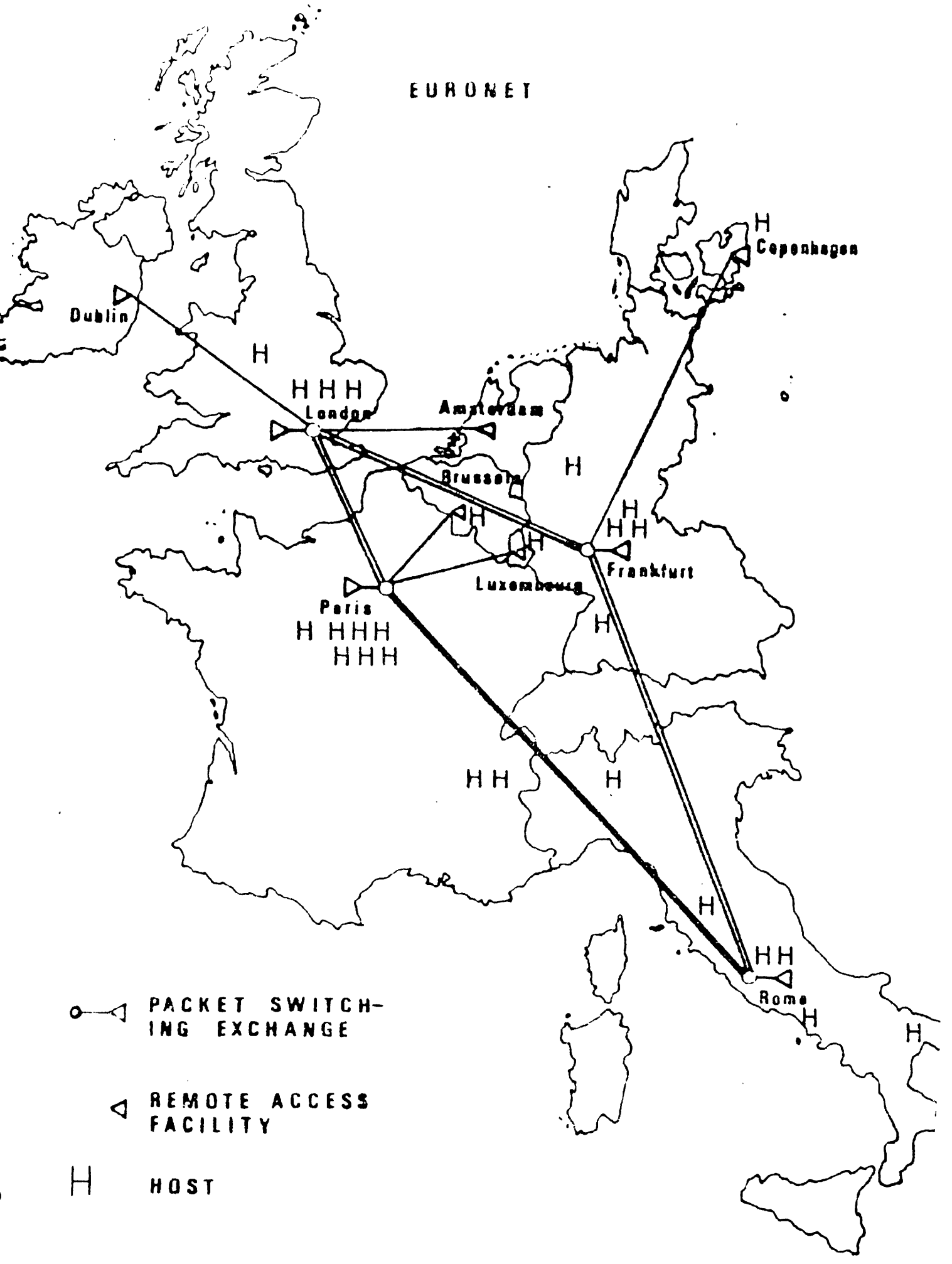
The idea of setting up such a substructure was suggested in 1971 by the Scientific and Technical Information Committee of the European Community. In 1974, a plan of action for 3 years was adopted by the Council of Ministers of the Community. The responsibility for the project was entrusted to the General Administration for Information and Scientific and Technical Documentation (DG XIII) of the Committee. In 1975, the Committee delegated the responsibility for the setting up of the data transmission network to the PTTs of the 9 member states. These national administrations in their turn signed an agreement which makes them jointly responsible, and they delegated the responsibility for contractual relations with the Commission to the French PTT, and also the industrial definition of the project. Such is the administrative description of the EURONET business which has taken 5 years of preliminary negotiations and 4 years of implementation to arrive at its present state of maturity.

The EURONET network is a simple transport substructure, and has no computing capability, except what is necessary for switching functions and for accounting. This substructure uses for a large part the existing means of telecommunication, which is owned in each country by the Post and Telecommunications network. Thus EURONET is in the same situation as the private users of leased lines, and does not benefit from any privilege coming from the PTT monopoly in each country.

At its inception - forecast for the summer of 1979, then put back to early 1980 - the network will have a link by country, as the map demonstrates, 3 connectors in Frankfurt, London, Paris and Rome; 5 connectors in Amsterdam, Brussels, Copenhagen, Dublic and Luxemburg; and a management centre in London, where the invoicing of users will be centralised.

In future, concentrators may be replaced by switching centres, and other links created, mainly in Switzerland and Spain; another management centre may be added. The first links will be 48,000 baud leased lines between switching centres, and 9,600 baud of lines between switching centres and concentrators.

