

**FORECAST OF
USERS OF ON-LINE RETRIEVAL SERVICES
FOR SCIENTIFIC AND TECHNICAL INFORMATION
IN EUROPE 1976-1985**

**Prepared for the Commission of the European Communities
by PA International Management Consultants Limited**

November 1974

EURONET User Studies, Phase 1

**FORECAST OF
USERS OF ON-LINE RETRIEVAL SERVICES
FOR SCIENTIFIC AND TECHNICAL INFORMATION
IN EUROPE, 1976-1985**

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Prepared for and with the assistance of Directorate General XIII
Scientific and Technical Information and Information Management

by PA International Management Consultants Limited
Advanced Systems Division

November 1974

The views expressed herein are not necessarily those of the Commission

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1. INTRODUCTION

1.1 Purpose of Report

This report presents the results of a study to forecast the users of on-line information retrieval services in the field of scientific and technical information in Europe for the period 1976-1985. The study was sponsored by the Commission of the European Communities, Directorate General XIII: Scientific and Technical Information and Information Management. It is part of a comprehensive development programme for an on-line European retrieval service called EURONET; it should be noted however that the forecast relates to the use of all such services in Europe, not merely EURONET.

This is the first attempt to prepare systematic and comprehensive estimates of the future use of on-line retrieval services in the field of scientific and technical information in Europe. Until now such forecasting has been virtually impossible; it is less than five years since these services began to be used. Even now, forecasts must be regarded as much more tentative than those that can be made in well established fields. However it is clear that a substantial growth of demand will occur, and to enable planning to proceed it is necessary to compile the best estimates that are possible at this time.

At this stage a long and exhaustive study is not appropriate: the resulting accuracy of detail would be nullified by the inevitable uncertainties in the overall picture. As time progresses it will be necessary to conduct frequent reviews of the estimates and to incorporate more reliable data as it becomes available and relevant, thus providing progressively more accurate forecasts of demand.

The objective of the present study was therefore relatively limited. The work was carried out over a period of 3 months by a small team representing a variety of disciplines, organisations and nationalities.

The study team had to make a number of assumptions about the eventual nature of EURONET, and of information retrieval services in general. One effect of these assumptions was to smooth out detailed variations, so that some individual components in these forecasts may differ appreciably from the correct values. The primary aim has been to provide a comprehensive and self-consistent picture in broad agreement with the best data and judgements so far available.

Care was taken, however, to use a methodology for the study that would allow updating of results as the design of EURONET progresses and as additional information on other services becomes available. The definition of assumptions and a detailed description of the methodology and sources are therefore important ingredients of this report.

1.2 Historical Background

In its resolution of 24th June, 1971, the Council of Ministers decreed that a network should be established to promote the exchange of scientific and technical information among the member countries of the European Community. To implement this resolution, the Council appointed a special committee, subsequently called the Committee for Information and Documentation in Science and Technology (CIDST). This Committee in conjunction with various committees set up under its auspices, notably the Technical Aspects Group, has worked with the Commission to develop an Action Plan for the implementation of EURONET. An assessment of the overall level of user demand for services of the type to be offered by EURONET was regarded as important information for the implementation of the Action Plan. This study was therefore initiated to produce results in time for the detailed planning work required within the framework of the Action Plan.

1.5 Concept of EURONET

Although the major tool required for the implementation of EURONET is likely to be a telecommunications network allowing remote access to computer-stored databases, the concept of EURONET is envisaged as the much broader ideal of the promotion of exchange and cooperation in the scientific and technical information field. Physical facilities will certainly have an important role to play, but there are many other factors also, notably multilingual tools, co-operative database production, etc. Although this report concentrates essentially on estimates of users of on-line services, it also takes into account - particularly in its scenario description - the fact that EURONET is based on the more general concept of the promotion of information exchange in science and technology.

1.4 Scope and Context of Study

The study specification required broad estimates of user demand to be available in time for the more detailed studies of the proposed Action Plan. It was therefore necessary to implement an intense multi-approach programme designed to utilise as many existing sources of data as possible which could be cross-checked with each other and with independent expert opinion. This was achieved through the involvement of some 10 team members working over a period of 10 weeks. Approximately seven man-months of effort were used in total. Clearly, the limited time available did not allow follow-up research in areas identified as lacking comprehensive data. The policy followed was to produce the best estimates possible with the available data and to indicate the degree of confidence in the results. Subsequent user studies can therefore go into greater depth in the areas of most interest, on a selective basis.

It is important to note that the estimates of user demand presented in the report refer to total expected European demand for on-line services in the scientific and technical information field, not only those available through EURONET.

The study specification excluded any direct investigation of databases and their use. A recent survey of work in this area is given by Williams.*

1.5 Method

The approach used in the study was to establish a mathematical model relating various input data, which may be estimated directly, to the desired forecast variables. The results were then reviewed in relation to current experience of the on-line retrieval field in Europe and the USA.

The study takes into account:

- 20 geographical regions
- 23 subject area sectors
- 12 types of on-line service
- 4 languages
- 4 measures of data traffic
- 3 forecast years.

* Williams, Martha E. "Use of Machine - Readable Data Bases". In Cuadra, Carlos (Ed). Annual Review of Information Science and Technology. Volume 9, Washington, DC, American Society for Information Science, 1974

1.6 Study Organisation

Project leadership was the responsibility of PA International Management Consultants Ltd. The project team included representatives of the following key organisations:

- Aslib (previously Association of Special Libraries and Information Bureaux)
Messrs. J. Martyn and G. Pratt
- EUSIDIC (European Association of Scientific Information Dissemination Centres)
Dr. A. Tomberg, Vice-Chairman.

Additionally, staff of the Commission worked as an integral part of the team. However, the views expressed in this Report are not necessarily those of the Commission.

Review meetings were held about every four weeks. Apart from their primary purpose of progress control, these meetings provided an important testing ground for parameter definitions, model development, and clarification of assumptions underlying the forecasts. It was felt that only in this way could consistency between the various forecasts be maintained.

TOTAL NUMBER OF USERS IN EUROPE

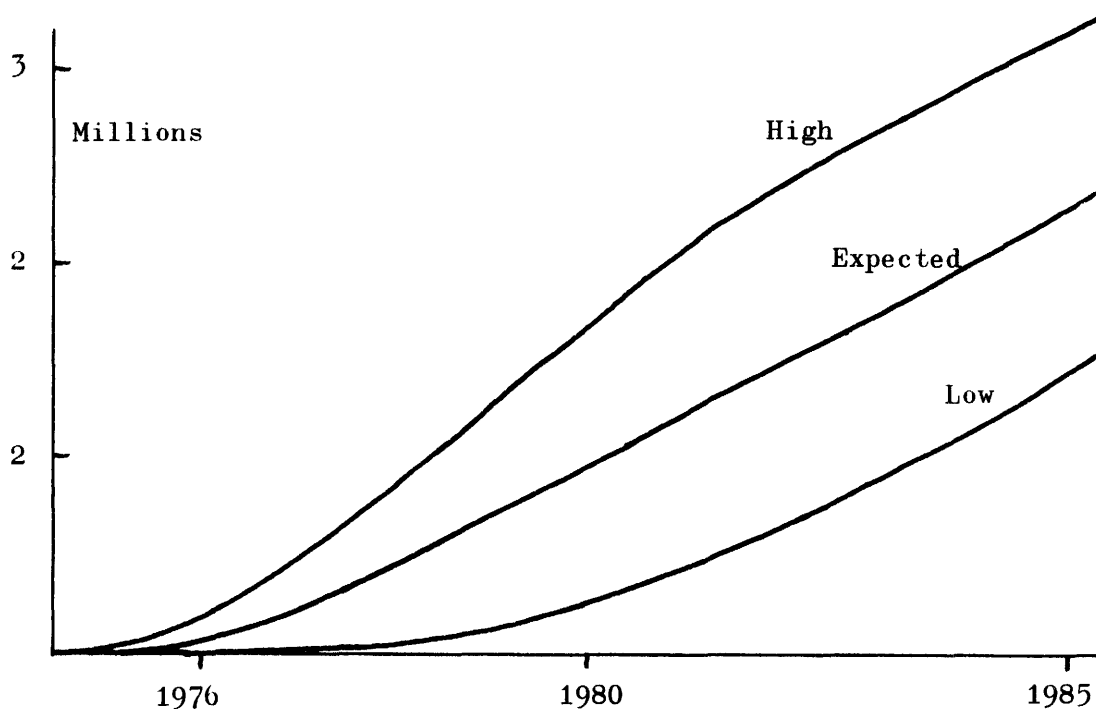


Figure 2.1

2. SUMMARY OF RESULTS

The study indicates that, across Europe, the number of users is expected to increase dramatically, i.e.:

1976	60,000
1980	960,000
1985	2,350,000

(These figures cover the Community countries plus Switzerland, Austria, Spain, Portugal, Sweden, Norway, Finland and Iceland.)

This forecast is critically dependent on the timing of introduction of new information services and on some other assumptions, such as the choice of mathematical model, and Fig. 2.1 shows, in terms of "HIGH" and "LOW" possibilities, how the rate of growth could be affected by these factors.

However, in the light of the evidence available at this time, including in particular the latest information from the USA and the known plans for new services, the figures in this Report are seen to be on the whole very reasonable. Commentators have pointed to several factors that have led to the growth in the USA and which may be assumed to lead to a similar growth in Europe:

- a rapid fall in the price of on-line storage
- a fall in the costs associated with data transmission
- the accumulation of operationally adequate databases
- improving reliability of computer systems.

The users are distributed reasonably evenly across the geographical regions, as shown diagrammatically in Fig. 2.2. The distribution by subject sector is however more uneven. Medicine and chemistry account for about 30% of all users during the first part of the forecast period, but a smaller proportion during the second part (see Fig. 2.3). In 1980, it is expected that approximately half of the users will work for commercial organisations, the rest for academic and governmental employers.

These figures relate to users who initiate searches to meet their information needs. They may not necessarily carry the searches out physically. This will be done in many cases by a mediator - usually a librarian or information officer.

Users by Euronet Region - 1980

Heavy shading = EEC

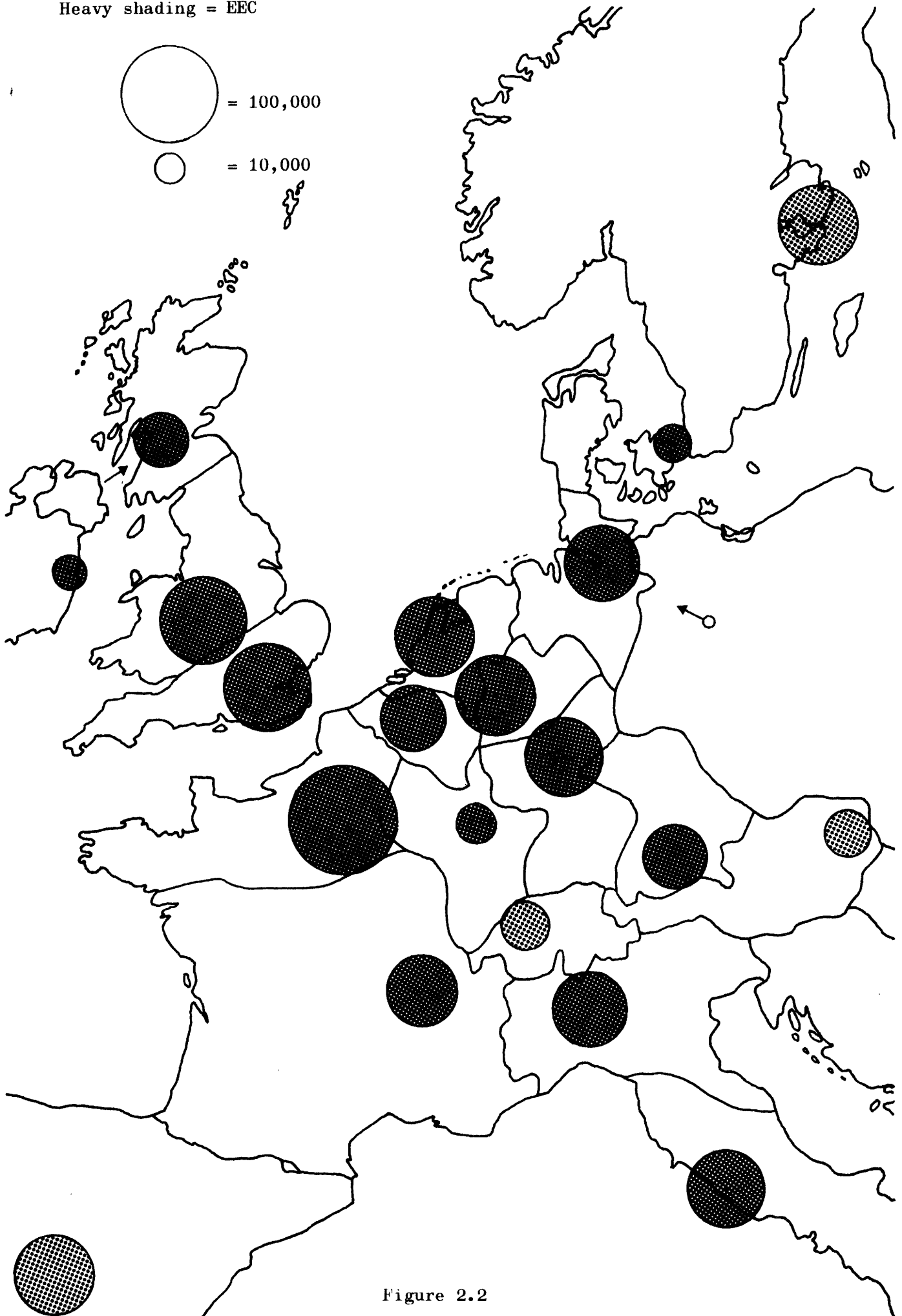
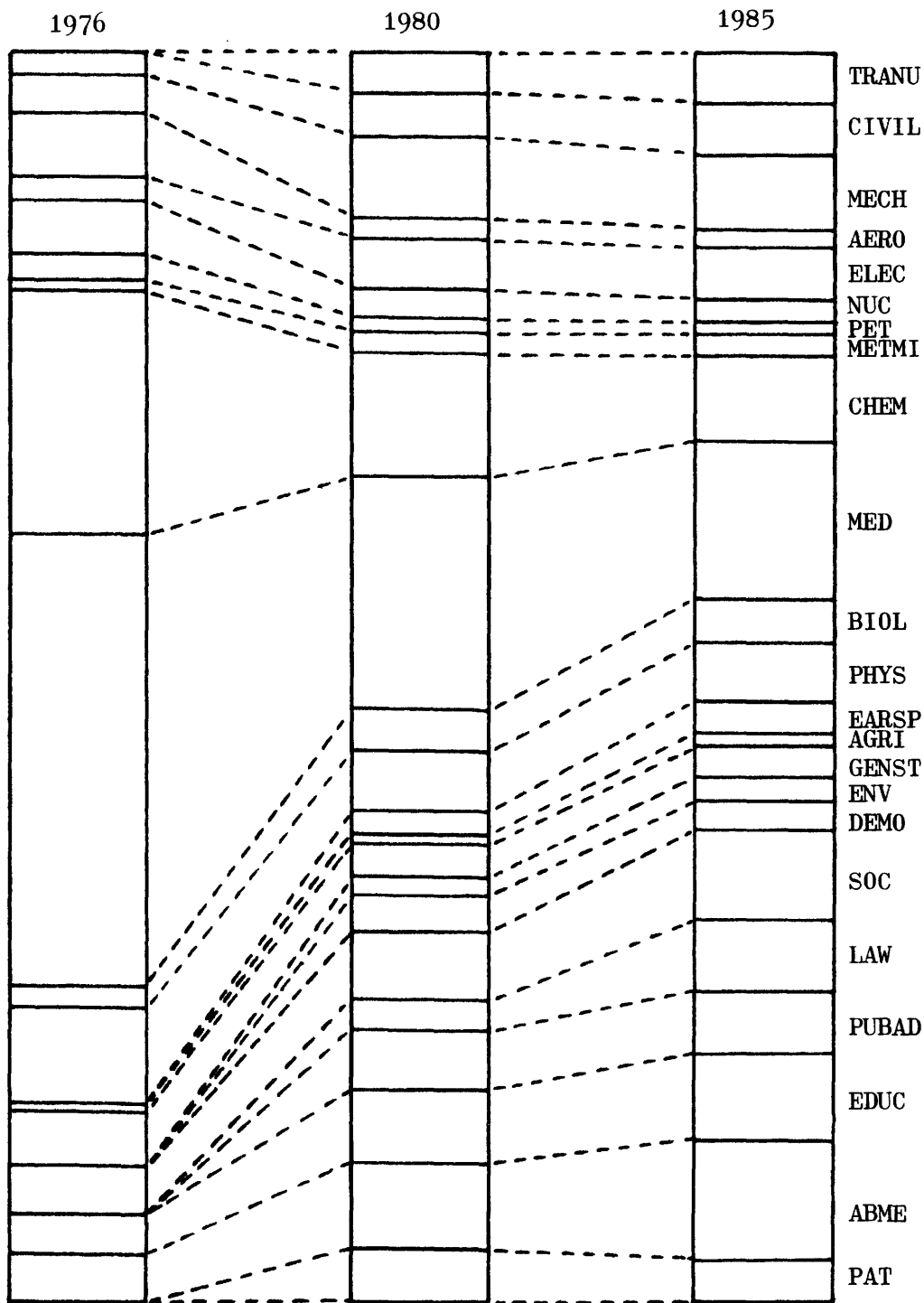


Figure 2.2

Distribution of Users Between Sectors
(percentages)



(for abbreviations - see page 18)

Figure 2.3

The average ability of users to use technical literature in various languages is:

English	77%
French	55%
German	52%
Italian	25%

The average annual frequency of use per user is expected to increase through the forecast period, from about 1.7 in 1976 through 2.8 in 1980 to 3.7 in 1985. The distribution of use is highly uneven and a small number of users have a very high frequency of use, while a large number make only very occasional use of information retrieval facilities.

The total data traffic flowing over the communication lines between users and the systems providing the on-line services is forecast to increase by an even greater margin than users, thus:

1976	$.1 \times 10^{12}$ bits per annum
1980	3.3×10^{12} bits per annum
1985	10.4×10^{12} bits per annum

In summary, therefore, the study forecasts a very rapid growth of both users and traffic between 1976 and 1980 of about a factor of 2 each year. A much slower growth rate prevails during the period 1980 to 1985. Nevertheless, the additional volume in the second period is comparable to the increase in volume in the first.

3. METHODOLOGY

3.1 Assumptions

The purpose of the study is to develop a forecast of users of on-line information retrieval services in the period 1976-1985. To do this, it is necessary to make some assumptions about the general character of the information service field in this time period. All forecasts in this report are based upon these assumptions.

a) Overall environment

It is assumed that the present political and economic patterns within Europe will continue. Information retrieval services will be developed steadily in response to direct factors of demand and cost, and will not be subject to external intervention and control.

b) Operators of services

It is assumed that a variety of services will be available in Europe. These will include:

- Large, international services offering access to a wide variety of databases. EURONET will be one of these, together with a small number of others of European or US origin;
- National or local services offering databases of local interest by virtue of coverage or language;
- Specialised services offering databases in highly specific subject areas;
- Various other services offered by organisations such as computer service bureaux as a sideline.

These services will evolve to fill needs, occupy markets, utilise spare capacity, etc. During the first half of the forecast period, growth will be so rapid that inter-service competition should not be a major factor. It may develop during the last half of the period.

c) Database suppliers

As in the case of operators of services, a large number of suppliers of databases is assumed. By supplier is meant an organisation which produces a machine-searchable database containing citations, abstracts, numerical data, or other searchable data. It is expected that the large professional and governmental suppliers will continue, supplemented by international organisations, commercial sources, as well as a variety of small organisations. Some of these will offer subsets of one or more of the larger databases.

Provided there is a proper financial return, suppliers are assumed to be willing to offer their databases through virtually any distribution network. Confidentiality or copyright considerations will only be important in a few cases.

d) Type of service

It is assumed that most services will be based upon retrospective searching and SDI capability. The present study has restricted itself to these types of service. However, it is likely that the range of services will in fact be broader, and thus the user and traffic figures of the study may be low. A discussion of some of this wider range of services is given in Section 5.2.3.

e) Language

Current language patterns in the areas of:

- ability to use technical literature
- original language of technical literature
- thesauri and command language

are assumed to continue. The trend will be for language facilities to broaden slowly and for users to increase their language competence in the languages that are most useful technically. Literature in non-Community languages, eg: Russian, Japanese, Chinese is of great or growing importance, but has not been taken into account in the forecasts.

No significant use of machine translation is expected in the forecast period, in the sense of providing translation of documents on demand.

f) Technology

It is likely that the present rate of cost/performance improvements in hardware and software will continue, and will generally facilitate the development and spread of information services. For example:

- Terminals will become cheaper and easier to use. Some will offer substantial intelligent functions.
- Storage will become cheaper, permitting more and larger databases to be held on-line.
- User interactive protocols will become easier to use as information retrieval software develops further.
- Communications costs will drop, permitting lower end-user costs, and encouraging the use of such developing facilities as facsimile transmission.

Apart from this general improvement, no specific technological factor is assumed to affect the forecast.

g) Pricing policy

It is assumed that costs of alternative on-line services will be comparable. While commercial organisations are likely to insist on short term profitability, public services such as EURONET may not. Nevertheless, financing from public funds is expected to diminish with time, virtually ceasing within the second half of the forecast period. Prices are assumed to be independent of the geographical location of the user.

These assumptions are in line with the basic principles developed by the special CIDST working group on pricing.

h) Costs

For a retrospective search against a single database, yielding 25 citations during a half hour session, the total charge to the user (in 1974 US dollars) including communication, processing and printing is assumed to be:

1976	§20
1980	§10
1985	§5

While these figures are only notional, they give an indication of both the perceived cost of a search to the user, and the potential revenue to the operators of services.

3.2 Forecasting Model

3.2.1 Purpose of Forecasting

The present study has two significant features which make forecasting difficult:

- a) The use of on-line information retrieval services is in its infancy and so there is very little trend data upon which to base an extrapolation. Further, the initial data on use is "noisy", in the sense that the very earliest use of new services depends upon accidents of availability, or of individual or organisational leadership, which are not representative of later mass use.
- b) Forecasts of the use of on-line information retrieval services depend upon what services will in fact be offered. Even if one could describe these future services in exhaustive detail it is unlikely that they would be realised in exactly the manner described. In any case, because of the brevity of this study it has not been possible to develop such exhaustive descriptions. Brief statements on assumptions have been made in Section 3.1 above.

Therefore, as far as possible, the specific forecasted variables must be related to those elements that are known today or that can be predicted with high reliability. Different approaches may be taken at different points in the forecasting procedure, ranging from the intuitive to the highly mathematical.

3.2.2 Requirements on the Forecasting Model

Any scheme of quantitative forecasting involves calculations upon what may be termed input data, in order to give forecasted figures. These calculations are not concept-free. They imply a way of looking at the phenomena in the area of the forecast, that is, they imply that the phenomena behave according to certain concepts. This combination of calculations and concepts is called a forecasting model.

The forecasting model used in this study has had to meet certain requirements in the areas of:

- components
- operation
- validity

These requirements help to explain the motivation behind various features of the model.

Components. The model has to be comprehensive with respect to a number of factors, ie:

- subject area
- geographic region
- services offered
- language capability
- forecast years

It must be organised from the outset to be comprehensive, and cannot rely solely upon isolated facts and figures gathered for other purposes.

With over 60 output tables and 15,000 component forecasts involved, a systematic means of deriving these figures must be developed. This has required that the model be computer-based.

Operation. The model has had to be developed and operated within a short time and resource schedule. This led to the use of existing data sources as far as possible. New data was not obtained by interview or sampling questionnaire; such methods require very strict quality control to give reliable results, and time did not permit this.

The model needed data from a number of different sources. It was desirable that this data should be gathered in parallel. This required the early definition of the model so that exact data requirements could be specified. Data could then be collected with the assurance that it was both necessary and sufficient to drive the model.

The model must be flexible and updateable. A computerised model can be both. If the model has a modular structure, then parts may be altered easily to reflect altered model structure. New values for input data may be inserted almost trivially, and the changes in output tables computed immediately. The fact that the effort of calculation is removed enables more attention to be paid to the values of data output, ie: to the content of the model.

The model has initially been developed for specified output tables and most likely data. However, being computer-based, later ad hoc analyses can be carried out with only modest additional effort. Further the model can be used in a simulation by entering data of the "what if" kind. For example, it can show what would happen if certain databases were advanced in schedule, or certain countries specifically encouraged use of these services.

Validity. The model must be demonstrably credible. It must therefore be fully explicit in assumptions, concepts, definitions, and calculations. In this way uncertainties can be isolated and identified.

The model must be internally consistent as well as externally consistent. There must be some means of assessing the overall accuracy of the output figures. It should be possible to appraise details of the model against pertinent known facts or related data. Some of these details may be intermediate results, produced as diagnostic aids, but not appearing in the final tables.

As pointed out earlier, however, the model is closely dependent upon assumptions made about the nature of future information retrieval services. Its validity is related to these assumptions, and cannot have an absolute, independent standing.

3.2.3 Model Components

The specification for this study states:

"The basic data to be obtained is:

- number of on-line users by sector, region and language;
- behavioural characteristics of on-line users by service used, eg: volume, type and frequency of enquiries."

One of the first steps in the study was the definition of the major terms used in this specification. These terms relate directly to model outputs, and the form of results discussed in Section 4. The definitions developed through consultation with the Commission are given below.

USER A user is someone who initiates at least one on-line retrospective search in the year in question. The user may carry out the search directly, or it may be mediated by another.

REGION A region is a specific geographical area, eg: Netherlands, Southern Italy. The regions of the study are listed in Fig. 3.1 and shown in map form in Fig. 3.2.

SECTOR A sector is a specific subject area, eg: medicine, education. Sectors may be considered as employment sectors, eg: people work in education, or as database sectors, eg: CAIN is an agricultural database. The sectors of the study are shown in Fig. 3.3.

SERVICE A service is a facility offered to users by on-line information retrieval systems, eg: retrospective search. While a large number are ideally possible (see Section 5.2.3) the study was restricted in scope. The services considered in the study are shown in Fig. 3.4.

LANGUAGE Language is the natural language in which users can read technical documents, or in which documents are written, eg: French. The languages of the study are shown in Fig. 3.4.

20 REGIONS

Regions are referred to by the name of a prominent city:

Brussels	-	Belgium
Hamburg	-)	Federal Republic of Germany
Dusseldorf	-)	
Frankfurt	-)	
Munich	-)	
Copenhagen	-	Denmark
Paris	-	Northern France
Metz	-	Eastern France plus Luxembourg
Lyon	-	Southern France
Glasgow	-	Scotland and Northern Ireland
Birmingham	-	Northern England and Wales
London	-	Southern England
Milan	-	Northern Italy
Rome	-	Southern Italy
Dublin	-	Republic of Ireland
The Hague	-	Netherlands
Vienna	-	Austria
Berne	-	Switzerland
Madrid	-	Spain and Portugal (Iberia)
Stockholm	-	Finland, Iceland, Norway and Sweden (Nordic)

Figure 3.1

Euronet Regions



Figure 3.2

23 SECTORS

<u>Science</u>	(6):	AGRI	Agriculture (including veterinary medicine, fisheries, biotechnology)
		BIOL	Biology
		CHEM	Chemistry (including chemical engineering)
		EARSF	Earth and Space Sciences (including geology, geophysics, oceanography, meteorology)
		MED	Medicine (including biomedicine, pharmacology, psychology)
		PHYS	Physics
<u>Engineering</u>	(8):	AERO	Aerospace
		CIVIL	Civil (including building, architecture)
		ELEC	Electrical and Electronic
		MECH	Mechanical
		METMI	Metals and Mining
		NUC	Nuclear
		PET	Petroleum
		TRANU	Transportation and Utilities
<u>Other</u>	(9)	ABME	Accounting, Business & Management, Economics
		DEMO	Demography
		EDUC	Education
		ENV	Environment
		LAW	Law
		PAT	Patents
		PUBAD	Public Administration
		SOC	Social Sciences (including anthropology & social psychology)
		GENST	General Science and Technology

Figure 3.3

12 SERVICES			
- Retrospective (relating to past literature):) for databases including:	
. Search		- citation only	
. Print results of search		- citation plus Abstract of document	
- SDI (Selective dissemination of information, relating to current literature):		- numerical data	
. Establish profile of user's needs ("search")			
. Print results of matching profile to current data			
4 LANGUAGES			
English	French	German	Italian
3 FORECAST YEARS			
	1976	1980	1985
4 TRAFFIC MEASURES			
Into System	-	messages/year	
	-	bits/year	
Out of System	-	messages/year	
	-	bits/year	

Figure 3.4

FORECASTING MODEL : Outline Logic

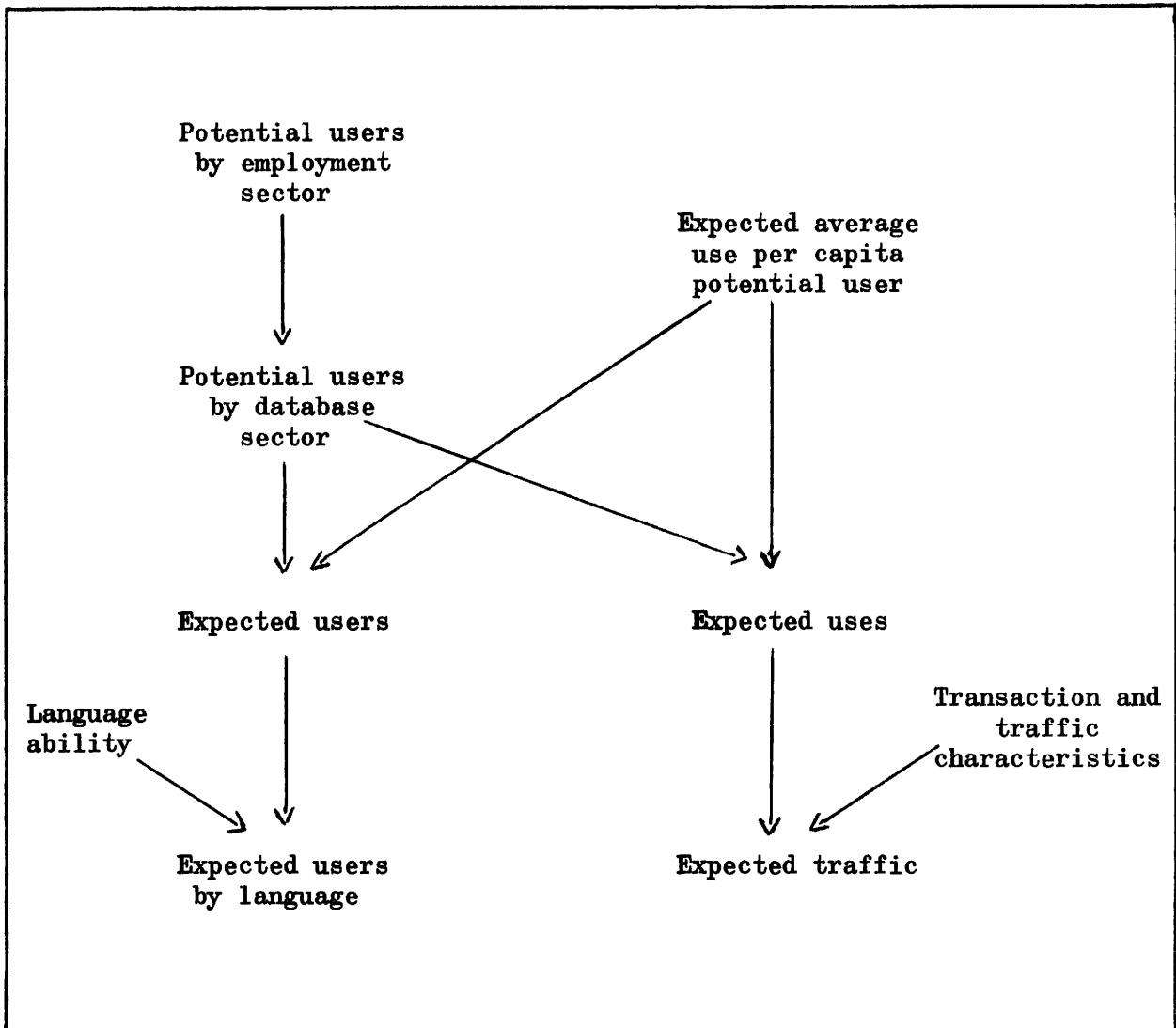


Figure 3.5

FORECAST YEARS Those years for which forecast data are required. The years of the study are 1976, 1980 and 1985. Forecasts are aggregates or averages over the calendar year.

TRAFFIC This refers to data communications traffic, expressed either as the number of messages or the number of bits transmitted into or out of the system by users.

A number of other definitions were made as part of the development of the model. These were chosen to reflect in a compact way the varied factors that in practice relate users to search activity.

POTENTIAL USER Potential users of services in a sector are taken to be the same in number as the sector population expressed in QSE's (Qualified Scientists and Engineers) or equivalents. The potential users represent a fairly homogeneous set of workers in the sector to which system use can be referred. It is, of course, well known that such use is not distributed evenly, and this is taken into account by the model. Note also that as there are two ways of interpreting sectors, as relating either to employment or to use of databases, so there are two definitions of potential user population; these are distinguished in the model.

USE A use of on-line retrieval services is the satisfaction of a retrospective information need by such services. The number of USES per USER per year is the frequency of use. For example, 100 users might be responsible for 150 uses per year, ie: an average frequency of use of 1.5.

DATABASE FACTOR This factor takes into account the fact that an information need will often be satisfied by searching more than one database. The database factor is the average number of databases searched per USE. Thus in the example above, assuming a database factor of 2, the 100 users would carry out 300 retrospective searches per year.

The above definition of use relates to the various forms of retrospective searching. Accesses associated with SDI are treated by a separate, add-on factor. This factor describes the additional search volume due to SDI activity. Thus if the add-on factor is .5, then the total annual searches generated by the 100 users above will be 450. This additional searching supports SDI profile construction or updating.

The outline logic of the forecasting model is shown in Figure 3.5. More complete details are given in Appendix A. Results are calculated throughout for countries and then allocated to regions for the output tables.

The major features of the model are described below. These features do not have the same external visibility as the output components. However, they are critical to the derivation of the output values and involve interesting conceptual issues.

For each country an estimate is made of the sector population by employment sector, considering QSE's (Qualified Scientists and Engineers) or equivalents. This is then transformed into a sector population by database sector. This is done because we are finally interested in users and traffic in terms of database sectors, eg: agricultural databases, and not in terms of employment sectors, eg: workers in agriculture.

Next, a saturation limit is estimated for each forecast year of the number of retrospective searches per capita of the sector population.

Separately, an estimate is made of the percentage of this saturation usage that will actually occur in any particular year. This is assumed, like many statistics of this type, to follow an S-shaped curve of the kind shown in Figure 3.6. Many such shapes are conceivable, but in the absence of detailed data the choice must be limited to one or two idealised shapes. Figure 3.6. shows two that are commonly found: the "Mansfield" curve and the "Gompertz" curve. * The former typically describes "epidemics" in which the initial rate of growth is proportional to the number already "infected"; the latter accelerates more rapidly, fitting a situation where the phenomenon can spread by "broadcasting" without existing users being involved. Each curve has a point of inflexion, in the neighbourhood of which the curve is approximately linear; this is indicated by an arrow in the figure. The Mansfield curve has its point of inflexion at 50% of the maximum height (in fact the curve is symmetrical about this point); the Gompertz curve has it at 36.8% of the maximum, after which it levels off relatively slowly.

* Gregg, J.V; Hossell, C.H; Richardson, J.T.
Mathematical Trend Curves: An Aid to Forecasting
Edinburgh, Oliver and Boyd, 1964, pp 12-14.

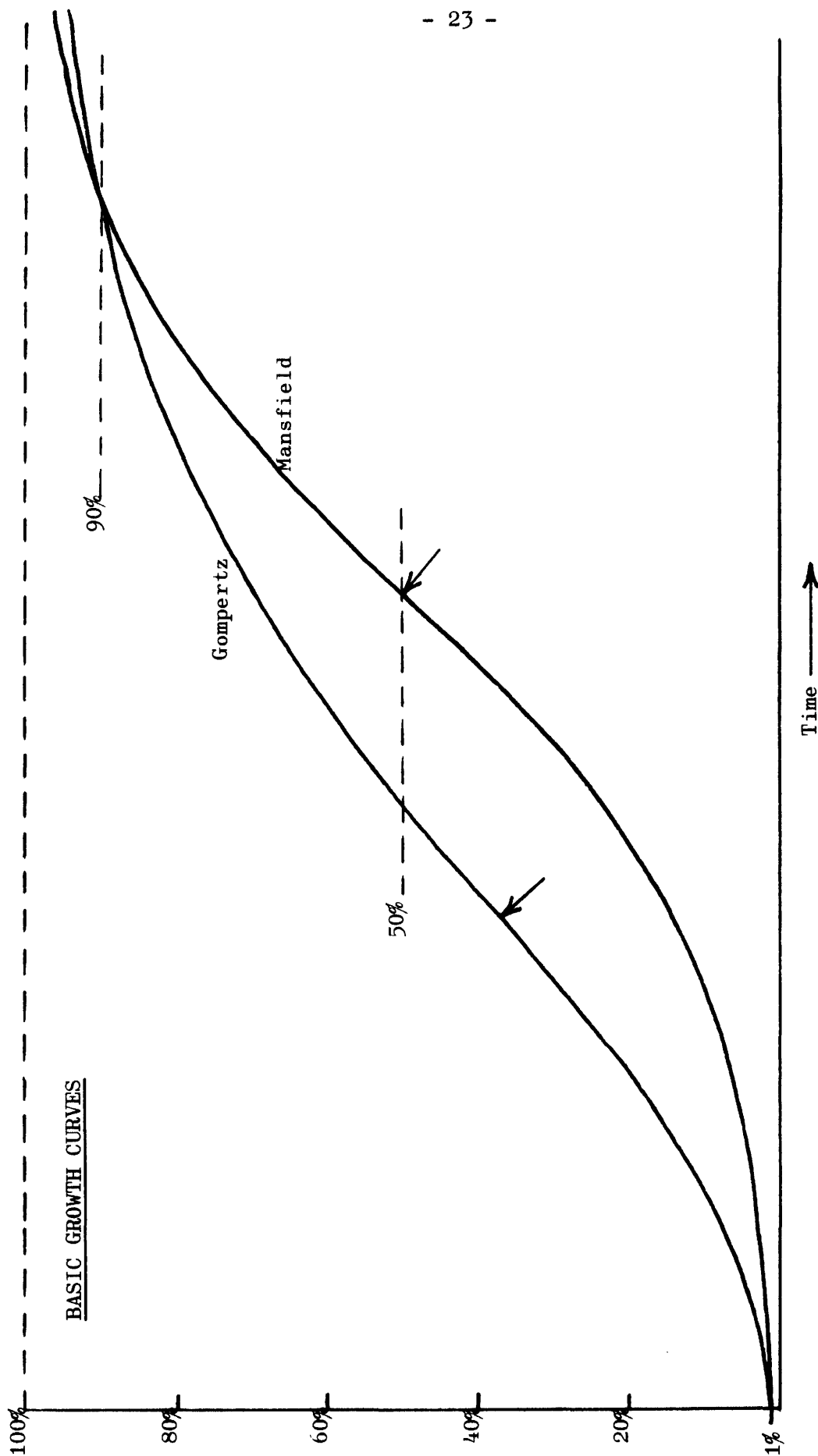


Figure 3.6

GROWTH OF MEDLINE SERVICE

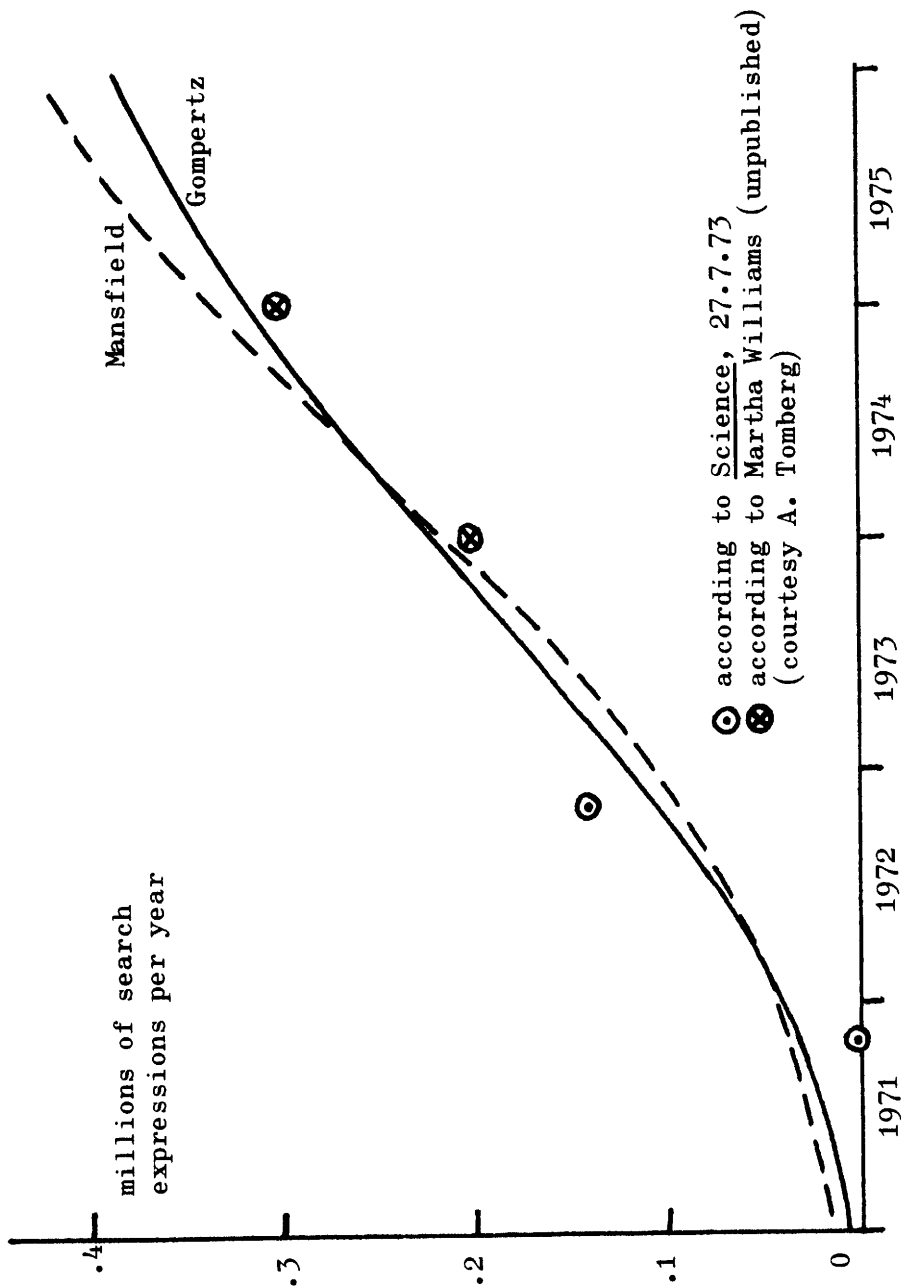


Figure 3.7

For this study the Gompertz curve was chosen for two reasons:

- The spread of information retrieval services seems more akin to "broadcasting" than to the development of an epidemic;
- Such figures as are available (eg: for the Medline service in the USA) are fitted better by this curve.

Figure 3.7 shows four estimates, relating to four different dates, of the number of searches per year of the Medline service, with the Gompertz and logistic curves drawn in for comparison. Though neither curve fits the data very well (and there are doubtless errors in the data), it is clear that the initial acceleration is very rapid and is better matched by the Gompertz curve.

It may be noted that in the aggregate forecasts, where several of these curves are superimposed, the sharpness of the initial rise is smoothed out. Figure 3.8 shows the effect of combining three Gompertz curves rising at different times; the solid curve is the mean of the three components.

The figures for potential users and for expected usage per capita are then combined in two different ways to yield expected uses and expected users by country and sector. The number of users is calculated by assuming that use is distributed in an inverse square manner. For example, the number of users who use the system exactly n times (annually) is 4 times the number who use it $2n$ times. This is a Lotka distribution*.

It has been suggested that this relationship changes from $1/n^2$ to $1/n^p$ where $p > 2$ as one moves from the hard sciences through soft to non-sciences, eg: see discussion and references in Voos**. This has no effect on the model results for traffic, since these are based on uses. It would however mean that users are over-estimated by a small amount in the sectors that are not hard sciences.

Finally, users are combined with language ability, and uses with traffic characteristics, to produce output figures which are then allocated to regions on the basis of total population ratios.

* See discussion in: de Solla Price, Derek. Little Science, Big Science. New York, Columbia University Press, 1963. pp 42-48.

** Voos, Henry. "Lotka and Information Science". JASIS 25:4 July-August 1974, pp 270-272.

COMBINATION OF GROWTH CURVES

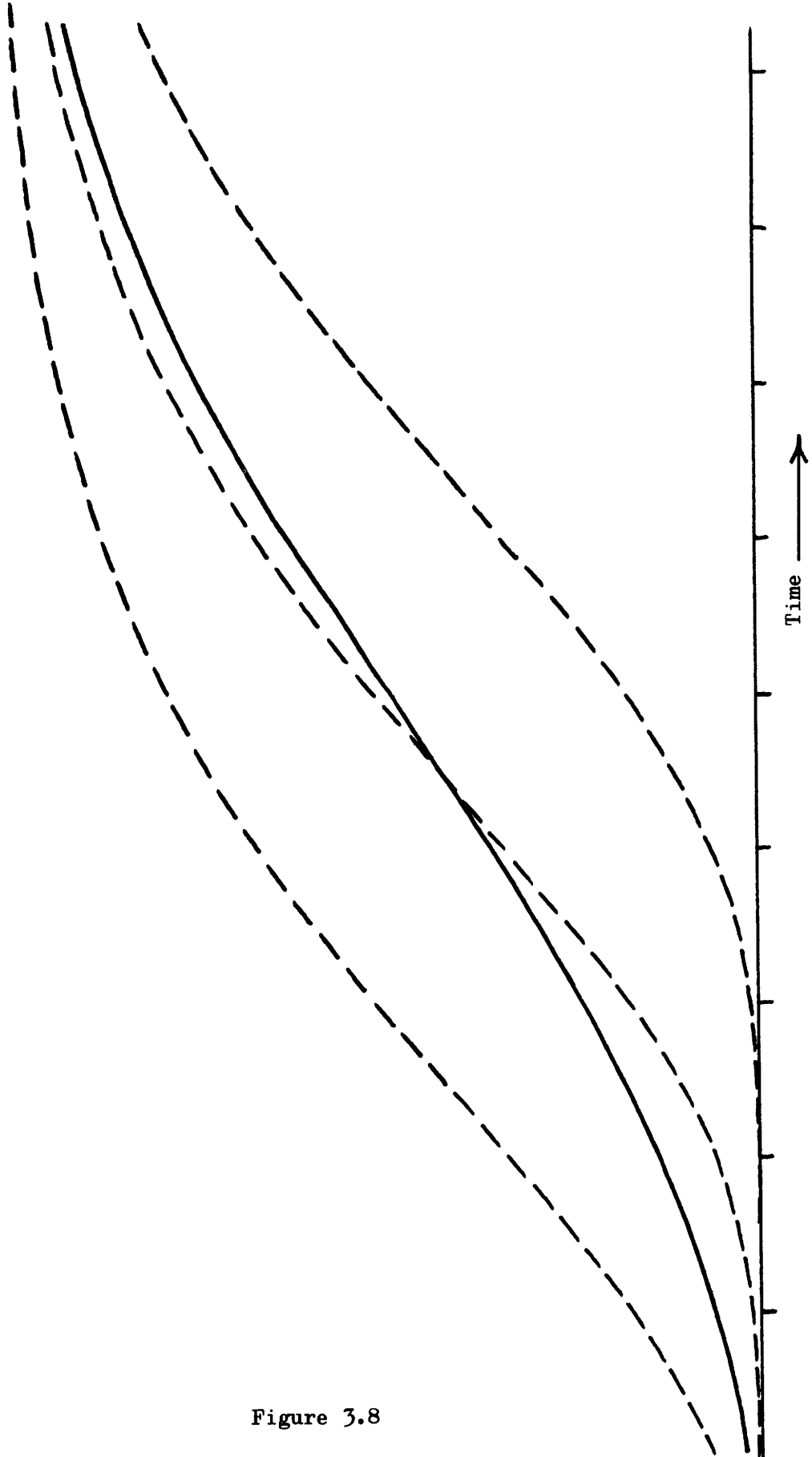


Figure 3.8

3.2.4 Model Operation

The overall operation of the model is shown in Figure 3.9. The stages in developing and operating the model were as follows:

- The exact form of the output results was defined using dummy table layouts.
- A first trial was made of the model logic and associated input data using a pilot sector (agriculture).
- A formal statement was made of the general model logic in sufficient detail for programming.
- Input data table formats were drawn up in order to acquire the data both necessary and sufficient to drive the model.
- The model was programmed interactively using a portable time-sharing terminal.
- The input data tables were filled in by different members of the project team.
- The model was run on the first version of the input data, producing first version outputs.
- These were reviewed together with the model logic.
- Refined input data was prepared, model logic was revised, and the final output tables computed.

3.2.5 Model Validity

It is important to discuss the validity of the model in general. In section 4 some specific points which qualify the interpretation of the various output figures are discussed. This section is concerned with the overall logic.

The major points to be considered in assessing the general validity of the model include:

Concepts: The model uses certain concepts in moving from input data to output tables. The most important are:

- average use per capita increases with time in a Gompertz curve towards saturation
- actual use is distributed between individuals in an inverse square manner (Lotka's law).

There is empirical evidence for both of these effects in other information contexts. We believe that their use is suitable in the present model, and give a consistency with other phenomena in the information field.

Calculations: Each figure in the output tables can be regarded as the product of a number of factors. The number of elements multiplied together to give an output figure may be called the length of the product chain. A long product chain with possibilities of inaccuracy at each step gives rise to final figures of potentially low reliability. In a well behaved chain, although the spread of possible values may increase rapidly, the probable deviations increase relatively slowly.

In the present case the product chains are three or four elements long. Further, there is a review of the 1976 output figures against current short term projections. This permits the calibration of the entire product chain. We do not believe that these product chains are a major source of error.

Limitations: The model has some limitations, mainly resulting from the limited objectives of a fast timetable. These include:

- Sector populations are considered as homogeneous. No attention is paid to well known differences of use between academic, government and industrial users.
- Regional allocations are not specific to individual sectors, but are based on total population.
- In deriving figures for usage and users, language constraints are ignored.

MODEL OPERATION

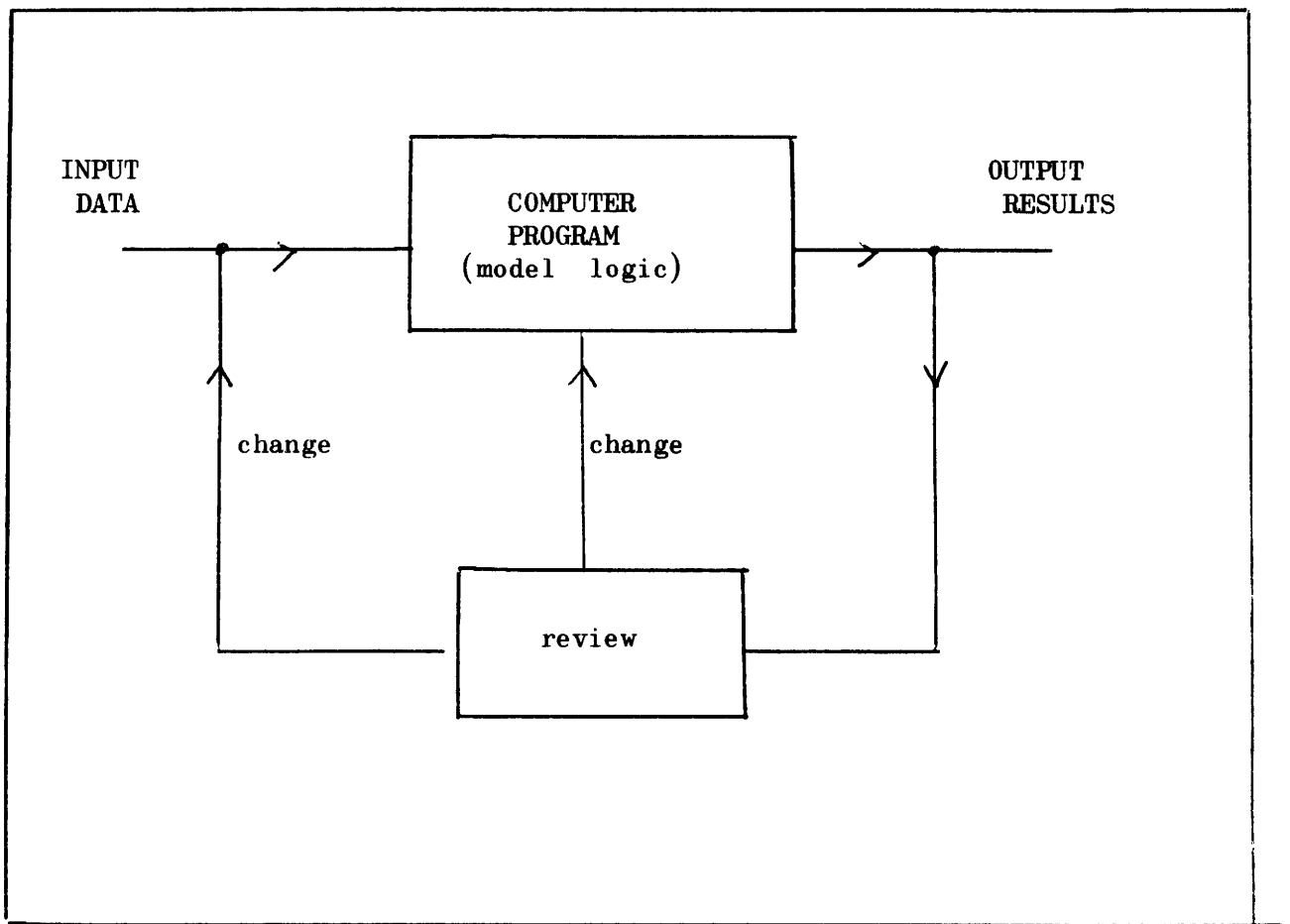


Figure 3.9

In addition there are limitations that are not introduced by the model but are rather inherent properties of the situation being modelled. In particular:

- Results are critically dependent on assumptions regarding the starting dates of services.
- Usage and traffic figures are critically dependent on assumptions about the saturation usage per capita.

The model has been designed to isolate these as specific input data whose values may be adjusted if desired.

Review and Consistency: The model has been developed by a multi-disciplinary team, representing forecasting technology, computers and communications, information work, retrieval services and international organisations. The results have been reviewed by a number of experts in these fields for logic and accuracy. In addition, the model permits numerous consistency checks to be run, between sectors, between countries etc. Both of these features of the model increase its reliability.

Usefulness: The model is not final. It provides a first comprehensive systematic view of the area under study. In the event that more accurate input data can be gathered, or specific judgements made on the output data, the model can easily be run again to refine the output figures.

For planning EURONET, not all output figures are equally significant. A small number of sectors is sufficient to characterise the important future requirements. Thus effort on refining the data can be focussed on these key sectors.

Accuracy: The figures represent a forecast based upon a set of assumptions about the way in which on-line retrieval services will develop in Europe in the period 1976-1985. Many of these assumptions deal with policies, priorities and investments yet to be developed. Nevertheless, the model represents the consequences of these assumptions.

There are four major qualifications to taking the figures as actual use figures for the years concerned:

- The figures for 1976 are very sensitive to the timing of introduction of new database services. One year's delay can make a factor of ten difference in the number of users, and hence traffic. This is less significant for 1980 and 1985.
- The figures for usage and traffic are sensitive to the potential usage per capita, which is dependent on how attractive the services are made for the user. This is most significant for 1980 and 1985.
- Figures have been computed for only a subset of possible services (see Section 5.2.3). If a larger set are in fact implemented the figures will be higher.
- Forecasts have been computed on the assumption of perfect language capability of users. Since this is not true, the figures represent ideal demand. Actual figures will be lower, by an amount depending on which languages are available in databases.

Taking all these points together we may finally assert that the figures produced by this study are fair estimates of the activity that is realisable in practice, assuming that appropriate services are offered to support this activity.

However, to give some idea of the possible spread of forecast results, alternative high and low forecasts have been prepared. These have been shown, for the number of users, in Figure 2.1. The high and low assumptions were obtained as follows.

First, the effect of changed assumptions about the starting dates and growth periods of the various services was considered. In the forecast model, each database sector is assigned a year of effective introduction, (defined as 1% of potential usage) and a growth period within which it will reach 90% of potential usage. In the high forecast alternative, databases introduced after 1975 were assumed to start one year earlier, and the growth period was decreased by 25%. In the low forecast alternative, databases introduced after 1974 were moved back two years, and the growth period increased by 50%. The results of these alternative assumptions are shown in Fig. 3.10. It can be seen that the 1980 forecast is very sensitive to these assumptions, but the 1985 forecast is less so, because by 1985 most of the services are approaching saturation. This figure also shows the effect on total data traffic.

Separately, the assumptions concerned directly with the volume of user activity were varied. The key assumptions here were the saturation level of use per potential user (see Section 3.2.3 above) and the "database factor" (i.e. number of searches per use - see Section A.2.h). The variations were taken to be as follows.

	1976	1980	1985
Saturation use:			
High Forecast	1.4	2.0	2.8
Reference Forecast	1.0	1.4	2.0
Low Forecast	0.8	1.1	1.6
Database factor:			
High Forecast	2.5	2.5	2.5
Reference Forecast	2.0	2.0	2.0
Low Forecast	1.5	1.5	1.5

The effect of these variations is shown in Fig. 3.11. It will be seen that they have a marked effect on traffic, as might be expected, but less so on the number of users. This is because, when a high percentage of the relevant population is already using the services, additional activity can only bring in relatively few additional users.

Combining these two sets of critical assumptions, the resultant total variation of the forecasts is shown in Fig. 3.12. It is the result given here for user numbers that was reproduced in Fig. 2.1.

EFFECT OF VARYING TIMINGS OF SERVICES

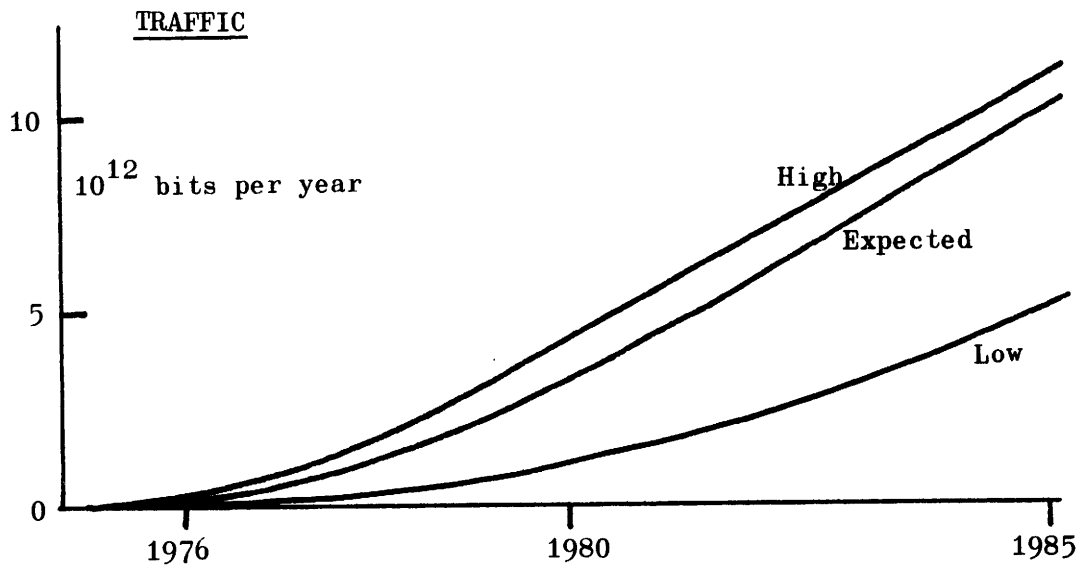
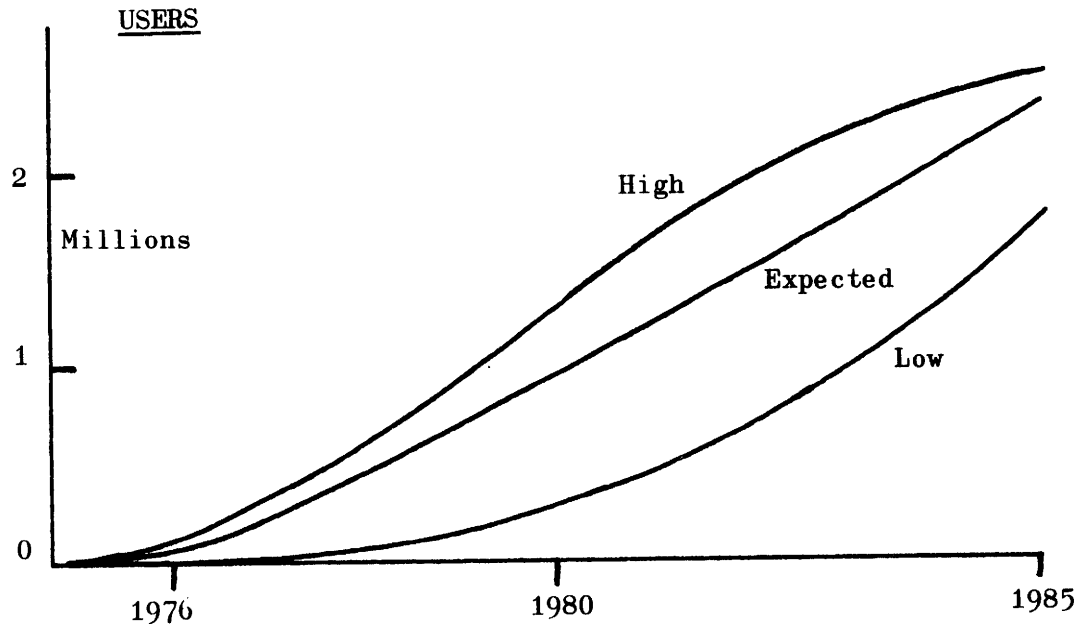


Figure 3.10

EFFECT OF VARYING USAGE LEVELS

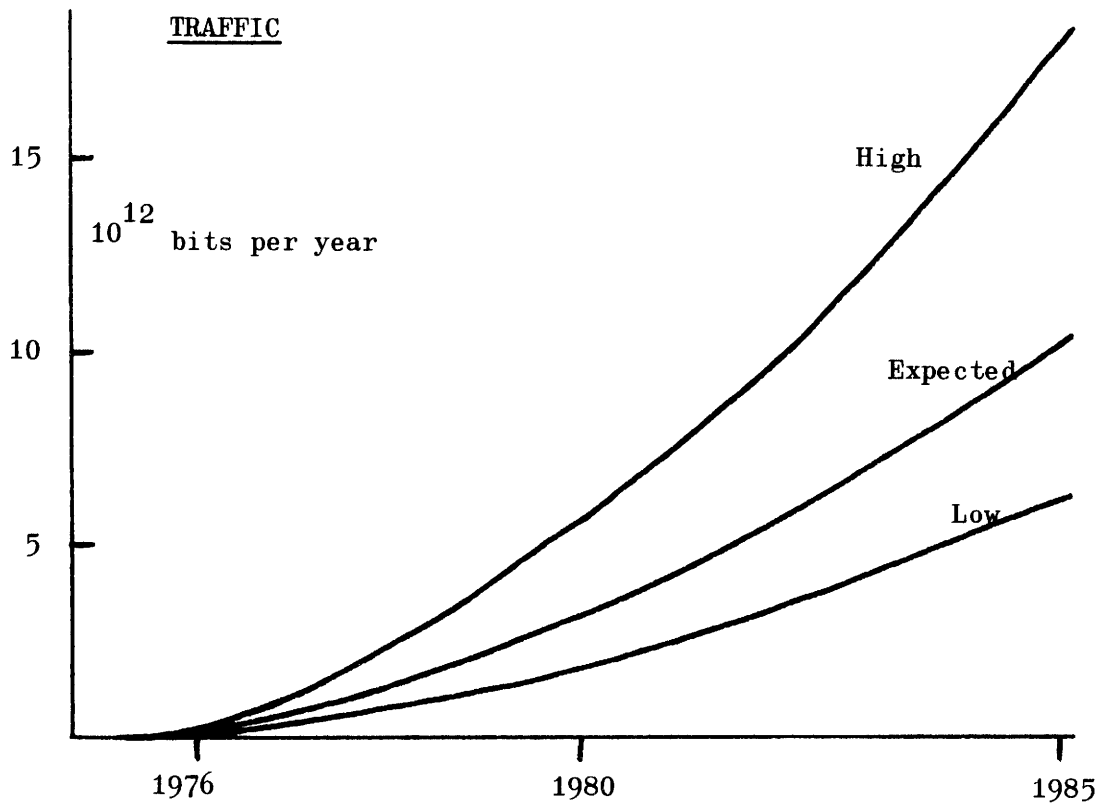
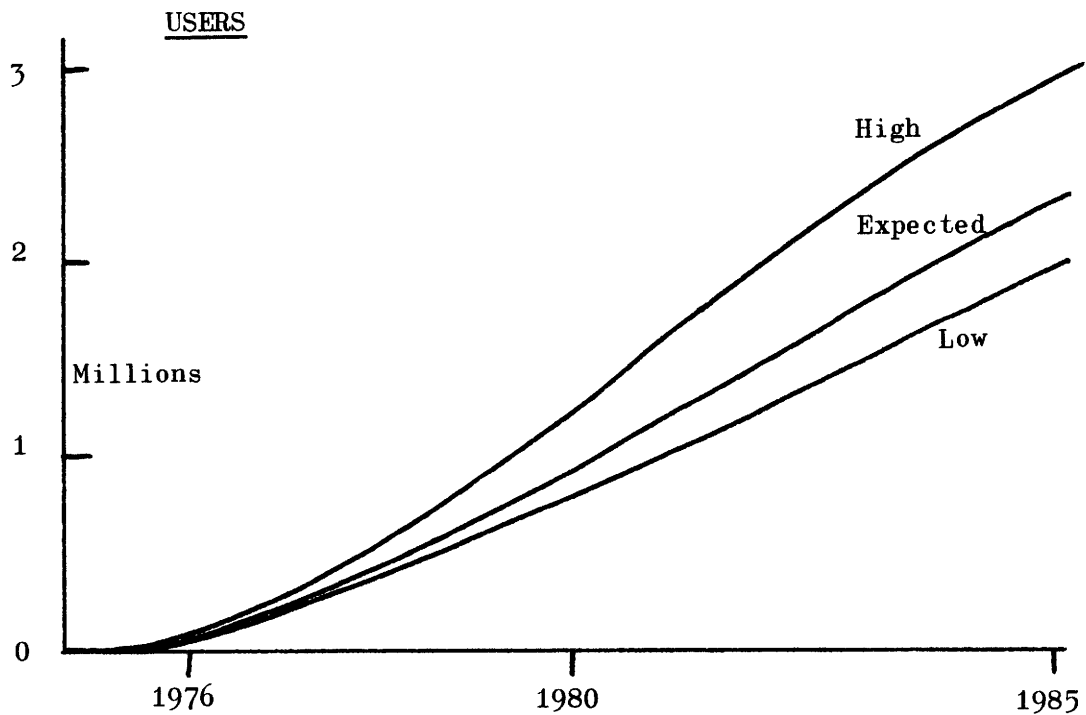


Figure 3.11

OVERALL VARIATION OF FORECASTS

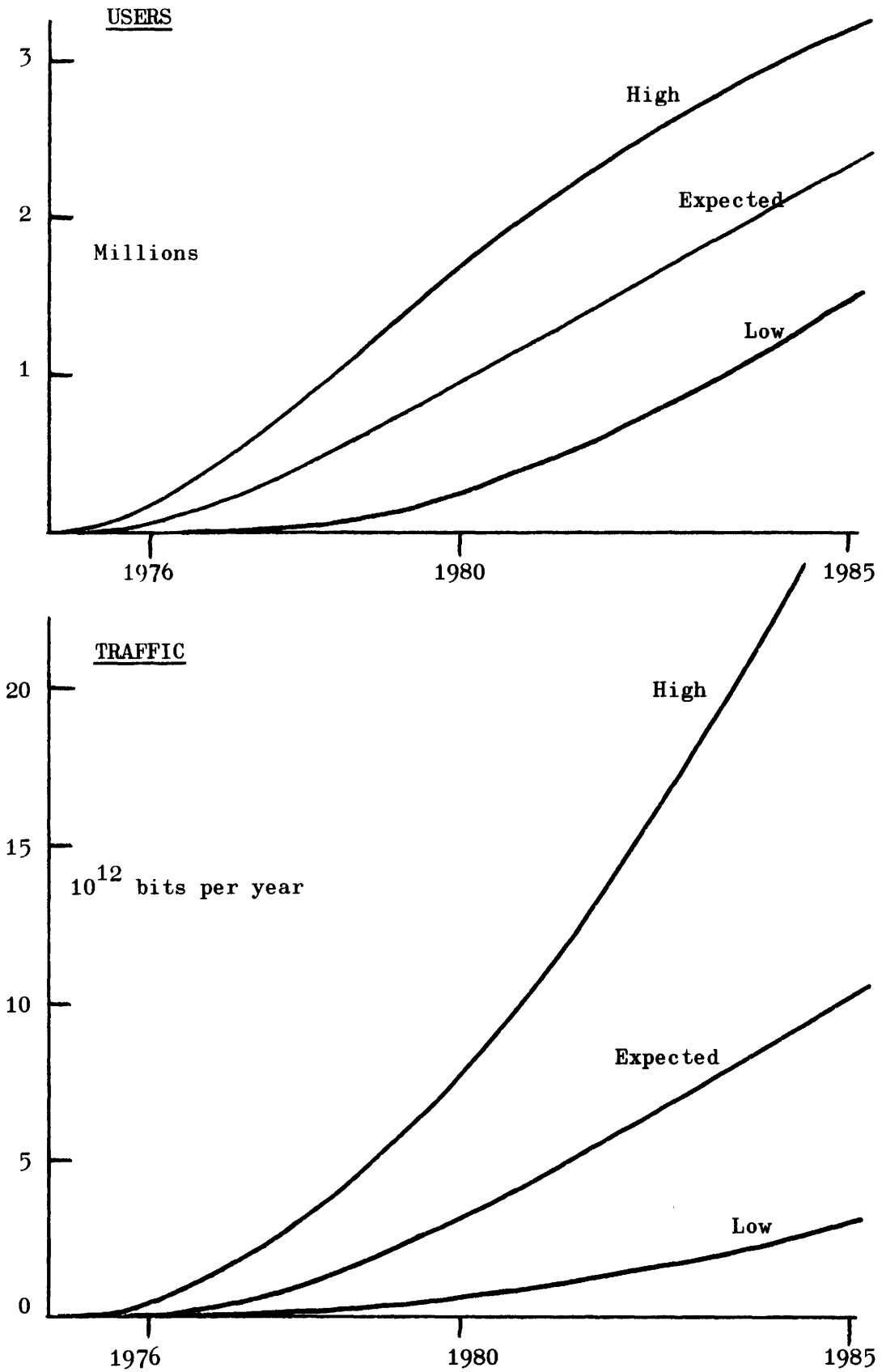


Figure 3.12

USES AND USERS OF ON-LINE S.T.I. SERVICES

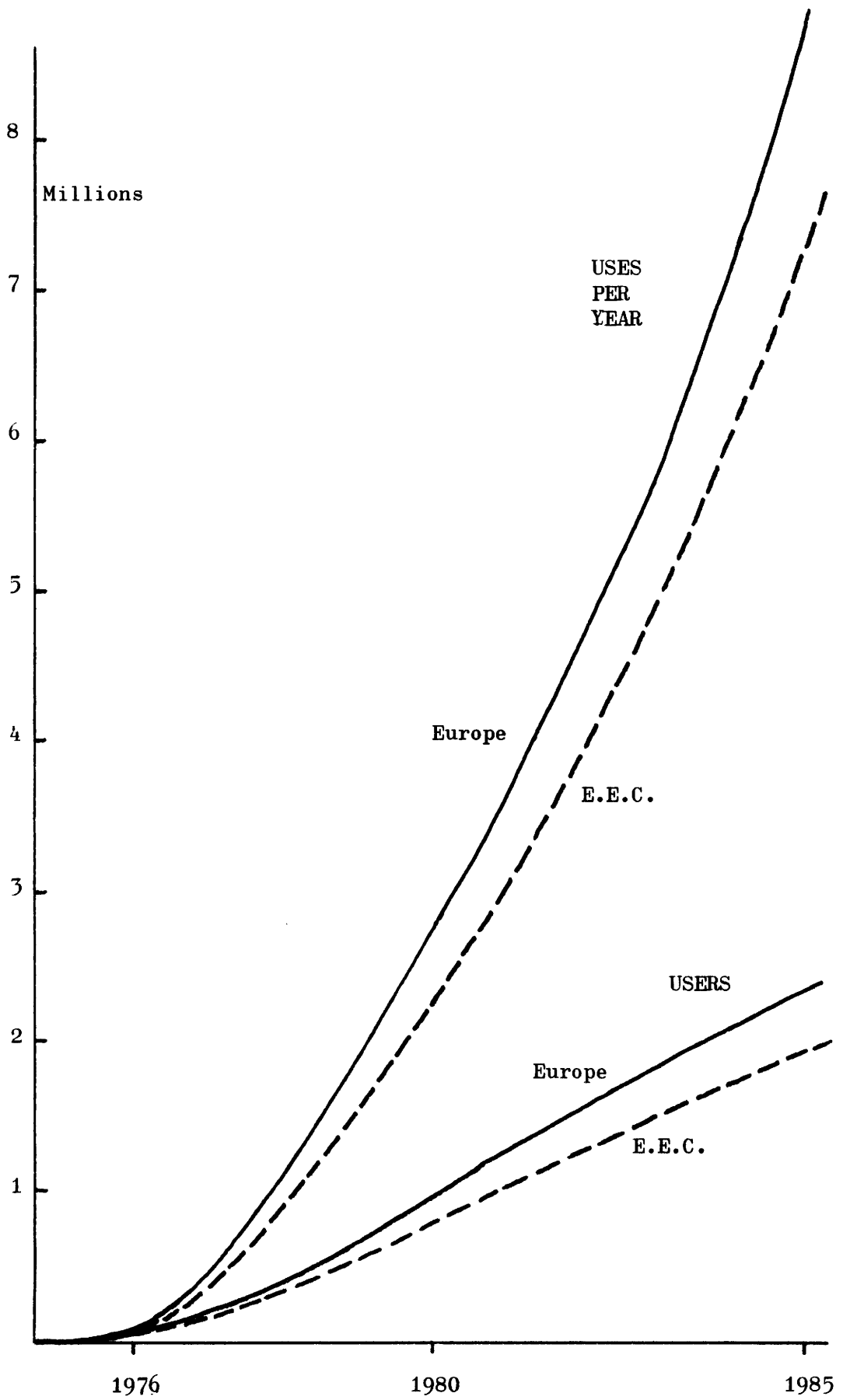


Figure 4.1

4. DISCUSSION OF RESULTS

4.1 General Features

Complete tables of results are given in Appendix B. Highlights only are discussed here. In all that follows the assumptions and limitations stated in Sections 3.1 and 3.2.5 should be borne in mind.

As can be seen from Figure 2.1 there is a very rapid growth in the number of users between 1976 and 1980, with a lesser growth to 1985. The growth rate for uses does not slow down in the same way as users (see Figure 4.1). This is because the average number of uses per user increases throughout the forecast period. Data traffic also continues to increase rapidly throughout the period.

If one looks for some other growth activity that is related to the same technical processes as information retrieval services, one may consider the growth of network information services, which comprise all on-line services offered commercially by data processing service companies. This portion of the data processing services sector in Europe is shown by the recent Euro-data study to be growing in turnover by almost a factor of eight through the forecast period. Although this is not so large a growth factor as is foreseen here for on-line STI services, nevertheless it shows that there is considerable growth potential for this type of activity.

The forecast figures enable a very rough estimate to be made of the possible revenue that could accrue to on-line STI services in Europe. Confining attention to retrospective searching and printing only, and using the following figures:

	<u>1976</u>	<u>1980</u>	<u>1985</u>
Charge per search of one database (see Sec. 3.1.h)	£20	£10	£5
Database factor (Sec. 3.2.3)	2	2	2
Uses per year	99K	2,720K	8,800K
the estimated annual revenue in millions of 1974 US dollars is	4	54	88

A comparison with the Eurodata figures shows this to be initially about 1%, rising to 4% or 5% of the turnover of network information services, which is not unreasonable.

These figures also give an indication of the volume of business and the scale of investment that is likely to occur in STI services. The figures could well be higher with the inclusion of additional related services that are likely to be offered. Even a small proportion of this business would be a worthwhile market objective for many organisations.

Network information services have already been in operation for several years and have passed their initial burst of growth. However a more timely comparison appears in an Institute for the Future report in 1971 which deals with the future of the telephone industry in the United States in the period 1970-85. The use of home electronic information services in terms of revenue is forecast as growing by almost a factor of one hundred in the period 1980-85. This is a similar order of growth to the forecasts in this Report.

In terms of data communications traffic, the present forecasts represent about 0.1% of the total European traffic in 1976, rising to 1.4% in 1980 and 2.1% in 1985, according to the Eurodata findings. If comparison is made with the Eurodata predictions for the data processing service industry, the traffic forecast here for STI services represents 0.5% of the traffic for that industry in 1976, rising to 4% in 1980 and 5% in 1985.

Another way of viewing the significance of these forecasts is to estimate the load on library facilities caused by users seeking documents cited in their search output. Suppose it is assumed that each use leads to a requirement for 5 documents to be obtained from library or other related facilities. This would lead to a total European demand in 1980 for 13 million documents, as a result of retrospective on-line retrieval system use. This is a large figure by itself, but not completely out of scale for existing library and information centre facilities. However, it is clear that with these assumptions the cost of supplying the cited documents themselves is likely to be comparable with the cost of the original reference retrieval service.

Considering the UK in particular, the National Lending Library met 1.4 million requests for documents in 1972. If the present growth rate of 15% per year is maintained, the 1980 demand will be 4.3 millions, an increase of 2.9 millions over the 1972 figure. If the above assumptions are followed, the UK demand arising from retrospective STI services in 1980 will be 2.6 millions.

Probably this demand will largely, but not entirely, be a substitute for part of the demand arising from present search methods. It might be looked on as one of the mechanisms that will help to maintain the 15% annual growth of library services, or it might have the effect of increasing this growth rate. In any case, the relative numbers involved are entirely reasonable, which lends further credence to the present forecasts.

4.2 Geographical Distribution

The distribution of activity between the regions is almost the same whether it is represented by numbers of users, numbers of uses, or data traffic. It is also very little affected by the passage of time.

Figure 4.2 shows the geographical distribution in terms of users in 1980. France, Germany and the UK each account for about 20% of the total, ie: 60% together. Among the Community countries these three comprise 72% of the total activity.

Major concentrations of users are in the Rhine valley, northern France and central England.

Using the assumptions about linguistic ability given in Table A.6, and weighting the figures according to the number of users in each country, it is possible to obtain a global average for the percentage of users in Europe that can read each of the four languages, viz:

English	77%
French	55%
German	52%
Italian	25%

(This implies that the average number of languages read by a user is 2.1). There are only slight variations of these figures between the sectors. The significance of them is discussed further in Section 4.6.

4.3 Distribution between Sectors

In Figure 2.3 the distribution of users between the sectors is shown, for the three forecast years. There is a marked change with time, due to the relatively late growth in some of the sectors. The general trend is for activity, initially concentrated in a few sectors for which services are already in operation or will soon start, to become spread more evenly as time progresses.

In 1976, Chemistry and Medicine will account for 56% of the users. By 1985 this percentage will have fallen to 20%. Medicine will still be the largest single sector (13%) but will be closely followed by Accounting etc. (9%), Social Sciences (7%), and Education (7%), each of which will be larger than Chemistry. Law, Transport & Utilities, Environment and Demography will increase from a mere 0.2% of the total in 1976 to 14% in 1985.

The engineering sectors, at the top of Figure 2.3, will in general expand while the sciences (especially Chemistry and Medicine) contract in relation to the total. The greatest growth will occur in the non-sciences, at the bottom of the Figure.

There are a few exceptions to these trends. In relative terms, Aeronautical and Nuclear Engineering will contract; they have been among the earliest users of STI services, but their period of most active research is now in the past. Among the sciences, biology will expand appreciably and physics will almost keep pace with the average growth of all sectors. These are basic sciences with plenty of scope for making more use of information services.

The distribution of potential users by commercial affiliation is shown in Figure 4.3. This is based on fairly crude estimates of user affiliation. Further there is evidence that actual users are much more likely to be in commercial employment than the body of potential users from which they come. Thus we may take this to be a low estimate of the proportion of actual users in commercial employment. This proportion probably averages about 50%, but as can be seen in Figure 4.3 varies widely between sectors.

Geographical Distribution of
Users - 1980

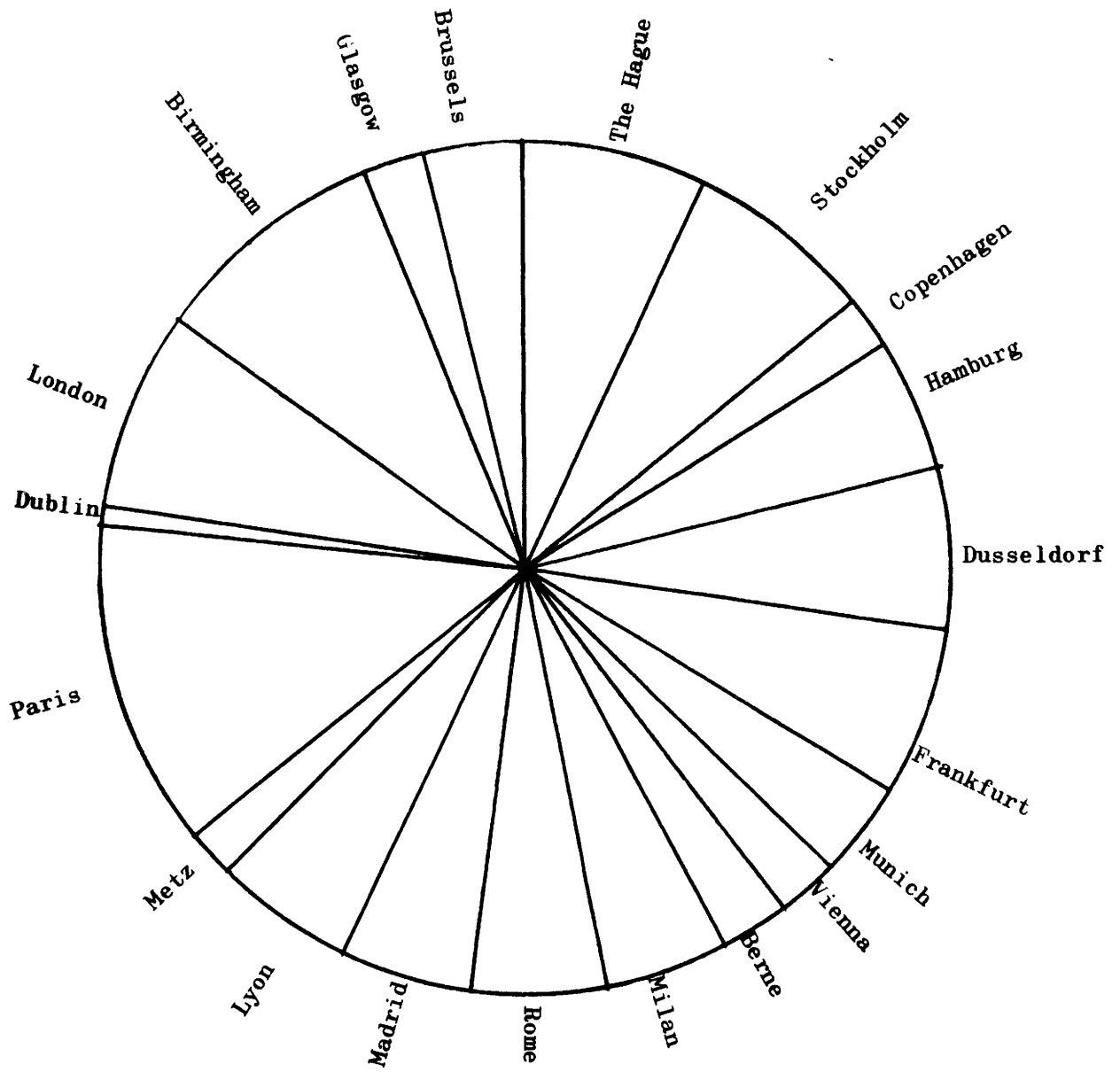


Figure 4.2

These figures are of interest since potential users in different employment groups, eg: academic, governmental and commercial, behave differently with respect to information retrieval services. Services to academic and governmental users are much more likely to be subsidised at a distance from the user, while commercial users have a more practical cost-justification approach. The latter are more likely to buy value for money, the former in the national or institutional interest. This is important in considering the relative market share that different services may come to hold, and strategies for successfully occupying certain portions of the potential market.