The technique selected for transmissions through the network is packet switching, which improves the average throughput of the lines. The X25 protocol of the CCITT


EURONET
Copenhagen
Dublin
London
Amsterdam
Brussels
Luxembourg
Frankfurt
Paris
Rome
PACKET SWITCH-
ING EXCHANGE
REMOTE ACCESS
FACILITY
HOST

will be used for the linking up of terminals and processors which will be accessible on the EURONET network. The fact that an international standard has been adopted speaks well for the intention of the Community to place the users on an equal footing on a technical level. The technical solution comes from TRANSPAC. Its operation has been given to a Franco-British software consortium, using SEMS and TRT-Philips equipment. This network, set up for European users and suppliers of automatic documentation, will soon accept all kinds of input: data bank and data base consultation, but also plane ticket orders, aeroplane reservations, and may be an electronic courier for businesses.

The cost of an ordinary bibliographic study amount to about FF25 in the case of the use of a 300 bit per second teleprinter.

If one compares the price of teleprocessing enquiries on EURONET on this basis, with previous hypotheses and actual prices in America, it can be seen that the price of enquiries is certainly higher in Europe, and that the telecommunications cost is a higher proportion of the total in Europe than in North America. On the other hand, significant price drops are expected in America, and the price of enquiry will soon be about $1 for half an hour. Here and now TELENET costs about $0.90 and DATAPAC (Canada) about $1.20. EURONET should therefore

aim for a maximum price of F55 per enquiry in the fifth year, against F25 in the above example. Some experts, including professor Piatier, think that the strength of American dealers springs from their concentration. The 28 hosts of EURONET according to this appear numerous and too widely scattered, which makes the substructure too expensive. EURONET's effort to reduce the cost of telecommunications should therefore attempt rearrangement of files and European retrieval services. With regard to this, on should consider the possible pressure the EURONET tariff could have towards such a concentration. At present, it is not clear that this stake is well weighed up by the member countries of the EEC, or by their administrations.

The promotion of the network to users or suppliers of information or documentation services will be ensured by the support of the EEC through an organisation called 'DIANE-EURONET'. The PTTs of the member countries will, for their part, ensure the search for their users. Finally, the extension of the network outside the 9 members is planned: in the short term, nodes will certainly be set up in Switzerland and Spain. But the network should expand as much in the services offered as in the geographical spread of access. In other words, the offering of conventional computing services will certainly be necessary for reasonable economy. EURONET has favoured, and will continue to do so, the development

of uniform international standards for the transmission of data (X25, XA, XB, XC, X7X.) Its setting up has encouraged several European countries to decide to form a national public service for data transmission and often to opt for the packet switched network. This is the case in France, England and Spain, to name but a few.

Probably the American retrieval service will soon be accessible to European people through the EURONET network, which should have the effect of lowering the cost of such services in Europe. If this happens, EURONET will have shown that it is an effective communication system for the user, and favourable to balanced competition in information services and products. But it is still too early to say if the challenge will be taken up.

1.1.8.4 DATA RESOURCES Inc.

DRI is an American service company which specialises in econometrics, with a European subsidiary in Brussels. DRI has econometric models and data bases. The data comes from the American commerce department, the OECD, the FMI, and other different sources of official statistics. From these models, DRI produces its own forecasts: for Europe these projections concern the main aggregates: GNP, foreign exchanges, balance of payments, etc.

The customer is offered a pure time-sharing service. The customer can consult DRI data bases, work on the models with his own data (stored in protected secret files), build his own models. In France, for instance, access is made by telephone, calling a Paris number. Afterwards, the transmission is forwarded via the International Record Carriers network (ITT, Western Union, RCA) across the Atlantic, then TYMNET or TELENET in America. The type of subscription and the prices vary according to data bases to which the clients wish to have access.

1.1.8.5 CHASE ECONOMETRICS

Chase Econometrics is a subsidiary of the Case Manhatten Bank, which specialises in the building of economic models. 80% of the company's activity consists of setting up international sectional forecasts every three months, which are publisyed in the form of a report. The client can pay a subscription (usually annual) for standard reports or for specialised reports. Access to the forecasts and historical information from which they are produced is also possible in conversational mode. The user can also program the models with his own data and build is own models, which he can add to his collection. Access to the data bases is carried out through the ADP and ICD networks (Inter-action Data Corporation). The central computer is in Michigan.

1.1.9 Administrative and governmental data flows

One cannot conclude this survey of the different TBDFs without mentioning the need of international and governmental organisations for information. The methods of our study have not really enabled us to consider this area, but it is appropriate to consider its significance, even if the corresponding amount of data is much less than that of private operators. One can mention in this respect the systems of the International Institute of Patents of the Hague, the dossier transfers between the administrations and Social Security.

The International Organisation of Criminal Police (INTERPOL) also operates from numerous transfers of information, with the aim of identification and international search for criminals. But it does not involve computerized flows, for the network is not at present made up of anything but teleprinters, located in 58 countries, linked through the Telex network. The creation of a computer network is at present being studied.

1.2 Classification of TBDF

1.2.0 Introduction

In the previous chapter we have shown a panoramic view of the whole range of TBDF, as they appear in the survey of different areas. This presentation, as we have already said, does not constitute a relevant classification for analysis. So it is appropriate to consider what would be a classification of TBDF which would allow rearrangement of the flows in categories suitable for different types of analysis. The object of this paragraph is to present this idea.

1.2.1 Criteria of classification

In the light of what has gone before, one can envisage different classifications of the data flows, according to whether one gives priority to:

- the medium of the transfer,
- the personality of the transmitter and the receiver of the data,
- the nature of the data carried,
- the direction of international exchanges,
- the commercial and non-commercial nature of the exchange

The different criteria do not conflict; each of them, on the contrary, is relevant to certain types of analysis, as we shall specify in the following paragraphs.