POTENTIAL USERS

Commercial Affiliation

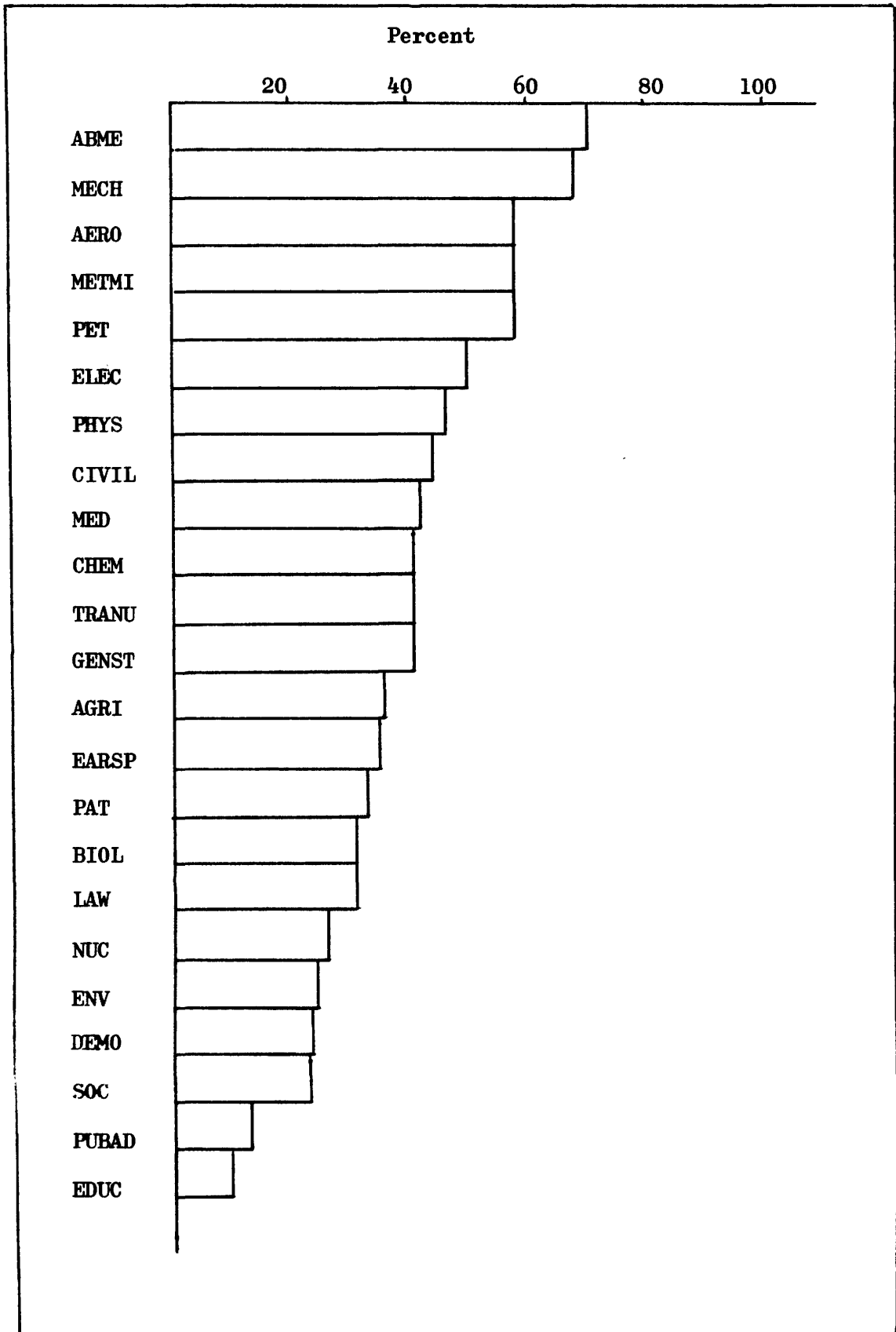


Figure 4.3

TOTAL ANNUAL TRAFFIC BETWEEN USERS AND SYSTEMS

(Bits x 10¹²)

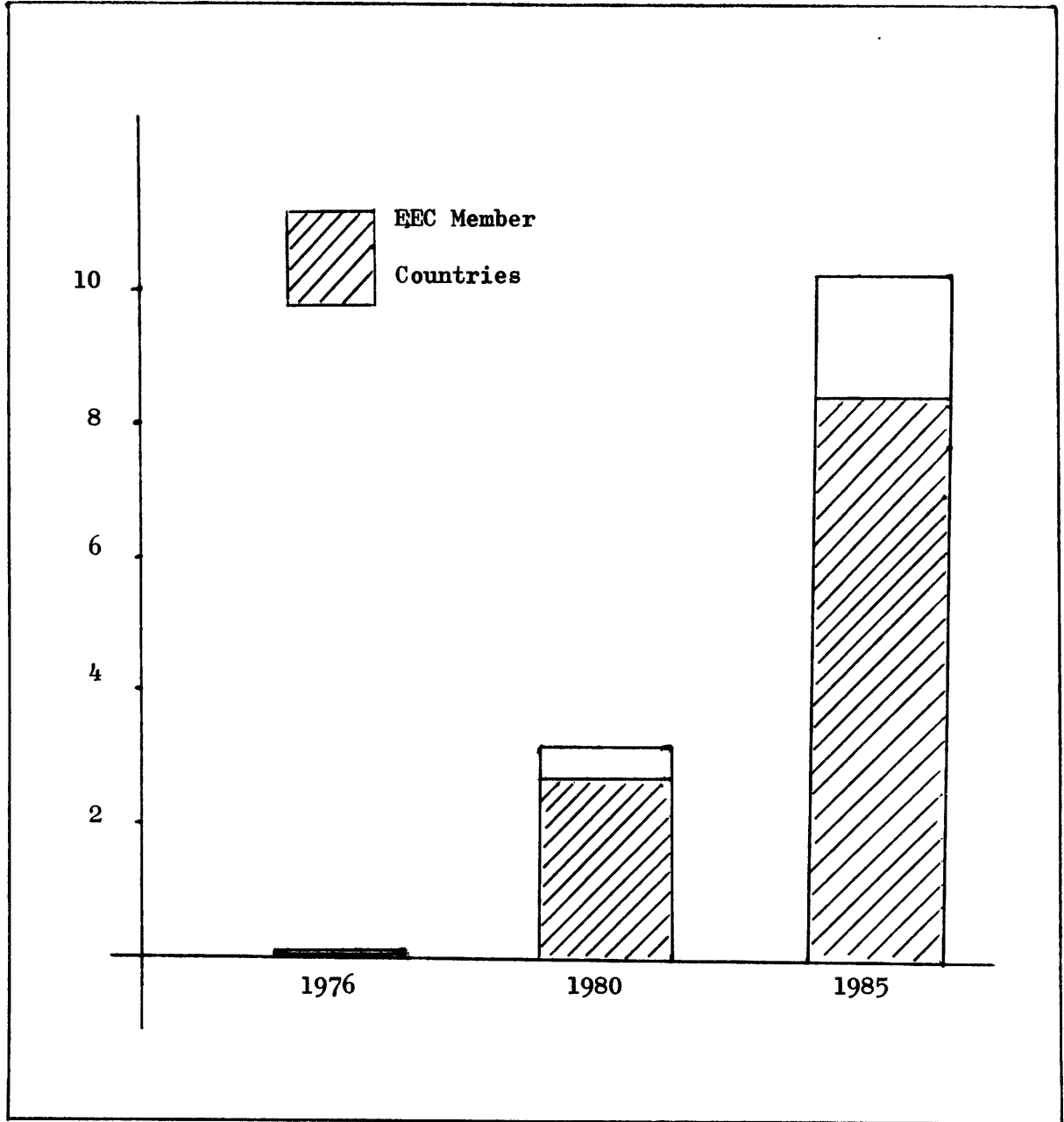


Figure 4.4

4.4 Behaviour

The behaviour of users is extremely varied and not a great deal is known about it in numerical terms. This section summarises those aspects that have been treated in the study.

4.4.1 Frequency of Use. Each user may use the services a number of times in a year. The assumptions made in this study lead to the following frequency of use for retrospective searching average over all sectors.

1976	1.65
1980	2.83
1985	3.74

Of course, the use is not distributed evenly. A handful of users use the services with great frequency, and very many (often from 50 to 90 per cent of all users) use the services only once in the year.

Because a person is not counted as a user unless he makes at least one use in the relevant year, the frequency of use cannot fall below 1.

Services are expected to be introduced later in some sectors than others, so that the growth curves for usage will rise at different times. This causes a variation in frequency of use between the sectors of the order of $\pm 20\%$, with Medicine showing consistently the highest frequency throughout the forecast period.

In addition, there will be SDI searching activity which is considered separately below (Section 4.4.3).

4.4.2 Databases per Use ("Database Factor"). A user with an information need to be satisfied by an on-line retrieval service will often have an opportunity to search more than one database to satisfy the need. There is evidence to show that a user may consult as many as four databases if they are available. However, there is little information on which to base precise assumptions for the purposes of this study.

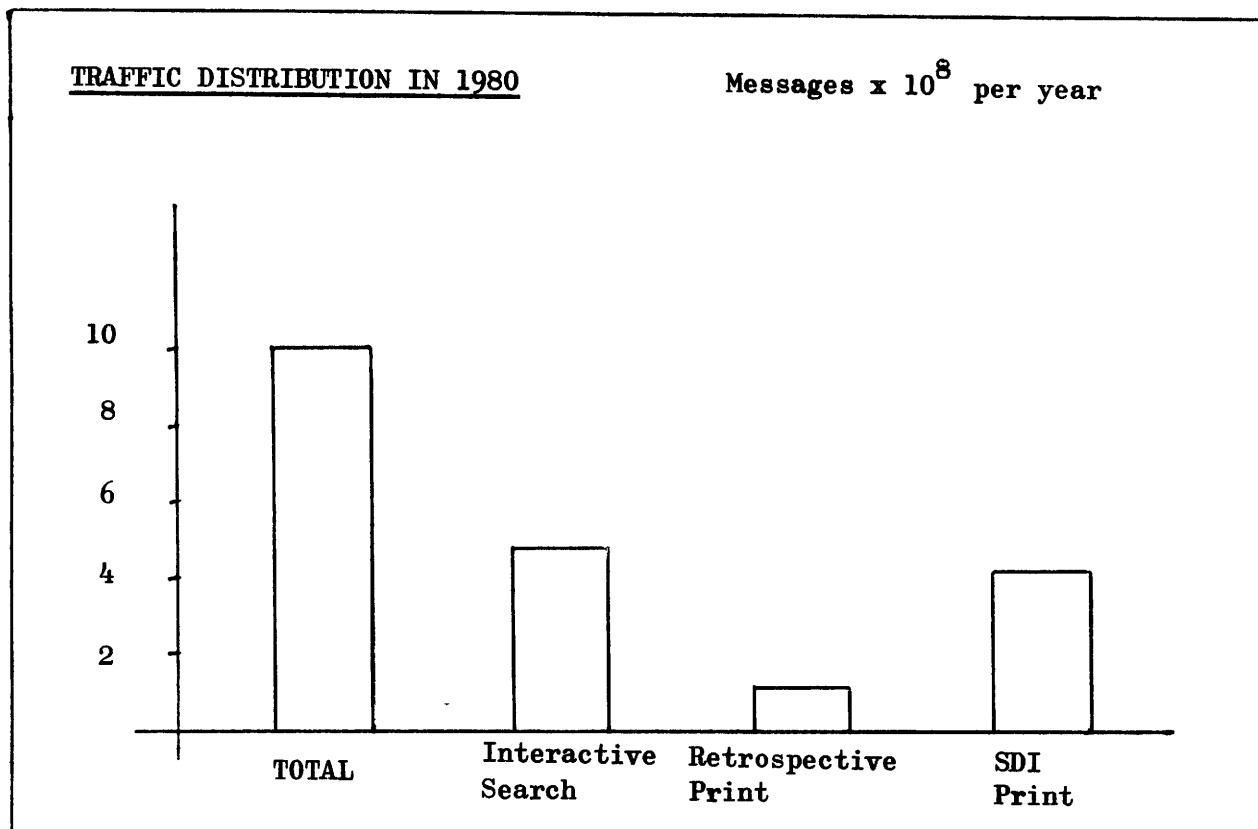


Figure 4.5

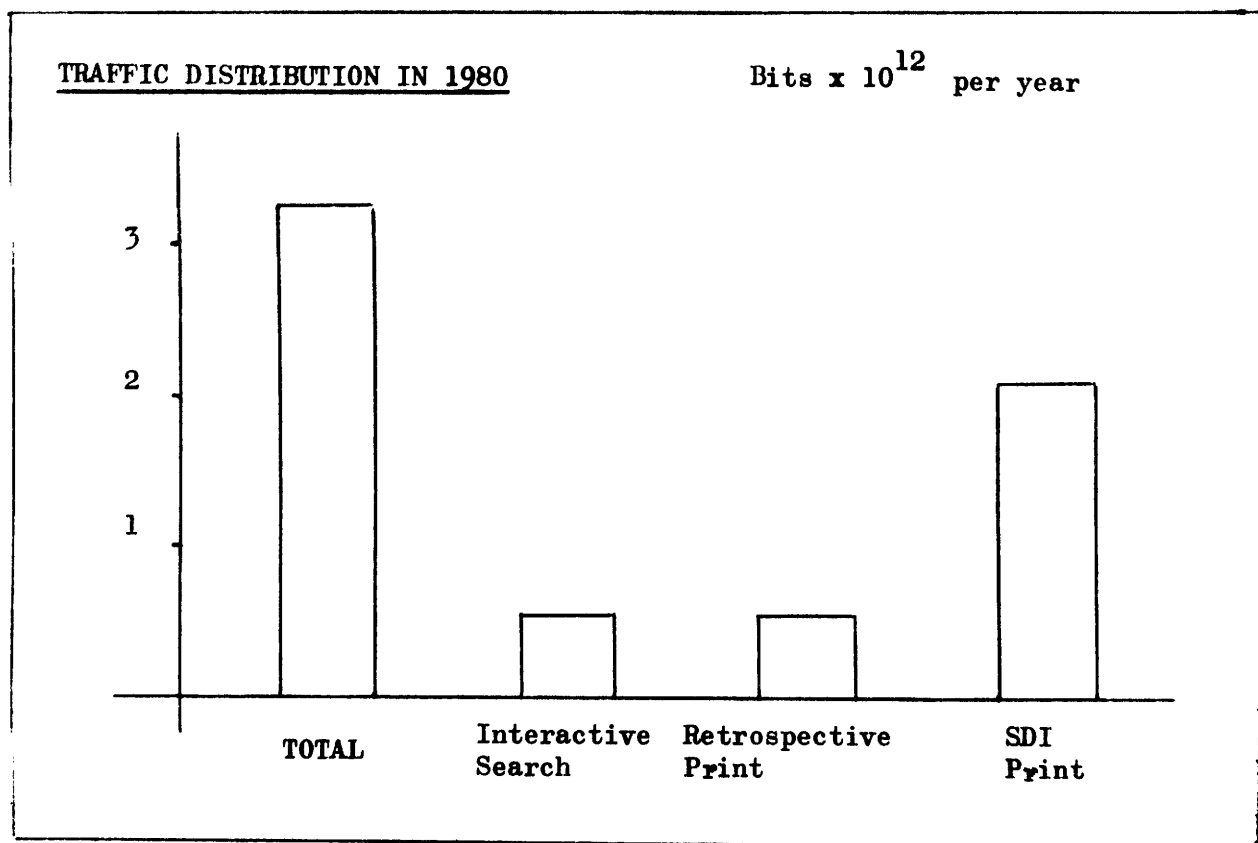


Figure 4.6

The value 2 has been taken throughout the period of the forecasts, as a plausible average. This figure represents in concept one database of general coverage from among the one to three likely to be available and one of a more specialist nature chosen from a larger set of such specialist databases within the sector.

Through the forecast period one may expect to see a proliferation of databases which will increase their number, but also a process of rationalisation, absorption, merging etc. which will decrease it. Taking account of these factors, it appears that the constant figure of two databases consulted per use is a reasonable estimate.

4.4.3 Type of Service Used. This study has been restricted in the types of service considered, and the discussion reflects this. The average ratio of SDI activity, measured in subscriptions, to retrospective uses is considered to decline during the forecast period in the following way:

1976	SDI per retrospective search = 1
1980	" " " " = .5
1985	" " " " = .25

It is assumed that each SDI subscription involves one on-line access per database per year to initiate or revise the profile. The type of database consulted (citations, abstracts or numerical data) will depend more on what is available than on the simple choice of the user. It is believed that over the forecast period there will be a shift from citation-only databases to a wider variety, attracting a corresponding variety of use, and that the overall trend in the distribution of searches will follow this kind of pattern:

	<u>Type of Database</u>		
	<u>Citation</u>	<u>Abstracts</u>	<u>Numerical</u>
1976	90%	6%	4%
1980	70%	22%	8%
1985	40%	45%	15%

There will, of course be some differences from sector to sector. For example, demography will be concerned almost exclusively with numerical data.

The actual behaviour of the user must be distinguished from the type of database that he is using. For example, even though abstracts are available, he may choose to conduct substantial parts of the search using citations only. This is an important consideration when deriving figures for communications traffic as in the next section.

4.5 Traffic

In this study, figures of annual data communications traffic between users and on-line retrieval services have been classified in three ways:

- interactive search, retrospective print or SDI print
- into or out of the systems
- measured in messages or bits.

The growth in total traffic across all regions and sectors is shown in Figure 4.4. It increases by a factor of one hundred in the forecast period to an annual total of about 10^{12} bits.

The distribution by type of traffic for the whole of Europe for the forecast year 1980 is shown in Figures 4.5 and 4.6 for messages and bits respectively. The distribution of bits shows the very large proportion of traffic that SDI printing contributes. This is due to the monthly (at least) frequency of this function. The distribution of messages shows the high message content of the contribution of the SDI printing. Retrospective printing is less frequent than SDI printing and has fewer messages in one session than interactive search.

The distribution of traffic by region and sector is shown in Figures 4.7 and 4.8 respectively for the forecast year 1980. As in the case of the user numbers these show a reasonably even distribution by region, with the exception of the two extremes. This implies that an integrated network such as EURONET will have to offer comparable channel capacity to each region.

REGIONAL DISTRIBUTION OF TRAFFIC (1980)

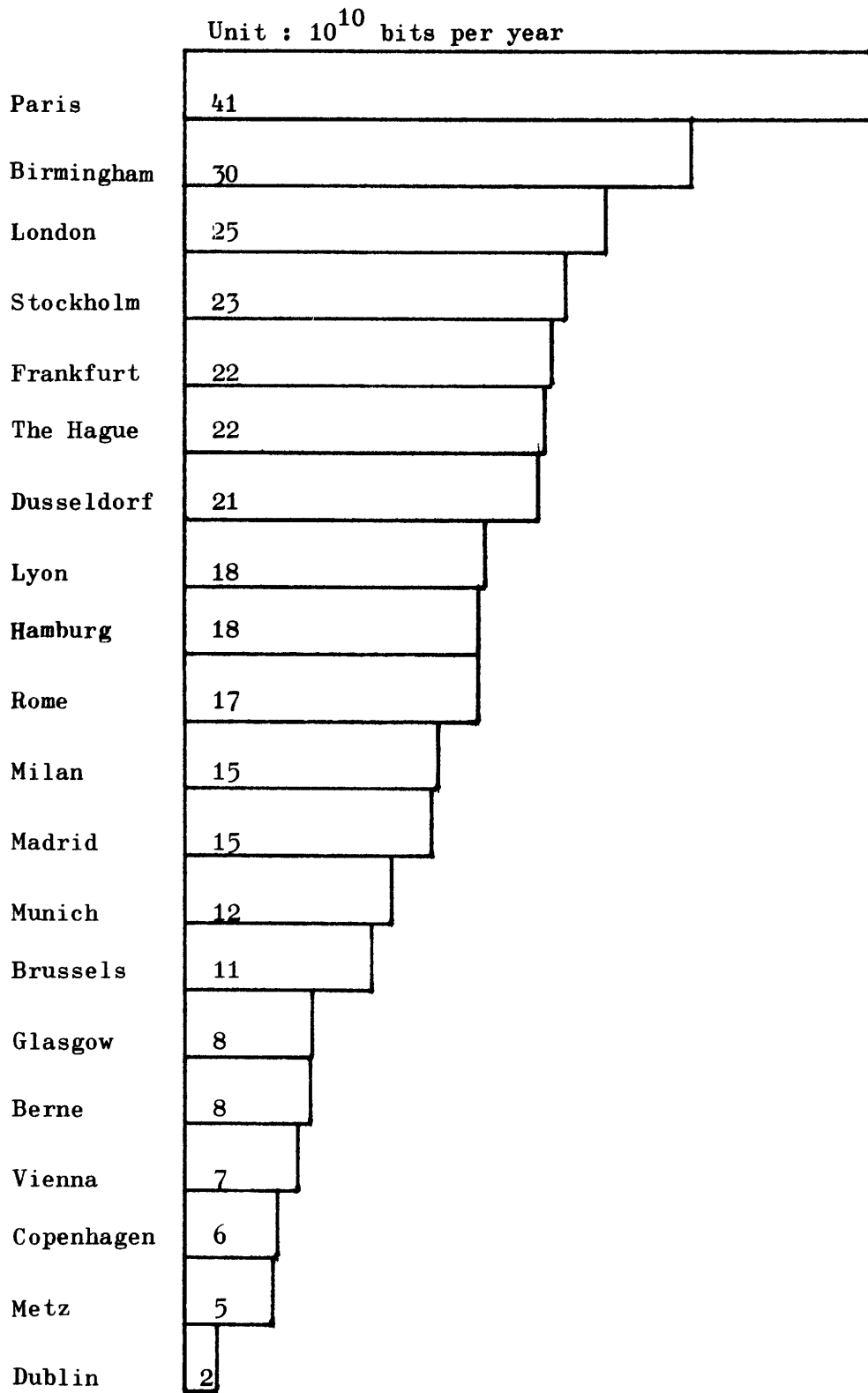


Figure 4.7

On the other hand, the traffic distribution by sector, as in the case of the user numbers, is very much less even. A substantial proportion (in the region of 40 per cent) is contributed by the two sectors, medicine and chemistry. This implies that the processing support required to handle a given number of enquiries against these databases will be higher than in the minor sectors. In fact, given the objective of grouping databases at processing centres so that processing loads are comparable, Figure 4.8 provides a tool for achieving such a goal.

4.6 Languages

The significance of language for information retrieval services in a multi-lingual environment such as Europe is very great. This significance is both practical and emotional. It is practical because multi-lingual facilities cost money and can therefore be asked to produce benefits in proportion. It is emotional since a great deal of personal and national morale is bound up with both one's own native language and the choice and use of secondary languages.

This section therefore summarises two aspects of the language situation as it exists in Europe today. The details are given in Appendix B.

The first approach is to ask what proportion of the users in a given sector can use primary literature written in a particular one of the four major languages. The average figures are as given in Section 4.2 above; there are only minor differences between the sectors.

These figures describe the language ability of the average European potential user of technical literature. By themselves they are not unexpected. However, they do have a bearing on the language of preference for introducing a new database or service, and also the language of preference for translations of documents originally written in non-European languages, eg: Russian or Japanese.

The second approach is to go beyond these figures. For certain sectors we know the distribution of primary literature by language. By combining the language distributions of user ability and of primary literature, a combined figure can be derived which represents the proportion of world technical literature readable by the average potential user in each country and sector. The figures for Europe as a whole are:

TRAFFIC DISTRIBUTION BY SECTOR (1980)

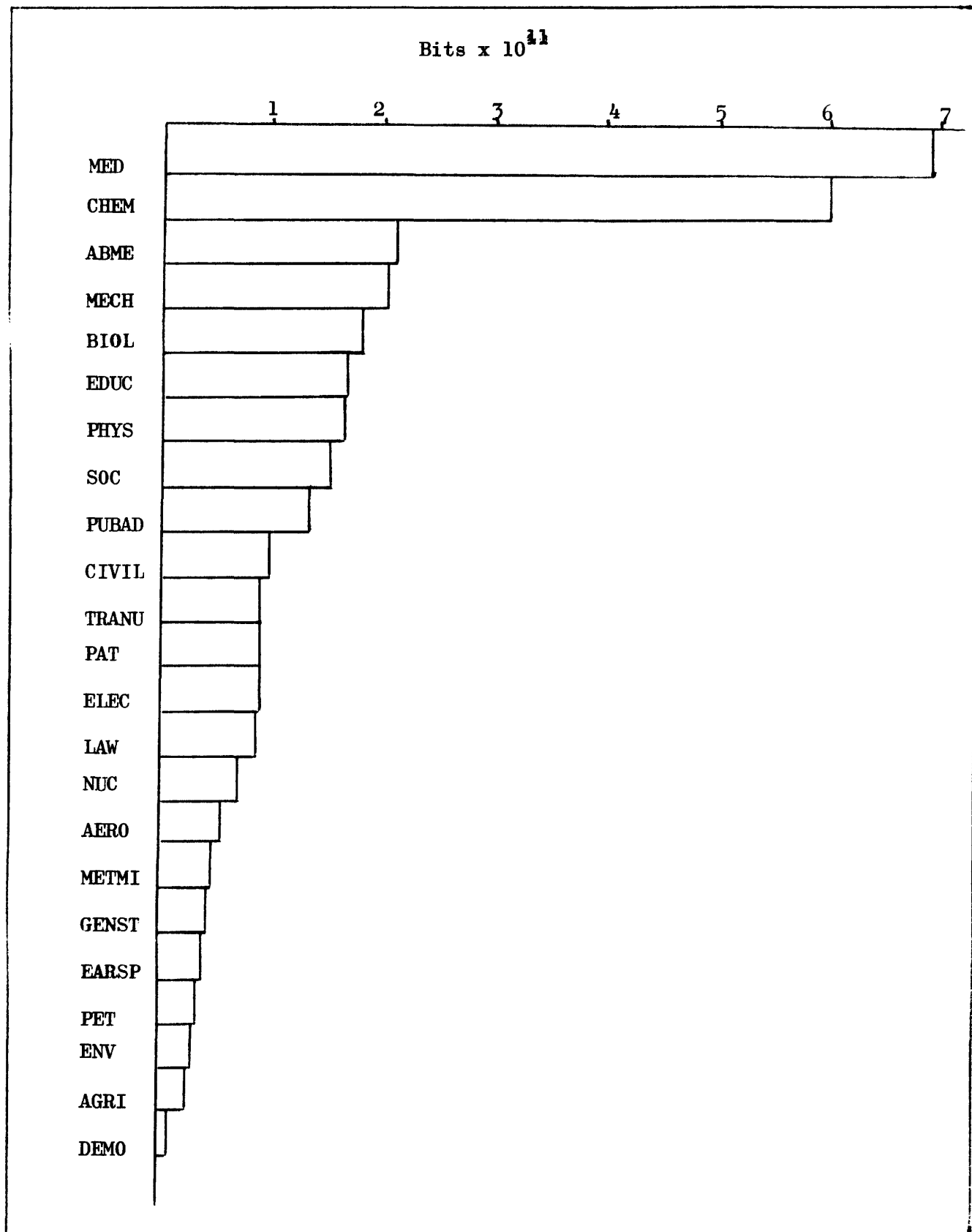


Figure 4.8

Agriculture	49%
Biology	61%
Chemistry	46%
Earth and Space Sciences	48%
Medicine	53%
Physics	61%
All Engineering	69%

For example, the average European qualified biologist can read 61% of all biological documents (if he has the time to do so). Perhaps 20-30 per cent of the short fall in each case can be attributed to literature originating in non-European languages.

There is considerable variation from one country to another. For example, Netherlands-Engineering has a value of 83%. France-Chemistry 38%, Denmark-Medicine 62% etc. Given these figures a country can assess its potential intake of technical literature by sector and perhaps consider special programs to support key areas.

The overall effect is that language alone is responsible for a degradation in the transfer of knowledge from the world's authors into Europe of about 40-50 per cent. Perhaps these are from "unimportant authors", but this would seem to require more detailed assessment.

Since the implications of these figures depend on judgements that must be largely subjective, no attempt was made to include language constraints in the model. Instead, it was assumed that no user would be deterred for language reasons from using any database or search language.

If it is desired to take account of language limitations in forecasting numbers of users, the forecasts in this Report must be discounted in the appropriate manner by the language ability factors in Table A.6 (Appendix A). For example suppose that the Physics sector in the Milan region is served by a French database. The forecast of Physics users in Milan in 1980, ignoring language constraints, as given in this Report is 1790. However it is believed that only 80% of QSEs in Italy are able to read French; thus the number of users should be scaled down to $80\% \times 1790 = 1430$ approx.

Judgement is still required in allowing for the usage of combinations of databases in different languages, or of multi-lingual databases, and a full discussion of this complex issue is beyond the scope of this Report. It may be expected however that user numbers need not be discounted in practice to so great an extent as the above example suggests, for two reasons:

- if databases are available in several alternative languages, relatively few users will be excluded from all of them;
- the actual users are likely to be better linguists than the average potential user.

5. SCENARIO : EURONET IN 1980

5.1 General Background

5.1.1 Introduction

This section contains a brief review of the wide range of activities and technologies that are coming to be associated with S.T.I. services. The pace of developments, especially in the USA, is now very rapid, and the concept of an information service is becoming much broader.

One major question not treated by this study is that of the cost-effectiveness of these services. With technology advancing so rapidly, is it possible that a new approach will prove more cost-effective within a few years? A related question, of more positive importance is: what combination of services will make the most cost-effective use of currently available systems and facilities? The following sub-sections indicate some of the possibilities to be considered.

Behind these questions lies a more fundamental one: what is the value of information to the user? Perhaps because of its abstract nature (eg: to receive an item of information twice is not twice as valuable as receiving it once), information has never quite followed the market behaviour of material commodities. Compared with the overall impact of scientific information on whole communities, most users appear unwilling to pay much for the information that they seek. It has become accepted, throughout the world, that libraries and information services should receive some measure of public support. Thus the question of cost-effectiveness becomes associated with policy questions about the types of service that should be supported.

5.1.2 Cooperative Activities

Many international organisations and programs have an interest in the development of international information retrieval services. These include such non-governmental organisations as:

FID	International Federation for Documentation
ICSU/AB	International Council of Scientific Unions/Abstracting Board
CODATA	Committee on Data
IFLA	International Federation of Library Associations
IFIP	International Federation for Information Processing
WFEO	World Federation of Engineering Organisations

In addition there is the UNISIST (Universal System for Information in Science and Technology) program of UNESCO, and the EURONET program of the Commission of the European Communities. There are also many other more limited committees and organisations representing various geographic or subject area interests.

Most of these bodies will continue in existence, developing cooperative relationships in the planning and implementation of information services. A small number of new major bodies may also develop during the forecast period.

Thus the background to any consideration of EURONET in 1980 must from the outset see EURONET as evolving in relationship with a number of other major international organisations and programs.

The major advantages of such a relationship are in the sharing of resources and expertise, the non-duplication of effort, and the development of compatible protocols and formats, etc. The major disadvantage is that multi-organisational decision-making can be very slow. This may result in a lag in effective services, or in the occupation of a portion of the market by entrepreneurial services which then generate de facto standards.

5.1.3 Trends in STI Services

On-line information retrieval systems already offer access to much of the world's primary scientific and technical literature. There are likely to be few problems in principle in consolidating the present situation, and:

- increasing the coverage to virtually 100%
- adding abstracts to citations
- developing widescale geographic access
- organising linked document delivery systems.

However, much of the significance of trends in SPI is in the development of related components of the overall information field eg:

- publishing
- libraries
- numerical data centres, etc.

a) Publishing

Rapidly advancing technology and the need for financial economy are changing the publishing industry. Offset printing is superseding letterpress, and the production of offset plates from microfilm has been introduced. This microfilm can be either the result of computer output (COM) or used as computer input (CIM). Photocomposition and the introduction of typewriter composition has virtually eliminated monotype in primary journals. Though computer composition has not yet in general proved an economic proposition, the development of the required peripherals eg: cathode ray tubes (CRTs) which can display over 2000 characters is likely to hasten the introduction of electronic composition methods.

The pricing and charging policies are undergoing much thought but few changes. The concept of page charging, now fairly common, is worrying to publishers because it cannot be applied consistently. However, it now covers such a high proportion of many publishers' costs that its elimination is unlikely. The other source of income - subscriptions - has also been shown to be affected by page charging, and this will no doubt keep the latter in check.

The situation is even more severe for the publishing side of abstracting and indexing services. For example, it has recently been estimated* that by 1979 it will be cheaper for a US library to buy terminals and search MEDLINE rather than subscribe to Index Medicus. This is based on carrying out searches at an average rate of one per hour, together with existing trends in the costs of printing Index Medicus and in searching MEDLINE. The problem is worse for the printed versions of Chemical Abstracts and Biological Abstracts, since they are more expensive than Index Medicus.

* McCarn, David B. "Trends in Information". Proceedings of the ASIS Annual Meeting Vol.11 Washington D.C., American Society for Information Science, 1974, pp 145-150

b) Libraries

Automation in libraries is now applied to all parts of the order-processing-cataloguing-circulation cycle. Machine readable cataloguing tapes (eg: MARC) have become available and individual libraries often develop their own machine readable catalogues, sometimes with the output produced on microfilm (COM). Union catalogues are produced and consolidated by computer for regional and national groups. Computer control of issuing and addressing systems has been introduced in many libraries, and further research is going on into the software that controls these systems. A large impetus has been given to electronic processing in libraries by the advent of mini-computers costing \$3,000 +. This has allowed libraries to have dedicated local computers which can also interact with more powerful computers for more extensive jobs. The production of KWIC and other machine generated indexes are often by-products of the introduction of spare computing capacity under the control of the librarian.

Selective dissemination services and on-line retrospective searches are now available in some libraries, and the recipients of the services are often unaware that electronic equipment is involved. They merely express their needs to the librarian who acts as an intermediary. Libraries are also beginning to take an active part in producing their own microforms. Catalogues on microfilm, research reports, high demand journal items and periodicals on microfiche are all being produced internally by various libraries. The general field of audio-visual materials (films, slides, etc) is another where libraries are moving forward on a broad front.

The most important change in library management is the use of tools that enable a librarian to justify the cost-effectiveness of both existing and proposed library services. The librarian/information service manager's involvement in financial accounting and other management techniques is growing rapidly, as a result of the increasing cost of library inputs and the current economic climate.

c) Numerical/Fact Retrieval

The compilation of critically selected numerical and other quantitative scientific data has become an important part of the general activity of scientific and technical information handling. Early collection and compilation of such data was confined to areas in which there were groups of scientists willing to undertake the compilation and in which there was a clear interest in their use. In the 1960s it was recognised that the field needed finance and coordination, and a number of national centres were established. The International Council for Scientific Unions set up a Committee on Data for Science and Technology which has become an international focal point for data compilations. The Committee on Scientific and Technical Information (COSATI) is another organisation responsible for pioneering work in data collection, and its storage on microforms. In 1971 agencies working under COSATI supervision produced and distributed more than 20 million microfiche.

Many specialised fields, now including engineering and the geo- and bio-sciences, are served by centres providing evaluated quantitative and/or descriptive data, very often in machine readable form. Pressures are developing to explore ways of making such sources available through on-line systems. New cataloguing and searching techniques are needed, adapted to the type and structure of the data. One organisation working in this field is the Atomic Weapons Research Establishment at Aldermaston in the UK, which has established a Mass Spectrometry Data Centre. This has built up a collection of spectra which is continually augmented by contributions from mass spectrometrists all over the world, and the results are distributed on a world wide basis. The data can be searched by a special computer program, Mass-Match, developed in cooperation with Unilever Ltd.

User requirements for numerical or factual data will vary in three ways:

- according to whether the information needed consists of numbers, character strings, or a mixture of the two;
- according to the complexity of the search process involved;
- according to whether the information is to be used in a computer or presented directly for manual use.

If the information is for use in a computer, the question arises whether the analysis is performed in the computer that holds the database, or in another computer.

Already there are services for investors that provide current stock market information with a range of simple analytical options such as valuing a portfolio, and the scope for widening this kind of service in the economic field is great. The US organisation Predicasts, Inc. has plans for a range of such services. These would be integrated with the process of accessing the database itself, and implemented through a single system.

On the other hand it is possible that, as information services develop, the practice will be introduced of allowing an analytical program in one computer to access a databank in another. Thus a computer operator may evolve an analytical service on his own computer, under his own control, using data supplied by another organisation which need not be aware of the details of the analysis for which the data is used.

5.1.4 Trends in Technology

Although there is much research into new principles for use in computer and communications hardware, the time-scale for any new principle to affect the market has become very long - usually ten years or more. This is because:

- large items such as central processors have a long design-development-tooling-manufacture-selling cycle;
- small items must be produced in large quantities to be competitive, and to reach a high rate of production takes time;
- system costs tend to be dominated by the software, especially during the early stages in the life of the system.

Thus the general trend of commercially available systems between now and 1985 can be seen today, and the possibility of surprises is remote.

Developments are considered below under the headings of Processors, Terminals, Data Communication Facilities, Image Handling and Software.

a) Processors

Two significant innovations have reached the market recently. These are:

- time-sharing systems, which began experimentally 15 years ago, and began to be offered commercially about 10 years ago, but have only recently become standard offerings;
- microcircuits, which were conceived 20 years ago, and began to be actively developed 10 years ago.

So far microcircuits have had relatively little impact on large computers, but have dramatically reduced the hardware cost of minicomputers. This is because the capital cost of design, development and tooling is high so that long production runs are required.

Large computer systems now use many small cheap processors for peripheral tasks, but the total cost is not greatly reduced. The next major step will come when new designs for large systems appear that enable them to be constructed entirely of arrays of similar minicomputers. The system design problems of doing so are considerable, and the process of establishing such new types of system in the market would take many years.

b) Terminals

The general trend in terminals is to provide more capability at the terminal, mainly through the provision of some "intelligence" via a small programmable processor with its own memory. This intelligence is particularly useful for data input validation and transmission error control. Some reduction in price may be expected, but the main benefit to the user will come through better capability for the same money, rather than lower cost.

An important trend for the user of information retrieval systems will be the rapidly increasing introduction of non-impact printers. These are currently undergoing an intense phase of development, utilising a range of technologies, including ink

spraying, thermal, electro-static and magnetic techniques. Some problems still remain to be overcome, notably the fact that only a single copy can be produced and that most techniques require special paper. However, the quieter, faster printing possible through non-impact printing is expected to make such printers common in the period 1980-85.

The use of visual display units as components of terminals will also increase. VDUs have particular advantages for the user of STI services:

- they are completely silent and therefore suitable for use in libraries and shared offices;
- they can receive and display information at a very high rate, which is convenient for interactive searching;
- they do not use paper.

Much of what a user receives during an interactive search is of transient interest only, and it is wasteful to use paper to make it visible. However a hard copy will still be required of the useful results.

Unfortunately no cheap and compact way has been found of combining the advantages of the VDU and the hard copy printer in one machine. The only compromise that avoids giving each user one of each type of machine is to install one printer serving a colony of users, with a local mail service to distribute the printed output.

Owing to the different properties of VDUs, search protocols for use with VDUs will come to differ from keyboard-printer protocols during the forecast period.

c) Data Communication Facilities

Current facilities available through the PTTs are based on a combination of three techniques:

Use of telegraph and telex lines. These are able to operate only at a low data transfer rate (maximum 200 bits per second) and their use is therefore limited mainly to the use of slow keyboard-printer terminals. Such lines are not at all suitable for the high-speed connections required by data communication networks.

Use of voice telephone lines. These provide the main medium for data transmission today. The public switched network allows data transfer in all the Community countries at speeds up to 1200 bits per second and in most up to 2400 bits per second. These are likely to increase to 4800 bits per second by 1980. However, if good quality medium and high speed links are required, leased lines have to be selected. All the Community countries can provide leased lines at 4800 bits per second and some at 9600 bits per second.

Wideband facilities. These allow very high data transfer (eg: 48 kilobits per second) and are obtainable only by leasing from the PTTs. Such lines will be used for the major links in the European Informatics Network (EIN).

These facilities will still dominate in 1980. However, of special significance to EURONET is the high degree of interest being shown by the PTTs in developing separate dedicated data transmission facilities. It is not yet clear whether such facilities would use circuit-switching or packet-switching technology, but it is likely that by 1985 most Community PTTs will be offering some dedicated data transmission services. From a EURONET point of view, two major questions need to be answered before the usefulness of such services to EURONET becomes apparent:

- 1) What tariff structure will these services have?
- 2) Will the services of the various PTTs be operable on a truly international basis?

Germany is in a special situation, having embarked some years ago on the development of a new digital network designed primarily to upgrade the telex service to higher speeds and also to cater for data traffic. It has no other plans for a data network.

Ultimately the whole telephone network will become digital, with the introduction of p.c.m. (pulse code modulation). The technology is already well understood and provides reliable quality circuits and potential cost savings. However it is only used at present in a few parts of the network; investment planning problems will prevent it spreading very rapidly. By the end of the century it should be common throughout Europe, and this will have a dramatic impact on systems using data transmission. An ordinary telephone channel will then be capable of carrying ten times as much data as it can today.

d) Image Handling

Computer technology is now well adapted to the storage and processing of numerical and textual information in well disciplined alphabets. However, recorded knowledge also includes graphical or pictorial information, and text that uses large and open-ended alphabets. Elaborate processing of such items is rarely required, but they need to be stored and retrieved. Some kind of automatic storage and retrieval method may be called for, especially if the items are associated with conventional text that is held in a computer system.