1.2.2 Transfer medium

Firstly we shall consider the medium used for the data flows, for this criterion seems to us to be of primary importance, for several reasons, both practical and legal. Indeed, in a case where the transfer of information is carried out on what we shall call 'material medium', that is to say on magnetic tape, floppy discs, cassettes, punched cards, listing, even discs, the result is that the data travels like merchandise; the medium makes the data flow perceptible, either in customs, or in postal or air freight statistics. The checking of physical flows can thus be done by methods which are well known and tried. On the other hand, all information carried by a telecommunication substructure is, necessarily, fleeting and invisible. So these flows are impossible to detect, to check or grasp without strict investigation, which can call for measures which would be considered interruptive and unpleasant, at least in a free society. In any case, the knowledge of these flows implies a close collaboration between those conducting the enquiry and the professional classes concerned.

This distinction between non-material flows (which use telecommunications) and material flows, using equipment, seems undeniable: it is doubtless linked to the legal status of the flows, to their identification, to the speed of circulation of information, and to a certain

technological state of development. We shall specify later, respectively in paragraphs 1.2.7 and 1.2.8 the particular positions of material and non-material data.

1.2.3 The character of the operator

The character of the operator of the flows is not without significance for the analysis. We shall remember this as a criterion of secondary importance, allowing when necessary, the dichotomy between material and non-material flow to be improved. For example, showing interest for this second criterion, we shall recall that American multinationals accord a great significance to the maintenance of data flows. For such operators, the same as for certain companies, whose social object is to carry out international transactions, the stake is important. This is why we that that the operator's personality is to be taken into account in analysing the data flows.

1.2.4 The nature of the information carried

The nature of the information carried has never appeared to us during the survey as a primary criterion for distinguishing between the flows. Very frequently, an economic agent causes international flows having a bearing on commercial, accounting, financial or technical data, so intermately mixed that it is impossible to establish the role of each type. Except in very special

cases, like SWIFT or the documentary data banks, the nature of the information and the content of the data messages is not a sufficiently general criterion of classification to be applied easily to all practical examples. But it is a distinction that the introduction of data protection legislation will bring in certain European countries: it is the distinction between data concerning people and non-personal data. In different countries this distinction will take several forms:

- a distinction between data referring to one person (whether physical or not), and non-personal data
- or a distinction between data referring to one physical person and data not concerning a physical person
- or a distinction between data referring to a physical person, data referring to a non-physical person, and non-personal data.

These different forms of distinction are the subject of further study in section 3. Let us not anticipate here what will be said further on, but we think it is fundamental to note that this criterion of nature, if it does not relate to anything which is observed at present, must be made feasible, as it is needed for the application of data protection laws.

1.2.5 Direction of the exchanges

It was outside the scope of this study, and physically impossible, to carry out an in depth study of the geography of the data flows. The results of the study do show, however, that the directions of flow are not random. The most significant conclusion of our study relating to this question, is that the geography of the data flows parallels that of the large economic decision areas and the large exchange current lines. This assertion is explained by the fact, shown in section 1.1, that most TBDF concerns industrial, commercial or financial activity. The large computer centres of the multinational companies, like those of the time-sharing companies or the data bank owners, are near the decision centres of the large companies. In Europe, these centres are essentially:

in Germany: Frankfurt, Dusseldorf, Munich

in Belgium: Brussels

in France: Paris

in Italy: Rome

in Holland: The Hague

in the United Kingdom: London

North America has a limited number of such centres:

in Canada: Toronto, Montreal

in America: Cleveland, New York and the largest towns of California.

The existing networks have been established in various ways between these different points. However, it is very interesting to note that the European entry point to the transatlantic network is, in a very large majority of cases, unique, and situated in London, Brussels, and, to a smaller extent, Paris or Amsterdam. This last point constitutes a good example of the correlation mentioned earlier, between the localisation of head offices of the large companies and that of the large computing centres.

It is also remarkable that most material data flows use the same directions as the processing networks. This fact seems to show that the setting up of networks has not greatly changed previous practice. Going further back in time, one could state that these large lines of exchange were already characterised as major routes for mail, then for telephone and telex, then for material flows, following an increasingly advanced automation system; these last flows now are giving way to networks. Another illustration of this fact is given by the creation, since 1977, of the POSTADEX network. First on a national level in Great Britain (DATA-POST), then in France (POSTADEX), then extended to an international scale, this postal network offers a personalised message carrying service, and it especially intened for businesses. It is worth noting that this network has as its particular aim the market of material TBDF; it was formed between the following countries: Great Britain, Belgium, France, Germany, Holland, USA, Brazil, Hong Kong, and thus uses the same special directions as mentioned above.

Thus the data flows use largely the traditional directions of the large exchange currents. This shows that the hypothesis of 'data havens', where data could be stored without cramping legal restrictions (on analogy with 'tax havens'), is completely unrealistic today.

But if the large networks have not innovated the geographical position of the exchanges, does this mean that their action is neutral? Of course not. By building motorways where there were local roads, the large networks emphasise on the contrary the imbalances which could exist between the financial areas and the other towns, between the mutlinational companies and the national companies, between the national companies and the regional companies.

So in fact there is a risk of economic imbalance resulting from the development of such networks. It is completely outside the scope of this study to analyse the risks of inaction in this sphere, or to consider the means the countries could use to establish an appropriate balance between exchanges. However, one can observe that tariff and regulatory measures in telecommunications can exert an influence on the subect that it would be appropriate to analyse further, and the same applies to the taxation and custom measures with regard to flows in material form. Let us remember in this aspect that the direction of exchanges, which it would be appropriate to combine with the operators' economic size to complete the

economic geography of the flows, does not make up an important criterion for classifying flows, but nevertheless remains an important part of the analysis, which it will in future be appropriate to consider.

1.2.6 Commercial and non-commercial

In certain cases, TBDF constitutes supply of a service which leads to an invoice between the customer and the supplier, and to the corresponding financial flow. In other cases the service is supplied free, as perhaps in the case between parent company and subsidiary, under the terms of certain agreements.

Finally, the data flow can be just the delivery of information belonging to a product or a service which is much more important: this last case is, for example, transfer of information linked to international commerce, which is an integral part of the transport and delivery of goods.

From an economic point of view, it can be interesting to make the distinction between commercial and non-commercial flows. The first reason, which we shall discuss briefly here because it is considered later in depth (1.3.4.2), concerns the evaluation of data flows. This is naturally much easier in the case of a commercial flow, because the flow corresponds to the supply of a service, whose sale price can serve as a basis for calculating the value. There is no such simple method of evaluating non-commercial flows.

The second reason concerns the activity of the computing sector. Commercial data flows correspond to the purchase of certain services abroad. (One could, though it is not needed here, give a list of these services: timesharing, interrogation of data banks, software purchase, information retrieval, etc.). It is important to analyse the imports from different European countries, the world wide imports to the EEC in this sphere. The number of imports, compared to the world wide production and to the exports from this sector, and the evolution of this external balance, enable the assessment of the strength of the processing services of a country. This analysis enables one to draw some conclusions with regard to employment and the commercial balance of certain computing services. Experts predict that in future this sector of teleprocessing will experience a very strong development and will become an economic activity of primary significance. Thus it is important to monitor its development properly: acquiring a strong teleprocessing sector will very certainly in future create jobs, earn foreign currency, ensure great profitability and a strong development of telecommunications systems, and finally accumulate knowledge and potential for research and development.

Finally, the last reason which justifies the dichotomy between commercial and non-commercial flows is that undoubtedly it is appropriate to pay particular attention to non-commercial flows which may exist in the large companies. In fact it is normal that a subsidiary

regularly sends to its parent company a certain amount of information pertaining to its financial position. Such information figures within the normal relationship a company develops with its shareholders. But, in certain cases, it can seem that the parent company asks its subsidiaries to give it more inportant data then the subsidiary is obliged to give, and without compensation. Then one should consider that the corresponding work, which can include the acquisition, assembly and processing of data, is not connected with the practice of the subsidiary's activity, and will therefore represent profit transferred to the parent company. We have at present no means of telling if such a policy exists, if it is in use, or if it does not exist. One thing alone is sure: temptation is very great, and countries should beware of supplying opportunities for tax evasion.

It is clear, from the reasons we have just shown, that the commercial/non-commercial criterion can be very useful in conducting an economic analysis of data flows, if not even an element of primary important.

1.2.7 Material flows: postal and customs position

One vital base of the classification we show in this section rests on the difference between material and non-material flows. In fact, the material flows come on the one hand under the monopoly of private correspondence

held by the Post Office, and, on the other hand, under the customs code, because, when they cross the boundary, they are classified as taxable goods. On the other hand, the non-material flows are regulated by the telecommunication system. The aim of this section is to show the postal and customs position of material flows: the telecommunication system is the subject of section 1.2.8.

The postal service, operational throughout Europe, aims fundamentally to ensure a monopoly on letter distribution, to the profit of the Post Office, and also packages and papers less than 1 kilogram in weight. Therefore, any private contractor is forbidden, as is any person not employed by the service, to undertake this delivery of letters. Defence in Europe of the post monopoly is one of the duties of the European Conference of Post and Telecommunications (CEPT). The user can in fact choose three types of post, each type corresponding to a different level of responsibility of the PTT.

- objects for 'ordinary correspondence', for which the Post Office is not held responsible in case of loss.
- registered mail, for which the Post Office does not pay any penalty for damage, or for theft. But loss must be compensated, except in circumstances beyond their control. Thus for example a magnetic tape sent by registered post which arrives torn or demagnetised would not be compensated if it arrived at its destination.

- items of declared value are insured both against risk of loss, deterioration and damage. However, there is a limit to this responsibility: the highest insurance value, fixed by agreement, is variable depending on the country of destination.

The Post Office administration also undertakes to respect the confidentiality of correspondence, ie letters and parcels, that it forwards. The customs can check the contents of a letter or a parcel, because they are responsible for intercepting deliveris whose import or export is forbidden, subject to restrictions or formalities. They must also ensure that customs rights have been fulfiled if this is necessary. But in no case can they have knowledge of the meaning of the correspondence, and may open letter or parcels only in the presence of Post Office and Telecommunications agents.

The definition of the extent of the monopoly causes disputes between the Post and Telecommunications administration and certain private businesses which use private postal services to deliver their magnetic tapes. The PTT network considers that such exchanges fall within the concept of correspondence, even if the medium used is not the usual letter paper, and thus is subject to the monopoly. Businesses put forward their own arguments on the speed of the service and the responsibility they can obtain through a contract on the carrier's part with a higher guarantee then the administration can give.

To our knowledge, this is the position, but neither party is very forthcoming on this question.