Essentially two forms of storage are available: optical microform, and magnetic recording. The former can be viewed by a purely optical device; the latter is essentially the same as video-recording. Thus the former is cheap and convenient if the stored image and the user are in the same place. Otherwise electrical transmission is involved, with the user viewing eg: a TV screen; the source can conveniently be a magnetic recording, though it could also be a microform scanned by a camera.

It is possible to digitise graphical information so that it can be held in an ordinary computer store, and this is done for certain purposes (eg: to manipulate technical drawings or to recognise patterns), but for mass storage of pictures that do not need to be processed this form of storage is uneconomic.

Microform, both roll and fiche, is at present becoming a widely used storage and distribution medium for technical and graphic information. The long term balance between optical and magnetic storage of information is not clear. In the shorter term up till 1980 it is likely that microform will continue to grow in use and availability.

Current research and development is concentrating on:

- relative roles of COM microforms v optically reduced
- choice of reduction ratios
- use of colour in microform
- development of viewers
- production of readable hardcopy from microform
- reproduction of microforms
- electronic transmission of microform images.

Development in these areas will continue, enabling microform to grow in use as a component of future information retrieval services. It will increasingly be linked with the cataloguing and searching procedures being developed for use in computer systems, so that the images can be retrieved under computer control.

For producing hard copy from transmitted images, the facsimile process has been available for many years. Some recent improvements have led to intense marketing efforts aimed at business users, but the response has so far been disappointing. Most systems require about three minutes to transmit an A4 page by telephone line. Digital techniques have now been introduced, enabling more powerful data compression methods to be used, reducing the A4 transmission time to about one minute. It is unlikely that much further improvement in speed can be made without resorting to special wideband lines or waiting for p.c.m. lines to become available.

However, there is still room for improvement in the attractiveness of facsimile systems to business users, and this could lead to higher sales and reduced costs. High speed machines could appear, for use over short lines where bandwidth is not expensive. (Some machines already developed as computer peripherals are essentially high speed facsimile receivers).

e) Software

Software has become the dominant cost in computer systems, and unfortunately there is no prospect of large improvements in this technology in the near future. The best that can be hoped for by 1985 is a gradual reduction of cost, and improved estimating, as a result of the introduction of proper management methods.

Another way of keeping down software costs is by reducing the complexity of the requirements eg: by limiting the variety of cases to be handled. Effort devoted by EURONET to the standardisation of conventions and protocols for STI services should not only improve the acceptability of these services to the average user but also lead to economies in software.

5.2 EURONET

5.2.1 Organisation and Management

The operational responsibility for EURONET is envisaged as resting with a special organisation dedicated to this purpose. As mentioned in Section 5.1.2 EURONET will have a complex set of relationships and responsibilities with regard to other international bodies. In addition, the EURONET management must liaise closely with such groups as:

- the Commission itself
- CIDST
- national information centres
- EUSIDIC
- professional societies
- database suppliers.

This liaison will have at least three major aspects:

- consultation, ie: a general exchange of information on issues, priorities and plans;
- cooperative policy formation on such things as the scope of database coverage, the role of national centres etc;

- cooperative operations, ie: activities which share or exchange resources, provide one service in return for another, or obtain a system component, eg: a specific database, for operational use, etc.

The actual form of EURONET management in 1980 will be the result of some years of evolutionary development, in which the key elements will be independence and responsiveness. Operational independence implies the freedom of EURONET to operate in an autonomous manner within the limits of its annual budget and governing policies. Responsiveness is more complex, and is addressed to at least three separate groups:

- to users, in identifying needs and service opportunities, in exploiting technological advances, in developing innovative programs, and in encouraging effective end-user feedback etc.
- to the Commission, in setting up priorities and policies, in developing budgets and schedules, in cost effective accountability, and in the development of Community scientific and technical resources.
- to national information groups and centres, respecting their freedom to develop national programs, and encouraging the national centres to collaborate in an international multi-organisational information service complex.

5.2.2 Operational Status

By 1980 it is likely that EURONET will have achieved full operational status. This implies at least the following elements:

- a staff with skills in computers, communications, database management, and user interface technology as well as expertise in languages, thesaurus construction, and the principal subject sectors.
- physical resources, eg: processing centres and communications networks.
- contractual relationships with database suppliers, information centres, etc.

- an operating division responsible for operations and for relationships with other bodies.
- a research and development division responsible for keeping EURONET at the forefront of information service technology.
- an annual budget and a five year forward plan, updated annually.

The annual budget could be of the order of 10 to 20 million dollars, based on the revenue figures of Section 3.1. Directly employed professional staff may total several hundred, depending on the amount of work contracted to other organisations.

5.2.3

Services Available

When EURONET first becomes operational, it will be able to offer only a limited set of services. Furthermore these will typically be based on services also available elsewhere. However, some services unique to EURONET will be in the process of development, and already operational to the extent that the databases have been built up by that time.

From this starting point the central objective for EURONET's development, acceptance and use, will be to develop an increasing proportion of overall services that are available only - or at least in better quality - through EURONET. The ultimate success of EURONET will depend upon the extent to which it will provide better and different services from those available today and those becoming available.

The following list indicates the breadth of services that EURONET could be offering or developing by 1980:

- a) Retrospective search (up to 2 years back)
- b) Retrospective search (more than 2 years back)
- c) Retrospective search - distribution of results
- d) SDI profile construction and updating
- e) SDI - distribution of results
- f) Numerical data retrieval from stored tables
- g) Fact retrieval, ie: file interrogation with minimal processing
- h) Question-answering, ie: logical processing based on files
- i) Computational retrieval, ie: the incorporation of retrieved data directly into the user's processing environment
- j) Library selection and acquisition support
- k) Library reference service support
- l) Library cataloguing and holdings file support
- m) Referral of users to databases and services within EURONET
- n) Referral to people, places and conferences.
- o) Mail-box, ie: system-user message facility
- p) Database transfer to systems outside EURONET, eg: specialised information centres
- q) User file services, eg: personal use bibliographies
- r) Document ordering for users (search related) from libraries or other centres
- s) Facsimile transmission of text and other images to users.

EURONET should strive to establish a small number of high level user protocols using a uniform set of conventions and supported by a uniform user reference and documentation service. However, privately developed databases using EURONET simply for distribution may still utilise idiosyncratic search methods.

Some progress will have been made on multi-lingual facilities, mainly in the areas of command language vocabulary, user documentation, subject area thesauri, and bibliographic citation files. By 1980 the cost-benefit aspects of the multi-lingual problem will be better understood. This will permit the development of multi-lingual facilities that are both cost-justified and nationally supported.

5.2.4 Users

As mentioned in Section 2.1, EURONET will be one of a number of major information retrieval services operating in EUROPE. These will be supplemented by a large number of smaller and more specialised services. Any one service will attract only a fraction of the total number of users of all services.

The proportion of the total user population that will be served by EURONET depends upon a number of factors, including:

- the precise mix of available alternative on-line services;
- coverage and variety of EURONET services;
- quality of EURONET services;
- date of introduction of EURONET services;
- geographical coverage of EURONET;
- language facilities of EURONET;
- cost structure of the information service market.

EURONET could reasonably expect to serve half of the total market by 1980, ranging from maybe 20 to 80 per cent in different sectors. This proportion will probably increase during the second half of the forecast period. To achieve these figures will require a determined development effort, well supported by the Commission in the early years before cost recovery is fully effective.

5.2.5 Development

EURONET is a concept today. In 1980 it will have developed into a maturing, multi-faceted complex of information retrieval services. A planning unit has been established by the Commission to guide this development.

As an illustration of the task that lies ahead, some of the steps that would be necessary to reach the 1980 objectives for EURONET are listed below in an approximate chronology.

1975 Studies undertaken on technical, design policy issues and alternatives. First five year development plan and budget formulated. Project management procedures established. Key personnel appointed.

- 1976 Staff recruitment started. Equipment requirement studies for processing and communications carried out. Phased contracts let. Central management and software service facilities defined. Extensive liaison conducted with other bodies. Pre-contractual discussion held with database suppliers.
- 1977 Staff recruitment continued. Initial equipment installed, database contract negotiated. Sectoral service managers appointed. Detailed sectoral plans developed and work initiated. Pilot service offered using ad hoc, existing system components.
- 1978 Staff recruitment continued. Major promotion and documentation begun. Basic services offered in leading sectors. Development of second generation services started.
- 1979 Staff recruitment, promotion & documentation continued, with a shift towards second generation posture. Broader set of services offered on a pilot basis. Increased language facilities with more complete geographic coverage developed.
- 1980 Major development phase completed. EURONET organised as a number of divisions each with separate responsibility. Orderly flow of new services and technologies, from research and development through pilot testing to operational status, established. Full cost recovery attained. Extensive user feedback and performance monitoring implemented. Services marketed outside Europe.

5.2.6 Beyond 1980

Information retrieval services will reach a watershed around 1980. Services based solely upon bibliographic citations, or even abstracts, will have completed their coverage of the world's literature. If they do not grow beyond this original scope, then they will become progressively isolated, simply electronic replacements for the library card catalogue or abstract journal. This consideration leads to two conclusions:

- EURONET must continually consider long term evolutionary opportunities. Alternative patterns of future activity must be developed for wide discussion, review and evaluation. These should be related to state-of-the-art projections in other parts of the world.

- The technological infrastructure developed for EURONET, eg: network communications facilities, must be so designed as to minimise constraints on future alternatives.

The broad alternatives for development beyond 1980 include at least the following major emphases, each of which has its advocates in current thinking:

- a) Cost trends in both publishing and computer searching of scientific and technical information are unambiguous. Electronic distribution of STI will inevitably replace printed distribution. Connections will be established between STI networks and publishers, and many journals will come to exist only in electronic form. EURONET will tend to become an electronic STI utility, rather than simply serving as an access tool.
- b) The real problem with STI is not its volume but the progressive deterioration in its average quality. (This is an inevitable consequence of the Lotka-like distribution of work quality among authors). Rather than facilitate more access to more information, EURONET might exercise strict quality control and hence deal with less volume than current systems. However, this reduced volume would have a much higher utility to the user because of its compact, high quality nature. This alternative is likely to run into criticisms of censorship. On the other hand, this is already present today under the guise of editorial judgement.
- c) Europe, as also the USA and Japan, are making the transition to a post-industrial society in which knowledge is a major resource. Knowledge will be comparable with manufacturing capacity in industrial countries or with raw materials in developing ones. The prime aim of EURONET will be to serve the European Community in the management and effective utilisation of knowledge as a resource. This alternative would call for considerable research into the role that knowledge does or can play in the support of social and economic activity.
- d) Scientific and technical information services are only one element in a varied and vigorous information and communications field. Other elements include, for example:

telephones	education resources
TV	advisory information services
radio	entertainment and leisure services
mail	libraries and information centres
newspapers	computer and data networks.

By 1980 the inter-connection of a number of these different elements will be possible. EURONET will give to the European Community the central leadership for a multi-faceted information complex serving virtually all the public through a variety of means. This alternative is open to abuse through central control of a large proportion of the public information environment.

These alternative emphases are not mutually exclusive, nor, of course, exhaustive. The development of the most advantageous alternative for Europe is a most challenging task for the many parties with an interest in the long term success of such a venture.

At the very least, in view of the trend of current developments, if EURONET services are to be competitive in 1980 the following must be seriously considered:

- full text delivery (physical, microform or electronic) where required;
- user file support;
- user processing support;
- user publication facilities;
- question answering and reference services competitive with manual alternatives.

Most of these exist today in a few systems of limited scope. The advantage of EURONET would lie in the use across Europe of a single integrated system offering a wide range of services.

A P P E N D I C E S

APPENDIX A : METHODOLOGY

A.1 Introduction

The model has been discussed in summary terms in Section 3.2 above. In this appendix more detail is given than was possible earlier, under the headings:

- Input Data - description of input data, sources, use made of it by model.
- Logic - detailed logic, sample calculations.

A.2 Input Data

This section describes the input data used by the model. The data is specified in the following tables:

- total population
- keyboard terminals
- sector population
- transfer matrix
- penetration
- language ability
- literature
- databases
- behaviour
- traffic

- a) Total Population. Total population and annual growth figures for each country in the study are shown in Figure A.1a.* These are derived from the PA Eurodata report, European Computer and Communications Markets 1973 - 1985. Original sources are given there as OECD International Statistics and national Annual Statistical Yearbooks.

* All tables follow page A.8

These figures are used in developing certain ratios used in the model to differentiate sectors and countries, e.g. ratio of keyboard terminals per capita total population as an indicator of technological support for on-line services.

The model computes results for countries and then allocates these to regions. The allocation ratios used are given in Figure A.1b. The source for these is The Statesman's Yearbook (1974/1975). The geographic coverage of the region is shown in Figure 3.2 above.

b) Keyboard Terminals

The number of keyboard terminals for each country in the study for the years 1976, 1980, 1985 is shown in Figure A.2. These figures are based upon the PA Eurodata forecasts in European Computer and Communications Markets 1973 - 1985. Terminal types included are:-

- 1 - 3 operator-oriented (keyboard/printer, VDU/keyboard, other)
- 8 small batch, i.e. including paper tape facilities.

As mentioned in (a) above, these figures are used to develop ratios to differentiate between different countries on technological grounds.

c) Sector Populations

The model requires three elements of information on sector populations:

- sector populations for each country-sector pair. This is the number of QSE's (Qualified Scientists and Engineers) or equivalent, e.g. in Law.
- annual growth rate for each sector
- percentage of each population commercially employed.

These figures are given in Figure A.3, and their derivation is described below.

- (i) Sector Populations are estimated in different ways. With the exception of agriculture and medicine, all sector populations are first of all estimated for the United Kingdom. They are then carried over into the other countries to give the same ratio per capita total population, modified by a specific factor. This factor is obtained from ILO (International Labour Organisation) statistics, Yearbook of Labour Statistics, 1973, on per cent of national populations in technical, professional and administrative employment. Each country is related to the UK by a factor which is the ratio of the country per cent to the UK per cent. Considerable simplification is involved in this approach, but it was necessary to make these estimates rapidly, from convenient sources.

Agriculture figures are based on personal communications from P.J. Boyle and H. Buntrock, co-authors of the AGRIS report: Survey of the World Agricultural Documentation Services, 1973. Medicine figures are based upon EUSIDIC figures, which in turn are based mainly on WHO figures (World Health Statistics Annual, Geneva, 1973). They include dentistry in medicine.

The UK figures are based mostly on the Department of Trade and Industry report, Persons with Qualifications in Engineering, Technology and Science, (1959 to 1968), which is abbreviated as PQETS. These are augmented by telephone calls to various professional bodies, etc. In summary, therefore, sources for the various sectors are:

<u>Agriculture, Medicine</u>	As above
<u>Biology, Chemistry, Physics,</u>	
<u>Civil, Electrical, Mechanical,</u>	
<u>Metallurgy and Mining</u>	PQETS
<u>Earth and Space Sciences</u>	Geology in PQETS, multiplied by 4
<u>Aerospace</u>	Society of British Aero- space Companies estimate of total employment for aircraft, plus 50% for aerospace, times PQETS % QSE for sector.
<u>Nuclear</u>	Institute of Nuclear Engineer's Survey esti- mate of upper limit of potential membership (unpublished)

Petroleum

Average of Aero-space and nuclear populations (EUSIDIC projects the searches in petroleum to lie between the aerospace and nuclear figures.)

Transport & Utilities

PQETS - utilities, transport corporations, plus vehicle manufacture.

Accountancy, Business & Management, and Economics

Membership of the Institute of Chartered Accountants plus British Institute of Management. Total divided by 2, since membership felt too large and general in orientation.

Demography

Assumed same size as Agriculture.

Education

Department of Education and Science and University Grants Committee - University and polytechnic teaching staff.

Environment

Assumed same size as Agriculture.

Law

Practising barristers and solicitors from Law Society and Inns of Court and Bar, plus educators in law.

Patents

Institute of Chartered Patent Agents, membership times 3 to allow for related professionals.

Public Administration

Department of Employment and Greater London Council administrative grade civil service and local government. Total divided by 10 to bring into range - unsuitable by itself.

Social Sciences

Social Science Research Council, survey of membership of UK social science societies.

General Science and Technology

No original population. Search population built upon population from other sectors.

(ii) Annual Growth Rate. Most of these figures are from PQETS. Others by analogy with similar sectors.

(iii) Percent Commercial. Many of these figures are from PQETS. Others by analogy with similar sectors.

d) Transfer Matrix

This matrix gives the distribution of searches against database sectors that originate in a particular employment sector. It is used to transform potential user populations from employment to database sectors. It is given in Figure A.4.

The source for these figures is the judgement of the project team, together with some figures supplied by EUSIDIC for the science sectors.

e) Penetration

These figures describe the way in which the average usage (annual retrospective searches) per capita potential users builds up with time. Average usage is built up out of two components:

- Saturation limit, varying with forecast year. This is shown in Figure A.5a.
- Time-dependent S-shape saturation curve. This is based upon three input data elements:
 - . relative ceiling
 - . year of 1% of ceiling
 - . year of 90% ceiling

These are shown in Figure A.5b.

The source of these figures is the judgement of the project team together with figures suggested by Aslib. The saturation limit of 1 per capita in 1976 is derived from figures for Medline searches in the US in relation to nominal population of US medicine sector. (This figure has already been reached in 1974).

The year of 1% ceiling is taken to be the year of effective introduction of services in the sector. The year of 90% is measured as a delay from the 1% year, whose average value is 9 years. The Gompertz curve used in the model has the property that the 50% year lies midway between the 1% and 90% years.

f) Language Ability

The ability of QSE's or equivalents in each country to read technical literature in foreign languages is shown in Figure A.6. These figures are obtained from a small scale enquiry in DG XIII, averaging the responses which include at least one national from each country. These figures are used to develop users by language etc.

g) Literature

The distribution of primary literature by sector is shown in Figure A.7 for the six science sectors plus engineering in general. This is used to assess the ability of European scientists to use existing literature sources in view of language difficulties.

The sources for each sector are:

Agriculture:	Buntrock, H. "International Cooperation in Agricultural Documentation", 1972 (In German)
Biology:	Biological Abstracts
Chemistry:	Chemical Abstracts
Earth and Space Sciences:	Geology Craig (Scottish J. Geology, 1969)
	Geography Aiyepaku (International Library Review, 1973)

Medicine:	Index Medicus
Physics:	Physics Abstracts, in Wood (J. Documentation, 1967)
Engineering:	Engineering Index, in Wood (J. Documentation, 1967)

h) Databases

The number of databases accessed per average retrospective search, or utilised per average SDI subscription is given in Figure A.8. The figure of 2 has been taken as an average by the project team of a range that is known to vary from one to four. The two are likely to consist of one large scale, comprehensive, general database and one smaller, more specialised.

i) Behaviour

User behaviour is described on input as having two components, which are shown in Figure A.9:

- breakdown of the average retrospective search by type of data involved in the search session, e.g. citations, abstracts, numerical.
- ratio of live SDI subscriptions to number of retrospective searches.

There is evidence that the latter figure will decline through the forecast period, although the rate at which this will happen is not clear. The figures on breakdown are very much ad hoc estimates by the project team.

j) Traffic

The characteristics of terminal traffic associated with each kind of service considered are shown in Figure A.10. These figures are derived from EUSIDIC empirical data. These have been strongly confirmed by recent unpublished figures from the US. No input messages or data for the print services have been shown since it is expected that they will be negligible in a well-designed system.

The EUSIDIC figures show that the amount of traffic per search of a single database varies by about a factor of three depending on the data rate of the terminal line combination. This study has assumed the highest figure, based upon a data rate of 2,400 bits per second.

Calculations of traffic figures assume that each retrospective search is associated with one print, and each SDI with twelve prints, i.e. monthly.

Total Population

a.

Country or
Country GroupPop x 10⁶Annual
Growth
Rate %

B	Belgium	9.9	.5
DK	Denmark	5.1	.4
F	France	54.0	1.0
D	Germany	62.0	1.0
IRL	Ireland	3.0	.4
I	Italy	56.0	.8
L	Luxembourg	.4	.8
NL	Netherlands	14.0	.7
GB	United Kingdom	57.0	.5
ND	Nordic	17.4	.6
CH	Switzerland	6.6	1.0
A	Austria	7.6	.5
IB	Iberia	45.0	.8

Note: These abbreviations are used elsewhere in the data tables.

b. Regional Allocation within single countriesFrance

Paris: Metz: Lyons = 64: 8: 28

Germany

Hamburg: Dusseldorf: Frankfurt: Munich = 24: 29: 30: 17

Italy

Milan: Rome = 48: 52

United Kingdom

Glasgow: Birmingham: London = 12: 48: 40

Figure A.1

Keyboard Terminals

(in 000's)

		1976	1980	1985
B	Belgium	11.4	20.7	29.4
DK	Denmark	4.2	7.0	10.5
F	France	37.3	73.0	125.0
D	Germany	62.0	124.0	230.0
IRL	Ireland	1.0	1.8	2.7
I	Italy	19.4	30.4	47.9
L	Luxembourg	.2	.4	.6
NL	Netherlands	14.8	25.0	36.5
GB	United Kingdom	50.4	89.7	135.0
ND	Nordic	16.7	28.0	42.2
CH	Switzerland	10.5	21.3	30.9
A	Austria	3.3	5.6	8.4
IB	Iberia	13.8	23.0	40.2

Figure A.2

Sector Populations (in 000's)

SECTORS	%Com- mercial	Annual Growth Rate %	Country or Country Group												
			B	DK	F	D	IRL	I	L	NL	GB	ND	CH	A	IB
AGRI	30	3	1.5	1.2	4.3	4.4	.45	2.8	.06	2.5	5.6	3.1	1.6	1.1	2.2
BIOL	15	5	2	.9	13	12	.46	6.5	.06	4.1	12	4.1	1.2	1.3	3.7
CHEM	55	4	6.2	3.0	40	39	1.4	21	.21	13	39	13	3.9	4.2	12
EARSP	20	6	1.8	.8	11	11	.4	5.8	.06	3.7	11	3.7	1.1	1.2	3.3
MED	30	3	18	13	95	140	4	110	.5	21	88	36	11	18	51
PHYS	35	4	3.2	1.5	21	20	.73	11	.11	6.6	20	6.6	2.0	2.1	6.0
AERO	60	4	1.6	.8	10	10	.37	5.3	.05	3.3	10	3.3	1.0	1.1	3.0
CIVIL	45	6	4.5	2.1	29	28	1.0	15	.15	9.3	28	9.3	2.8	3.0	8.5
ELEC	55	5	6.2	3.0	40	39	1.4	21	.21	13	39	13	3.9	4.2	12
MECH	70	3	8.8	4.2	57	55	2.0	29	.29	18	55	18	5.5	5.9	16
METMI	60	3	1.5	.7	9.7	9.4	.34	4.9	.05	3.1	9.4	3.1	.94	1.0	2.8
NUC	30	4	.8	.4	5.2	5	.18	2.6	.03	1.7	5	1.7	.50	.53	1.5
PET	70	3	1.2	.6	8.0	7.7	.28	4.1	.04	2.9	7.7	2.9	.77	.82	2.3
TRANU	40	6	6.0	2.9	39	37	1.4	19	.19	13	37	13	3.8	4.0	11
ABME	80	8	9.6	4.6	62	60	2.2	31	.31	20	60	20	6.0	6.4	18
DEMD	50	5	.8	.4	5.2	5	.18	2.6	.03	1.7	5	1.7	.50	.53	1.5
EDUC	10	6	8.0	3.8	52	50	1.8	26	.26	17	50	17	5.0	5.3	15
ENV	30	5	.8	.4	5.2	5	.18	2.6	.03	1.7	5	1.7	.50	.53	1.5
LAW	20	8	5.1	2.4	33	32	1.2	17	.17	11	32	11	3.2	3.4	9.5
PAT	80	5	.5	.2	3.1	3	.11	1.6	.02	1.0	3	1.0	.3	.32	.9
PURAD	5	4	5.7	2.7	37	36	1.3	19	.19	12	36	12	3.6	3.8	11
SOC	20	4	8.0	3.8	52	50	1.8	26	.26	17	50	17	5.0	5.3	15
GENST	60	4	-	-	-	-	-	-	-	-	-	-	-	-	-

Figure A.3

Transfer Matrix

Employment Sectors

<u>Data-base Sectors</u>	AGRI	BIOL	CHEM	EARSP	MED	PHYS	AERO	CIVIL	ELEC	MECH	METMI	NUC	PET	TRANU	ABME	DEMO	EDUC	ENV	LAW	PAT	PUBAD	SOC	GENST
AGRI	50	10	5																				
BIOL	10	55	10		10		5						10					5	5				
CHEM	15	15	50	10	15		5		5		5	10	20					10	5			5	
EARSP	10	10	5	50	70		5	5	20	10	5	25						5					
MED	10	15	5	20	55		5	5															
PHYS																							
AERO							60	65	5		5	5	5	15		5		5					
CIVIL							5	60		70	70	50	5	10				5					
ELEC							5	5	60	5	5	5	5	5				5					
MECH							5	5		5	5	5	5	5				5					
METMI							5	5		5	5	5	5	5				5					
NUC							5	5		5	5	5	5	5				5					
PET							5	5		5	5	5	5	5				5					
TRANU							5	5		5	5	5	5	5				5					
ABME							5	5		5	5	5	5	5				5					
DEMO							5	5		5	5	5	5	5				5					
EDUC							5	5		5	5	5	5	5				5					
ENV							5	5		5	5	5	5	5				5					
LAW							5	5		5	5	5	5	5				5					
PAT							5	5		5	5	5	5	5				5					
PUBAD							5	5		5	5	5	5	5				5					
SOC							5	5		5	5	5	5	5				5					
GENST							5	5		5	5	5	5	5				5					

Figure A.4

a. Saturation Limit

(Average Uses per capita potential user for all sectors)

1976	1.0
1980	1.4
1985	2.0

b. Penetration

	Relative Ceiling	Year of 1% of Ceiling	Year of 90% of Ceiling
AGRI	1	76	87
BIOL	1	76	85
CHEM	1	75	81
EARSF	1	77	86
MED	1	75	81
PHYS	1	75	85
AERO	1	74.5	82
CIVIL	1	76	86
ELEC	1	76	85
MECH	1	76	84
METMI	1	76	85
NUC	1	75	82
PET	1	75	84
TRANU	1	77	84
AFME	1	76	86
DEMO	1	77	81
EDUC	1	76	86
ENV	1	77	86
LAW	1	78	87
PAT	1	77	81
PUBAD	1	77	83
SOC	1	76	88
GENST	1	75	84

Figure A.5

Language Ability

	English	French	German	Italian
Belgium	70	90	30	10
Denmark	90	25	80	5
France	60	100	20	30
Fed. Republic of Germany	80	30	100	15
Republic of Ireland	100	20	25	5
Italy	60	80	40	100
Luxembourg	85	100	100	25
Netherlands	90	40	90	10
United Kingdom	100	35	25	5
The Nordic Countries	85	20	55	5
Switzerland	70	70	80	35
Austria	65	35	100	25
Iberia	58	80	20	45

Figure A.6

Literature

(Distribution by language)

	English	French	German
AGRI	45	9	17
BIOL	75	3	3
CHEM	50	7	6
EARSP	50	9	9
MED	51	9	17
PHYS	73	4	4
ENGRG	82	2	9

Figure A.7.

Database Factor

(All sectors)

Average number of databases accessed per search		
	Retrospective	SDI
1976	2	2
1980	2	2
1985	2	2

Figure A.8

Behaviour (Breakdown of average search by type of database.
c = citation, a = abstracts, n = numerical. Also ratio of
SDI subscriptions to retrospective searches).

	Type of database			SDI/ retro	Type of database			SDI/ retro	Type of database			SDI/ retro
	c	a	n		c	a	n		c	a	n	
AGRI	100	-	-	1	70	30	-	.5	30	60	10	.25
BIOL	100	-	-	1	40	60	-	.5	10	80	10	.25
CHEM	70	20	19	1	40	50	10	.5	10	80	10	.25
EARSP	100	-	-	1	80	15	5	.5	50	30	20	.25
MED	100	-	-	1	80	20	-	.5	20	80	-	.25
PHYS	100	-	-	1	70	25	5	.5	40	50	10	.25
AERO	100	-	-	1	80	20	-	.5	40	60	-	.25
CIVIL	100	-	-	1	80	20	-	.5	60	40	-	.25
ELEC	100	-	-	1	80	20	-	.5	40	60	-	.25
MECH	100	-	-	1	80	20	-	.5	50	50	-	.25
METMI	100	-	-	1	80	20	-	.5	50	50	-	.25
NUC	100	-	-	1	80	20	-	.5	30	70	-	.25
PET	100	-	-	1	80	20	-	.5	50	50	-	.25
TRANU	100	-	-	1	80	20	-	.5	50	50	-	.25
ABME	90	-	10	1	65	20	15	.5	40	40	20	.25
DEMO	-	-	100	-	-	-	100	-	-	-	100	-
EDUC	100	-	-	1	80	20	-	.5	60	40	-	.25
ENV	100	-	-	1	80	15	5	.5	60	30	10	.25
LAW	100	-	-	-	100	-	-	-	100	-	-	-
PAT	-	100	-	-	-	100	-	-	-	100	-	-
PUBAD	90	-	10	1	70	15	15	.5	50	30	20	.25
SOC	100	-	-	1	80	20	-	.5	60	40	-	.25
GENST	100	-	-	1	100	-	-	.5	100	-	-	.25

1976

1980

1985

Figure A.9

TRAFFIC PER SEARCH

Retrospective search citations
 Retrospective search abstracts
 Retrospective search numerical data
 SDI search citations
 SDI search abstracts
 SDI search numerical data

 Retrospective print citations
 Retrospective print abstracts
 Retrospective print numerical data
 SDI print citations
 SDI print abstracts
 SDI print numerical data

	TO SYSTEM		FROM SYSTEM	
	Messages	Total Bits	Messages	Total Bits
Retrospective search citations	25	2K	25	56K
Retrospective search abstracts	48	3.5K	48	120K
Retrospective search numerical data	15	5K	15	5K
SDI search citations	25	2K	25	56K
SDI search abstracts	48	3.5K	48	120K
SDI search numerical data	15	1.5K	15	5K
Retrospective print citations	-	-	8	40K
Retrospective print abstracts	-	-	54	270K
Retrospective print numerical data	-	-	9	45K
SDI print citations	-	-	6	30K
SDI print abstracts	-	-	40	200K
SDI print numerical data	-	-	9	45K

Figure A.10

FORECASTING MODEL : Outline Logic

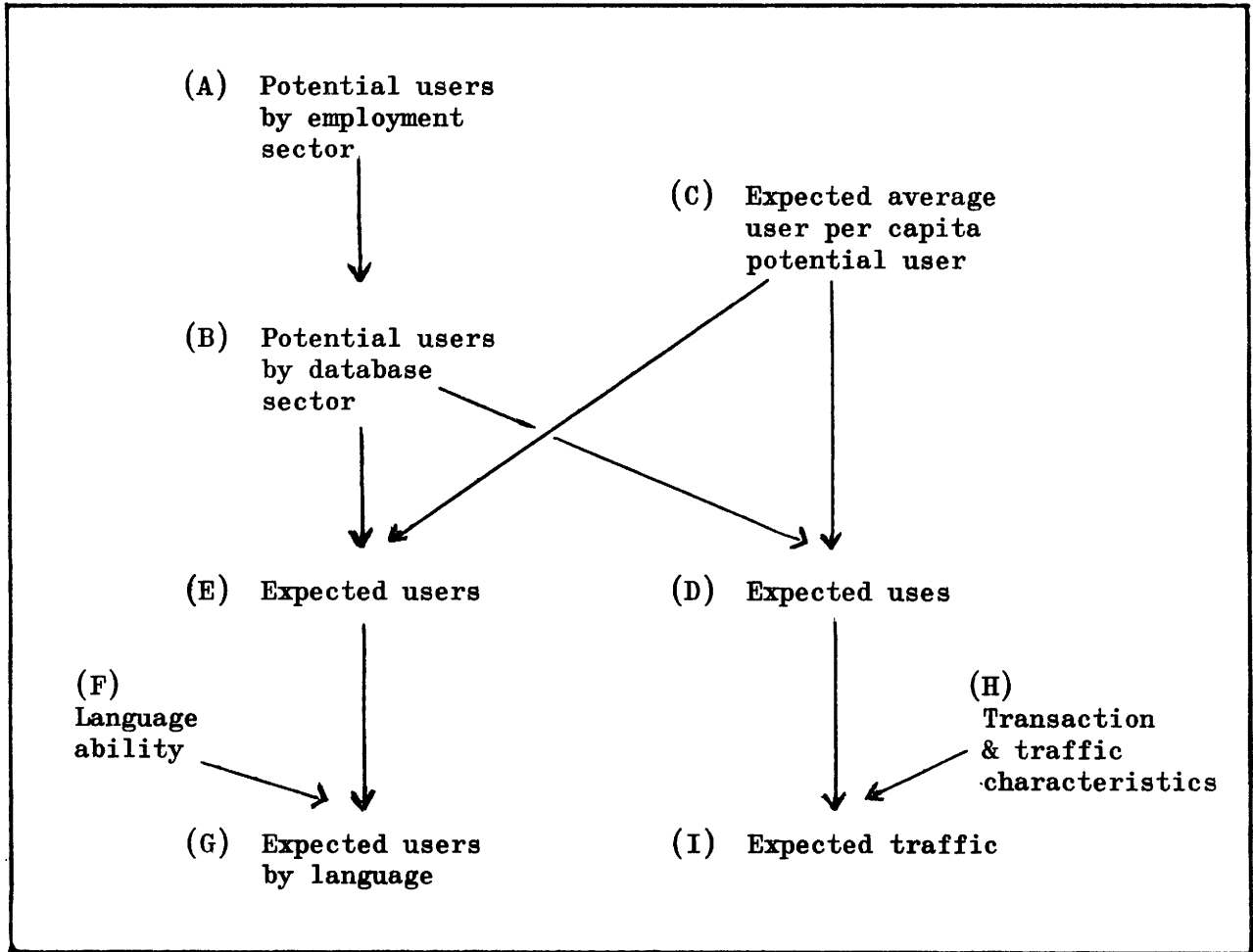


Figure A.11

A.3 Logic

The aim of this section is to give a complete exposition of the model logic, together with sample calculations at each step. These sample calculation steps do not follow a path of actual data values in all cases, but are intended to show clearly at each step what actually happens in the model.

The model logic described in Section 3.2.3 above is as shown in Figure A.11. Each of the elements in the flow diagram has been labelled. The detailed model logic for each element, or transition between elements, is shown below, using the agriculture sector in Belgium as the basis for illustration.

- A. Potential users by employment. This figure is the input data table value for QSE's in the agriculture sector in Belgium, i.e. 1500, see Figure A.3.
- B. Potential users by database. This figure is derived from the various employment sector figures that are shown as giving rise to database sector figures in the transfer matrix of Figure A.4. This shows that the sectors, and their contributing percentages are:

50% x agriculture

10% x biology

5% x chemistry

5% x environment

The individual population figures for these are 1500, 2000, 6200 and 800 respectively from Figure A.3. Thus the potential users for the agriculture database sector are:

$$\begin{aligned} &.50 \times 1500 + .10 \times 2000 + .05 \times 6200 + .05 \times 800 \\ &= 750 + 200 + 310 + 40 = \underline{1300} \end{aligned}$$

which is slightly less than the original figure for the agriculture employment sector.

C. Expected average use per capita. The agriculture penetration data is given in Figure A.5b.

$$\text{relative ceiling} = 1$$

$$\text{year of 1\% penetration} = 1976 = t_1, \text{ say}$$

$$\text{year of 90\% penetration} = 1987 = t_{90}, \text{ say}$$

The Gompertz formula for penetration $P = P(t)$ as a function of time is:

$$\log P(t) = a + b e^{-kt}$$

where a , b , k are the parameters to be calculated from the input data. It can be shown that:

$$a = \log P(\infty)$$

$$b = (\log .01) / e^{-kt_1}$$

$$k = 3.78 / (t_{90} - t_1)$$

From these equations, taking $t = 0$ in year 1970:

$$a = 0$$

$$b = -36.7$$

$$k = .343$$

The penetration may now be calculated for a year such as 1980, i.e. $t = 10$, using the formula above:

$$P(1980) = .31$$

The year 1980 is chosen to lend clarity to the example, and is not necessarily consistent with 1976 population figures, etc. This is a general penetration figure for agriculture. This is now modified to reflect two aspects of Belgium:

f_1 = the terminal capability v. average
European capability = 1.4, say

f_2 = the per capita ratio of agriculture
QSE's to total population v. average
European figure = 1.6, say.

The modifier used is $f = (f_1 \times f_2)^{\frac{1}{2}} = 1.5$ (approx.). The square root is taken to diminish the effect of large deviations from the average. The modifier is applied to the penetration P via an intermediate variable R , which has the property of progressively damping out the modifier as P tends towards 100 per cent, which is a general requirement on the behaviour of P .

$$\begin{aligned}
 R &= P / (1-P) = .31 / .69 = .45 \\
 R' &= R \times f = .45 \times 1.5 = .674 \\
 P &= R' / (1 + R') = .674 / 1.674 = .40
 \end{aligned}$$

Figure A.5a shows the saturation limit for 1980 to be 1.4, hence the average use per capita potential user population is:

$$.40 \times 1.4 = \underline{.56}$$

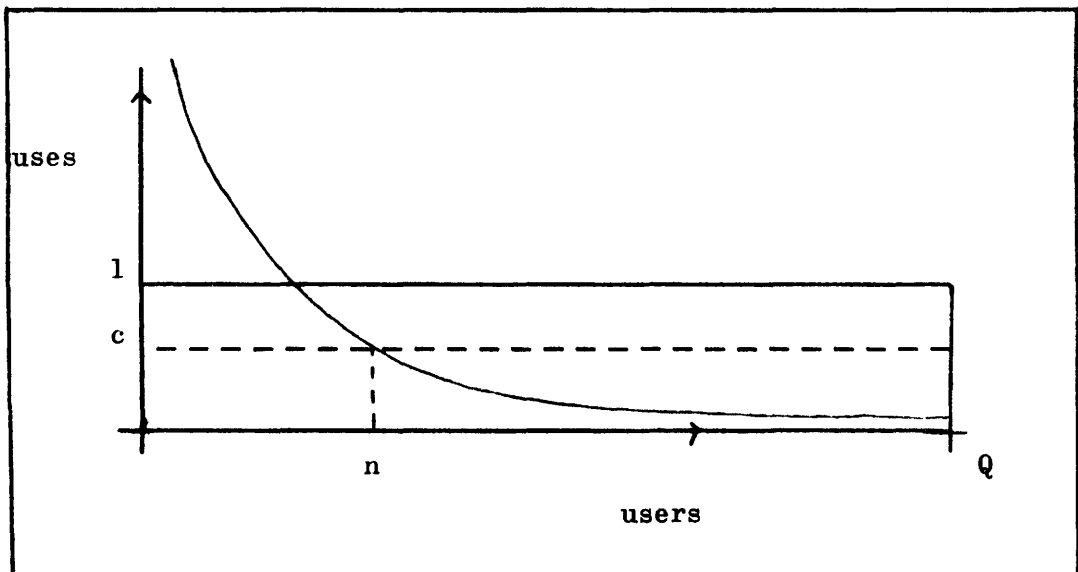
- D. Expected Uses. This is simply obtained by multiplying the potential users by average use, i.e.:

$$1300 \times .56 = \underline{730}$$

- E. Expected Users. The derivation of expected users depends upon the assumption that uses are distributed among users in a Lotka fashion.

Let: c = average use per capita potential user
 Q = potential users.

The Lotka distribution is illustrated below:



It has the meaning that the uses of the rth user (where users are ranked in descending order by frequency of use) equal some constant divided by r. In the illustration the average use c is shown, also the level of use of one per year. A total of n users search at least once per year.

The total users are made up of two groups:

- those who search more than once per year, i.e. n users, and
- those who search on average less than once per year. These can be found by first finding out the uses ascribed to the n "hard core" users and subtracting these from the total uses. This remainder is accounted for by individual uses by low frequency users.

An analytical approximation to the number of users may be obtained:

$$N = \frac{Q c}{\log Q} \left(1 + \log \left(\frac{\log Q}{c} \right) \right)$$

In this case $Q = 1300$, $c = .56$ and $\log Q = 7.16$, giving:

$$N = \underline{361}$$

The average frequency of use of actual users is

$$F = 730/361 = \underline{2.02}$$

F, G Language. The relevant language capabilities for Belgium are given in Figure A.6, i.e.

English	70
French	90
German	30
Italian	10

These figures have the meaning that 70% of Belgian QSE's can use technical literature in English etc.

Hence the numbers of users by language are the total users - 361 - multiplied by the appropriate language factor, i.e.

English	=	361 x .70	=	<u>253</u>
French	=	361 x .90	=	<u>325</u>
German	=	361 x .30	=	<u>108</u>
Italian	=	361 x .10	=	<u>36</u>

H. Transaction and Traffic Characteristics. Considering the year 1980, Figure A.9 gives as input data the following elements

- breakdown of average search citations:
abstracts = 70: 30
- ratio of SDI subscriptions to retrospective searches = .5

This is sufficient to calculate the fraction of each of the twelve service types occurring annually.

Using the abbreviations:

R = retrospective	a = abstracts
S = SDI	n = numerical
c = citations	

	<u>SEARCH</u>						<u>PRINT</u>					
	Rc	Ra	Rn	Sc	Sa	Sn	Rc	Ra	Rn	Sc	Sa	Sn
the twelve figures are:	.7	.3	0	.35	.15	0	.7	.3	0	.35	.15	0
each uses 2 databases (Figure A.8) therefore database searches:	1.4	.6	0	.7	.3	0	1.4	.6	0	.7	.3	0
SDI print is monthly:	1.4	.6	0	.7	.3	0	1.4	.6	0	8.4	3.6	0

The traffic characteristics of each of the twelve service types as given in Figure A.10 are used to calculate the total traffic per use. Calculating annual traffic out of the system in messages per use and using the figures in Figure A.10 gives:

$$\begin{aligned} \text{Interactive search} &= 1.4 \times 25 + .6 \times 48 + .7 \times 25 \\ &\quad + .3 \times 48 = 95.7 \end{aligned}$$

$$\text{Retro print} = 1.4 \times 8 + .6 \times 54 = 43.6$$

$$\text{SDI print} = 8.4 \times 6 + 3.6 \times 40 = 194.4$$

These figures must be multiplied by the total number of uses, i.e. 730, to give the final figure of:

Interactive search	= 70,000	}	messages per year
Retro print	= 32,000	}	out of the
SDI print	= 140,000	}	system

Other measures of traffic, i.e. messages in and bits in/out are calculated in a similar way.

APPENDIX B : OUTPUT TABLES

<u>TABLE</u>	<u>Page</u>
Number of Users	
By country / region, sector and year	4 - 5
Number of Restrospective Uses per Year	
By country / region, sector and year	6 - 7
Number of Retrospective Uses per User	
By sector and year	8
Percentage of Literature Readable by Users	
By country for science and general engineering sectors	9
Linguistic Ability by Sector	
(Percentage of sector members that can read publication languages)	
By sector for four publication languages	9

<u>TABLE</u>	<u>Page</u>
Users by Language (Number of users that can read publica- tion languages) By sector and year for four publication languages:	
European total	10
EEC total	11
By country / region	12 - 21
Total Traffic Messages and bits, into and out of systems:	
European total - by country/region and year (all sectors)	22
European total - by sector and year (all countries)	22
EEC total - by sector and year	23
By country / region, sector and year	23 - 35

Key to Country/Region Abbreviations *

<u>Abbreviation</u>	<u>Region</u>	<u>Country or Countries</u>
B	Brussels	Belgium
DK	Copenhagen	Denmark
F		France (total)
F1	Paris	Northern France
F2	Metz	Eastern France plus Luxembourg
F3	Lyon	Southern France
D		Fed. Republic of Germany (total)
D1	Hamburg) } regions within the Fed. Republic of Germany
D2	Dusseldorf	
D3	Frankfurt	
D4	Munich	
IRL	Dublin	Republic of Ireland
I		Italy (total)
I1	Milan	Northern Italy
I2	Rome	Southern Italy
L	Luxembourg	Luxembourg
NL	The Hague	Netherlands
GB		United Kingdom (total)
GB1	Glasgow	Scotland and Northern Ireland
GB2	Birmingham	Northern England and Wales
GB3	London	Southern England
ND	Stockholm	Finland, Iceland, Norway, Sweden
CH	Berne	Switzerland
A	Vienna	Austria
IB	Madrid	Spain and Portugal

* Notes: The tables include both the country and the regional breakdown of data, so that a particular abbreviation may denote either: - a region
or - a country or group of countries
or both, where the latter is itself a region.

NUMBER OF USERS

	1976	B	DK	F	F1	F2	F3	D	D1	D2	D3	D4	IRL	I	II
AGRI	21	15	47	30	4	13	52	12	15	16	9	3	17	8	
BIOL	46	24	194	124	16	54	239	57	69	72	41	5	84	40	
CHEM	483	255	2160	1390	189	610	2640	630	760	790	448	71	960	460	
EARSP	3	1	16	11	1	5	18	4	5	5	3	0	4	2	
MED	860	620	3310	2120	288	930	5800	1380	1670	1730	980	123	2850	1370	
PHYS	189	82	910	580	78	255	950	228	275	284	161	27	285	137	
AERO	127	60	580	374	50	164	630	151	183	189	107	20	198	95	
CIVIL	48	21	221	141	19	62	232	56	67	70	39	6	66	32	
ELEC	49	22	230	147	20	65	246	59	71	74	42	6	71	34	
MECH	77	33	367	235	31	103	386	93	112	116	66	10	107	51	
METMI	24	9	109	70	9	31	116	28	34	35	20	3	32	15	
NUC	107	49	510	327	44	143	530	127	154	159	90	16	159	76	
PET	51	23	240	154	20	67	252	61	73	76	43	7	75	36	
TRANU	2	1	9	6	1	3	10	2	3	3	2	0	2	1	
ABME	89	39	423	271	36	119	447	107	130	134	76	12	121	58	
DEMO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EDUC	79	34	375	240	32	105	393	94	114	118	67	10	107	51	
ENV	2	1	12	8	1	3	13	3	4	4	2	0	3	1	
LAW	0	0	1	1	0	0	1	0	0	0	0	0	0	0	
PAT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUBAD	1	0	6	4	1	2	6	2	2	2	1	0	2	1	
SOC	96	43	452	290	38	127	494	119	143	148	84	12	142	68	
GENST	110	51	477	305	41	134	530	128	155	160	91	18	195	94	
TOTAL	2470	1390	10700	6800	920	2990	13900	3350	4040	4180	2370	350	5500	2630	
1980	B	DK	F	F1	F2	F3	D	D1	D2	D3	D4	IRL	I	II	
AGRI	428	295	1270	820	122	357	1340	322	390	403	228	99	510	243	
BIOL	1280	720	6100	3920	540	1710	7300	1750	2120	2190	1240	243	3300	1580	
CHEM	3370	1980	17400	11100	1530	4860	19800	4740	5700	5900	3360	780	11400	5500	
EARSP	710	306	3500	2240	308	980	3660	880	1060	1100	620	120	1190	570	
MED	6100	4340	28400	18200	2490	8000	40700	9800	11800	12200	6900	1370	28800	13800	
PHYS	1780	830	9500	6100	830	2670	9500	2290	2770	2860	1620	345	3730	1790	
AERO	660	339	3490	2240	308	980	3540	850	1030	1060	600	154	1640	790	
CIVIL	1310	600	6800	4340	590	1900	6900	1650	2060	2060	1170	234	2390	1150	
ELEC	1450	680	7600	4890	670	2140	7800	1870	2260	2340	1320	269	2880	1380	
MECH	2400	1120	12900	8300	1130	3610	12900	3100	3750	3880	2200	466	4890	2350	
METMI	650	300	3400	2180	299	950	3450	830	1000	1040	590	124	1250	600	
NUC	820	410	4510	2890	399	1260	4420	1060	1280	1330	750	186	2020	970	
PET	443	219	2370	1520	209	660	2370	570	690	710	403	94	970	466	
TRANU	1210	570	6400	4100	560	1800	6400	1530	1850	1910	1080	232	2190	1050	
ABME	2640	1210	13900	8900	1210	3900	14200	3410	4120	4260	2410	475	4750	2280	
DEMO	1040	520	5700	3660	510	1600	5600	1340	1620	1680	950	239	2560	1230	
EDUC	2180	990	11500	7400	1000	3230	11700	2800	3390	3500	1990	384	3940	1890	
ENV	530	248	2660	1700	235	750	2720	650	790	820	462	93	880	423	
LAW	870	372	4360	2790	380	1220	4570	1100	1370	1370	780	140	1320	640	
PAT	1400	680	7700	4930	680	2160	7600	1820	2200	2280	1290	321	3510	1690	
PUBAD	1760	820	9500	6100	830	2650	9600	2300	2780	2870	1630	346	3630	1740	
SOC	2090	970	10700	6900	930	3000	11400	2730	3300	3420	1940	347	3780	1810	
GENST	1020	500	5300	3370	466	1480	5400	1300	1570	1620	920	222	2410	1160	
TOTAL	36100	19000	185000	118000	16200	52000	203000	48700	59000	61000	34500	7300	94000	45100	
1985	B	DK	F	F1	F2	F3	D	D1	D2	D3	D4	IRL	I	II	
AGRI	1020	690	3920	2510	363	1100	3920	940	1140	1180	670	288	2040	980	
BIOL	2910	1760	15000	9600	1320	4210	17300	4160	5000	5200	2950	710	11000	5300	
CHEM	5500	3280	29300	18700	2570	8200	32800	7900	9500	9900	5600	1380	21400	10300	
EARSP	2200	1060	12200	7800	1070	3420	12100	2910	3520	3640	2060	520	6000	2880	
MED	9700	7000	47400	30400	4150	13300	66000	15700	19000	19700	11200	2400	51000	24300	
PHYS	3770	1860	21500	13800	1890	6000	21000	5000	6100	6300	3570	910	10900	5200	
AERO	1130	590	6200	4000	550	1750	6200	1490	1800	1870	1060	290	3390	1630	
CIVIL	3540	1750	20000	12800	1750	5600	19500	4680	5600	5800	3310	830	9600	4630	
ELEC	3470	1750	19800	12700	1740	5500	19500	4670	5600	5800	3310	830	10100	4850	
MECH	4970	2480	28600	18300	2490	8000	27700	6700	8000	8300	4710	1220	14400	6900	
METMI	1470	720	8300	5300	720	2310	8100	1940	2350	2430	1370	357	4110	1970	
NUC	1410	710	8000	5100	710	2250	7700	1860	2240	2320	1320	355	4230	2030	
PET	840	433	4790	3060	421	1340	4680	1120	1360	1400	800	212	2480	1190	
TRANU	3210	1630	18400	11800	1610	5200	17700	4240	5100	5300	3000	810	9000	4330	
ABME	7800	3870	44900	28700	3900	12600	44000	10600	12800	13200	7500	1850	21100	10100	
DEMO	1910	970	10900	7000	960	3060	10500	2530	3050	3160	1790	487	5700	2740	
EDUC	5900	2910	34100	21800	2970	9500	33200	8000	9600	10000	5600	1380	16100	7700	
ENV	1680	850	9300	6000	820	2610	9100	2190	2640	2730	1550	406	4490	2160	
LAW	4860	2360	27600	17700	2410	7700	27300	6600	7900	8200	4650	1140	12700	6100	
PAT	2560	1290	14700	9400	1290	4110	14200	3420	4130	4270	2420	650	7800	3750	
PUBAD	3950	1970	22800	14600	1990	6400	22200	5300	6400	6700	3780	990	11900	5700	
SOC	6100	3090	34300	22000	2980	9600	35000	8400	10200	10500	6000	1350	16500	7900	
GENST	2090	1060	11700	7500	1030	3270	11400	2730	3300	3420	1940	520	6000	2900	
TOTAL	82000	44100	454000	290000	39700	127000	471000	113000	137000	141000	80000	19900	262000	126000	

NUMBER OF USERS

	1976	I2	L	NL	GB	GB1	GB2	GB3	ND	CH	A	IB	EEC	EUR
AGRI	9		1	37	62	7	30	25	39	26	9	10	254	338
BIOL	44		1	81	197	23	93	77	86	33	24	37	870	1050
CHEM	498		16	900	2220	267	1070	890	930	352	260	435	9700	11700
EARSP	2		0	8	18	2	8	7	6	2	1	2	69	81
MED	1480		23	960	3240	389	1560	1300	1610	610	640	1090	17800	21700
PHYS	148		6	410	930	112	448	373	362	137	83	135	3790	4510
AERO	103		4	269	620	75	299	249	242	92	62	99	2520	3010
CIVIL	34		1	145	229	27	110	92	92	35	20	32	930	1110
EL EC	37		1	110	242	29	116	97	96	36	22	35	980	1160
MECH	56		2	168	380	46	182	152	147	57	33	50	1530	1820
METMI	17		0	51	114	14	55	45	45	17	9	15	458	540
NUC	83		3	234	520	63	251	209	209	78	49	79	2130	2550
PET	39		1	124	248	30	119	99	110	38	23	37	1020	1230
TRANU	1		0	4	9	1	5	4	4	1	1	1	38	44
ABME	63		2	198	440	53	211	176	173	65	38	61	1770	2110
DEMO	0		0	0	0	0	0	0	0	0	0	0	0	1
EDUC	56		2	179	387	46	186	155	156	58	34	53	1560	1870
ENV	2		0	6	13	2	6	5	5	2	1	1	50	59
LAW	0		0	0	1	0	0	0	0	0	0	0	4	4
PAT	0		0	0	0	0	0	0	0	0	0	0	1	1
PUBAD	1		0	3	6	1	3	3	2	1	0	1	25	29
SOC	74		2	210	465	56	223	186	190	70	43	68	1920	2290
GENST	101		3	206	510	61	245	205	199	83	52	112	2110	2550
TOTAL	2850		68	4260	10900	1300	5200	4350	4710	1790	1410	2350	49500	60000
1980	I2	L	NL	GB	GB1	GB2	GB3	ND	CH	A	IB	EEC	EUR	
AGRI	264		20	740	1520	182	730	610	810	443	243	340	6200	8100
BIOL	1720		46	2100	5900	700	2810	2340	2420	880	830	1580	27000	32700
CHEM	5900		138	5700	16800	2020	8100	6700	6600	2240	2530	5900	77000	95000
EARSP	620		28	1450	3560	427	1710	1420	1340	494	354	620	14500	17300
MED	15000		218	7400	26700	3210	12800	10700	11600	3940	5600	13400	144000	179000
PHYS	1940		73	3580	9400	1120	4490	3750	3410	1210	990	1940	38800	46300
AERO	850		29	1300	3510	421	1680	1400	1270	440	425	920	14700	17700
CIVIL	1240		51	2680	6700	810	3220	2680	2520	920	690	1260	27600	33000
EL EC	1500		58	2980	7600	910	3660	3050	2810	1000	790	1530	31400	37500
MECH	2540		93	4810	12700	1520	6100	5100	4590	1630	1340	2530	52000	62000
METMI	650		27	1310	3380	405	1620	1350	1240	452	355	660	13900	16600
NUC	1050		38	1650	4380	530	2100	1750	1610	550	510	1120	18400	22200
PET	500		20	960	2330	280	1120	930	930	386	262	530	9800	11800
TRANU	1140		46	2580	6200	750	2990	2490	2440	850	650	1180	25800	31000
ABME	2470		96	5500	13800	1660	6600	5500	5100	1830	1370	2550	57000	67000
DEMO	1330		48	2110	5600	670	2670	2220	2070	690	650	1460	23400	28300
EDUC	2050		80	4580	11400	1370	5500	4550	4290	1510	1130	2100	46800	56000
ENV	458		22	1110	2650	318	1270	1060	1030	385	266	466	10900	13100
LAW	690		31	1880	4390	530	2110	1760	1700	630	400	670	17900	21300
PAT	1830		62	2810	7500	900	3610	3010	2750	930	880	1960	31600	38100
PUBAD	1890		70	3620	9400	1130	4510	3760	3450	1210	980	1980	38700	46300
SOC	1970		73	4250	10600	1270	5100	4240	4070	1470	1080	1930	44200	53000
GENST	1250		44	1970	5300	630	2520	2100	1950	710	610	1430	22100	26800
TOTAL	48900		1410	67000	181000	21800	87000	73000	70000	24700	22900	48100	790000	960000
1985	I2	L	NL	GB	GB1	GB2	GB3	ND	CH	A	IB	EEC	EUR	
AGRI	1060		50	1810	4270	510	2050	1710	2000	920	700	1390	18000	23000
BIOL	5700		115	4710	14200	1710	6800	5700	5700	1900	2310	5700	68000	83000
CHEM	11100		227	9400	28200	3390	13600	11300	10900	3600	4410	11600	132000	162000
EARSP	3120		96	4380	12000	1440	5800	4800	4330	1430	1440	3450	51000	61000
MED	26300		359	12200	44400	5300	21300	17800	18800	6200	9400	24800	240000	299000
PHYS	5700		164	7500	20800	2500	10000	8300	7400	2450	2490	6200	88000	107000
AERO	1770		49	2220	6200	750	2980	2480	2220	730	790	2000	26400	32100
CIVIL	5000		150	7100	19300	2320	9300	7700	7000	2330	2310	5600	82000	99000
EL EC	5300		152	7000	19300	2320	9300	7700	6900	2270	2330	5900	82000	99000
MECH	7500		209	9800	27600	3310	13200	11000	9800	3220	3340	8200	117000	141000
METMI	2140		65	2880	8000	960	3850	3210	2860	960	980	2380	34000	41100
NUC	2200		65	2790	7700	930	3710	3090	2790	910	960	2470	33100	40200
PET	1290		39	1790	4660	560	2240	1860	1780	560	580	1440	19900	24300
TRANU	4690		133	6600	17600	2110	8400	7000	6600	2110	2160	5400	75000	91000
ABME	11000		316	15700	43500	5200	20900	17400	15600	5100	5100	12400	183000	221000
DEMO	2970		87	3860	10500	1260	5100	4210	3860	1240	1300	3410	45000	55000
EDUC	8300		242	12100	32900	3940	15800	13100	12000	3860	3830	9400	139000	168000
ENV	2340		75	3380	9000	1090	4340	3620	3370	1120	1090	2610	38400	46600
LAW	6600		201	10000	26900	3230	12900	10800	9900	3200	3070	7100	113000	136000
PAT	4060		112	5100	14200	1710	6800	5700	5100	1660	1770	4600	61000	74000
PUBAD	6200		171	7900	22200	2660	10600	8900	7900	2580	2680	7100	94000	114000
SOC	8600		241	12000	33000	3970	15900	13200	12200	4000	3960	9200	142000	171000
GENST	3140		91	4140	11300	1360	5400	4540	4160	1380	1410	3600	48300	59000
TOTAL	136000		3410	154000	438000	53000	210000	175000	163000	54000	58000	146000	1930000	2350000

NUMBER OF USES

1976	B	DK	F	F1	F2	F3	D	D1	D2	D3	D4	IRL	I	II
AGRI	21	15	52	33	5	15	58	14	17	17	10	3	17	8
BIOL	51	24	249	159	21	70	314	75	91	94	53	5	97	47
CHEM	800	387	4030	2580	338	1130	5000	1210	1460	1510	860	89	1570	750
EARSP	3	1	16	11	1	5	18	4	5	5	3	0	4	2
MED	1500	1050	6300	4030	530	1760	11800	2830	3420	3530	2000	164	5200	2500
PHYS	266	103	1470	940	123	412	1550	372	450	466	264	29	395	190
AERO	186	79	1000	640	83	279	1090	263	317	328	186	22	284	136
CIVIL	53	21	287	184	24	80	305	73	88	91	52	6	74	35
BLEC	55	22	301	192	25	84	324	78	94	97	55	6	80	38
MECH	91	36	500	320	42	140	530	127	154	159	90	10	126	51
METMI	24	9	132	85	11	37	142	34	41	42	24	3	33	16
NUC	147	60	820	520	69	229	860	206	249	257	146	16	214	103
PET	61	25	345	221	29	97	367	88	106	110	62	7	91	44
TRANU	2	1	9	6	1	3	10	2	3	3	2	0	2	1
ABME	107	42	580	373	49	163	620	149	181	187	106	12	145	69
DEMO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EDUC	93	36	510	327	43	143	540	130	157	162	92	10	127	61
ENV	2	1	12	8	1	3	13	3	4	4	2	0	3	1
LAW	0	0	1	1	0	0	1	0	0	0	0	0	0	0
PAT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PUBAD	1	0	6	4	1	2	6	2	2	2	1	0	2	1
SOC	116	47	630	401	52	176	690	166	201	208	118	12	172	83
GENST	146	61	730	466	61	204	840	201	243	251	142	18	266	130
TOTAL	3720	2020	18000	11500	1510	5000	25100	6000	7300	7500	4270	410	5700	4000
1980	B	DK	F	F1	F2	F3	D	D1	D2	D3	D4	IRL	I	II
AGRI	890	590	2770	1770	248	780	2980	720	870	890	510	160	930	445
BIOL	3080	1580	16500	10600	1390	4630	20200	4840	5800	6000	3430	448	7700	3690
CHEM	10100	5600	58000	37300	4950	16300	67000	16100	19500	20200	11400	1970	35600	17100
EARSP	1480	570	8300	5300	700	2320	8900	2130	2570	2660	1510	186	2340	1120
MED	19000	13200	98000	63000	8300	27400	145000	34900	42200	43600	24700	3630	97000	46700
PHYS	4530	1910	27400	17600	2320	7700	27800	6700	8100	8300	4720	690	9100	4380
AERO	1680	790	10200	6500	860	2850	10400	2500	3020	3120	1770	314	4230	2020
CIVIL	3060	1250	17900	11400	1510	5000	18400	4410	5300	5500	3120	415	5300	2520
BLEC	3510	1500	20900	13400	1770	5900	21700	5200	6300	6500	3680	500	6600	3180
MECH	5300	2690	38000	24300	3200	10600	38500	9200	11200	11600	6500	960	12200	5700
METMI	1470	600	8700	5600	740	2450	9000	2160	2610	2700	1530	210	2660	1280
NUC	2130	970	13400	8600	1140	3740	13200	3160	3820	3950	2240	387	5300	2520
PET	1010	452	6300	4020	530	1760	6300	1520	1840	1900	1080	164	2170	1040
TRANU	2370	1220	17200	11000	1440	4810	17300	4140	5000	5200	2930	420	4860	2330
ABME	5600	2720	38800	24800	3260	10900	40100	9600	11600	12000	6800	910	11000	5300
DEMO	2760	1280	17400	11100	1480	4880	17100	4110	4970	5100	2910	520	6900	3310
EDUC	5300	2180	31700	20300	2660	8900	32500	7800	9400	9700	5500	720	9000	4320
ENV	1080	450	6200	3950	520	1730	6400	1540	1860	1920	1090	140	1670	800
LAW	1670	640	9500	6100	800	2660	10100	2430	2930	3030	1720	203	2390	1150
PAT	3840	1710	24000	15400	2040	6700	23700	5700	6900	7100	4040	720	9700	4660
PUBAD	4500	1900	27200	17400	2300	7600	27900	6700	8100	8400	4740	690	8900	4950
SOC	4830	2030	27800	17800	2330	7800	30000	7200	8700	9000	5100	610	8200	3920
GENST	2540	1130	14800	9400	1250	4130	15400	3700	4470	4620	2620	430	6000	2890
TOTAL	94000	47000	540000	346000	45800	152000	610000	147000	177000	183000	104000	15400	260000	125000
1985	B	DK	F	F1	F2	F3	D	D1	D2	D3	D4	IRL	I	II
AGRI	3110	2040	12900	8300	1140	3630	13100	3140	3800	3930	2220	750	6000	2890
BIOL	9800	5700	57000	36400	4840	15900	66000	15900	19300	19900	11300	2070	39300	18800
CHEM	20000	11500	119000	76000	10100	33300	134000	32200	38900	40200	22800	4510	85000	40700
EARSP	7200	3220	44900	28700	3810	12600	44800	10700	13000	13400	7600	1420	19900	9600
MED	36900	25700	198000	127000	16900	55000	279000	67000	81000	84000	47500	8200	212000	102000
PHYS	13000	6000	83000	53000	7100	23300	81000	19500	23600	24400	13800	2700	39000	18700
AERO	3630	1790	22800	14600	1940	6400	22700	5500	6600	6800	3860	820	11800	5600
CIVIL	12000	5500	76000	48600	6400	21300	74000	17800	21600	22300	12600	2390	33300	16000
BLEC	11900	5600	76000	48800	6500	21300	75000	18000	21800	22500	12800	2470	35900	17300
MECH	17600	8300	114000	73000	9700	31900	110000	26500	32000	33100	18800	3810	54000	25800
METMI	4690	2160	30000	19200	2550	8400	29500	7100	8500	8800	5000	970	13700	6600
NUC	4590	2210	29800	19100	2540	8400	28700	6900	8300	8600	4880	1020	14900	7200
PET	2610	1250	16900	10800	1440	4730	16600	3970	4800	4970	2810	560	8100	3900
TRANU	11100	5300	72000	45800	6100	20000	68000	16400	19900	20500	11600	2450	32600	15700
ABME	28000	13100	179000	115000	15200	50000	177000	42400	51000	53000	30000	5700	77000	36900
DEMO	6400	3110	41700	26700	3550	11700	40100	9600	11600	12000	6800	1460	20900	10000
EDUC	20800	9600	134000	86000	11300	37500	131000	31400	38000	39300	22300	4150	57000	27500
ENV	5300	2530	33600	21500	2860	9400	33000	7900	9600	9900	5600	1090	14600	7000
LAW	16400	7400	105000	67000	8900	29300	104000	25000	30200	31300	17700	3230	42800	20500
PAT	8800	4230	57000	36600	4860	16000	55000	13300	16000	16600	9400	2020	29100	14000
PUBAD	14000	6600	90000	58000	7700	25300	88000	21100	25600	26400	15000	3110	44700	21500
SOC	20800	9900	131000	84000	11000	36600	135000	32300	39100	40400	22900	3850	56000	26900
GENST	6900	3320	43800	28000	3730	12300	42800	10300	12400	12800	7300	1510	21400	10200
TOTAL	286000	146000	1770000	1130000	150000	495000	1850000	444000	540000	560000	315000	60000	970000	465000

NUMBER OF USES

	1976	I2	L	NL	GB	GB1	GB2	GB3	ND	CH	A	IB	EEC	EUR
AGRI	9		1	40	71	9	34	28	43	27	9	10	277	367
BIOL	51		1	96	248	30	119	99	103	36	24	39	1090	1290
CHEM	810		16	1590	4180	500	2000	1670	1640	570	384	650	17700	20900
EARSP	2		0	8	18	2	8	7	6	2	1	2	69	81
MED	2710		25	1670	6200	740	2980	2480	2950	1030	1050	1780	33900	40700
PHYS	205		6	630	1520	183	730	610	540	188	103	172	6000	7000
AERO	148		4	435	1080	129	520	430	381	130	79	129	4170	4890
CIVIL	38		1	128	299	36	144	120	110	38	20	33	1170	1380
EL EC	42		1	135	318	38	153	127	115	40	22	36	1240	1450
MECH	66		2	216	520	62	250	208	185	65	35	55	2030	2370
METMI	17		0	58	139	17	67	56	50	17	9	15	540	630
NUC	111		3	355	840	101	405	337	308	103	58	97	3310	3880
PET	47		1	170	360	43	173	144	147	44	25	41	1430	1680
TRANU	1		0	4	9	1	5	4	4	1	1	1	38	44
ABME	75		2	259	610	73	293	244	222	76	41	67	2380	2790
DEMO	0		0	0	0	0	0	0	0	0	0	0	0	1
EDUC	66		2	231	530	64	255	212	198	66	35	58	2080	2440
ENV	2		0	6	13	2	6	5	5	2	1	1	50	59
LAW	0		0	0	1	0	0	0	0	0	0	0	4	4
PAT	0		0	0	0	0	0	0	0	0	0	0	1	1
PUBAD	1		0	3	6	1	3	3	2	1	0	1	25	29
SOC	90		2	276	650	78	312	260	246	82	46	77	2600	3050
GENST	138		3	293	790	95	381	317	282	108	61	144	3140	3740
TOTAL	4630		70	6600	18400	2210	8800	7400	7500	2620	2010	3410	83000	99000
1980	I2	L	NL	GB	GB1	GB2	GB3	ND	CH	A	IB	EEC	EUR	
AGRI	482		26	1640	3430	412	1650	1370	1790	970	444	590	13400	17200
BIOL	4000		69	5300	15800	1900	7600	6300	6100	2080	1780	3350	71000	84000
CHEM	18500		295	17900	57000	6800	27100	22600	20700	6500	7200	17300	254000	305000
EARSP	1220		35	3280	8500	1020	4080	3400	2960	1020	640	1110	33600	39300
MED	51000		488	23300	92000	11000	44100	36800	37800	12000	17200	42100	492000	600000
PHYS	4750		123	9800	27100	3250	13000	10800	9200	3030	2230	4370	108000	127000
AERO	2200		47	3540	10300	1230	4930	4110	3440	1080	990	2200	41500	49200
CIVIL	2730		75	6800	17800	2130	8500	7100	6200	2120	1400	2550	71000	83000
EL EC	3450		91	7800	21000	2520	10100	8400	7200	2400	1690	3250	84000	98000
MECH	6300		163	13500	37500	4500	18000	15000	12600	4210	3130	5800	150000	176000
METMI	1380		37	3190	8700	1050	4190	3490	2950	1000	700	1290	34700	40600
NUC	2730		66	4560	13000	1560	6200	5200	4410	1370	1210	2710	53000	63000
PET	1130		28	2420	6200	750	2980	2480	2290	680	530	1080	25100	29700
TRANU	2530		68	6600	16700	2010	8000	6700	6100	1980	1340	2420	67000	79000
ABME	5700		156	14600	38800	4650	18600	15500	13300	4500	3000	5500	154000	180000
DEMO	3580		86	6000	16900	2030	8100	6800	5900	1790	1590	3660	69000	82000
EDUC	4680		128	12100	31400	3770	15100	12600	11100	3650	2410	4450	125000	147000
ENV	870		27	2450	6200	740	2970	2470	2220	770	466	810	24600	28300
LAW	1240		37	3950	9600	1160	4620	3850	3470	1200	670	1110	38100	44600
PAT	5100		117	8200	23500	2820	11300	9400	8000	2470	2220	5100	96000	113000
PUBAD	4600		118	9900	27200	3260	13000	10900	9300	3040	2220	4480	108000	127000
SOC	4250		109	10600	27600	3310	13300	11000	9900	3360	2180	3860	112000	131000
GENST	3130		72	5200	14800	1780	7100	5900	5100	1750	1350	3400	60000	72000
TOTAL	135000		2460	183000	530000	64000	255000	212000	192000	63000	57000	122000	2280000	2720000
1985	I2	L	NL	GB	GB1	GB2	GB3	ND	CH	A	IB	EEC	EUR	
AGRI	3130		108	5800	14300	1720	6900	5700	6400	2810	2010	3980	58000	73000
BIOL	20400		282	16500	54000	6400	25700	21400	20100	6200	7500	19400	251000	304000
CHEM	44100		630	35400	114000	13700	55000	45700	41400	12700	15700	44000	520000	640000
EARSP	10400		224	15100	44000	5300	21100	17600	14800	4520	4380	10900	181000	215000
MED	110000		1040	46600	185000	22200	89000	74000	74000	22800	35400	99000	990000	1220000
PHYS	20300		421	27100	81000	9700	38600	32200	26800	8200	8100	21100	333000	398000
AERO	6100		114	7500	22700	2720	10900	9100	7500	2280	2450	6600	94000	113000
CIVIL	17300		370	25300	73000	8800	35200	29300	24900	7700	7300	18300	302000	361000
EL EC	18700		385	25200	74000	8900	35700	29700	24900	7600	7600	19900	307000	367000
MECH	27900		560	36600	110000	13200	53000	43900	36300	11100	11400	29200	455000	540000
METMI	7100		148	9800	29100	3500	14000	11700	9700	2960	2950	7500	120000	143000
NUC	7800		157	9600	28700	3440	13800	11500	9600	2880	3020	8300	120000	144000
PET	4220		85	5900	16400	1970	7900	6600	5800	1660	1700	4500	68000	82000
TRANU	17000		341	24100	68000	8200	32600	27200	23900	7100	7100	18600	284000	341000
ABME	40000		850	59000	174000	20800	83000	69000	58000	17800	17200	42900	710000	850000
DEMO	10800		221	13700	40100	4810	19200	16000	13700	4030	4260	12000	168000	202000
EDUC	29800		630	44800	129000	15500	62000	52000	44100	13200	12600	31900	530000	630000
ENV	7600		170	11400	32600	3910	15600	13000	11300	3480	3260	8100	134000	160000
LAW	22200		492	35900	102000	12200	48800	40600	35100	10600	9600	22700	417000	495000
PAT	15100		292	18600	55000	6600	26500	22100	18600	5500	5900	16500	231000	277000
PUBAD	23300		456	29500	88000	10500	42200	35100	29400	8800	9100	25600	365000	438000
SOC	29100		590	43300	126000	15100	60000	50000	43800	13400	12500	29500	530000	620000
GENST	11100		224	14500	42500	5100	20400	17000	14500	4470	4470	12300	177000	213000
TOTAL	500000		8800	560000	1700000	204000	820000	680000	600000	182000	196000	510000	7300000	8800000

NUMBER OF RETROSPECTIVE USES PER USER

	<u>1976</u>	<u>1980</u>	<u>1985</u>
AGRI	1.08	2.14	3.19
BIOL	1.23	2.57	3.64
CHEM	1.79	3.23	3.94
EARSP	1.00	2.27	3.52
MED	1.88	3.37	4.09
PHYS	1.55	2.75	3.72
AERO	1.63	2.77	3.51
CIVIL	1.24	2.52	3.64
ELEC	1.25	2.62	3.70
MECH	1.30	2.81	3.84
METMI	1.16	2.44	3.48
NUC	1.52	2.82	3.57
PET	1.37	2.51	3.38
TRANU	1.00	2.55	3.73
ABME	1.32	2.67	3.84
DEMO	1.00	2.90	3.68
EDUC	1.31	2.63	3.77
ENV	1.00	2.21	3.45
LAW	1.00	2.09	3.63
PAT	1.00	2.97	3.75
PUBAD	1.00	2.75	3.83
SOC	1.33	2.49	3.65
GENST	1.47	2.68	3.61
AVERAGE	1.65	2.83	3.76

% OF LITERATURE READABLE IN COUNTRY

	AGRI	BIOL	CHEM	EARSP	MED	PHYS	ENGG
B	45	56	43	46	49	56	62
DK	56	71	52	54	62	70	81
F	39	49	38	41	43	49	53
D	56	64	48	52	60	64	75
IRL	51	76	53	54	57	75	85
I	41	49	38	41	45	49	54
L	64	70	55	60	69	70	81
NL	59	71	53	57	65	71	83
GB	52	77	54	55	58	75	85
ND	49	66	47	49	55	65	75
CH	51	57	45	48	56	57	66
A	49	53	41	45	53	53	63
IB	37	46	36	38	40	46	51
EUROP	49	61	46	48	53	61	68

LINGUISTIC ABILITY BY SECTOR

	ENGLISH	FRENCH	GERMAN	ITALIAN
AGRI	78	54	52	24
BIOL	77	57	50	26
CHEM	77	56	50	26
EARSP	77	56	51	26
MED	74	57	53	33
PHYS	77	57	50	26
AERO	77	56	51	26
CIVIL	77	57	50	26
ELEC	77	56	50	26
MECH	77	56	50	26
METMI	77	56	50	26
NUC	77	56	50	25
PET	77	56	51	25
TRANU	77	56	50	25
ABME	77	56	50	25
DEMO	77	56	50	25
EDUC	77	56	50	25
ENV	77	56	50	25
LAW	77	56	50	26
PAT	77	57	50	26
PUBAD	77	56	50	26
SOC	77	56	50	25

EUR	USERS BY LANGUAGE				1976
	ENG	FREN	GERM	ITAL	TOTAL
AGRI	270	173	189	66	338
BIOL	820	560	570	241	1050
CHEM	9100	6300	6300	2700	11700
EARSP	64	43	43	16	81
MED	16600	11700	12300	6000	21700
PHYS	3550	2420	2400	960	4510
AERO	2370	1610	1610	650	3010
CIVIL	870	590	590	232	1110
EL EC	920	620	620	245	1160
MECH	1440	970	970	380	1820
METMI	430	291	291	113	540
NUC	2010	1370	1360	540	2550
PET	970	650	660	258	1230
TRANU	35	23	24	9	44
ABME	1670	1120	1130	437	2110
DEMO	0	0	0	0	1
EDUC	1470	990	1000	387	1870
ENV	47	31	31	12	59
LAW	3	2	2	1	4
PAT	1	0	0	0	1
PUBAD	23	15	15	6	29
SOC	1810	1220	1230	485	2290
GENST	2000	1380	1350	580	2550
TOTAL	46400	32000	32700	14400	60000
1980					
	ENG	FREN	GERM	ITAL	TOTAL
AGRI	6400	4240	4370	1720	8100
BIOL	25200	17900	17400	8300	32700
CHEM	72000	53000	49200	25900	95000
EARSP	13600	9400	9200	3820	17300
MED	134000	101000	95000	56000	179000
PHYS	36100	25500	24100	10800	46300
AERO	13700	9800	9100	4360	17700
CIVIL	25800	18000	17300	7400	33000
EL EC	29300	20500	19600	8600	37500
MECH	48700	34200	32500	14400	62000
METMI	13000	9100	8700	3780	16600
NUC	17200	12300	11400	5400	22200
PET	9200	6500	6200	2770	11800
TRANL	24200	16900	16200	6900	31000
ABME	53000	36700	35400	15100	67000
DEMO	21900	15700	14500	6900	28300
EDUC	43700	30400	29300	12500	56000
ENV	10200	7100	6900	2870	13100
LAW	16800	11500	11400	4550	21300
PAT	29500	21200	19600	9400	38100
PUBAD	36100	25400	24100	10700	46300
SOC	41300	28600	28000	11800	53000
GENST	20800	14800	13800	6500	26800
TOTAL	740000	530000	500000	241000	960000
1985					
	ENG	FREN	GERM	ITAL	TOTAL
AGRI	17900	12500	12000	5600	23000
BIOL	63000	47100	43200	23800	83000
CHEM	123000	92000	83000	46400	162000
EARSP	47300	34200	31300	15500	61000
MED	223000	171000	157000	96000	299000
PHYS	82000	60000	54000	27500	107000
AERO	24700	18000	16300	8400	32100
CIVIL	76000	55000	50000	25000	99000
EL EC	76000	56000	51000	25500	99000
MECH	109000	79000	72000	36400	141000
METMI	31700	23100	20900	10500	41100
NUC	30900	22600	20300	10500	40200
PET	18700	13600	12400	6200	24300
TRANU	70000	51000	46400	23200	91000
ABME	171000	124000	113000	55000	221000
DEMO	42200	30800	27800	14300	55000
EDUC	130000	94000	86000	42100	168000
ENV	36000	26000	23800	11700	46600
LAW	106000	76000	70000	33700	136000
PAT	57000	41600	37400	19300	74000
PUBAD	88000	64000	58000	29700	114000
SOC	132000	95000	88000	43000	171000
GENST	45300	33100	29900	15200	59000
TOTAL	1800000	1320000	1200000	630000	2350000

EFC	USERS BY LANGUAGE				1976
	ENG	FREN	GERM	ITAL	TOTAL
AGRI	206	136	136	49	254
BIOL	680	482	467	202	870
CHEM	7700	5400	5200	2270	9700
EARSP	55	38	36	14	69
MED	13700	9800	10000	5100	17800
PHYS	3010	2110	1980	810	3790
AERO	2010	1390	1320	540	2520
CIVIL	740	520	487	195	930
EL EC	780	540	510	206	980
MECH	1220	850	800	321	1530
METMI	365	254	240	96	458
NUC	1700	1190	1120	457	2130
PET	820	570	540	217	1020
TRANU	30	21	20	8	38
ABME	1410	980	930	369	1770
DEMO	0	0	0	0	0
EDUC	1250	870	820	326	1560
ENV	40	28	26	10	50
LAW	3	2	2	1	4
PAT	1	0	0	0	1
PUBAD	20	14	13	5	25
SOC	1530	1060	1020	409	1920
GENST	1670	1170	1100	480	2110
TOTAL	38900	27400	26800	12100	49500
1980					
	ENG	FREN	GERM	ITAL	TOTAL
AGRI	5000	3410	3260	1310	6200
BIOL	21100	15300	14300	6900	27000
CHEM	60000	44400	40100	21500	77000
EARSP	11500	8100	7500	3210	14500
MED	10000	83000	77000	46500	144000
PHYS	30600	22000	19900	9100	38800
AERO	11500	8400	7500	3630	14700
CIVIL	21800	15600	14200	6200	27600
EL EC	24800	17700	16200	7200	31400
MECH	41300	29700	26800	12200	52000
METMI	11000	7900	7200	3180	13900
NUC	14500	10600	9400	4540	18400
PET	7700	5500	5000	2310	9800
TRANU	20400	14600	13300	5800	25800
ABME	44800	31900	29200	12700	57000
DEMO	18400	13400	11900	5800	23400
EDUC	37000	26400	24200	10500	46800
ENV	8700	6100	5700	2410	10900
LAW	14300	10000	9400	3850	17900
PAT	24800	18100	16000	7800	31600
PUBAD	30500	21900	19900	9000	38700
SOC	35000	24800	23100	10000	44200
GENST	17400	12600	11300	5400	22100
TOTAL	620000	452000	412000	201000	790000
1985					
	ENG	FREN	GERM	ITAL	TOTAL
AGRI	14300	10100	9200	4360	18000
BIOL	52000	39200	35100	19700	68000
CHEM	102000	76000	68000	38300	132000
EARSP	39700	29100	25600	12800	51000
MED	182000	139000	127000	80000	240000
PHYS	69000	51000	44600	22800	88000
AERO	20600	15200	13300	6900	26400
CIVIL	64000	47100	41300	20800	82000
EL EC	64000	47200	41400	21100	82000
MECH	91000	68000	59000	30200	117000
METMI	26600	19600	17200	8700	34000
NUC	25800	19100	16600	8700	33100
PET	15600	11500	10100	5200	19900
TRANU	59000	43300	37900	19200	75000
ABME	144000	105000	93000	46100	183000
DEMO	35200	26000	22700	11800	45000
EDUC	109000	80000	70000	35000	139000
ENV	30100	22100	19400	9700	38400
LAW	89000	65000	58000	28100	113000
PAT	47400	35100	30500	16000	61000
PUBAD	74000	54000	47400	24500	94000
SOC	111000	81000	72000	35800	142000
GENST	37800	27900	24400	12500	48300
TOTAL	1500000	1110000	980000	520000	1930000