With regard to customs, a report by the Conseil de Cooperation Douaniere (Customs Cooperation Council), published in January 1977, enabled the updating of customs codes, which until then had ignored computer and computing. This report, which constitutes article 49 of the CCD, establishes the value to be assigned to the program medium and documents output from the computers when going through the customs. The report states that 'the customs value ... can be determined by reference to that of plans and industrial designs'. The report specifies further that the value can be estimated by taking account of the four following elements:

a The price of support medium (ie of the magnetic tape, cards, disc, etc ... on which the information has been recorded).
b The cost of writing the program, or the collection of the data before it can be recorded.
c The cost of recording on the medium.
d The profit made on these three elements.

When the last element cannot be determined, the report specifies that it will be estimated at 100% of the total amount of the other three. Mental work (preliminary to the writing of the program) and formatting the data are explicitly excluded from the customs value. It is in

accordance with the general principle, which excludes from customs value all intellectual investment and author's rights. Once can see another application of this principle in music, in the assessment of the value of records and cassettes. Also the report specifies that programs of which many copies are sold 'are effectively merchandizable goods, whose price can form the basis of the valuation'. As for documents output from computers abroad, it is specified that they are 'the result of supply of a service, and can be valued as such', and taxed according to the corresponding indirect taxes in the EEC countries.

However, under article 3 of the Treaty of Rome, no duty can be demanded on goods circulating within the EEC. In principle, the preceding rules therefore only concern data flow between an EEC country and an outside country. However, even inside the EEC, a differential duty can be demanded, corresponding to the different VAT rates between two member countries. In this case, the fule of customs value applies.

Let us note that this rule has the two advantages of being precise and satisfactory on a commercial basis. It refers to a clear doctrine and one with a very wide use. But we hear many anecdotes indicating that the setting up of this rule was not effected without difficulty: sometimes the sender of magnetic tape has to spend a long time at the border, or the customs shed of the airport before the customs officers could solve the problem.

1.2.8 Non-material flows: the telecommunication regulatory administration

Material flows are subject both to customs laws and to the postal monopoly. The position for non-material data flows is different: customs rules do not concern them. On the other hand they are ruled by a general system, that of telecommunications, which has a monopoly just as rigid as they of the Post Office, and which, in addition, does not guarantee as good conditions to the users, from the point of view of the service. The basic rules of the telecommunications network are established nationally. But in Europe all these rules come from the International Convention of Telecommunications. These rules were then completed by the ideas of different commissions of UIT, and especially the CCITT (Consultative International Committee for Telegrams and Telephones). These rules set out in no uncertain terms the systematic character of telecommunications, in particular, rule that the PTT reserves the right to intercept all private communications considered dangerous for the security of the State (article 32 of UIT), and they reserve the right to cancel the service for an unstated length of time (article 33 of the UIT). The same rules state on the other hand that the PTT accepts no responsibility with regard to users of international telecommunication services (article 34 of UIT): the user therefore cannot make a complaint, nor claim any compensation when the

service is cancelled, nor can he complain about bad quality of the transmission or disclosure of data to a third party. There is nothing equivalent to registered post for European telecommunications. This is the fundamental difference from the postal system which considers the possibility of compensation, even if only to a limited extent, for the user in the case of loss or damage of the post.

On the other hand, recommendation D1 of the CCITT defines very strictly the monopoly applying to the position of international circuits. This article stipulates in particular that:

- communications must be restricted to the activity for which the circuit has been granted
- the PTT must forbid a client supplying a telecommunication service to a third party
- the PTT reserves the right to set up specialised networks to satisfy specific needs of certain clients.

The International Convention of Telecommunications applies to all subscriber countries. But each administration has the choice of conforming, or not, to the CCITT's rules. The strict application of article D1, which we have mentioned above, is particularly the act of European administrations, under the aegis of CEPT, of which we have already spoken.

This very strict definition of a monopoly applies in Europe to the TBDF operator, whether he is himself European or from a multinational company. He has no right, for example, to join with a third party to share the cost of using a line; he cannot obtain any guarantee of service no compensation in the case of destruction or disclosing of information. The transfer from the old methods of forwarding data to the modern methods using the networks thus leads to a decline in legal protection for the user: under the old system, post guaranteed for the user confidentiality and under certain conditions and certain restrictions, the possibility of compensation. The telecommunication user can claim neither of these guarantees. This fact is one of the fundamental differences between material and non-material flows which we wish to underline.

1.3 The amount of TBDF

1.3.1 Interest in the amount of data flows

In the proceding discussion, the quantitative aspect does not appear. Why should one wish to quantify the data flows? Can one determine which flows bear the important amounts of data, which can have a considerable bearing on the balance of commercial exchanges? Or on the level of employment? Those which represent a serious danger of alienation or cultural dependence? etc.

We must state what a quantitative measurement would reveal. For clearly it does not consist of collecting quantitative data for the pleasure of accumulating figures: a quantification should first attribute a measure of importance relative to different flows.

The criterion used to carry out the measure is not important. The main thing is to have available a sufficiently homogeneous criterion to define, even roughly the main data flows and the minor ones; the rapidly growing flows and the constant and declining ones. This raw information is fundamental: for it is this which enables the economist, the lawyer or the sociologist to appreciate the essentials.

In our view, a quantification of the flows should also throw light on the economic aspect. Taking account of the increase in automation of society, and the value the economy gives to data, the data flows across the boundaries make up a very significant economic stake. But, at present, no data can measure this influence and its development. Who today can say what the impact of the data flows is on the level of activity, in the processing sphere? Is it significant or negligible? Who knows, even approximately, the value of the flow of currency accompanying the data? There is a gap there which a measure of the flow would fill. But the economic aspect is not the only one. TBDF also affect the cultural development of our society. One needs only to take the example of the data bank of the New York Times,

INFOBANK. Due to its enormous influence on press information, INFOBANK is in the process of becoming the world's memory. If that happens, the historians who, in 10 or 20 years time, undertake to tell the story of the creation of the European community, will be tempted to make reference to a documentary source that is almost entirely American. To judge this trend, one must therefore determine the extent of cultural dependence.