H	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	15	19	6	2	21	300	385	128	43	428	720	920	307	102	1020					
BIOL	32	41	14	5	46	900	1150	385	128	1280	2040	2620	870	291	2910					
CHEM	338	435	145	48	483	2360	3030	1010	337	3370	3850	4960	1650	550	5500					
EARSP	2	3	1	0	3	495	640	212	71	710	1540	1900	660	220	2200					
MED	600	780	259	86	860	4260	5500	1820	610	6100	6800	8800	2920	970	9700					
PHYS	132	170	57	19	189	1240	1600	530	178	1780	2640	3390	1130	377	3770					
AERO	89	114	38	13	127	462	590	198	66	660	790	1020	339	113	1130					
CIVIL	33	43	14	5	48	920	1180	393	131	1310	2480	3190	1060	354	3540					
ELEC	34	44	15	5	49	1010	1300	434	145	1450	2430	3130	1040	347	3470					
MECH	54	70	23	8	77	1680	2160	720	240	2400	3480	4470	1490	497	4970					
METMI	17	21	7	2	24	458	590	196	65	650	1030	1320	440	147	1470					
NUC	75	97	32	11	107	580	740	247	82	820	980	1260	422	141	1410					
PET	36	46	15	5	51	310	399	133	44	443	590	760	253	84	840					
TRANU	1	2	1	0	2	850	1090	364	121	1210	2250	2890	960	321	3210					
ABME	63	80	27	9	89	1850	2380	790	264	2640	5500	7000	2350	780	7800					
DEMO	0	0	0	0	0	730	930	311	104	1040	1330	1710	570	191	1910					
EDUC	55	71	24	8	79	1530	1960	650	218	2180	4150	5300	1780	590	5900					
ENV	2	2	1	0	2	372	478	159	53	530	1180	1510	500	168	1680					
LAW	0	0	0	0	0	610	780	260	87	870	3400	4380	1460	486	4860					
PAT	0	0	0	0	0	980	1260	421	140	1400	1800	2310	770	256	2560					
PUBAD	1	1	0	0	1	1230	1590	530	176	1760	2770	3560	1190	395	3950					
SOC	67	87	29	10	96	1460	1880	630	209	2090	4270	5500	1830	610	6100					
GENST	77	99	33	11	110	720	920	307	102	1020	1460	1880	630	209	2090					
TOTAL	1730	2220	740	247	2470	25300	32500	10800	3610	36100	57000	74000	24600	8200	82000					
DK	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	13	4	12	1	15	265	74	236	15	295	620	173	550	35	690					
BIOL	21	6	19	1	24	650	180	570	36	720	1590	440	1410	88	1760					
CHEM	230	64	204	13	255	1780	495	1580	99	1980	2950	820	2620	164	3280					
EARSP	1	0	1	0	1	275	76	245	15	306	960	266	850	53	1060					
MED	560	156	500	31	620	3910	1090	3470	217	4340	6300	1740	5600	348	7000					
PHYS	73	20	65	4	82	740	206	660	41	830	1670	465	1490	93	1860					
AERO	54	15	48	3	60	305	85	271	17	339	530	148	473	30	590					
CIVIL	18	5	16	1	21	540	149	477	30	600	1570	437	1400	87	1750					
ELEC	20	5	17	1	22	610	170	540	34	680	1570	437	1400	87	1750					
MECH	30	8	27	2	33	1010	281	900	56	1120	2230	620	1990	124	2480					
METMI	8	2	7	0	9	270	75	240	15	300	650	181	580	36	720					
NUC	44	12	39	2	49	369	103	328	21	410	640	179	570	36	710					
PET	21	6	19	1	23	197	55	175	11	219	390	108	346	22	433					
TRANU	1	0	1	0	1	510	142	456	28	570	1460	407	1300	81	1630					
ABME	35	10	31	2	39	1090	302	970	60	1210	3480	970	3100	193	3870					
DEMO	0	0	0	0	0	468	130	416	26	520	880	243	780	49	970					
EDUC	30	8	27	2	34	890	247	790	49	990	2620	730	2330	146	2910					
ENV	1	0	1	0	1	223	62	199	12	248	760	212	680	42	850					
LAW	0	0	0	0	0	335	93	298	19	372	2120	590	1890	118	2360					
PAT	0	0	0	0	0	610	171	550	34	680	1170	324	1040	65	1290					
PUBAD	0	0	0	0	0	740	205	660	41	820	1770	492	1570	98	1970					
SOC	39	11	35	2	43	870	243	780	49	970	2790	770	2480	155	3090					
GENST	46	13	41	3	51	451	125	401	25	500	950	265	850	53	1060					
TOTAL	1250	347	1110	69	1390	17100	4750	15200	950	19000	39700	11000	35200	2200	44100					
F	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	28	47	9	14	47	760	1270	255	382	1270	2350	3920	780	1180	3920					
BIOL	116	194	39	58	194	3670	6100	1220	1840	6100	9000	15000	3010	4510	15000					
CHEM	1300	2160	433	650	2160	10400	17400	3470	5200	17400	17600	29300	5900	8800	29300					
EARSP	10	16	3	5	16	2100	3500	700	1050	3500	7300	12200	2440	3670	12200					
MED	1990	3310	660	990	3310	17100	28400	5700	8500	28400	28500	47400	9500	14200	47400					
PHYS	550	910	182	273	910	5700	9500	1900	2860	9500	12900	21500	4300	6500	21500					
AERO	351	580	117	175	580	2100	3490	700	1050	3490	3750	6200	1250	1870	6200					
CIVIL	133	221	44	66	221	4070	6800	1360	2030	6800	12000	20000	3990	6000	20000					
ELEC	138	230	46	69	230	4580	7600	1530	2290	7600	11900	19800	3960	5900	19800					
MECH	220	367	73	110	367	7700	12900	2580	3870	12900	17100	28600	5700	8600	28600					
METMI	65	109	22	33	109	2040	3400	680	1020	3400	4950	8300	1650	2480	8300					
NUC	307	510	102	153	510	2710	4510	900	1350	4510	4810	8000	1600	2410	8000					
PET	144	240	48	72	240	1420	2370	473	710	2370	2870	4790	960	1440	4790					
TRANU	6	9	2	3	9	3850	6400	1280	1920	6400	11100	18400	3690	5500	18400					
ABME	254	423	85	127	423	8400	13900	2790	4180	13900	26900	44900	9000	13500	44900					
DEMO	0	0	0	0	0	3430	5700	1140	1710	5700	6600	10900	2180	3280	10900					
EDUC	225	375	75	112	375	6900	11500	2310	3460	11500	20400	34100	6800	10200	34100					
ENV	7	12	2	4	12	1600	2660	530	800	2660	5600	9300	1870	2800	9300					
LAW	1	1	0	0	1	2620	4360	870	1310	4360	16600	27600	5500	8300	27600					
PAT	0	0	0	0	0	4620	7700	1540	2310	7700	8800	14700	2940	4410	14700					
PUBAD	4	6	1	2	6	5700	9500	1890	2840	9500	13700	22800	4550	6800	22800					
SOC	271	452	90	136	452	6400	10700	2150	3220	10700	20600	34300	6900	10300	34300					
GENST	286	477	95	143	477	3160	5300	1050	1580	5300	7000	11700	2330	3500	11700					
TOTAL	6400	10700	2130	3200	10700	111000	185000	37000	56000	185000	272000	454000	91000	136000	454000					

F1	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	18	30	6	9	30	489	820	163	245	820	1510	2510	500	750	2510					
BIOL	74	124	25	37	124	2350	3920	780	1180	3920	5800	9600	1930	2890	9600					
CHEM	830	1390	277	416	1390	6700	11100	2220	3330	11100	11200	18700	3750	5600	18700					
EARSP	6	11	2	3	11	1340	2240	448	670	2240	4690	7800	1560	2350	7800					
MED	1270	2120	424	640	2120	10900	18200	3640	5500	18200	18200	30400	6100	9100	30400					
PHYS	349	580	116	175	580	3660	6100	1220	1830	6100	8300	13800	2750	4130	13800					
AERO	225	374	75	112	374	1340	2240	447	670	2240	2400	4000	800	1200	4000					
CIVIL	85	141	28	42	141	2600	4340	870	1300	4340	7700	12800	2560	3840	12800					
BLEC	88	147	29	44	147	2930	4890	980	1470	4890	7600	12700	2530	3800	12700					
MECH	141	235	47	70	235	4960	8300	1650	2480	8300	11000	18300	3660	5500	18300					
METMI	42	70	14	21	70	1310	2180	435	650	2180	3170	5300	1060	1580	5300					
NUC	196	327	65	98	327	1730	2890	580	870	2890	3080	5100	1030	1540	5100					
PET	92	154	31	46	154	910	1520	303	455	1520	1840	3060	610	920	3060					
TRANU	4	6	1	2	6	2460	4100	820	1230	4100	7100	11800	2360	3540	11800					
ABME	163	271	54	81	271	5400	8900	1780	2680	8900	17200	28700	5700	8600	28700					
DEMO	0	0	0	0	0	2200	3660	730	1100	3660	4190	7000	1400	2100	7000					
EDUC	144	240	48	72	240	4430	7400	1480	2220	7400	13100	21800	4360	6500	21800					
ENV	5	8	2	2	8	1020	1700	341	510	1700	3580	6000	1190	1790	6000					
LAW	0	1	0	0	1	1670	2790	560	840	2790	10600	17700	3540	5300	17700					
PAT	0	0	0	0	0	2960	4930	990	1480	4930	5600	9400	1880	2820	9400					
PUBAD	2	4	1	1	4	3630	6100	1210	1820	6100	8700	14600	2910	4370	14600					
SOC	174	290	58	87	290	4120	6900	1370	2060	6900	13200	22000	4390	6600	22000					
GENST	183	305	61	92	305	2020	3370	670	1010	3370	4480	7500	1490	2240	7500					
TOTAL	4090	6800	1360	2050	6800	71000	118000	23700	35500	118000	174000	290000	58000	87000	290000					
F2	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	3	4	1	1	4	79	122	41	36	122	231	363	113	107	363					
BIOL	10	16	4	5	16	333	540	144	158	540	820	1320	355	390	1320					
CHEM	117	189	50	56	189	950	1530	416	451	1530	1600	2570	700	760	2570					
EARSP	1	1	0	0	1	192	308	84	91	308	670	1070	291	317	1070					
MED	178	288	76	85	288	1550	2490	670	740	2490	2580	4150	1120	1230	4150					
PHYS	48	78	20	23	78	520	830	225	247	830	1170	1890	510	560	1890					
AERO	31	50	13	15	50	192	308	85	91	308	341	550	149	162	550					
CIVIL	12	19	5	6	19	368	590	159	175	590	1090	1750	469	520	1750					
BLEC	12	20	5	6	20	416	670	180	198	670	1080	1740	468	510	1740					
MECH	19	31	8	9	31	700	1130	300	333	1130	1550	2490	670	740	2490					
METMI	6	9	2	3	9	186	299	81	88	299	451	720	197	214	720					
NUC	27	44	11	13	44	249	399	111	118	399	440	710	193	209	710					
PET	13	20	5	6	20	131	209	58	62	209	262	421	115	124	421					
TRANU	0	1	0	0	1	347	560	148	165	560	1000	1610	428	476	1610					
ABME	22	36	9	11	36	750	1210	319	359	1210	2420	3900	1030	1160	3900					
DEMO	0	0	0	0	0	315	510	139	149	510	600	960	262	284	960					
EDUC	20	32	8	9	32	620	1000	265	297	1000	1840	2970	790	880	2970					
ENV	1	1	0	0	1	146	235	65	69	235	510	820	224	243	820					
LAW	0	0	0	0	0	235	380	100	112	380	1500	2410	640	710	2410					
PAT	0	0	0	0	0	423	680	185	200	680	800	1290	347	381	1290					
PUBAD	0	1	0	0	1	510	830	222	245	830	1240	1990	530	590	1990					
SOC	24	38	9	11	38	580	930	245	276	930	1850	2980	790	880	2980					
GENST	26	41	11	12	41	291	466	129	138	466	640	1030	278	303	1030					
TOTAL	570	920	238	273	920	10100	16200	4370	4800	16200	24700	39700	10700	11700	39700					
F3	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	8	13	3	4	13	214	357	71	107	357	660	1100	220	329	1100					
BIOL	33	54	11	16	54	1030	1710	343	510	1710	2530	4210	840	1260	4210					
CHEM	364	610	121	182	610	2920	4860	970	1460	4860	4920	8200	1640	2460	8200					
EARSP	3	5	1	1	5	590	980	196	294	980	2050	3420	680	1030	3420					
MED	560	930	185	278	930	4770	8000	1590	2390	8000	8000	13300	2660	3980	13300					
PHYS	153	255	51	76	255	1600	2670	530	800	2670	3610	6000	1200	1810	6000					
AERO	98	164	33	49	164	590	980	196	293	980	1050	1750	350	520	1750					
CIVIL	37	62	12	19	62	1140	1900	380	570	1900	3360	5600	1120	1680	5600					
BLEC	39	65	13	19	65	1280	2140	428	640	2140	3330	5500	1110	1660	5500					
MECH	62	103	21	31	103	2170	3610	720	1080	3610	4800	8000	1600	2400	8000					
METMI	18	31	6	9	31	570	950	190	286	950	1390	2310	462	690	2310					
NUC	86	143	29	43	143	760	1260	253	379	1260	1350	2250	449	670	2250					
PET	40	67	13	20	67	398	660	133	199	660	800	1340	268	402	1340					
TRANU	2	3	1	1	3	1080	1800	359	540	1800	3100	5200	1030	1550	5200					
ABME	71	119	24	36	119	2340	3900	780	1170	3900	7500	12600	2510	3770	12600					
DEMO	0	0	0	0	0	960	1600	320	480	1600	1830	3060	610	920	3060					
EDUC	63	105	21	31	105	1940	3230	650	970	3230	5700	9500	1910	2860	9500					
ENV	2	3	1	1	3	447	750	149	224	750	1570	2610	520	780	2610					
LAW	0	0	0	0	0	730	1220	244	366	1220	4640	7700	1550	2320	7700					
PAT	0	0	0	0	0	1290	2160	432	650	2160	2470	4110	820	1230	4110					
PUBAD	1	2	0	1	2	1590	2650	530	800	2650	3820	6400	1270	1910	6400					
SOC	76	127	25	38	127	1800	3000	600	900	3000	5800	9600	1920	2880	9600					
GENST	80	134	27	40	134	890	1480	295	443	1480	1960	3270	650	980	3270					
TOTAL	1790	2990	600	900	2990	31100	52000	10400	15500	52000	76000	127000	25400	38100	127000					

D)	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	42	16	52	8	52	1070	403	1340	201	1340	3140	1180	3920	590	3920					
BIJL	191	72	239	36	239	5800	2190	7300	1090	7300	13900	5200	17300	2600	17300					
CHEM	2110	790	2640	395	2640	15800	5900	19800	2970	19800	26300	9900	32800	4930	32800					
EARSP	14	5	18	3	18	2930	1100	3660	550	3660	9700	3640	12100	1820	12100					
MED	4600	1730	5800	860	5800	32500	12200	40700	6100	40700	52000	19700	66000	9800	66000					
PHYS	760	284	950	142	950	7600	2860	9500	1430	9500	16800	6300	21000	3150	21000					
AERJ	500	189	630	95	630	2830	1060	3540	530	3540	4980	1870	6200	930	6200					
CIVIL	186	70	232	35	232	5500	2060	6900	1030	6900	15600	5800	19500	2920	19500					
EL EC	197	74	246	37	246	6200	2340	7800	1170	7800	15600	5800	19500	2920	19500					
MECH	309	116	386	58	386	10300	3880	12900	1940	12900	22200	8300	27700	4160	27700					
METMI	92	35	116	17	116	2760	1040	3450	520	3450	6500	2430	8100	1210	8100					
NUC	425	159	530	80	530	3540	1330	4420	660	4420	6200	2320	7700	1160	7700					
PET	202	76	252	38	252	1900	710	2370	356	2370	3740	1400	4680	700	4680					
TRANU	8	3	10	1	10	5100	1910	6400	960	6400	14100	5300	17700	2650	17700					
ABME	358	134	447	67	447	11400	4260	14200	2130	14200	35200	13200	44000	6600	44000					
DEMO	0	0	0	0	0	4480	1680	5600	840	5600	8400	3160	10500	1580	10500					
EDUC	315	118	393	59	393	9300	3500	11700	1750	11700	26600	10000	33200	4980	33200					
ENV	10	4	13	2	13	2170	820	2720	408	2720	7300	2730	9100	1370	9100					
LAW	1	0	1	0	1	3650	1370	4570	680	4570	21900	8200	27300	4100	27300					
PAT	0	0	0	0	0	6100	2280	7600	1140	7600	11400	4270	14200	2130	14200					
PUBAD	5	2	6	1	6	7700	2870	9600	1440	9600	17800	6700	22200	3330	22200					
SOC	395	148	494	74	494	9100	3420	11400	1710	11400	28000	10500	35000	5300	35000					
GENST	428	160	530	80	530	4320	1620	5400	810	5400	9100	3420	11400	1710	11400					
TOTAL	11200	4180	13900	2090	13900	162000	61000	203000	30400	203000	377000	141000	471000	71000	471000					
D1	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	10	4	12	2	12	258	97	322	48	322	750	282	940	141	940					
BIJL	46	17	57	9	57	1400	530	1750	263	1750	3330	1250	4160	620	4160					
CHEM	510	190	630	95	630	3800	1420	4740	710	4740	6300	2360	7900	1180	7900					
EARSP	3	1	4	1	4	700	264	880	132	880	2330	870	2910	437	2910					
MED	1100	414	1380	207	1380	7800	2930	9800	1460	9800	12600	4720	15700	2360	15700					
PHYS	182	68	228	34	228	1830	690	2290	343	2290	4030	1510	5000	760	5000					
AERO	121	45	151	23	151	680	255	850	127	850	1190	448	1490	224	1490					
CIVIL	45	17	56	8	56	1320	494	1650	247	1650	3740	1400	4680	700	4680					
EL EC	47	18	59	9	59	1500	560	1870	280	1870	3740	1400	4670	700	4670					
MECH	74	28	93	14	93	2480	930	3100	465	3100	5300	2000	6700	1000	6700					
METMI	22	8	28	4	28	660	249	830	124	830	1550	580	1940	291	1940					
NUC	102	38	127	19	127	850	318	1060	159	1060	1490	560	1860	279	1860					
PET	48	18	61	9	61	455	171	570	85	570	900	337	1120	168	1120					
TRANU	2	1	2	0	2	1220	459	1530	229	1530	3390	1270	4240	640	4240					
ABME	86	32	107	16	107	2730	1020	3410	510	3410	8400	3170	10600	1580	10600					
DEMO	0	0	0	0	0	1080	403	1340	202	1340	2020	760	2530	379	2530					
EDUC	75	28	94	14	94	2240	840	2800	420	2800	6400	2390	8000	1200	8000					
ENV	2	1	3	0	3	520	196	650	98	650	1750	660	2190	328	2190					
LAW	0	0	0	0	0	880	329	1100	164	1100	5200	1970	6100	980	6100					
PAT	0	0	0	0	0	1460	550	1820	273	1820	2730	1020	3420	510	3420					
PUBAD	1	0	2	0	2	1840	690	2300	345	2300	4260	1600	5300	800	5300					
SOC	95	36	119	18	119	2190	820	2730	410	2730	6700	2520	8400	1260	8400					
GENST	103	39	128	19	128	1040	389	1300	194	1300	2190	820	2730	410	2730					
TOTAL	2680	1000	3350	500	3350	38900	14600	48700	7300	48700	90000	33900	113000	17000	113000					
D2	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	12	5	15	2	15	312	117	390	58	390	910	341	1140	171	1140					
BIOL	55	21	69	10	69	1690	630	2120	317	2120	4020	1510	5000	750	5000					
CHEM	610	229	760	115	760	4590	1720	5700	860	5700	7600	2860	9500	1430	9500					
EARSP	4	2	5	1	5	850	319	1060	159	1060	2810	1050	3520	530	3520					
MED	1330	500	1670	250	1670	9400	3540	11800	1770	11800	15200	5700	19000	2850	19000					
PHYS	220	82	275	41	275	2210	830	2770	415	2770	4870	1830	6100	910	6100					
AERO	146	55	183	27	183	820	308	1030	154	1030	1440	540	1800	271	1800					
CIVIL	54	20	67	10	67	1590	600	1990	299	1990	4520	1690	5600	850	5600					
EL EC	57	21	71	11	71	1810	680	2260	339	2260	4520	1690	5600	850	5600					
MECH	90	34	112	17	112	3000	1120	3750	560	3750	6400	2410	8000	1210	8000					
METMI	27	10	34	5	34	800	300	1000	150	1000	1880	700	2350	352	2350					
NUC	123	46	154	23	154	1030	385	1280	192	1280	1800	670	2240	337	2240					
PET	59	22	73	11	73	550	206	690	103	690	1090	407	1360	204	1360					
TRANU	2	1	3	0	3	1480	550	1850	277	1850	4090	1540	5100	770	5100					
ABME	104	39	130	19	130	3300	1240	4120	620	4120	10200	3830	12800	1910	12800					
DEMO	0	0	0	0	0	1300	487	1620	244	1620	2440	920	3050	458	3050					
EDUC	91	34	114	17	114	2710	1020	3390	510	3390	7700	2890	9600	1440	9600					
ENV	3	1	4	1	4	630	237	790	118	790	2110	790	2640	396	2640					
LAW	0	0	0	0	0	1060	397	1320	199	1320	6300	2380	7900	1190	7900					
PAT	0	0	0	0	0	1760	660	2200	330	2200	3300	1240	4130	620	4130					
PUBAD	2	1	2	0	2	2220	830	2780	416	2780	5200	1930	6400	970	6400					
SOC	115	43	143	21	143	2640	990	3300	495	3300	8100	3050	10200	1520	10200					
GENST	124	47	155	23	155	1250	470	1570	235	1570	2640	990	3300	495	3300					
TOTAL	3230	1210	4040	610	4040	47000	17600	59000	8800	59000	109000	41000	137000	20500	137000					

D3	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	12	5	16	2	16	322	121	403	60	403	940	353	1180	176	1180					
BIOL	57	22	72	11	72	1750	660	2190	328	2190	4160	1560	5200	780	5200					
CHEM	630	237	790	119	790	4740	1780	5900	890	5900	7900	2960	9900	1480	9900					
EARSP	4	2	5	1	5	880	330	1100	165	1100	2910	1090	3640	550	3640					
MED	1380	520	1730	257	1730	9800	3660	12200	1830	12200	15700	5900	19700	2950	19700					
PHYS	228	85	284	43	284	2290	860	2860	429	2860	5000	1890	6300	940	6300					
AERJ	151	57	189	28	189	850	319	1060	159	1060	1490	560	1870	280	1870					
CIVIL	56	21	70	10	70	1650	620	2060	309	2060	4680	1750	5800	880	5800					
BLEC	59	22	74	11	74	1870	700	2340	351	2340	4670	1750	5800	880	5800					
MECH	93	35	116	17	116	3100	1160	3880	580	3880	6700	2490	8300	1250	8300					
METMI	28	10	35	5	35	830	311	1040	155	1040	1940	730	2430	364	2430					
NUC	127	48	159	24	159	1060	398	1330	199	1330	1860	700	2320	348	2320					
PET	61	23	76	11	76	570	213	710	107	710	1120	421	1400	211	1400					
TRANU	2	1	3	0	3	1530	570	1910	287	1910	4240	1590	5300	790	5300					
ABME	107	40	134	20	134	3410	1280	4260	640	4260	10600	3960	13200	1980	13200					
DEMO	0	0	0	0	0	1340	500	1680	252	1680	2530	950	3160	474	3160					
EDUC	94	35	118	18	118	2800	1050	3500	530	3500	8000	2990	10000	1490	10000					
ENV	3	1	4	1	4	650	245	820	122	820	2190	820	2730	410	2730					
LAW	0	0	0	0	0	1100	411	1370	205	1370	6600	2460	8200	1230	8200					
PAT	0	0	0	0	0	1820	680	2280	341	2280	3420	1280	4270	640	4270					
PUBAD	2	1	2	0	2	2300	860	2870	431	2870	5300	2000	6700	1000	6700					
SOC	119	44	148	22	148	2730	1030	3420	510	3420	8400	3150	10500	1580	10500					
GENST	128	48	160	24	160	1300	486	1620	243	1620	2730	1030	3420	510	3420					
TOTAL	3350	1250	4180	630	4180	48700	18200	61000	9100	61000	113000	42400	141000	21200	141000					

D4	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	7	3	9	1	9	183	69	228	34	228	530	200	670	100	670					
BIOL	33	12	41	6	41	990	372	1240	186	1240	2360	880	2950	442	2950					
CHEM	359	134	448	67	448	2690	1010	3360	500	3360	4470	1670	5600	840	5600					
EARSP	2	1	3	0	3	498	187	620	93	620	1650	620	2060	309	2060					
MED	780	293	980	147	980	5500	2070	6900	1040	6900	8900	3350	11200	1670	11200					
PHYS	129	48	161	24	161	1300	487	1620	243	1620	2850	1070	3570	540	3570					
AERJ	86	32	107	16	107	481	180	600	90	600	850	317	1060	159	1060					
CIVIL	32	12	39	6	39	930	350	1170	175	1170	2650	990	3310	497	3310					
BLEC	33	13	42	6	42	1060	397	1320	199	1320	2650	990	3310	496	3310					
MECH	53	20	66	10	66	1760	660	2200	330	2200	3770	1410	4710	710	4710					
METMI	16	6	20	3	20	470	176	590	88	590	1100	412	1370	206	1370					
NUC	72	27	90	14	90	600	226	750	113	750	1050	395	1320	197	1320					
PET	34	13	43	6	43	322	121	403	60	403	640	230	800	119	800					
TRANU	1	0	2	0	2	870	325	1080	162	1080	2400	900	3000	450	3000					
ABME	61	23	76	11	76	1930	720	2410	362	2410	6000	2240	7500	1120	7500					
DEMO	0	0	0	0	0	760	286	950	143	950	1430	540	1790	269	1790					
EDUC	53	20	67	10	67	1590	600	1990	298	1990	4520	1690	5600	850	5600					
ENV	2	1	2	0	2	370	139	462	69	462	1240	465	1550	232	1550					
LAW	0	0	0	0	0	620	233	780	116	780	3720	1390	4650	700	4650					
PAT	0	0	0	0	0	1030	387	1290	193	1290	1940	730	2420	363	2420					
PUBAD	1	0	1	0	1	1300	488	1630	244	1630	3020	1130	3780	570	3780					
SOC	67	25	84	13	84	1550	580	1940	290	1940	4760	1790	6000	890	6000					
GENST	73	27	91	14	91	730	275	920	138	920	1550	580	1940	290	1940					
TOTAL	1900	710	2370	355	2370	27600	10300	34500	5200	34500	64000	24000	80000	12000	80000					

IRL	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	3	1	1	0	3	99	20	25	5	99	288	58	72	14	288					
BIOL	5	1	1	0	5	243	49	61	12	243	710	142	177	35	710					
CHEM	71	14	18	4	71	780	156	195	39	780	1380	276	345	69	1380					
EARSP	0	0	0	0	0	120	24	30	6	120	520	103	129	26	520					
MED	123	25	31	6	123	1370	274	342	68	1370	2400	479	600	120	2400					
PHYS	27	5	7	1	27	345	69	86	17	345	910	181	226	45	910					
AERJ	20	4	5	1	20	154	31	38	8	154	290	58	72	14	290					
CIVIL	6	1	1	0	6	234	47	58	12	234	830	166	208	42	830					
BLEC	6	1	1	0	6	269	54	67	13	269	830	167	209	42	830					
MECH	10	2	2	0	10	466	93	116	23	466	1220	244	305	61	1220					
METMI	3	1	1	0	3	124	25	31	6	124	357	71	89	18	357					
NUC	16	3	4	1	16	186	37	47	9	186	355	71	89	18	355					
PET	7	1	2	0	7	94	19	24	5	94	212	42	53	11	212					
TRANU	0	0	0	0	0	232	46	58	12	232	810	162	203	41	810					
ABME	12	2	3	1	12	475	95	119	24	475	1850	369	462	92	1850					
DEMO	0	0	0	0	0	239	48	60	12	239	487	97	122	24	487					
EDUC	10	2	2	0	10	384	77	96	19	384	1380	276	345	69	1380					
ENV	0	0	0	0	0	93	19	23	5	93	406	81	102	20	406					
LAW	0	0	0	0	0	140	28	35	7	140	1140	227	284	57	1140					
PAT	0	0	0	0	0	321	64	80	16	321	650	131	164	33	650					
PUBAD	0	0	0	0	0	346	69	86	17	346	990	198	248	50	990					
SOC	12	2	3	1	12	347	69	87	17	347	1350	270	338	68	1350					
GENST	18	4	5	1	18	222	44	55	11	222	520	104	130	26	520					
TOTAL	350	70	88	18	350	7300	1460	1820	364	7300	19900	3980	4970	990	19900					

I	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	10	13	7	17	17	304	406	203	510	510	1220	1630	810	2040	2040					
BIOL	51	67	34	84	84	1980	2640	1320	3300	3300	6600	8800	4390	11000	11000					
CHEM	580	770	383	960	960	6800	9100	4570	11400	11400	12800	17100	8600	21400	21400					
EARSP	3	3	2	4	4	720	950	477	1190	1190	3600	4800	2400	6000	6000					
MED	1710	2280	1140	2850	2850	17300	23000	11500	28800	28800	30400	40500	20300	51000	51000					
PHYS	171	228	114	285	285	2240	2990	1490	3730	3730	6500	8700	4360	10900	10900					
AERO	119	158	79	198	198	990	1310	660	1640	1640	2040	2720	1360	3390	3390					
CIVIL	39	53	26	66	66	1440	1910	960	2390	2390	5800	7700	3860	9600	9600					
ELEC	42	56	28	71	71	1730	2300	1150	2880	2880	6100	8100	4040	10100	10100					
MECH	64	86	43	107	107	2930	3910	1960	4890	4890	8600	11500	5800	14400	14400					
METMI	19	26	13	32	32	750	1000	498	1250	1250	2470	3290	1640	4110	4110					
NUC	95	127	64	159	159	1210	1620	810	2020	2020	2540	3380	1690	4230	4230					
PET	45	60	30	75	75	580	780	388	970	970	1490	1980	990	2480	2480					
TRANU	1	2	1	2	2	1310	1750	880	2190	2190	5400	7200	3610	9000	9000					
ABME	73	97	48	121	121	2850	3800	1900	4750	4750	12700	16900	8500	21100	21100					
DEMO	0	0	0	0	0	1540	2050	1020	2560	2560	3430	4570	2290	5700	5700					
EDUC	64	86	43	107	107	2360	3150	1580	3940	3940	9600	12800	6400	16100	16100					
ENV	2	2	1	3	3	530	700	352	880	880	2700	3590	1800	4490	4490					
LAW	0	0	0	0	0	790	1060	530	1320	1320	7600	10200	5100	12700	12700					
PAT	0	0	0	0	0	2110	2810	1410	3510	3510	4680	6200	3120	7800	7800					
PUBAD	1	1	1	2	2	2180	2910	1450	3630	3630	7100	9500	4750	11900	11900					
SOC	85	114	57	142	142	2270	3020	1510	3780	3780	9900	13200	6600	16500	16500					
GENST	117	156	78	195	195	1440	1930	960	2410	2410	3620	4830	2420	6000	6000					
TOTAL	3290	4380	2190	5500	5500	56000	75000	37600	94000	94000	157000	209000	105000	262000	262000					
II	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	5	6	3	8	8	146	195	97	243	243	590	780	391	980	980					
BIOL	24	32	16	40	40	950	1270	630	1580	1580	3160	4210	2110	5300	5300					
CHEM	276	368	184	460	460	3290	4380	2190	5500	5500	6200	8200	4110	10300	10300					
EARSP	1	2	1	2	2	344	458	229	570	570	1730	2300	1150	2880	2880					
MED	820	1090	550	1370	1370	8300	11100	5500	13800	13800	14600	19400	9700	24300	24300					
PHYS	82	109	55	137	137	1080	1430	720	1790	1790	3140	4180	2090	5200	5200					
AERO	57	76	38	95	95	473	630	316	790	790	980	1300	650	1630	1630					
CIVIL	19	25	13	32	32	690	920	459	1150	1150	2780	3710	1850	4630	4630					
ELEC	20	27	14	34	34	830	1110	550	1380	1380	2910	3880	1940	4850	4850					
MECH	31	41	21	51	51	1410	1880	940	2350	2350	4150	5500	2770	6900	6900					
METMI	9	12	6	15	15	359	478	239	600	600	1180	1580	790	1970	1970					
NUC	46	61	31	76	76	580	780	388	970	970	1220	1620	810	2030	2030					
PET	22	29	14	36	36	279	372	186	466	466	710	950	475	1190	1190					
TRANU	1	1	0	1	1	630	840	421	1050	1050	2600	3460	1730	4330	4330					
ABME	35	46	23	58	58	1370	1830	910	2280	2280	6100	8100	4060	10100	10100					
DEMO	0	0	0	0	0	740	980	492	1230	1230	1650	2200	1100	2740	2740					
EDUC	31	41	21	51	51	1130	1510	760	1890	1890	4620	6200	3080	7700	7700					
ENV	1	1	1	1	1	254	338	169	423	423	1290	1730	860	2160	2160					
LAW	0	0	0	0	0	382	510	254	640	640	3660	4880	2440	6100	6100					
PAT	0	0	0	0	0	1010	1350	670	1690	1690	2250	3000	1500	3750	3750					
PUBAD	0	1	0	1	1	1050	1400	700	1740	1740	3420	4560	2280	5700	5700					
SOC	41	55	27	68	68	1090	1450	730	1810	1810	4760	6300	3170	7900	7900					
GENST	56	75	37	94	94	690	920	462	1160	1160	1740	2320	1160	2900	2900					
TOTAL	1580	2100	1050	2630	2630	27100	36100	18000	45100	45100	75000	100000	50000	126000	126000					
I2	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	5	7	3	9	9	158	211	106	264	264	640	850	424	1060	1060					
BIOL	26	35	18	44	44	1030	1370	690	1720	1720	3420	4560	2280	5700	5700					
CHEM	299	399	199	498	498	3560	4750	2370	5900	5900	6700	8900	4450	11100	11100					
EARSP	1	2	1	2	2	372	496	248	620	620	1870	2490	1250	3120	3120					
MED	890	1180	590	1480	1480	9000	12000	6000	15000	15000	15800	21100	10500	26300	26300					
PHYS	89	118	59	148	148	1170	1550	780	1940	1940	3400	4530	2270	5700	5700					
AERO	62	82	41	103	103	510	680	342	850	850	1060	1410	710	1770	1770					
CIVIL	20	27	14	34	34	750	1000	498	1240	1240	3010	4010	2010	5000	5000					
ELEC	22	29	15	37	37	900	1200	600	1500	1500	3150	4200	2100	5300	5300					
MECH	33	45	22	56	56	1530	2030	1020	2540	2540	4500	6000	3000	7500	7500					
METMI	10	13	7	17	17	389	520	259	650	650	1280	1710	850	2140	2140					
NUC	50	66	33	83	83	630	840	420	1050	1050	1320	1760	880	2200	2200					
PET	23	31	16	39	39	303	403	202	500	500	770	1030	510	1290	1290					
TRANU	1	1	0	1	1	680	910	456	1140	1140	2810	3750	1880	4690	4690					
ABME	38	50	25	63	63	1480	1980	990	2470	2470	6600	8800	4390	11000	11000					
DEMO	0	0	0	0	0	800	1070	530	1330	1330	1780	2380	1190	2970	2970					
EDUC	33	45	22	56	56	1230	1640	820	2050	2050	5000	6700	3340	8300	8300					
ENV	1	1	1	2	2	275	367	183	458	458	1400	1870	930	2340	2340					
LAW	0	0	0	0	0	413	550	276	690	690	3400	5300	2640	6600	6600					
PAT	0	0	0	0	0	1100	1460	730	1830	1830	2430	3250	1620	4060	4060					
PUBAD	0	1	0	1	1	1130	1510	760	1890	1890	3710	4940	2470	6200	6200					
SOC	44	59	30	74	74	1180	1570	790	1970	1970	5200	6900	3440	8600	8600					
GENST	61	81	41	101	101	750	1000	500	1250	1250	1880	2510	1260	3140	3140					
TOTAL	1710	2280	1140	2850	2850	29300	39100	19500	48900	48900	82000	109000	54000	136000	136000					

L	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	0	1	1	0	1	17	20	20	5	20	42	50	50	12	50					
BIOL	1	1	1	0	1	39	46	46	11	46	97	115	115	29	115					
CHEM	13	16	16	4	16	117	138	138	35	138	193	227	227	57	227					
EARSP	0	0	0	0	0	23	28	28	7	28	81	96	96	24	96					
MED	19	23	23	6	23	186	218	218	55	218	305	359	359	90	359					
PHYS	5	6	6	1	6	62	73	73	18	73	140	164	164	41	164					
AERO	3	4	4	1	4	24	29	29	7	29	42	49	49	12	49					
CIVIL	1	1	1	0	1	43	51	51	13	51	127	150	150	37	150					
ELEC	1	1	1	0	1	49	58	58	15	58	129	152	152	38	152					
MECH	2	2	2	0	2	79	93	93	23	93	178	209	209	52	209					
METMI	0	0	0	0	0	23	27	27	7	27	55	65	65	16	65					
NUC	3	3	3	1	3	33	38	38	10	38	55	65	65	16	65					
PET	1	1	1	0	1	17	20	20	5	20	33	39	39	10	39					
TRANU	0	0	0	0	0	39	46	46	11	46	113	133	133	33	133					
ABME	2	2	2	1	2	81	96	96	24	96	269	316	316	79	316					
DEMO	0	0	0	0	0	41	48	48	12	48	74	87	87	22	87					
EDUC	2	2	2	0	2	68	80	80	20	80	206	242	242	61	242					
ENV	0	0	0	0	0	19	22	22	5	22	63	75	75	19	75					
LAW	0	0	0	0	0	26	31	31	8	31	170	201	201	50	201					
PAT	0	0	0	0	0	53	62	62	16	62	95	112	112	28	112					
PUBAD	0	0	0	0	0	60	70	70	18	70	145	171	171	43	171					
SOC	2	2	2	1	2	62	73	73	18	73	205	241	241	60	241					
GENST	3	3	3	1	3	38	44	44	11	44	78	91	91	23	91					
TOTAL	58	68	68	17	68	1200	1410	1410	353	1410	2900	3410	3410	850	3410					
NL	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	33	15	33	4	37	670	298	670	74	740	1630	720	1630	181	1810					
BIOL	73	32	73	8	81	1890	840	1890	210	2100	4240	1880	4240	471	4710					
CHEM	810	358	810	90	900	5200	2290	5200	570	5700	8400	3750	8400	940	9400					
EARSP	7	3	7	1	8	1300	580	1300	145	1450	3940	1750	3940	438	4380					
MED	870	385	870	96	960	6700	2960	6700	740	7400	10900	4860	10900	1220	12200					
PHYS	369	164	369	41	410	3220	1430	3220	358	3580	6700	2990	6700	750	7500					
AERO	242	107	242	27	269	1170	520	1170	130	1300	2000	890	2000	222	2220					
CIVIL	94	42	94	10	105	2410	1070	2410	268	2680	6400	2830	6400	710	7100					
ELEC	99	44	99	11	110	2680	1190	2680	298	2980	6300	2790	6300	700	7000					
MECH	151	67	151	17	168	4330	1930	4330	481	4810	8800	3920	8800	980	9800					
METMI	46	20	46	5	51	1180	520	1180	131	1310	2590	1150	2590	288	2880					
NUC	211	94	211	23	234	1480	660	1480	165	1650	2510	1120	2510	279	2790					
PET	111	49	111	12	124	870	385	870	96	960	1610	710	1610	179	1790					
TRANU	4	2	4	0	4	2320	1030	2320	258	2580	6000	2650	6000	660	6600					
ABME	179	79	179	20	198	4910	2180	4910	550	5500	14100	6300	14100	1570	15700					
DEMO	0	0	0	0	0	1900	840	1900	211	2110	3470	1540	3470	386	3860					
EDUC	161	71	161	18	179	4120	1830	4120	458	4580	10900	4840	10900	1210	12100					
ENV	5	2	5	1	6	1000	442	1000	111	1110	3040	1350	3040	338	3380					
LAW	0	0	0	0	0	1700	750	1700	188	1880	9000	4010	9000	1000	10000					
PAT	0	0	0	0	0	2530	1120	2530	281	2810	4610	2050	4610	510	5100					
PUBAD	2	1	2	0	3	3260	1450	3260	362	3620	7100	3980	7100	790	7900					
SOC	189	84	189	21	210	3820	1700	3820	425	4250	10800	4810	10800	1200	12000					
GENST	185	82	185	21	206	1770	790	1770	197	1970	3730	1660	3730	414	4140					
TOTAL	3830	1700	3830	426	4260	60000	26800	60000	6700	67000	139000	62000	139000	15400	154000					

GB	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	62	22	16	3	62	1520	530	379	76	1520	4270	1500	1070	214	4270					
BIOL	193	67	48	10	193	5900	2050	1470	293	5900	14200	4900	3560	710	14200					
CHEM	2220	780	560	111	2220	16800	5900	4210	840	16800	28200	9900	7100	1410	28200					
EARSP	18	6	4	1	18	3560	1240	890	178	3560	12000	4200	3000	600	12000					
MED	3240	1140	810	162	3240	26700	9400	6700	1340	26700	44400	15500	11100	2220	44400					
PHYS	930	327	233	47	930	9400	3280	2340	468	9400	20800	7300	5200	1040	20800					
AERO	620	218	156	31	620	3510	1230	880	175	3510	6200	2170	1550	311	6200					
CIVIL	229	80	57	11	229	6700	2350	1680	335	6700	19300	6800	4830	970	19300					
EL EC	242	85	60	12	242	7600	2670	1900	381	7600	19300	6800	4830	970	19300					
MECH	380	133	95	19	380	12700	4440	3170	630	12700	27600	9700	6900	1380	27600					
METMI	114	40	28	6	114	3380	1180	840	169	3380	8000	2810	2010	401	8000					
NUC	520	183	131	26	520	4380	1530	1100	219	4380	7700	2700	1930	386	7700					
PET	248	87	62	12	248	2330	820	580	117	2330	4660	1630	1160	233	4660					
TRANU	9	3	2	0	9	6200	2180	1560	311	6200	17600	6200	4390	880	17600					
ABME	440	154	110	22	440	13800	4850	3460	690	13800	43500	15200	10900	2180	43500					
DEMO	0	0	0	0	0	5600	1940	1390	278	5600	10500	3690	2630	530	10500					
EDUC	387	135	97	19	387	11400	3990	2850	570	11400	32900	11500	8200	1640	32900					
ENV	13	4	3	1	13	2650	930	660	132	2650	9000	3170	2260	452	9000					
LAW	1	0	0	0	1	4390	1540	1100	220	4390	26900	9400	6700	1340	26900					
PAT	0	0	0	0	0	7500	2630	1880	376	7500	14200	4980	3560	710	14200					
PUBAD	6	2	2	0	6	9400	3290	2350	470	9400	22200	7800	5500	1110	22200					
SOC	465	163	116	23	465	10600	3710	2650	530	10600	33000	11600	8300	1650	33000					
GENST	510	179	128	26	510	5300	1840	1310	263	5300	11300	3970	2840	570	11300					
TOTAL	10900	3800	2720	540	10900	181000	63000	45300	9100	181000	438000	153000	110000	21900	438000					
GBI	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	7	3	2	0	7	182	64	45	9	182	510	180	128	26	510					
BIOL	23	8	6	1	23	700	246	176	35	700	1710	600	427	85	1710					
CHEM	267	93	67	13	267	2020	710	510	101	2020	3390	1190	850	169	3390					
EARSP	2	1	1	0	2	427	149	107	21	427	1440	500	360	72	1440					
MED	389	136	97	19	389	3210	1120	800	160	3210	5300	1870	1330	267	5300					
PHYS	112	39	28	6	112	1120	393	281	56	1120	2500	880	630	125	2500					
AERO	75	26	19	4	75	421	147	105	21	421	750	261	186	37	750					
CIVIL	27	10	7	1	27	810	282	201	40	810	2320	810	580	116	2320					
EL EC	29	10	7	1	29	910	320	229	46	910	2320	810	580	116	2320					
MECH	46	16	11	2	46	1520	530	381	76	1520	3310	1160	830	166	3310					
METMI	14	5	3	1	14	405	142	101	20	405	960	337	241	48	960					
NUC	63	22	16	3	63	530	184	131	26	530	930	325	232	46	930					
PET	30	10	7	1	30	280	98	70	14	280	560	196	140	28	560					
TRANU	1	0	0	0	1	750	261	187	37	750	2110	740	530	105	2110					
ABME	53	18	13	3	53	1660	580	415	83	1660	5200	1830	1310	261	5200					
DEMO	0	0	0	0	0	670	233	167	33	670	1260	442	316	63	1260					
EDUC	46	16	12	2	46	1370	478	342	68	1370	3940	1380	990	197	3940					
ENV	2	1	0	0	2	318	111	79	16	318	1090	380	271	54	1090					
LAW	0	0	0	0	0	530	185	132	26	530	3230	1130	810	161	3230					
PAT	0	0	0	0	0	900	316	226	45	900	1710	600	427	85	1710					
PUBAD	1	0	0	0	1	1130	394	282	56	1130	2660	930	660	133	2660					
SOC	56	20	14	3	56	1270	445	318	64	1270	3970	1390	990	198	3970					
GENST	61	21	15	3	61	630	221	158	32	630	1360	476	340	68	1360					
TOTAL	1300	456	326	65	1300	21800	7600	5400	1090	21800	53000	18400	13100	2630	53000					