1.3.2 Difficulties encountered during the survey

With regard to data flows, two important methods can be used to obtain quantitative information. The first consists of finding global statistical data which already exists, and concerning either directly the flow itself, or some activity linked to the flow. The second method consists of collecting the information on the spot, from economic agents who have a direct or indirect link with the flows.

Now, as we recalled as an introduction to this report, at present no global statistical information on data flows across boundaries is available; neither from official statistics services; nor from the Post and Telecommunications administration; nor from the customers administration. Here and there, in some countries, scraps of information can be obtained, but it does not fit together. However, the group of experts of OCDE responsible for studying the obstacles to TBDF and data protection have taken a census by means of questionnaires

information available in the different member countries. The table on the following page, from an OECD source, presents a synthhesis of the available information on this subject. This table shows two facts:

a) The data which exists in the different countries only covers one part, often imperfectly, of the description of the TBDF given above. These data flows neither give a global view, nor permit analytical study.

b) Apart from some exceptions, the available data is not homogenous between the different countries consulted, where units of measure used are different, and this prevents any significant comparison of the flow in value and volume.

ETAT RECAPITULATIF DES INFORMATIONS DISPONIBLES DANS LES PAYS DE L'OCDE

(PAR TYPE D'INFORMATIONS)

Pays	Australie	Canada	Finlande	France	Pays-Bas	Irlande	Japon	Suède	Suisse	Royaume-Uni	Etats-Unis
Type d'informations (1)											
- volume total du trafic de données	+	+	-	-	-	-	+	-	-	-	-
- nombre de lignes spécialisées	x	+	x	-	+	-	+	+	-	-	-
- utilisation de lignes spécialisées	+	-	-	-	-	-	+	-	-	-	-
- exportations de services informatiques	-	+	-	+	-	-	-	-	-	+	-
- importations de services informatiques	-	+	x	-	-	-	-	-	-	-	-
- recherches dans les bases de données	x	-	x	-	+	-	-		+	-	-
- répartition de la totalité des flux entre les données de caractère personnel et sans caractère personnel	-	-	-	-	-	-	-	-	-	-	-

Notes : (1) Il conviendrait de faire remarquer que divers pays peuvent fournir des informations relatives à la même rubrique mais exprimées dans différentes unités de mesure.

Symboles : "+" = informations fournies en réponse au questionnaire

"x" = informations susceptibles d'être obtenues

"-" = aucune information disponible

(Document extrait de la note DSTI/ICCP/79.43 de l'OCDE.)

However, although data is not available, it does not necessarily mean that none exists. In the case of customs administration, for example, it seems accepted that information does not exist because the classification of the customs statistics is not detailed enough: all the computer materials are recorded under a single title. It is not certain that this is the general case for European countries. But the methods we have available for this enquiry did not enable us to systematically compare the statistics available from administrations. In addition, some of these statistics can be of a fairly confidential nature.

A direct enquiry of the operators was therefore the only quick possibility of obtaining information on the data flows. This is the method we adopted. But, taking account of our methods, we have had to select a limited number of interviewees, and using our contacts to give a feel for the situation. One could extrapolate the items of data to draw conclusions on the whole flow, but it would be difficult and dangerous: for the samples of businesses which we visited (about 80 in number) are not statistically representative. This led us to give up hoping for global data.

The second difficulty stemmed from the fact that it was impossible for us to acquire the information we sought on the spot. This was so for many reasons: the first is that, in most cases, the data which we sought did not exist in the business. Only large companies usually have

figures on the cost of telecommunications, as a percentage of the processing budget. But this figure itself is only of moderate interest: with regard to specialised links, it is impossible to deduce the amount of data exchanged, since the cost os fixed no matter what the usage. When a switched network is used, it is no easier to decude the amount of the glow: the global cost of telecommunications includes a total of short distance communications at a low cost, and long distance communications which are very highly priced. Its relationship to the timespan of the communication is therefore not simple. In some cases, companies have figures available on daily weekly or monthly times of connection. But besides the fact that one rarely finds such information, it is only part of the data, since it excludes all the material flows. And this merits a general observation: it is even more diffucult to obtain data on material than on non-material flows. This is surprising, since material data flows are those which, by their very nature, one would consider to be easy to monitor.

The second reason which makes the collection of such data extremely difficult is that the data is generally considered confidential by companies. Everyone knows today, in industrial or commercial circles, how it is possible to use correalations data to produce new information. Also business circles are increasingly unwilling to supply data when they do not know what conclusions will be drawn from it. Adding to this the

mistrust which has arisen from the publications and rumours spread around by the works on the data protection, of which we have already spoken in the introduction to this report (1.0.2), it is very diffucult to obtain quantitative information from our interviewees.

The last difficulty is that, even when the organisation of the company allows it, quantitative information on the flows is not collected, because the company does not feel the need. The collection of this data requires therefore an extra effort, which can be substantial for several departments, may be involved; on the other hand, in certain businesses, it is not easy to differentiate between national data flows and international flows. It was impossible for us to demand this within this study.

1.3.3 Some quantitative aspects of TBDF

The following quantitative elements are taken from a report by OECD specifying the results of a questionnaire sent to the different member countries by a group of experts on the obstacles and data protection led by Mr Kirby.

The main result of this enquiry is that the data flow across boundaries is increasing very rapidly. Australia estimates at 50% the rate of annual increase of amounts of data transferred by the switched network, and the average annual increase of the number of specialised

lines abroad at 20%. Holland estimates an annual growth of 25% in the number of specialised lines with other countries.

For Japan, the number of circuits used for international data transmission services has also an annual growth rate of 25%.

Once again the heterogeneity of the available data, and the fact that no data concerns the material flows is deplorable. It appears that this growth can be accounted for largely by the increase of the use of teleprocessing as an administrative method in business, and by the expansion of the computing services industry. Which section of the computing service engenders data flows across the boundaries is however not easy to establish. The data suspects that about 50% of UK exports of computer services is computer time, but only 5% is online service.

The OECD report regretted, as we should, that it is not possible to obtain a great amount of quantitative data on this question. It hoped, without apparently believing it, that the new Eurodata study, which should be finished in 1980, and the setting up of different national data protection authorities, which will encourage an assessment of the flows of personal data, can produce some results in this area.

1.3.4 The basic problem: evaluation of data flows

Like all economic considerations, the data flows can become the object of two different types of evaluation: by volume, or by value. We shall examine in this paragraph how these two alternatives are possible. We shall make several reflexions on this subject, which arise from the enquiry carried out. This paragraph does not give a definite answer to the question of the evaluation of flows, which deserves much further study, but it gives a sketch which could be a preliminary to a much more detailed consideration.

1.3.4.1 Measure of volume

As we noted previously, curious as this may be, non-material data flows are the ones on which it is now possible to obtain the most quantitative information. They are also those which, up to the present time, have received the most attention from all the people and organisations interested in the flow of data.

In the information usually available one can find:

- the number of specialised leased lines between a country and abroad. It is clear that such information does not constitute in any way a measure of the flow, since only a very small proportion of the data flow uses these links. On the other hand there is nothing which gives any indication of the

amount of use of these lines. Nevertheless, the information is of some interest: it can give an idea, however rough, of the geographical division of flows which usually use this equipment: management flow of the very large companies, timesharing networks etc.

- the number of hours of telephone connections spent on the exchange of data between a country and foreign countries. Here too, it is a pity that this information relates only to material flows. Further, it must be remembered that this data is always spoiled by a large error, for a number of users connect small portable terminals without the knowledge of the telecommunications administrations. Finally, and this is the greatest source of uncertainty, this figure gives the amount of connection time, not of the amount of data transmitted. In the case of a timesharing link between a terminal and a computer, for example, little information is exchanged in an hour's connection. Despite the significant problems which we have just presented, this data can enable comparisons to be carried out between different countries, by using the comparable figures, or an analysis of its development in time. In addition it has the advantage of being easy to acquire, since the method of invoicing for the telephone still depends upon the length of the call.

- the number of bits transmitted this data alone measures exactly the amount of flow. Also one encounters estimates of the number of characters transmitted sometimes, which is equivalent apart from a factor. But these values are not usually available, because, with regard to non-material data flows, charging on the telephone network is still operated on the basis of timespan, and only rarely on the amount of data transmitted. The coming of packet switching networks and charging according to amount will allow the missing information to be acquired. But one must note that packet transmission will bring with it uncertainty with regard to volume, which will be the greater if an exchange consists of short messages. This point, which results from the fact that the unit of measure in his case is the packet, and that the last packet of a message is never complete, has given rise to pricing problems. Concerning material flows, it must be said that no comparable information is available, and no changes are envisaged in this sphere. Quantification however seems easier: in the case of magnetic tape, for example, the amount of data is approximately proportional to the recorded length of tape: as for magnetic disc, the amount is proportional to the number of sectors. But is it necessary to have a good reason to ask the carrier or the sender of the magnetic tape to state the length which has been used. And also is it necessary to know precisely sbout such media passing through national boundaries, and this is far from being the case ...

To conclude this section, one should note that the measure of the amount gives rise to a number of problems, both theoretical and practical. But there is another difficulty - a theoretical one: in an ideal case, one can acquire knowledge of how much data is transformed. But amount of data does not mean amount of information. A very long message may be almost completely lacking in information content. A short message may consist of some very important information. This observation, in our eyes, makes an economic assessment of the flows by their volume misleading.

1.3.4.2 Measure of value

For an ecomonic analysis of TBDF, one must attach a financial value to the exchanges. We shall not enter here into a detailed study of the theory of value, which would largely be irrelevant to this study. We shall only enunciate some simple ideas, which are nontheless operational.

It is appropriate particularly to distinguish between commercial and non-commercial flows, this being one of the criteria of our study.

When it is a commiercial flow, the work of evaluation is greatly simplified: the data flow corresponds to the provision of a service of which it is the result. Its value is equal to the price of the service, which it is easy to find since a sale price has been agreed between

the two parties. In most cases, the service in question is a routine one, and has a market price which is realistic; not artificial, as may be the case when the published price does not correspond to the financial transfer that is carried out in reality, but enables a concealed transfer of profit. Thus, in the case of a service between a parent company and its subsidiaries abroad, it could happen that the invoiced price of the parent company is higher than the market price of the service rendered; or, conversely, that the service rendered by the subsidiary to the parent company is invoiced at a lower price than the market price. We have taken this example because it is simple and explicit. We cannot confirm either that it is current practice, or unusual. We have never had any knowledge of the methods by which such services are invoiced between a parent company and its subsidiaries, for it was not within the objectives of this study to determine this, and had no means available to do it. But it is clear that it is a tempting practice.