GB2	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	30	10	7	1	30	730	255	182	36	730	2050	720	510	103	2050					
BIOL	93	32	23	5	93	2810	980	700	141	2810	6800	2390	1710	341	6800					
CHEM	1070	373	267	53	1070	8100	2830	2020	404	8100	13600	4750	3390	690	13600					
EARSP	8	3	2	0	8	1710	600	427	85	1710	5800	2020	1440	288	5300					
MED	1560	550	389	78	1560	12800	4490	3210	640	12800	21300	7500	5300	1070	21300					
PHYS	448	157	112	22	448	4490	1570	1120	225	4490	10000	3500	2500	500	10000					
AERO	299	105	75	15	299	1680	590	421	84	1680	2980	1040	750	149	2930					
CIVIL	110	38	27	5	110	3220	1130	810	161	3220	9300	3240	2320	464	9300					
BL EC	116	41	29	6	116	3660	1280	910	183	3660	9300	3250	2320	464	9300					
MECH	182	64	46	9	182	6100	2130	1520	304	6100	13200	4640	3310	660	13200					
METMI	55	19	14	3	55	1620	570	405	81	1620	3850	1350	960	193	3850					
NUC	251	88	63	13	251	2100	740	530	105	2100	3710	1300	930	185	3710					
PET	119	42	30	6	119	1120	392	280	56	1120	2240	780	560	112	2240					
TRANU	5	2	1	0	5	2990	1050	750	149	2990	8400	2950	2110	422	8400					
ABME	211	74	53	11	211	6600	2330	1660	332	6600	20900	7300	5200	1040	20900					
DEMO	0	0	0	0	0	2670	930	670	133	2670	5100	1770	1260	253	5100					
EDUC	186	65	46	9	186	5500	1910	1370	273	5500	15800	5500	3940	790	15800					
ENV	6	2	2	0	6	1270	445	318	64	1270	4340	1520	1090	217	4340					
LAW	0	0	0	0	0	2110	740	530	105	2110	12900	4520	3230	650	12900					
PAT	0	0	0	0	0	3610	1260	900	181	3610	6800	2390	1710	341	6800					
PUBAD	3	1	1	0	3	4510	1580	1130	225	4510	10600	3720	2660	530	10600					
SDC	223	78	56	11	223	5100	1780	1270	254	5100	15900	5600	3970	790	15900					
GENST	245	86	61	12	245	2520	880	630	126	2520	5400	1910	1360	272	5400					
TOTAL	5200	1820	1300	261	5200	87000	30500	21800	4350	87000	210000	74000	53000	10500	210000					
GB3	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	25	9	6	1	25	610	212	152	30	610	1710	600	427	85	1710					
BIOL	77	27	19	4	77	2340	820	590	117	2340	5700	1990	1420	285	5700					
CHEM	890	311	222	44	890	6700	2360	1680	337	6700	11300	3950	2820	560	11300					
EARSP	7	2	2	0	7	1420	498	356	71	1420	4800	1680	1200	240	4800					
MED	1300	454	324	65	1300	10700	3740	2670	530	10700	17800	6200	4440	890	17800					
PHYS	373	131	93	19	373	3750	1310	940	187	3750	8300	2920	2080	417	8300					
AERO	249	87	62	12	249	1400	491	351	70	1400	2480	870	620	124	2480					
CIVIL	92	32	23	5	92	2680	940	670	134	2680	7700	2700	1930	386	7700					
BL EC	97	34	24	5	97	3050	1070	760	152	3050	7700	2710	1930	387	7700					
MECH	152	53	38	8	152	5100	1780	1270	254	5100	11000	3860	2760	550	11000					
METMI	45	16	11	2	45	1350	473	338	68	1350	3210	1120	800	161	3210					
NUC	209	73	52	10	209	1750	610	438	88	1750	3090	1080	770	155	3090					
PET	99	35	25	5	99	930	327	233	47	930	1860	650	466	93	1860					
TRANU	4	1	1	0	4	2490	870	620	124	2490	7000	2460	1760	352	7000					
ABME	176	62	44	9	176	5500	1940	1380	277	5500	17400	6100	4350	870	17400					
DEMO	0	0	0	0	0	2220	780	560	111	2220	4210	1470	1050	211	4210					
EDUC	155	54	39	8	155	4550	1590	1140	228	4550	13100	4600	3290	660	13100					
ENV	5	2	1	0	5	1060	371	265	53	1060	3620	1270	900	181	3620					
LAW	0	0	0	0	0	1760	620	439	88	1760	10800	3760	2690	540	10800					
PAT	0	0	0	0	0	3010	1050	750	150	3010	5700	1990	1420	285	5700					
PUBAD	3	1	1	0	3	3760	1310	940	188	3760	8900	3100	2220	443	8900					
SDC	186	65	47	9	186	4240	1480	1060	212	4240	13200	4630	3300	660	13200					
GENST	205	72	51	10	205	2100	740	530	105	2100	4540	1590	1130	227	4540					
TOTAL	4350	1520	1090	217	4350	73000	25400	18100	3630	73000	175000	61000	43800	8800	175000					

ND	USERS BY LANGUAGE					1976 .					1980 .					1985 .				
	ENG	FREN	GERM	ITAL	TOTAL .	ENG	FREN	GERM	ITAL	TOTAL .	ENG	FREN	GERM	ITAL	TOTAL .					
AGRI	33	8	22	2	39 .	690	162	446	41	810 .	1700	400	1100	100	2000 .					
BIOL	73	17	47	4	86 .	2060	484	1330	121	2420 .	4820	1130	3120	283	5700 .					
CHEM	790	187	510	47	930 .	5600	1320	3620	329	6600 .	9200	2170	6000	540	10900 .					
EARSP	6	1	4	0	6 .	1140	268	740	67	1340 .	3680	870	2380	217	4330 .					
MED	1370	321	880	80	1610 .	9800	2310	6400	580	11600 .	16000	3750	10300	940	18800 .					
PHYS	308	72	199	18	362 .	2900	680	1880	171	3410 .	6300	1480	4080	371	7400 .					
AERO	206	48	133	12	242 .	1080	255	700	64	1270 .	1880	443	1220	111	2220 .					
CIVIL	78	18	51	5	92 .	2140	500	1390	126	2520 .	6000	1400	3860	351	7000 .					
BL EC	81	19	53	5	96 .	2390	560	1550	141	2810 .	5900	1380	3810	346	6900 .					
MECH	125	29	81	7	147 .	3900	920	2520	229	4590 .	8300	1950	5400	488	9800 .					
METMI	38	9	25	2	45 .	1050	248	680	62	1240 .	2430	570	1580	143	2860 .					
NUC	177	42	115	10	209 .	1370	322	890	81	1610 .	2370	560	1530	139	2790 .					
PET	93	22	60	5	110 .	790	186	510	46	930 .	1510	356	980	89	1780 .					
TRANU	3	1	2	0	4 .	2070	487	1340	122	2440 .	5600	1320	3630	330	6600 .					
ABME	147	35	95	9	173 .	4340	1020	2810	255	5100 .	13200	3110	8600	780	15600 .					
DEMO	0	0	0	0	0 .	1760	414	1140	104	2070 .	3280	770	2120	193	3860 .					
EDUC	133	31	86	8	156 .	3650	860	2360	215	4290 .	10200	2390	6600	600	12000 .					
ENV	4	1	3	0	5 .	880	206	570	52	1030 .	2860	670	1850	168	3370 .					
LAW	0	0	0	0	0 .	1450	341	940	85	1700 .	8400	1980	5400	494	9900 .					
PAT	0	0	0	0	0 .	2340	550	1520	138	2750 .	4360	1030	2820	256	5100 .					
PUBAD	2	0	1	0	2 .	2930	690	1900	173	3450 .	6700	1590	4360	396	7900 .					
SDC	162	38	105	10	190 .	3460	810	2240	204	4070 .	10400	2450	6700	610	12200 .					
GENST	169	40	110	10	199 .	1660	391	1070	98	1950 .	3530	830	2290	208	4160 .					
TOTAL	4000	940	2590	235	4710 .	59000	14000	38500	3500	70000 .	139000	32600	90000	8200	163000 .					
CH	USERS BY LANGJAGE					1976 .					1980 .					1985 .				
	ENG	FREN	GERM	ITAL	TOTAL .	ENG	FREN	GERM	ITAL	TOTAL .	ENG	FREN	GERM	ITAL	TOTAL .					
AGRI	18	18	21	9	26 .	310	310	354	155	443 .	640	640	730	321	920 .					
BIOL	23	23	27	12	33 .	620	620	710	309	880 .	1330	1330	1520	670	1900 .					
CHEM	246	246	281	123	352 .	1570	1570	1790	790	2240 .	2520	2520	2880	1260	3600 .					
EARSP	2	2	2	1	2 .	346	346	395	173	494 .	1000	1000	1140	500	1430 .					
MED	424	424	485	212	610 .	2760	2760	3150	1380	3940 .	4350	4350	4970	2170	6200 .					
PHYS	96	96	110	48	137 .	850	850	970	423	1210 .	1710	1710	1960	860	2450 .					
AERO	64	64	73	32	92 .	308	308	352	154	440 .	510	510	590	257	730 .					
CIVIL	25	25	28	12	35 .	640	640	740	322	920 .	1630	1630	1870	820	2330 .					
BL EC	26	26	29	13	36 .	700	700	800	351	1000 .	1590	1590	1820	800	2270 .					
MECH	40	40	45	20	57 .	1140	1140	1310	570	1630 .	2260	2260	2580	1130	3220 .					
METMI	12	12	14	6	17 .	317	317	362	158	452 .	670	670	760	335	960 .					
NUC	55	55	62	27	78 .	384	384	439	192	550 .	640	640	730	319	910 .					
PET	27	27	30	13	38 .	214	214	245	107	306 .	390	390	445	195	560 .					
TRANU	1	1	1	0	1 .	600	600	680	298	850 .	1480	1480	1690	740	2110 .					
ABME	46	46	52	23	65 .	1280	1280	1470	640	1830 .	3570	3570	4080	1790	5100 .					
DEMO	0	0	0	0	0 .	484	484	550	242	690 .	870	870	990	433	1240 .					
EDUC	40	40	46	20	58 .	1060	1060	1210	530	1510 .	2700	2700	3090	1350	3860 .					
ENV	1	1	1	1	2 .	270	270	308	135	385 .	790	790	900	393	1120 .					
LAW	0	0	0	0	0 .	442	442	500	221	630 .	2240	2240	2560	1120	3200 .					
PAT	0	0	0	0	0 .	650	650	740	326	930 .	1160	1160	1330	580	1660 .					
PUBAD	1	1	1	0	1 .	850	850	970	425	1210 .	1800	1800	2060	900	2580 .					
SDC	49	49	56	25	70 .	1030	1030	1170	510	1470 .	2800	2800	3200	1400	4000 .					
GENST	58	58	67	29	83 .	500	500	570	250	710 .	970	970	1110	485	1380 .					
TOTAL	1250	1250	1430	630	1790 .	17300	17300	19800	8700	24700 .	37600	37600	43000	18800	54000 .					

A	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	6	3	9	2	9	158	85	243	61	243	457	246	700	176	700					
BIOL	15	8	24	6	24	540	290	830	207	830	1500	810	2310	580	2310					
CHEM	169	91	260	65	260	1650	890	2530	630	2530	2860	1540	4410	1100	4410					
EARSP	1	0	1	0	1	230	124	354	89	354	930	500	1440	359	1440					
MED	417	225	640	160	640	3650	1970	5600	1400	5600	6100	3290	9400	2350	9400					
PHYS	54	29	83	21	83	640	345	990	246	990	1620	870	2490	620	2490					
AERO	40	22	62	15	62	277	149	425	106	425	510	277	790	190	790					
CIVIL	13	7	20	5	20	445	240	690	171	690	1500	810	2310	580	2310					
ELEC	14	8	22	5	22	510	277	790	198	790	1510	820	2330	580	2330					
MECH	22	12	33	8	33	870	469	1340	335	1340	2170	1170	3340	840	3340					
METMI	6	3	9	2	9	231	124	355	89	355	630	341	980	244	980					
NUC	32	17	49	12	49	332	179	510	128	510	620	335	960	239	960					
PET	15	8	23	6	23	170	92	262	66	262	375	202	580	144	580					
TRANU	0	0	1	0	1	421	227	650	162	650	1400	760	2160	540	2160					
ABME	25	13	38	10	38	890	481	1370	343	1370	3300	1780	5100	1270	5100					
DEMO	0	0	0	0	0	422	227	650	162	650	850	456	1300	326	1300					
EDUC	22	12	34	8	34	730	394	1130	281	1130	2490	1340	3830	960	3830					
ENV	1	0	1	0	1	173	93	266	67	266	710	383	1090	274	1090					
LAW	0	0	0	0	0	260	140	400	100	400	2000	1070	3070	770	3070					
PAT	0	0	0	0	0	570	308	880	220	880	1150	620	1770	441	1770					
PUBAD	0	0	0	0	0	640	344	980	245	980	1740	940	2680	670	2680					
SDC	28	15	43	11	43	700	376	1080	269	1080	2570	1390	3960	990	3960					
GENST	34	18	52	13	52	393	212	610	151	610	920	493	1410	352	1410					
TOTAL	910	492	1410	352	1410	14900	8000	22900	5700	22900	37900	20400	58000	14600	58000					
IB	USERS BY LANGUAGE					1976					1980					1985				
	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL	ENG	FREN	GERM	ITAL	TOTAL					
AGRI	6	8	2	5	10	197	272	68	153	340	800	1110	278	620	1390					
BIOL	21	30	7	17	37	910	1260	315	710	1580	3330	4590	1150	2580	5700					
CHEM	252	348	87	196	435	3430	4740	1180	2660	5900	6700	9200	2310	5200	11600					
EARSP	1	2	0	1	2	360	496	124	279	620	2000	2760	690	1550	3450					
MED	630	870	217	489	1090	7800	10700	2680	6000	13400	14400	19900	4970	11200	24800					
PHYS	78	108	27	61	135	1130	1560	389	870	1940	3590	4950	1240	2780	6200					
AERO	57	79	20	45	99	530	740	184	415	920	1160	1600	399	900	2000					
CIVIL	19	26	6	14	32	730	1010	252	570	1260	3230	4460	1120	2510	5600					
ELEC	20	28	7	16	35	890	1220	306	690	1530	3400	4690	1170	2640	5900					
MECH	29	40	10	23	50	1470	2030	510	1140	2530	4750	6600	1640	3690	8200					
METMI	9	12	3	7	15	384	530	132	298	660	1380	1900	476	1070	2380					
NUC	46	63	16	35	79	650	900	224	500	1120	1430	1970	493	1110	2470					
PET	22	30	7	17	37	305	421	105	237	530	840	1160	289	650	1440					
TRANU	1	1	0	0	1	690	950	237	530	1180	3100	4280	1070	2410	5400					
ABME	35	48	12	27	61	1480	2040	510	1150	2550	7200	9900	2470	5600	12400					
DEMO	0	0	0	0	0	840	1160	291	660	1460	1980	2730	680	1530	3410					
EDUC	31	43	11	24	53	1220	1680	420	950	2100	5400	7500	1870	4210	9400					
ENV	1	1	0	1	1	270	373	93	210	466	1520	2090	520	1180	2610					
LAW	0	0	0	0	0	387	530	133	300	670	4140	5700	1430	3210	7100					
PAT	0	0	0	0	0	1140	1570	393	880	1960	2670	3680	920	2070	4600					
PUBAD	0	1	0	0	1	1150	1590	397	890	1980	4100	5700	1410	3180	7100					
SDC	40	55	14	31	68	1120	1550	386	870	1930	5400	7400	1850	4150	9200					
GENST	65	90	22	51	112	830	1140	286	640	1430	2090	2880	720	1620	3600					
TOTAL	1360	1880	470	1060	2350	27900	38500	9600	21600	48100	85000	117000	29200	66000	146000					

EUROPE TOTAL TRAFFIC

1976	KMESS IN	KMESS OUT	MBITS IN	MBITS OUT
B	383	1130	31	4590
DK	207	600	17	2450
F	1850	5500	151	22300
F1	1190	3520	97	14300
F2	155	461	13	1870

F3	520	1540	42	6300
D	2580	7600	210	30600
D1	620	1810	50	7400
D2	750	2190	61	8900
D3	770	2270	63	9200
D4	439	1280	36	5200
IRL	42	125	3	510
I	910	2640	74	10700
I1	438	1270	36	5100
I2	475	1370	38	5500

L	7	21	1	87
NL	680	2040	56	8300
GB	1900	5600	155	22900
GB1	228	680	19	2750
GB2	910	2710	74	11000
GB3	760	2250	62	9200
ND	780	2290	63	9300
CH	270	800	22	3240
A	206	600	17	2430
IB	350	1020	28	4130

EEC	8600	25200	700	103000
EUR	10200	30000	830	122000

1980	KMESS IN	KMESS OUT	MBITS IN	MBITS OUT
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H	8300	27000	690	112000
DK	4190	13700	344	57000
F	47700	154000	3950	640000
F1	30600	99000	2530	410000
F2	4040	13000	334	54000
F3	13400	43100	1110	179000
D	54000	175000	4450	730000
D1	13000	42100	1070	175000
D2	15700	51000	1290	212000
D3	16200	53000	1340	219000

D4	9200	29800	760	124000
IRL	1370	4440	113	18500
I	23300	76000	1900	319000
I1	11200	36600	910	153000
I2	12100	39700	990	166000
L	218	700	18	2930
NL	16000	51000	1330	214000
GB	46800	151000	3870	630000
GB1	5600	18100	465	75000
GB2	22400	72000	1860	301000

GB3	18700	60000	1550	251000
ND	17000	55000	1400	228000
CH	5600	18000	459	75000
A	5000	16500	414	69000
IB	10900	35800	900	149000

EEC	202000	650000	16700	2720000
EUR	241000	780000	19900	3240000

1985	KMESS IN	KMESS OUT	MBITS IN	MBITS OUT
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B	25000	79000	2050	330000
DK	13000	42000	1060	175000
F	154000	483000	12600	2010000
F1	98000	309000	8100	1290000
F2	13000	41100	1070	171000
F3	43000	135000	3530	560000
D	163000	520000	13300	2170000
D1	39200	125000	3190	520000
D2	47300	151000	3860	630000
D3	48900	156000	3990	650000

D4	27700	88000	2260	369000
IRL	5300	16800	434	70000
I	88000	286000	7100	1200000
I1	42100	137000	3410	580000
I2	45700	149000	3690	620000
L	770	2420	63	10100
NL	48200	150000	3970	620000
GB	148000	464000	12100	1930000
GB1	17700	56000	1460	232000
GB2	71000	223000	5800	930000

GB3	59000	186000	4850	770000
ND	52000	164000	4260	680000
CH	15900	50000	1300	209000
A	17500	56000	1420	236000
IB	46100	149000	3750	620000

EEC	640000	2040000	53000	8500000
EUR	780000	2460000	63000	10300000

EUR TOTAL TRAFFIC

1976	KMESS IN	KMESS OUT	MBITS IN	MBITS OUT
AGRI	37	95	3	375
BIOL	129	334	10	1320
CHEM	2390	9700	203	41900
EARSP	8	21	1	83
MED	4070	10600	326	41700

PHYS	700	1820	56	7200
AERO	489	1270	39	5000
CIVIL	138	358	11	1410
ELEC	145	378	12	1490
MECH	237	620	19	2430
METMI	63	164	5	650
NUC	388	1010	31	3970
PET	168	438	13	1720
TRANU	4	11	0	45
ABME	268	730	24	2900

DEMO	0	0	0	0
EDUC	244	630	20	2500
ENV	6	15	0	60
LAW	0	0	0	1
PAT	0	0	0	1

PUBAD	3	8	0	30
SJC	305	790	24	3120
GENST	374	970	30	3830

TOTAL	10200	30000	830	122000
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1980 TOTAL TRAFFIC

1980	KMESS IN	KMESS OUT	MBITS IN	MBITS OUT
AGRI	1650	5700	127	24400
BIOL	9800	42400	730	187000
CHEM	32500	137000	2690	600000
EARSP	3290	9800	273	39800
MED	53000	167000	4150	690000
PHYS	11600	38900	940	163000
AERO	4370	13600	339	56000
CIVIL	7400	23000	570	95000
ELEC	8700	27200	680	113000
MECH	15600	48600	1210	201000

METMI	3610	11200	280	46500
NUC	5600	17300	432	72000
PET	2640	8200	205	34000
TRANU	7000	21900	550	91000
ABME	15200	50000	1390	207000
DEMO	2460	3930	820	8200
EDUC	13000	40600	1010	168000
ENV	2420	7200	201	29200
LAW	2230	2940	178	8600
PAT	10900	23100	790	88000

PUBAD	10300	31800	950	130000
SJC	11600	36300	900	150000
GENST	5400	11700	431	43700

TOTAL	241000	780000	19900	3240000
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1985 TOTAL TRAFFIC

1985	KMESS IN	KMESS OUT	MBITS IN	MBITS OUT
AGRI	6900	23900	570	101000
BIOL	32200	121000	2610	520000
CHEM	68000	253000	5500	1090000
EARSP	16100	47300	1570	191000
MED	133000	486000	9800	2090000
PHYS	35300	116000	2960	484000
AERO	10900	36800	820	156000
CIVIL	30800	92000	2340	381000
ELEC	35600	120000	2660	510000
MECH	49500	158000	3730	660000

METMI	13100	41700	980	175000
NUC	14800	52000	1090	222000
PET	7500	23900	560	100000
TRANU	31100	99000	2340	416000
ABME	68000	217000	6500	890000
DEMO	6000	9700	2020	20200
EDUC	54000	162000	4110	670000
ENV	12400	35300	1080	143000
LAW	24700	32600	1980	95000
PAT	26600	57000	1940	216000

PUBAD	32700	96000	3180	389000
SJC	53000	160000	4060	660000
GENST	13300	24300	1060	85000

TOTAL	780000	2460000	63000	10300000
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ECC TOTAL TRAFFIC					R TOTAL TRAFFIC				
1976	KMESS IN	KMESS OUT	MBITS IN	MBITS OUT	1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	28	72	2	284	AGRI	2100	5500	168	21500
BIOL	109	282	9	1110	BIOL	5100	13200	406	52000
CHEM	2020	8200	172	35400	CHEM	91000	369000	7700	1590000
EARSP	7	18	1	70	EARSP	316	820	25	3240
MED	3390	8800	271	34700	MED	150000	391000	12000	1540000
PHYS	600	1550	48	6100	PHYS	26600	69000	2130	272000
AERO	417	1090	33	4270	AERO	18600	48300	1490	190000
CIVIL	117	305	9	1200	CIVIL	5300	13800	426	55000
EL EC	124	323	10	1270	EL EC	5500	14300	441	56000
MECH	203	530	16	2080	MECH	9100	23700	730	93000
METMI	54	141	4	550	METMI	2430	6300	194	24900
NUC	331	860	27	3390	NUC	14700	38100	1170	150000
PET	143	371	11	1460	PET	6100	15900	490	63000
TRANU	4	10	0	39	TRANU	170	441	14	1740
ABME	229	630	20	2480	ABME	10300	28200	910	111000
DEMO	0	0	0	0	DEMO	1	1	0	2
EDUC	208	540	17	2130	EDUC	9300	24100	740	95000
ENV	5	13	0	51	ENV	227	590	18	2320
LAW	0	0	0	1	LAW	8	11	1	31
PAT	0	0	0	1	PAT	3	6	0	23
PUBAD	2	7	0	26	PUBAD	105	289	9	1140
SOC	260	670	21	2660	SOC	11600	30200	930	119000
GENST	314	820	25	3220	GENST	14600	37900	1170	149000
TOTAL	8600	25200	700	103000	TOTAL	383000	1130000	31200	4590000
1980	KMESS IN	KMESS OUT	MBITS IN	MBITS OUT	1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	1280	4480	99	19000	AGRI	85000	298000	6600	1260000
BIOL	8200	35700	620	157000	BIOL	359000	1550000	26800	6900000
CHEM	27000	114000	2230	496000	CHEM	1070000	4520000	89000	19700000
EARSP	2810	8300	233	34000	EARSP	124000	368000	10300	1500000
MED	43700	136000	3400	560000	MED	1690000	5300000	131000	21800000
PHYS	9800	33200	800	139000	PHYS	411000	1390000	33500	5800000
AERO	3680	11500	286	47600	AERO	149000	464000	11600	1920000
CIVIL	6300	19600	489	81000	CIVIL	272000	850000	21100	3510000
EL EC	7400	23100	580	96000	EL EC	312000	970000	24300	4030000
MECH	13300	41500	1030	172000	MECH	560000	1740000	43400	7200000
METMI	3080	9600	239	39700	METMI	131000	407000	10200	1690000
NUC	4700	14600	365	61000	NUC	189000	590000	14700	2440000
PET	2230	6900	173	28800	PET	90000	281000	7000	1160000
TRANU	6000	18600	464	77000	TRANU	255000	790000	19800	3290000
ABME	12900	42700	1190	177000	ABME	550000	1830000	51000	7600000
DEMO	2070	3310	690	6900	DEMO	83000	133000	27600	276000
EDUC	11100	34600	860	143000	EDUC	473000	1470000	36800	6100000
ENV	2060	6100	171	24900	ENV	90000	268000	7500	1090000
LAW	1910	2520	152	7300	LAW	83000	110000	6700	320000
PAT	9200	19500	670	74000	PAT	369000	780000	26900	3000000
PUBAD	8800	27000	810	110000	PUBAD	364000	1120000	33700	4570000
SOC	9900	31000	770	128000	SOC	429000	1340000	33400	5500000
GENST	4530	9800	362	36700	GENST	190000	414000	15200	1540000
TOTAL	202000	650000	16700	2720000	TOTAL	8300000	27000000	690000	112000000
1985	KMESS IN	KMESS OUT	MBITS IN	MBITS OUT	1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	5500	19000	455	80000	AGRI	294000	1020000	24400	4300000
BIOL	26600	99000	2150	428000	BIOL	1040000	3900000	84000	16800000
CHEM	56000	208000	4490	900000	CHEM	2120000	7900000	172000	34200000
EARSP	13500	39700	1310	160000	EARSP	540000	1580000	52000	6400000
MED	108000	394000	7900	1700000	MED	4000000	14600000	295000	63000000
PHYS	29600	97000	2480	406000	PHYS	1150000	3770000	97000	15800000
AERO	9100	30700	680	130000	AERO	352000	1180000	26300	5000000
CIVIL	25900	77000	1970	319000	CIVIL	1020000	3060000	78000	12600000
EL EC	29800	100000	2230	425000	EL EC	1150000	3880000	86000	16500000
MECH	41500	132000	3130	550000	MECH	1610000	5100000	121000	21500000
METMI	10900	34900	820	146000	METMI	428000	1370000	32300	5700000
NUC	12300	43300	910	185000	NUC	472000	1660000	35000	7100000
PET	6200	19900	470	83000	PET	238000	760000	17900	3130000
TRANU	25900	83000	1950	346000	TRANU	1010000	3220000	76000	13500000
ABME	57000	182000	5500	750000	ABME	2260000	7100000	214000	29400000
DEMO	5000	8000	1680	16800	DEMO	193000	308000	64000	640000
EDUC	45400	136000	3450	560000	EDUC	1780000	5300000	135000	22000000
ENV	10400	29600	900	119000	ENV	413000	1180000	35900	4750000
LAW	20800	27500	1670	80000	LAW	820000	1080000	66000	3150000
PAT	22100	47100	1620	180000	PAT	850000	1800000	62000	6900000
PUBAD	27300	80000	2650	323000	PUBAD	1040000	3060000	102000	12400000
SOC	44900	134000	3420	550000	SOC	1790000	5300000	135000	22000000
GENST	11100	20300	880	71000	GENST	433000	790000	34600	2770000
TOTAL	640000	2040000	53000	8500000	TOTAL	25000000	79000000	2050000	330000000

DK TOTAL TRAFFIC					F TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	1460	3800	117	15000	AGRI	5200	13600	417	53000
BIOL	2410	6300	193	24700	BIOL	24900	65000	1990	255000
CHEM	44200	179000	3750	770000	CHEM	461000	1870000	39100	8100000
EARSP	115	300	9	1100	EARSP	1650	4280	132	16900
MED	105000	274000	8400	1080000	MED	630000	1640000	50000	6500000
PHYS	10300	26700	820	105000	PHYS	147000	383000	11800	1510000
AERO	7900	20500	630	81000	AERO	100000	259000	8000	1020000
CIVIL	2050	5300	164	21000	CIVIL	28700	75000	2300	294000
ELEC	2190	5700	175	22400	ELEC	30100	78000	2400	308000
MECH	3560	9300	285	36500	MECH	50000	130000	4000	510000
METMI	920	2400	74	9400	METMI	13200	34400	1060	135000
NUC	6000	15500	478	61000	NUC	82000	212000	6500	840000
PET	2510	6500	201	25700	PET	34500	90000	2760	354000
TRANU	67	175	5	690	TRANU	930	2420	74	9500
ABME	4010	11000	355	43500	ABME	56000	154000	4960	610000
DEMO	0	0	0	1	DEMO	3	5	1	11
EDUC	3590	9300	287	36800	EDUC	51000	133000	4090	520000
ENV	92	240	7	940	ENV	1220	3160	97	12400
LAW	3	4	0	12	LAW	45	59	4	171
PAT	1	2	0	8	PAT	15	32	1	124
PUBAD	40	111	4	438	PUBAD	580	1580	51	6300
SOC	4730	12300	378	48400	SOC	63000	163000	5000	640000
GENST	6100	15700	484	62000	GENST	73000	189000	5800	750000
TOTAL	207000	600000	16800	2450000	TOTAL	1850000	5500000	151000	22300000
DK TOTAL TRAFFIC					F TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	57000	197000	4340	840000	AGRI	265000	920000	20400	3920000
BIOL	184000	800000	13800	3520000	BIOL	1920000	8300000	144000	36700000
CHEM	600000	2520000	49400	11000000	CHEM	6200000	26100000	510000	114000000
EARSP	47400	141000	9300	570000	EARSP	700000	2060000	58000	8400000
MED	1170000	3660000	91000	15200000	MED	8700000	27100000	680000	112000000
PHYS	173000	580000	14100	2450000	PHYS	2490000	8400000	203000	35200000
AERO	70000	219000	5500	910000	AERO	900000	2820000	70000	11700000
CIVIL	111000	346000	8600	1430000	CIVIL	1590000	4950000	123000	20500000
ELEC	133000	414000	10300	1710000	ELEC	1860000	5800000	144000	24000000
MECH	238000	740000	18500	3080000	MECH	3380000	10500000	262000	43600000
METMI	54000	167000	4160	690000	METMI	780000	2420000	60000	10000000
NUC	86000	269000	6700	1120000	NUC	1190000	3700000	92000	15300000
PET	40200	125000	3120	520000	PET	560000	1740000	43300	7200000
TRANU	108000	337000	8400	1400000	TRANU	1530000	4750000	119000	19700000
ABME	229000	760000	21000	3130000	ABME	3270000	10800000	300000	44700000
DEMO	38400	61000	12800	128000	DEMO	520000	840000	174000	1740000
EDUC	194000	600000	15100	2500000	EDUC	2810000	8800000	219000	36300000
ENV	37800	112000	3130	456000	ENV	520000	1540000	42900	6300000
LAW	31900	42100	2550	122000	LAW	475000	630000	38000	1820000
PAT	164000	349000	12000	1340000	PAT	2300000	4900000	168000	18700000
PUBAD	154000	474000	14300	1930000	PUBAD	2200000	6800000	204000	27700000
SOC	180000	560000	14000	2330000	SOC	2470000	7700000	192000	31900000
GENST	85000	185000	6800	690000	GENST	1110000	2400000	89000	9000000
TOTAL	4190000	13700000	344000	57000000	TOTAL	47700000	154000000	3950000	640000000
DK TOTAL TRAFFIC					F TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	193000	670000	16000	2820000	AGRI	1220000	4220000	101000	17900000
BIOL	600000	2250000	48700	9700000	BIOL	6000000	22600000	488000	97000000
CHEM	1220000	4560000	99000	19600000	CHEM	12600000	47100000	1020000	203000000
EARSP	241000	710000	23400	2850000	EARSP	3350000	9800000	326000	39800000
MED	2790000	10200000	206000	44000000	MED	21500000	79000000	1580000	339000000
PHYS	530000	1750000	44900	7300000	PHYS	7400000	24200000	620000	101000000
AERO	174000	590000	13000	2480000	AERO	2210000	7400000	165000	31600000
CIVIL	473000	1420000	36000	5800000	CIVIL	6500000	19400000	493000	80000000
ELEC	550000	1840000	40900	7800000	ELEC	7400000	24900000	550000	105000000
MECH	760000	2430000	57000	10200000	MECH	10400000	33100000	780000	139000000
METMI	197000	630000	14900	2640000	METMI	2740000	8700000	206000	36600000
NUC	227000	800000	16800	3410000	NUC	3060000	10800000	227000	46200000
PET	114000	365000	8600	1530000	PET	1540000	4920000	116000	20600000
TRANU	483000	1540000	36400	6500000	TRANU	6500000	20800000	492000	87000000
ABME	1050000	3330000	100000	13700000	ABME	14400000	45700000	1370000	188000000
DEMO	93000	149000	31100	311000	DEMO	1250000	2000000	417000	4170000
EDUC	820000	2460000	62000	10100000	EDUC	11400000	34300000	870000	141000000
ENV	196000	560000	17000	2250000	ENV	2600000	7400000	225000	29900000
LAW	371000	490000	29700	1430000	LAW	5200000	6900000	418000	20100000
PAT	406000	860000	29600	3300000	PAT	5500000	11700000	400000	44600000
PUBAD	492000	1440000	47900	5800000	PUBAD	6800000	19800000	660000	80000000
SOC	840000	2530000	64000	10400000	SOC	11200000	33400000	850000	138000000
GENST	208000	380000	16600	1330000	GENST	2740000	5000000	219000	17500000
TOTAL	13000000	42000000	1060000	175000000	TOTAL	154000000	483000000	12600000	2010000000

F1 TOTAL TRAFFIC					F2 TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	3340	8700	267	34200	AGRI	468	1220	37	4800
BIOL	15900	41400	1270	163000	BIOL	2080	5400	166	21300
CHEM	295000	1190000	25000	5200000	CHEM	38700	157000	3280	680000
EARSP	1050	2740	84	10800	EARSP	138	359	11	1410
MED	403000	1050000	32300	4130000	MED	53000	137000	4230	540000
PHYS	94000	245000	7500	970000	PHYS	12300	32100	990	126000
AERO	64000	166000	5100	650000	AERO	8300	21700	670	85000
CIVIL	18400	47800	1470	188000	CIVIL	2400	6200	192	24600
BL EC	19200	50000	1540	197000	BL EC	2520	6500	201	25800
MECH	32000	83000	2560	327000	MECH	4180	10900	334	42800
METMI	8500	22000	680	87000	METMI	1110	2880	88	11300
NUC	52000	136000	4180	540000	NUC	6900	17900	550	70000
PET	22100	57000	1770	226000	PET	2890	7500	231	29600
TRANU	600	1550	48	6100	TRANU	78	202	6	790
ABME	35800	98000	3170	388000	ABME	4680	12800	414	51000
DEMO	2	4	1	7	DEMO	0	0	0	1
EDUC	32700	85000	2620	335000	EDUC	4270	11100	342	43700
ENV	780	2020	62	8000	ENV	102	265	8	1050
LAW	29	38	2	110	LAW	4	5	0	10
PAT	10	21	1	79	PAT	1	3	0	14
PUBAD	369	1010	33	4000	PUBAD	48	132	4	520
SDC	40100	104000	3210	411000	SDC	5200	13600	419	54000
GENST	46600	121000	3730	477000	GENST	6100	16000	492	63000
TOTAL	1190000	3520000	97000	14300000	TOTAL	155000	461000	12700	1870000
F1 TOTAL TRAFFIC					F2 TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	170000	590000	13000	2510000	AGRI	23700	83000	1820	350000
BIOL	1230000	5300000	92000	23500000	BIOL	162000	700000	12100	3090000
CHEM	3970000	16700000	328000	73000000	CHEM	530000	2220000	43600	9700000
EARSP	445000	1320000	36900	5400000	EARSP	59000	174000	4860	710000
MED	5600000	17400000	433000	72000000	MED	740000	2310000	57000	9500000
PHYS	1590000	5400000	130000	22500000	PHYS	210000	710000	17200	2970000
AERO	580000	1800000	45000	7500000	AERO	77000	239000	5900	990000
CIVIL	1020000	3170000	79000	13100000	CIVIL	134000	417000	10400	1730000
BL EC	1190000	3710000	92000	15400000	BL EC	157000	489000	12200	2020000
MECH	2160000	6700000	168000	27900000	MECH	285000	890000	22100	3670000
METMI	497000	1550000	38600	6400000	METMI	65000	204000	5100	840000
NUC	760000	2370000	59000	9800000	NUC	101000	314000	7800	1300000
PET	357000	1110000	27700	4600000	PET	47100	147000	3660	610000
TRANU	980000	3040000	76000	12600000	TRANU	128000	399000	10000	1650000
ABME	2090000	6900000	192000	28600000	ABME	275000	910000	25200	3760000
DEMO	334000	530000	111000	1110000	DEMO	44400	71000	14800	148000
EDUC	1800000	5600000	140000	23300000	EDUC	236000	740000	18400	3050000
ENV	331000	980000	27500	4000000	ENV	43700	130000	3620	530000
LAW	304000	401000	24300	1170000	LAW	39800	53000	3190	153000
PAT	1470000	3130000	108000	12000000	PAT	196000	416000	14300	1590000
PUBAD	1410000	4350000	131000	17700000	PUBAD	186000	570000	17200	2340000
SDC	1580000	4930000	123000	20400000	SDC	207000	650000	16100	2680000
GENST	710000	1540000	57000	5700000	GENST	94000	204000	7500	760000
TOTAL	30600000	99000000	2530000	410000000	TOTAL	4040000	13000000	334000	54000000
F1 TOTAL TRAFFIC					F2 TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	780000	2700000	65000	11400000	AGRI	108000	373000	8900	1580000
BIOL	3860000	14500000	312000	62000000	BIOL	510000	1920000	41500	8300000
CHEM	8100000	30200000	650000	130000000	CHEM	1070000	4020000	87000	17300000
EARSP	2150000	6300000	209000	25500000	EARSP	285000	840000	27700	3380000
MED	13700000	50000000	1010000	217000000	MED	1830000	6700000	135000	28900000
PHYS	4730000	15500000	397000	65000000	PHYS	630000	2060000	53000	8600000
AERO	1420000	4770000	106000	20200000	AERO	188000	630000	14100	2680000
CIVIL	4150000	12400000	316000	51000000	CIVIL	550000	1650000	41900	6800000
BL EC	4730000	15900000	354000	68000000	BL EC	630000	2120000	47000	9000000
MECH	6600000	21200000	500000	89000000	MECH	880000	2810000	66000	11800000
METMI	1750000	5600000	132000	23400000	METMI	232000	740000	17500	3110000
NUC	1960000	6900000	146000	29600000	NUC	261000	920000	19400	3940000
PET	990000	3150000	74000	13200000	PET	131000	419000	9900	1750000
TRANU	4180000	13300000	315000	56000000	TRANU	550000	1770000	41700	7400000
ABME	9200000	29200000	880000	120000000	ABME	1220000	3870000	116000	16000000
DEMO	800000	1280000	267000	2670000	DEMO	107000	171000	35500	355000
EDUC	7300000	21900000	560000	98000000	EDUC	970000	2900000	74000	12000000
ENV	1660000	4740000	144000	19100000	ENV	221000	630000	19200	2540000
LAW	3350000	4420000	268000	12800000	LAW	443000	580000	35400	1700000
PAT	3510000	7500000	256000	28500000	PAT	467000	990000	34000	3790000
PUBAD	4320000	12700000	421000	51000000	PUBAD	570000	1690000	56000	6800000
SDC	7100000	21400000	540000	88000000	SDC	940000	2830000	72000	11700000
GENST	1750000	3210000	140000	11200000	GENST	233000	427000	18600	1490000
TOTAL	98000000	309000000	8100000	1290000000	TOTAL	13000000	41100000	1070000	171000000