When it is a non-trading flow, it cn nevertheless be the result of a service, which, although free, is no less current and has an established market value. This brings us to the previous case. This is the case of a free service of which one does not know the market value. Thus one must come back to the concept of cost price, but not the cost price of the flow iteself, which is the valuation method used by the customs, as we have already explained (1.2.7) - but of the service of which it is the

result. We shall not lay emphasis on this question, which is rather delicate and would require a complete study in itself. The concept of cost price is indeed a concept on which views are divided. The law-giver himself has often stumbled against this question. For example, in France, within the scope of the law on protection of competition, the definition of a lost sale in the case where it does not solely concern re-sale without alterations has been given up. And even in this case the definition given is subject to debate, for a lost sale is defined as a sale below the purchase price. But it is clear that a minimal margin is necessary to the seller, to ensure a balance, for he must cover his administrative and capital costs. Also, in France, the concept of cost price used by the tax administration to value stocks excludes all the administrative and commercial costs: this cost price corresponds with the cost of production, but not with what we would call the cost of 'putting on the market'. With regard to TBDF, we think that a detailed study is necessary, starting with concrete examples and a clear classification of all the possible cases.

1.4 Conclusion

This study has assembled information on the current state of TBDF, within the European Economic Community and between member states and outside countries. This information falls under three headings:

- major data flows at present
- classification of these flows
- quantification of these flows.

The major dataflows at present have been analysed following a survey which revealed their great diversity: as much with respect to the character of the operators of these flows as to the nature of the transmitted data and the medium used. These TBDFs did not originate with computing: the need for them, and their existence, result from the freeing of trade and from its new world-wide scale, which require businessmen and information to travel more and more throughout Europe and the world. Nevertheless, the computerisation of companies, now just at its beginning, will result in increasing quantities of transmitted information and higher transmission speeds. So we can foresee in the next few years a large increase in the amount of TBDF because of the spreading business use of computers.

We must note that this computerisation at present concerns only companies, so the only existing flows are professional ones. But private TBDF will appear in the next few years, resulting from the integration of computers in everyday life. Electronic mail is an example of such private development of computers; some of our air-mail letters will become electronic TBDF.

Besides these traditional flows, computing has created specific flows of a new kind: exchanges of programs, transfers of raw data, and of information about data processing, computer bureau services, etc. But the amount of this new part of TBDF seems to be very small at present, representing only a few percent of the total as revealed by our enquiry.

The classification of TBDF which we presented emphasises the basic dichotomy between:

- dataflows using a material medium: magnetic tapes, discs, punched cards, etc.
- dataflows using telecommunications.

This distinction seems unquestionable. Even if the actual data carried by post and telecommunications are of the same nature, the flows differ in their status as regards customs, postal, telecommunications, trade and tax regulations. Further, the structure of costs is

different in each case. This distinction, though it is necessary, does not cover all the needs of analysis and we saw that other criteria must be used to make an orderly census of TBDF:

- the distinction between personal data and non-personal data and, within personal data, between data about a physical person and data about a non-physical person
- the distinction between commercial flows and non-commercial flows
- the operator's character
- the direction of the exchanges, especially when countries outside the European Community are involved, and in particular USA.

As regards the quantification of TBDF, our survey pointed out the difficulty of obtaining useful information by direct enquiry. Systematic statistical data on this subject at a national level seems to be lacking. On the other hand, it turned out to be very difficult to get information from sources such as companies. The large number of information sources would require the setting up of a very powerful means of enquiry, out of proportion to this initial study. Further, this kind of data is generally considered confidential by companies, which would obviously hamper its collection, even for a statistical survey.

Lastly, from a theoretical point of view, a substantial effort is still needed to define more precisely a satisfactory method of evaluation of TBDFs. The ideas on this subject presented in 1.3.4 could constitute the starting-point of more extensive research in the continuing Community programme.

In conclusion, this study emphasizes the importance of TBDF for European countries. This has three aspects:

a) A commercial stake: we have pointed out how much TBDF is bound up with the internationalisation of the western economy and with its liberal character. In some sectors of the economy (banks, financial institutions, airlines, and all multinational companies) the maintenance and development of free exchanges of information, and the possibility of using for them the most suitable medium as regards cost, quantity and speed of communication, remains fundamental. Therefore we must watch over the maintenance and development of such exchanges in Europe, while respecting the principles of individual freedom and free competition established in the European Community's treaties.

b) A cultural stake: we have pointed out in this section how great is the risk of cultural alienation. The risk comes from the development of new information

media, such as those now required for the press. The development of such new technologies must not help the creation of monopolies benefiting only companies outside the European Community. Third-world countries are by now quite conscious of the problems of an American-dominated press, and attach great importance to achieving a better balance in this field. Among developed countries also, this balance must be maintained. Concerning databanks, the Euronet network is an important factor, which should allow Europe to take up a challenge posed by the American databanks and information retrieval systems which have established their reputation.

c) An industrial stake: the connection of data processing and telecommunications will give rise to a wide range of new products and services. Many have already embarked on this course in Europe. The entry of IBM in such a project as SBS clearly shows how attractive the future seems for large companies combining data processing and telecommunications. But it also clearly shows that it will become more and more difficult to sell data processing equipment without integrating it in large networks. Information competition will demand, in this field too, that European companies give themselves world-wide range and equal opportunity to the largest American trusts.

These are the thoughts to which this study has led us. We did not have the means to develop them completely within the scope of this report, but we hope that we have presented enough facts to give a firm base for more detailed studies which will follow.

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1.5.7 Other interesting sources

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