F1 TOTAL TRAFFIC					D TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	1460	3800	117	15000	AGRI	5800	15100	464	59000
BIOL	7000	18100	560	71000	BIOL	31400	82000	2510	322000
CHEM	129000	520000	10900	2260000	CHEM	580000	2330000	48900	10100000
EARSP	461	1200	37	4720	EARSP	1810	4690	144	18500
MED	176000	459000	14100	1810000	MED	1180000	3060000	94000	12100000
PHYS	41200	107000	3300	422000	PHYS	155000	404000	12400	1590000
AERO	27900	72000	2230	285000	AERO	109000	284000	8800	1120000
CIVIL	8000	20900	640	82000	CIVIL	30500	79000	2440	312000
EL EC	8400	21900	670	86000	EL EC	32400	84000	2590	332000
MECH	14000	36400	1120	143000	MECH	53000	133000	4250	540000
METMI	3700	9600	296	37900	METMI	14200	36900	1130	145000
NUC	22900	59000	1830	234000	NUC	86000	223000	6900	880000
PET	9700	25100	770	99000	PET	36700	95000	2940	376000
TRANU	260	680	21	2670	TRANU	970	2510	77	9900
ABME	15700	43000	1390	170000	ABME	60000	164000	5300	650000
DEMO	1	2	0	3	DEMO	4	6	1	12
EDUC	14300	37200	1150	147000	EDUC	54000	141000	4330	550000
ENV	340	880	27	3480	ENV	1290	3350	103	13200
LAW	12	16	1	48	LAW	48	63	4	185
PAT	4	9	0	35	PAT	16	35	1	133
PUBAD	161	443	14	1750	PUBAD	620	1700	55	6700
SJC	17600	45700	1410	180000	SJC	69000	180000	5500	710000
GENST	20400	53000	1630	209000	GENST	84000	218000	6700	860000
TOTAL	520000	1540000	42300	6300000	TOTAL	2580000	7600000	210000	30600000
F3 TOTAL TRAFFIC					D TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	74000	259000	5700	1100000	AGRI	285000	1000000	21900	4220000
BIOL	540000	2330000	40300	10300000	BIOL	2350000	10200000	175000	44800000
CHEM	1740000	7300000	144000	31900000	CHEM	7200000	30200000	590000	132000000
EARSP	195000	580000	16100	2360000	EARSP	740000	2200000	62000	9000000
MED	2440000	7600000	189000	31500000	MED	12900000	40300000	1000000	167000000
PHYS	700000	2350000	57000	9900000	PHYS	2520000	8500000	206000	35600000
AERO	253000	790000	19700	3270000	AERO	920000	2880000	72000	11900000
CIVIL	445000	1390000	34500	5700000	CIVIL	1630000	5100000	127000	21000000
EL EC	520000	1620000	40400	6700000	EL EC	1920000	6000000	149000	24900000
MECH	950000	2950000	73000	12200000	MECH	3420000	10700000	266000	44100000
METMI	217000	680000	16900	2810000	METMI	800000	2490000	62000	10300000
NUC	332000	1040000	25800	4290000	NUC	1170000	3640000	91000	15100000
PET	156000	486000	12100	2010000	PET	560000	1760000	43800	7300000
TRANU	427000	1330000	33200	5500000	TRANU	1530000	4780000	119000	19800000
ABME	920000	3020000	84000	12500000	ABME	3380000	11100000	310000	46200000
DEMO	146000	234000	48800	488000	DEMO	510000	820000	171000	1710000
EDUC	790000	2460000	61000	10200000	EDUC	2890000	9000000	224000	37300000
ENV	145000	430000	12000	1750000	ENV	540000	1590000	44500	6500000
LAW	133000	175000	10600	510000	LAW	510000	670000	40400	1940000
PAT	650000	1370000	47000	5200000	PAT	2280000	4840000	166000	18500000
PUBAD	620000	1900000	57000	7800000	PUBAD	2250000	7000000	209000	28400000
SJC	690000	2160000	54000	8900000	SJC	2670000	8300000	207000	34400000
GENST	310000	670000	24800	2510000	GENST	1160000	2510000	92000	9400000
TOTAL	13400000	43100000	1110000	179000000	TOTAL	54000000	175000000	4450000	730000000
F3 TOTAL TRAFFIC					D TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	343000	1180000	28400	5000000	AGRI	1240000	4270000	102000	18100000
BIOL	1690000	6300000	137000	27200000	BIOL	7000000	26400000	570000	114000000
CHEM	3530000	13200000	285000	57000000	CHEM	14200000	53000000	1150000	229000000
EARSP	940000	2760000	91000	11100000	EARSP	3350000	9800000	326000	39700000
MED	6000000	22000000	443000	95000000	MED	30300000	111000000	2230000	478000000
PHYS	2070000	6800000	174000	28400000	PHYS	7200000	23700000	610000	99000000
AERO	620000	2090000	46300	8800000	AERO	2200000	7400000	165000	31500000
CIVIL	1820000	5400000	138000	22400000	CIVIL	6400000	19000000	483000	78000000
EL EC	2070000	7000000	155000	29500000	EL EC	7300000	24500000	540000	104000000
MECH	2910000	9300000	219000	39900000	MECH	10100000	32200000	760000	135000000
METMI	770000	2440000	58000	10200000	METMI	2690000	8600000	203000	35900000
NUC	860000	3020000	64000	12900000	NUC	2950000	10400000	219000	44500000
PET	432000	1380000	32600	5800000	PET	1510000	4820000	114000	20200000
TRANU	1830000	5800000	138000	24500000	TRANU	6200000	19900000	471000	84000000
ABME	4040000	12800000	384000	53000000	ABME	14200000	45000000	1350000	185000000
DEMO	350000	560000	117000	1170000	DEMO	1200000	1930000	401000	4010000
EDUC	3200000	9600000	244000	39600000	EDUC	11200000	33500000	850000	138000000
ENV	730000	2070000	63000	8400000	ENV	2550000	7300000	221000	29300000
LAW	1460000	1930000	117000	5600000	LAW	5200000	6900000	417000	20000000
PAT	1540000	3260000	112000	12500000	PAT	5300000	11300000	387000	43100000
PUBAD	1890000	5600000	184000	22400000	PUBAD	6600000	19300000	640000	78000000
SJC	3130000	9400000	238000	38600000	SJC	11500000	34500000	880000	142000000
GENST	770000	1400000	61000	4900000	GENST	2680000	4900000	214000	17100000
TOTAL	43000000	135000000	3530000	560000000	TOTAL	163000000	520000000	13300000	2170000000

DI	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1976				
AGRI	1390	3620	111	14300
BIOL	7500	19600	600	77000
CHEM	138000	560000	11700	2420000
EARSP	433	1130	35	4440
MED	283000	740000	22600	2900000
PHYS	37200	97000	2980	381000
AERO	26300	68000	2100	269000
CIVIL	7300	19000	580	75000
EL EC	7800	20200	620	80000
MECH	12700	33100	1020	130000
METMI	3400	8800	272	34800
NUC	20600	54000	1650	211000
PET	8800	22900	700	90000
TRANU	232	600	19	2380
ABME	14400	39400	1270	156000
DEMO	1	1	0	3
EDUC	13000	33800	1040	133000
ENV	309	800	25	3170
LAW	12	15	1	44
PAT	4	8	0	32
PUBAD	149	409	13	1610
SOC	16600	43300	1330	170000
GENST	20100	52000	1610	206000
TOTAL	620000	1810000	50000	7400000

D2	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1976				
AGRI	1680	4380	135	17200
BIOL	9100	23700	730	93000
CHEM	167000	680000	14200	2920000
EARSP	520	1360	42	5400
MED	342000	890000	27300	3500000
PHYS	45000	117000	3600	461000
AERO	31700	82000	2540	325000
CIVIL	8800	23000	710	90000
EL EC	9400	24400	750	96000
MECH	15400	40000	1230	158000
METMI	4110	10700	329	42000
NUC	24900	65000	1990	255000
PET	10600	27700	850	109000
TRANU	280	730	22	2870
ABME	17300	47600	1540	188000
DEMO	1	2	0	4
EDUC	15700	40800	1260	161000
ENV	374	970	30	3820
LAW	14	18	1	54
PAT	5	10	0	39
PUBAD	180	494	16	1950
SOC	20100	52000	1610	206000
GENST	24300	63000	1940	249000
TOTAL	750000	2190000	61000	8900000

DI	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1980				
AGRI	69000	239000	5300	1010000
BIOL	560000	2440000	42100	10800000
CHEM	1720000	7200000	142000	31600000
EARSP	178000	530000	14800	2150000
MED	3100000	9700000	241000	40000000
PHYS	610000	2040000	49400	8600000
AERO	222000	690000	17200	2860000
CIVIL	391000	1220000	30400	5100000
EL EC	461000	1440000	35900	6000000
MECH	820000	2560000	64000	10600000
METMI	192000	600000	14900	2480000
NUC	281000	870000	21800	3620000
PET	135000	422000	10500	1750000
TRANU	368000	1150000	28600	4750000
ABME	810000	2680000	74000	11100000
DEMO	123000	197000	41100	411000
EDUC	690000	2160000	54000	8900000
ENV	129000	382000	10700	1560000
LAW	121000	160000	9700	464000
PAT	550000	1160000	39900	4440000
PUBAD	540000	1670000	50000	6800000
SOC	640000	2000000	49800	8300000
GENST	277000	600000	22200	2250000
TOTAL	13000000	42100000	1070000	175000000

D2	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1980				
AGRI	83000	289000	6400	1220000
BIOL	680000	2950000	51000	13000000
CHEM	2080000	8700000	172000	38200000
EARSP	215000	640000	17800	2600000
MED	3750000	11700000	291000	48400000
PHYS	730000	2460000	60000	10300000
AERO	268000	840000	20800	3460000
CIVIL	473000	1470000	36700	6100000
EL EC	560000	1740000	43300	7200000
MECH	990000	3090000	77000	12800000
METMI	232000	720000	18000	2990000
NUC	339000	1060000	26300	4380000
PET	163000	510000	12700	2110000
TRANU	444000	1390000	34500	5700000
ABME	980000	3230000	90000	13400000
DEMO	149000	238000	49700	497000
EDUC	840000	2610000	65000	10800000
ENV	156000	462000	12900	1880000
LAW	147000	193000	11700	560000
PAT	660000	1400000	48200	5400000
PUBAD	650000	2020000	61000	8200000
SOC	770000	2410000	60000	10000000
GENST	335000	730000	26900	2720000
TOTAL	15700000	51000000	1290000	212000000

DI	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1985				
AGRI	297000	1020000	24600	4340000
BIOL	1690000	6300000	137000	27300000
CHEM	3410000	12800000	276000	55000000
EARSP	800000	2360000	78000	9500000
MED	7300000	26600000	540000	115000000
PHYS	1730000	5700000	146000	23800000
AERO	530000	1780000	39500	7500000
CIVIL	1530000	4560000	116000	18800000
EL EC	1750000	5900000	131000	25000000
MECH	2420000	7700000	182000	32400000
METMI	650000	2060000	48600	8600000
NUC	710000	2500000	53000	10700000
PET	362000	1160000	27300	4850000
TRANU	1500000	4790000	113000	20000000
ABME	3410000	10800000	324000	44500000
DEMO	289000	462000	96000	960000
EDUC	2690000	8000000	204000	33200000
ENV	610000	1740000	53000	7000000
LAW	1250000	1650000	100000	4800000
PAT	1270000	2710000	93000	10300000
PUBAD	1580000	4640000	154000	18700000
SOC	2760000	8300000	210000	34100000
GENST	640000	1180000	51000	4110000
TOTAL	39200000	125000000	3190000	520000000

D2	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1985				
AGRI	359000	1240000	29700	5200000
BIOL	2040000	7600000	165000	32900000
CHEM	4120000	15400000	334000	67000000
EARSP	970000	2850000	94000	11500000
MED	8800000	32200000	650000	139000000
PHYS	2100000	6900000	176000	28700000
AERO	640000	2150000	47800	9100000
CIVIL	1840000	5500000	140000	22800000
EL EC	2110000	7100000	158000	30200000
MECH	2920000	9300000	220000	39100000
METMI	780000	2490000	59000	10400000
NUC	860000	3020000	64000	12900000
PET	438000	1400000	33000	5900000
TRANU	1810000	5800000	137000	24200000
ABME	4120000	13100000	392000	54000000
DEMO	349000	560000	116000	1160000
EDUC	3250000	9700000	247000	40100000
ENV	740000	2110000	64000	8500000
LAW	1510000	1990000	121000	5800000
PAT	1540000	3270000	112000	12500000
PUBAD	1910000	5600000	186000	22700000
SOC	3340000	10000000	254000	41200000
GENST	780000	1420000	62000	4970000
TOTAL	47300000	151000000	3860000	630000000

D3 TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	1740	4530	139	17800
BIOL	9400	24500	750	97000
CHEM	173000	700000	14700	3020000
EARSP	540	1410	43	5500
MED	353000	920000	28300	3620000
PHYS	46600	121000	3720	477000
AERO	32800	85000	2630	336000
CIVIL	9100	23800	730	94000
EL EC	9700	25300	780	100000
MECH	15900	41400	1270	163000
METMI	4250	11000	340	43500
NUC	25700	67000	2060	264000
PET	11000	28600	880	113000
TRANU	290	750	23	2970
ABME	17900	49200	1590	194000
DEMO	1	2	0	4
EDUC	16200	42200	1300	166000
ENV	386	1000	31	3960
LAW	14	19	1	55
PAT	5	10	0	40
PUBAD	186	510	16	2020
SOC	20800	54000	1660	213000
GENST	25100	65000	2010	257000
TOTAL	770000	2270000	63000	9200000

D4 TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	990	2570	79	10100
BIOL	5300	13900	428	55000
CHEM	98000	397000	8300	1710000
EARSP	307	800	25	3140
MED	200000	520000	16000	2050000
PHYS	26400	69000	2110	270000
AERO	18600	48400	1490	190000
CIVIL	5200	13500	414	53000
EL EC	5500	14300	441	56000
MECH	9000	23500	720	92000
METMI	2410	6300	193	24600
NUC	14600	37900	1170	149000
PET	6200	16200	499	64000
TRANU	164	427	13	1690
ABME	10200	27900	900	110000
DEMO	1	1	0	2
EDUC	9200	23900	740	94000
ENV	219	570	18	2240
LAW	8	11	1	31
PAT	3	6	0	23
PUBAD	106	290	9	1140
SOC	11800	30700	940	121000
GENST	14200	37000	1140	146000
TOTAL	439000	1280000	35700	5200000

D3 TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	86000	299000	6600	1270000
BIOL	700000	3050000	53000	13400000
CHEM	2150000	9000000	178000	39500000
EARSP	223000	660000	18500	2690000
MED	3880000	12100000	301000	50000000
PHYS	760000	2550000	62000	10700000
AERO	277000	860000	21500	3580000
CIVIL	489000	1520000	38000	6300000
EL EC	580000	1800000	44800	7400000
MECH	1030000	3200000	80000	13200000
METMI	240000	750000	18600	3100000
NUC	351000	1090000	27300	4530000
PET	169000	530000	13100	2180000
TRANU	460000	1430000	35700	5900000
ABME	1010000	3340000	93000	13900000
DEMO	154000	247000	51000	510000
EDUC	870000	2700000	67000	11200000
ENV	161000	478000	13300	1950000
LAW	152000	200000	12100	580000
PAT	680000	1450000	49800	5600000
PUBAD	680000	2090000	63000	8500000
SOC	800000	2500000	62000	10300000
GENST	347000	750000	27700	2810000
TOTAL	16200000	53000000	1340000	219000000

D4 TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	48500	169000	3730	720000
BIOL	399000	1730000	29800	7600000
CHEM	1220000	5100000	101000	22400000
EARSP	126000	374000	10500	1530000
MED	2200000	6800000	171000	28400000
PHYS	429000	1440000	35000	6100000
AERO	157000	490000	12200	2030000
CIVIL	277000	860000	21500	3580000
EL EC	327000	1020000	25400	4220000
MECH	580000	1810000	45200	7500000
METMI	136000	424000	10600	1750000
NUC	199000	620000	15400	2570000
PET	96000	299000	7400	1240000
TRANU	260000	810000	20200	3360000
ABME	570000	1890000	53000	7900000
DEMO	87000	140000	29100	291000
EDUC	491000	1530000	38100	6300000
ENV	91000	271000	7600	1100000
LAW	86000	113000	6900	330000
PAT	387000	820000	28200	3150000
PUBAD	383000	1180000	35600	4820000
SOC	454000	1410000	35200	5900000
GENST	197000	427000	15700	1590000
TOTAL	9200000	29800000	760000	124000000

D3 TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	371000	1280000	30700	5400000
BIOL	2110000	7900000	171000	34100000
CHEM	4270000	16000000	345000	69000000
EARSP	1000000	2950000	98000	11900000
MED	9100000	33300000	670000	143000000
PHYS	2170000	7100000	182000	29700000
AERJ	660000	2230000	49400	9400000
CIVIL	1910000	5700000	145000	23500000
EL EC	2190000	7400000	163000	31200000
MECH	3020000	9700000	228000	40400000
METMI	810000	2570000	61000	10800000
NUC	890000	3120000	66000	13300000
PET	453000	1450000	34100	6100000
TRANU	1870000	6000000	141000	25100000
ABME	4260000	13500000	405000	56000000
DEMO	361000	580000	120000	1200000
EDUC	3360000	10100000	256000	41500000
ENV	760000	2180000	66000	8800000
LAW	1560000	2060000	125000	6000000
PAT	1590000	3380000	116000	12900000
PUBAD	1980000	5800000	192000	23400000
SOC	3450000	10300000	263000	42700000
GENST	800000	1470000	64000	5100000
TOTAL	48900000	156000000	3990000	650000000

D4 TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	210000	730000	17400	3070000
BIOL	1200000	4480000	97000	19300000
CHEM	2420000	9100000	196000	39000000
EARSP	570000	1670000	55000	6700000
MED	5200000	18900000	380000	81000000
PHYS	1230000	4020000	103000	16900000
AERO	375000	1260000	28000	5300000
CIVIL	1080000	3230000	82000	13300000
EL EC	1240000	4170000	93000	17700000
MECH	1710000	5500000	129000	22900000
METMI	457000	1460000	34400	6100000
NUC	500000	1770000	37200	7600000
PET	257000	820000	19300	3430000
TRANU	1060000	3390000	80000	14200000
ABME	2420000	7700000	230000	31500000
DEMO	205000	327000	68000	680000
EDUC	1900000	5700000	145000	23500000
ENV	433000	1230000	37600	4990000
LAW	890000	1170000	71000	3400000
PAT	900000	1920000	66000	7300000
PUBAD	1120000	3290000	109000	13300000
SOC	1960000	5900000	149000	24200000
GENST	455000	830000	36400	2910000
TOTAL	27700000	88000000	2260000	369000000

IRL	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1976				
AGRI	305	790	24	3120
BIOL	550	1420	44	5600
CHEM	10200	41400	870	178000
EARSP	33	85	3	335
MED	16400	42700	1310	168000
PHYS	2900	7500	232	29700
AERO	2130	5700	174	22300
CIVIL	560	1450	45	5700
EL EC	580	1520	47	6000
MECH	980	2540	78	10000
METMI	257	670	21	2640
NUC	1620	4210	130	16600
PET	680	1780	55	7000
TRANU	19	49	1	192
ABME	1110	3040	98	12000
DEMO	0	0	0	0
EDUC	980	2540	78	10000
ENV	24	63	2	250
LAW	1	1	0	4
PAT	0	1	0	2
PUBAD	11	31	1	122
SOC	1220	3170	98	12500
GENST	1850	4400	148	18900
TOTAL	42500	125000	3460	510000

I	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1976				
AGRI	1660	4320	133	17000
BIOL	9700	25300	780	100000
CHEM	179000	730000	15200	3130000
EARSP	432	1120	35	4420
MED	520000	1360000	41700	5300000
PHYS	39500	103000	3160	404000
AERO	28400	74000	2270	291000
CIVIL	7400	19200	590	76000
EL EC	8000	20800	640	82000
MECH	12600	32900	1010	129000
METMI	3350	8700	268	34300
NUC	21400	56000	1710	219000
PET	9100	23700	730	93000
TRANU	222	580	18	2270
ABME	13900	38100	1230	150000
DEMO	1	2	0	3
EDUC	12700	32900	1010	130000
ENV	306	800	24	3130
LAW	12	16	1	46
PAT	4	9	0	35
PUBAD	148	405	13	1600
SOC	17200	44800	1380	177000
GENST	26600	69000	2130	272000
TOTAL	910000	2640000	74000	10700000

IRL	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1980				
AGRI	15300	53000	1170	226000
BIOL	52000	226000	3900	1000000
CHEM	209000	880000	17300	3850000
EARSP	15600	46400	1300	189000
MED	322000	1000000	25100	4160000
PHYS	62000	210000	5100	880000
AERO	27900	87000	2170	360000
CIVIL	36800	115000	2860	475000
EL EC	44500	139000	3460	570000
MECH	85000	265000	6600	1100000
METMI	18700	58000	1450	241000
NUC	34300	107000	2670	443000
PET	14600	45500	1130	188000
TRANU	37300	116000	2900	482000
ABME	77000	254000	7100	1050000
DEMO	15500	24800	5200	52000
EDUC	64000	200000	4980	830000
ENV	11800	34900	980	142000
LAW	10200	13400	810	39000
PAT	69000	147000	5000	560000
PUBAD	56000	172000	5200	700000
SOC	54000	170000	4230	700000
GENST	32900	71000	2630	267000
TOTAL	1370000	4440000	113000	18500000

I	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1980				
AGRI	89000	309000	6800	1310000
BIOL	890000	3880000	67000	17100000
CHEM	3790000	15900000	313000	70000000
EARSP	196000	580000	16200	2370000
MED	8600000	26900000	670000	112000000
PHYS	830000	2790000	68000	11700000
AERO	376000	1170000	29200	4850000
CIVIL	466000	1450000	36200	6000000
EL EC	590000	1840000	45800	7600000
MECH	1080000	3380000	84000	14000000
METMI	236000	740000	18300	3050000
NUC	466000	1450000	36200	6000000
PET	193000	600000	15000	2490000
TRANU	431000	1340000	33500	5600000
ABME	930000	3070000	85000	12700000
DEMO	207000	331000	69000	690000
EDUC	800000	2490000	62000	10300000
ENV	140000	417000	11600	1700000
LAW	119000	158000	9600	459000
PAT	470000	1980000	68000	7600000
PUBAD	720000	2210000	66000	9000000
SOC	730000	2260000	56000	9400000
GENST	451000	980000	36100	3660000
TOTAL	23300000	76000000	1900000	319000000

IRL	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1985				
AGRI	71000	245000	5900	1040000
BIOL	219000	820000	17700	3540000
CHEM	479000	1790000	38700	7700000
EARSP	106000	312000	10300	1260000
MED	890000	3250000	65000	14000000
PHYS	239000	780000	20100	3280000
AERO	79000	267000	5900	1130000
CIVIL	205000	610000	15600	2530000
EL EC	239000	810000	17900	3420000
MECH	348000	1110000	26200	4650000
METMI	89000	284000	6700	1190000
NUC	103000	371000	7800	1580000
PET	51000	164000	3870	690000
TRANU	224000	710000	16900	2990000
ABME	459000	1450000	43700	6000000
DEMO	43900	70000	14600	146000
EDUC	355000	1060000	27000	4380000
ENV	84000	240000	7300	970000
LAW	161000	213000	12900	620000
PAT	194000	412000	14100	1570000
PUBAD	233000	680000	22600	2760000
SOC	329000	980000	25000	4060000
GENST	95000	173000	7600	610000
TOTAL	5300000	16800000	434000	70000000

I	TOTAL TRAFFIC			
	MESS IN	MESS OUT	KBITS IN	KBITS OUT
1985				
AGRI	570000	1970000	47200	8300000
BIOL	4160000	15600000	337000	67000000
CHEM	9000000	33700000	730000	145000000
EARSP	1490000	4380000	145000	17700000
MED	23000000	84000000	1690000	363000000
PHYS	3460000	11300000	290000	47400000
AERO	1140000	3840000	85000	16300000
CIVIL	2850000	8500000	217000	35200000
EL EC	3490000	11700000	261000	49700000
MECH	4900000	15700000	369000	66000000
METMI	1250000	3990000	94000	16700000
NUC	1530000	5400000	114000	23100000
PET	740000	2360000	56000	9900000
TRANU	2980000	9500000	224000	39800000
ABME	6200000	19600000	590000	81000000
DEMO	630000	1000000	209000	2090000
EDUC	4910000	14700000	373000	61000000
ENV	1130000	3220000	98000	13000000
LAW	2140000	2820000	171000	8200000
PAT	2790000	5900000	204000	22700000
PUBAD	3340000	9800000	325000	39700000
SOC	4790000	14300000	364000	59000000
GENST	1330000	2440000	107000	8500000
TOTAL	88000000	286000000	7100000	1200000000

II TOTAL TRAFFIC					I2 TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	800	2070	64	8200	AGRI	860	2250	69	8900
BIOL	4670	12100	373	47800	BIOL	5100	13100	404	52000
CHEM	86000	348000	7300	1500000	CHEM	93000	377000	7900	1630000
EARSP	207	540	17	2120	EARSP	225	580	18	2300
MED	250000	650000	20000	2560000	MED	271000	700000	21700	2780000
PHYS	19000	49300	1520	194000	PHYS	20500	53000	1640	210000
AERO	13600	35400	1090	140000	AERO	14800	38400	1180	151000
CIVIL	3540	9200	283	36300	CIVIL	3840	10000	307	39300
ELEC	3830	10000	307	39300	ELEC	4150	10800	332	42500
MECH	6100	15800	485	62000	MECH	6600	17100	530	67000
METMI	1610	4180	129	16500	METMI	1740	4530	139	17800
NUC	10300	26700	820	105000	NUC	11100	28900	890	114000
PET	4380	11400	350	44800	PET	4740	12300	379	48600
TRANU	106	277	9	1090	TRANU	115	300	9	1180
ABME	6700	18300	590	72000	ABME	7200	19800	640	78000
DEMO	0	1	0	2	DEMO	0	1	0	?
EDUC	6100	15800	486	62000	EDUC	6600	17100	530	67000
ENV	147	382	12	1500	ENV	159	413	13	1630
LAW	6	8	0	22	LAW	6	8	0	24
PAT	2	4	0	17	PAT	2	5	0	18
PUBAD	71	195	6	770	PUBAD	77	211	7	830
SDC	8300	21500	660	85000	SDC	9000	23300	720	92000
GENST	12800	33200	1020	131000	GENST	13800	35900	1110	142000
TOTAL	438000	1270000	35500	5100000	TOTAL	475000	1370000	38500	5500000
II TOTAL TRAFFIC					I2 TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	42500	148000	3270	630000	AGRI	46100	161000	3540	680000
BIOL	429000	1860000	32100	8200000	BIOL	465000	2020000	34800	8900000
CHEM	1820000	7700000	150000	33400000	CHEM	1970000	8300000	163000	36200000
EARSP	94000	279000	7800	1140000	EARSP	102000	302000	8400	1230000
MED	4150000	12900000	322000	54000000	MED	4490000	14000000	349000	58000000
PHYS	398000	1340000	32400	5600000	PHYS	431000	1450000	35200	6100000
AERO	180000	560000	14000	2330000	AERO	195000	610000	15200	2520000
CIVIL	224000	700000	17400	2890000	CIVIL	242000	760000	18800	3130000
ELEC	283000	880000	22000	3650000	ELEC	306000	950000	23800	3950000
MECH	520000	1620000	40400	6700000	MECH	560000	1760000	43800	7300000
METMI	113000	353000	8800	1460000	METMI	123000	383000	9500	1580000
NUC	224000	700000	17400	2890000	NUC	242000	760000	18800	3130000
PET	93000	288000	7200	1190000	PET	100000	313000	7800	1290000
TRANU	207000	650000	16100	2670000	TRANU	224000	700000	17400	2900000
ABME	446000	1470000	40900	6100000	ABME	483000	1590000	44300	6600000
DEMO	99000	159000	33100	331000	DEMO	107000	172000	35800	358000
EDUC	384000	1200000	29800	4950000	EDUC	416000	1300000	32300	5400000
ENV	67000	200000	5600	810000	ENV	73000	217000	6100	880000
LAW	57000	76000	4590	220000	LAW	62000	82000	4970	239000
PAT	448000	950000	32600	3640000	PAT	485000	1030000	35400	3940000
PUBAD	344000	1060000	31900	4320000	PUBAD	372000	1150000	34500	4680000
SDC	348000	1090000	27100	4500000	SDC	377000	1180000	29300	4870000
GENST	217000	471000	17300	1760000	GENST	235000	510000	18800	1900000
TOTAL	11200000	36600000	910000	153000000	TOTAL	12100000	39700000	990000	166000000
II TOTAL TRAFFIC					I2 TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	273000	940000	22600	4000000	AGRI	296000	1020000	24500	4330000
BIOL	2000000	7500000	162000	32200000	BIOL	2160000	8100000	175000	34900000
CHEM	4320000	16200000	349000	70000000	CHEM	4680000	17500000	378000	75000000
EARSP	720000	2100000	70000	8500000	EARSP	780000	2280000	75000	9200000
MED	11000000	40400000	810000	174000000	MED	12000000	43800000	880000	189000000
PHYS	1660000	5400000	139000	22800000	PHYS	1800000	5900000	151000	24700000
AERO	550000	1840000	40900	7800000	AERO	590000	2000000	44300	8500000
CIVIL	1370000	4090000	104000	16900000	CIVIL	1480000	4440000	113000	18300000
ELEC	1670000	5600000	125000	23900000	ELEC	1810000	6100000	135000	25900000
MECH	2350000	7500000	177000	31500000	MECH	2550000	8100000	192000	34100000
METMI	600000	1920000	45200	8000000	METMI	650000	2070000	49000	8700000
NUC	740000	2590000	55000	11100000	NUC	800000	2810000	59000	12000000
PET	356000	1130000	26800	4750000	PET	385000	1230000	29000	5100000
TRANU	1430000	4560000	108000	19100000	TRANU	1550000	4940000	117000	20700000
ABME	2970000	9400000	282000	38800000	ABME	3220000	10200000	306000	42000000
DEMO	300000	481000	100000	1000000	DEMO	325000	520000	108000	1080000
EDUC	2350000	7000000	179000	29100000	EDUC	2550000	7600000	194000	31500000
ENV	540000	1540000	47000	6200000	ENV	590000	1670000	51000	6800000
LAW	1030000	1360000	82000	3940000	LAW	1110000	1470000	89000	4270000
PAT	1340000	2850000	98000	10900000	PAT	1450000	3090000	106000	11800000
PUBAD	1600000	4710000	156000	19000000	PUBAD	1740000	5100000	169000	20600000
SDC	2300000	6900000	175000	28400000	SDC	2490000	7400000	189000	30700000
GENST	640000	1170000	51000	4100000	GENST	690000	1270000	56000	4440000
TOTAL	42100000	137000000	3410000	580000000	TOTAL	45700000	149000000	3690000	620000000

L TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	51	133	4	520
BIOL	87	227	7	900
CHEM	1820	7400	154	31800
EARSP	6	16	1	65
MED	2450	6400	196	25100
PHYS	560	1460	45	5700
AERO	366	950	29	3750
CIVIL	106	276	9	1090
BL EC	113	295	9	1160
MECH	179	466	14	1840
METMI	49	126	4	497
NUC	331	860	26	3390
PET	127	329	10	1300
TRANU	3	8	0	32
ABME	197	540	17	2130
DEMO	0	0	0	0
EDUC	179	467	14	1840
ENV	5	13	0	50
LAW	0	0	0	1
PAT	0	0	0	0
PUBAD	2	6	0	23
SDC	221	570	18	2260
GENST	325	840	26	3330
TOTAL	7200	21300	580	87000

NL TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	4020	10500	322	41200
BIOL	9600	24900	770	98000
CHEM	182000	740000	15400	3180000
EARSP	760	1970	61	7800
MED	167000	434000	13400	1710000
PHYS	63000	164000	5000	650000
AERO	43500	113000	3480	446000
CIVIL	12800	33300	1030	131000
BL EC	13500	35000	1080	138000
MECH	21600	56000	1730	221000
METMI	5800	15000	463	59000
NUC	35500	92000	2840	363000
PET	17000	44100	1360	174000
TRANU	435	1130	35	4450
ABME	24900	68000	2200	270000
DEMO	2	2	1	5
EDUC	23100	60000	1850	237000
ENV	560	1450	45	5700
LAW	20	27	2	78
PAT	7	14	0	54
PUBAD	259	710	23	2810
SDC	27600	72000	2200	282000
GENST	29300	76000	2350	300000
TOTAL	680000	2040000	56000	8300000

L TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	2490	8700	191	36800
BIOL	8000	34800	600	153000
CHEM	31400	132000	2590	580000
EARSP	2960	8800	245	35800
MED	43300	135000	3370	560000
PHYS	11200	37600	910	158000
AERO	4170	13000	324	54000
CIVIL	6700	20800	520	86000
BL EC	8100	25300	630	105000
MECH	14500	45100	1120	187000
METMI	3310	10300	258	42800
NUC	5900	18200	455	76000
PET	2480	7700	193	32000
TRANU	6000	18800	469	78000
ABME	13200	43500	1210	180000
DEMO	2580	4130	860	8600
EDUC	11300	35300	880	146000
ENV	2270	6700	188	27400
LAW	1840	2430	147	7100
PAT	11200	23800	820	91000
PUBAD	9600	29500	890	120000
SDC	9700	30200	750	125000
GENST	5400	11700	431	43600
TOTAL	218000	700000	18100	2930000

NL TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	157000	550000	12100	2330000
BIOL	620000	2700000	46500	11900000
CHEM	1910000	8000000	158000	35100000
EARSP	275000	820000	22800	3330000
MED	2070000	6500000	161000	26800000
PHYS	890000	2990000	72000	12600000
AERO	315000	980000	24400	4060000
CIVIL	600000	1870000	46600	7700000
BL EC	690000	2160000	54000	8900000
MECH	1200000	3730000	93000	15500000
METMI	284000	880000	22000	3660000
NUC	405000	1260000	31500	5200000
PET	215000	670000	16700	2780000
TRANU	590000	1840000	45700	7600000
ABME	1230000	4050000	113000	16800000
DEMO	181000	289000	60000	600000
EDUC	1070000	3340000	83000	13800000
ENV	205000	610000	17000	2480000
LAW	198000	261000	15800	760000
PAT	790000	1670000	57000	6400000
PUBAD	800000	2480000	74000	10100000
SDC	940000	2930000	73000	12100000
GENST	387000	840000	30900	3140000
TOTAL	16000000	51000000	1330000	214000000

L TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	10200	35100	840	149000
BIOL	29800	112000	2410	481000
CHEM	67000	251000	5400	1080000
EARSP	16700	49200	1630	199000
MED	113000	415000	8400	1790000
PHYS	37300	122000	3130	510000
AERO	11100	37300	830	158000
CIVIL	31700	95000	2410	391000
BL EC	37300	126000	2790	530000
MECH	51000	163000	3860	680000
METMI	13500	43200	1020	181000
NUC	16200	57000	1200	244000
PET	7700	24700	580	104000
TRANU	31100	99000	2350	416000
ABME	68000	216000	6500	890000
DEMO	6600	10600	2210	22100
EDUC	54000	161000	4100	670000
ENV	13200	37500	1140	151000
LAW	24600	32500	1970	94000
PAT	28000	60000	2040	228000
PUBAD	34100	100000	3320	404000
SDC	51000	152000	3870	630000
GENST	14000	25600	1120	89000
TOTAL	770000	2420000	63000	10100000

NL TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	550000	1880000	45200	8000000
BIOL	1750000	6600000	142000	28300000
CHEM	3750000	14000000	303000	60000000
EARSP	1130000	3310000	110000	13400000
MED	5100000	18500000	373000	80000000
PHYS	2400000	7900000	202000	33000000
AERO	730000	2460000	55000	10400000
CIVIL	2160000	6500000	164000	26700000
BL EC	2440000	8200000	182000	34800000
MECH	3340000	10700000	251000	44600000
METMI	890000	2840000	67000	11900000
NUC	990000	3490000	73000	14900000
PET	540000	1710000	40400	7200000
TRANU	2200000	7000000	166000	29400000
ABME	4770000	15100000	453000	62000000
DEMO	411000	660000	137000	1370000
EDUC	3830000	11500000	291000	47300000
ENV	880000	2510000	76000	10200000
LAW	1800000	2370000	144000	6900000
PAT	1780000	3790000	130000	14500000
PUBAD	2200000	6500000	214000	26100000
SDC	3700000	11100000	282000	45700000
GENST	900000	1660000	72000	5800000
TOTAL	48200000	150000000	3970000	620000000

GB TOTAL TRAFFIC					GB1 TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	7100	18500	570	73000	AGRI	850	2220	68	8700
BIOL	24800	64000	1980	254000	BIOL	2980	7700	238	30500
CHEM	478000	1940000	40500	8400000	CHEM	57000	232000	4860	1000000
EARSP	1770	4600	142	18100	EARSP	212	550	17	2170
MED	620000	1610000	49600	6300000	MED	74000	193000	6000	760000
PHYS	152000	396000	12200	1560000	PHYS	18300	47500	1460	187000
AERO	108000	280000	8600	1100000	AERO	12900	33600	1030	132000
CIVIL	29900	78000	2400	307000	CIVIL	3590	9300	287	36800
EL EC	31800	83000	2540	325000	EL EC	3810	9900	305	39100
MECH	52000	135000	4160	530000	MECH	6200	16200	500	64000
METMI	13900	36100	1110	142000	METMI	1670	4330	133	17100
NUC	84000	219000	6700	860000	NUC	10100	26300	810	104000
PET	36000	94000	2880	369000	PET	4320	11200	346	44300
TRANU	950	2460	76	9700	TRANU	114	296	9	1160
ABME	59000	161000	5200	640000	ABME	7000	19300	620	76000
DEMO	4	6	1	12	DEMO	0	1	0	1
EDUC	53000	138000	4250	540000	EDUC	6400	16600	510	65000
ENV	1270	3300	102	13000	ENV	152	396	12	1560
LAW	46	61	4	178	LAW	6	7	0	21
PAT	16	35	1	133	PAT	2	4	0	16
PUBAD	610	1670	54	6600	PUBAD	73	201	6	790
SDC	65000	169000	5200	660000	SDC	7800	20300	620	80000
GENST	79000	206000	6300	810000	GENST	9500	24700	760	97000
TOTAL	1900000	5600000	155000	22900000	TOTAL	228000	680000	18600	2750000

GB TOTAL TRAFFIC					GB1 TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	328000	1150000	25200	4860000	AGRI	39400	137000	3030	580000
BIOL	1840000	8000000	138000	35200000	BIOL	221000	960000	16500	4220000
CHEM	6000000	25300000	497000	111000000	CHEM	720000	3040000	60000	13300000
EARSP	710000	2120000	59000	8600000	EARSP	86000	254000	7100	1040000
MED	8200000	25400000	630000	105000000	MED	980000	3050000	76000	12600000
PHYS	2460000	8300000	200000	34700000	PHYS	295000	990000	24000	4170000
AERO	910000	2850000	71000	11800000	AERO	110000	341000	8500	1410000
CIVIL	1580000	4920000	123000	20400000	CIVIL	189000	590000	14700	2450000
EL EC	1870000	5800000	145000	24100000	EL EC	224000	700000	17400	2890000
MECH	3330000	10400000	259000	43000000	MECH	400000	1250000	31100	5200000
METMI	780000	2420000	60000	10000000	METMI	93000	290000	7200	1200000
NUC	1150000	3600000	90000	14900000	NUC	138000	432000	10800	1790000
PET	550000	1720000	42800	7100000	PET	66000	206000	5100	850000
TRANU	1480000	4630000	115000	19200000	TRANU	178000	560000	13800	2390000
ABME	3270000	10800000	299000	44600000	ABME	392000	1290000	35900	5400000
DEMO	510000	810000	169000	1690000	DEMO	61000	98000	20300	203000
EDUC	2790000	8700000	217000	36000000	EDUC	335000	1040000	26000	4320000
ENV	520000	1540000	43000	6300000	ENV	62000	185000	5200	750000
LAW	481000	640000	38500	1850000	LAW	58000	76000	4620	222000
PAT	2250000	4790000	164000	18300000	PAT	270000	570000	19700	2200000
PUBAD	2200000	6800000	204000	27600000	PUBAD	264000	810000	24500	3320000
SDC	2450000	7600000	191000	31700000	SDC	294000	920000	22900	3800000
GENST	1110000	2410000	89000	9000000	GENST	133000	290000	10700	1080000
TOTAL	46800000	151000000	3870000	630000000	TOTAL	5600000	18100000	465000	75000000

GB TOTAL TRAFFIC					GB1 TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	1360000	4680000	112000	19800000	AGRI	163000	560000	13500	2380000
BIOL	5700000	21300000	460000	92000000	BIOL	680000	2550000	55000	11000000
CHEM	12100000	45400000	980000	195000000	CHEM	1450000	5400000	118000	23400000
EARSP	3290000	9700000	320000	39000000	EARSP	395000	1160000	38400	4680000
MED	20000000	73000000	1480000	316000000	MED	2400000	8800000	177000	37900000
PHYS	7100000	23400000	600000	98000000	PHYS	860000	2810000	72000	11800000
AERO	2200000	7400000	164000	31400000	AERO	264000	890000	19700	3770000
CIVIL	6300000	18700000	476000	77000000	CIVIL	750000	2250000	57000	9300000
EL EC	7200000	24300000	540000	103000000	EL EC	870000	2910000	65000	12300000
MECH	10000000	32000000	750000	134000000	MECH	1200000	3830000	91000	16100000
METMI	2660000	8500000	200000	35500000	METMI	319000	1020000	24000	4260000
NUC	2940000	10400000	219000	44400000	NUC	353000	1240000	26200	5300000
PET	1500000	4780000	113000	20000000	PET	180000	570000	13600	2400000
TRANU	6200000	19800000	468000	83000000	TRANU	740000	2380000	56000	10000000
ABME	14000000	44300000	1330000	182000000	ABME	1680000	5300000	159000	21900000
DEMO	1200000	1920000	401000	4010000	DEMO	144000	231000	48100	481000
EDUC	11000000	33000000	840000	136000000	EDUC	1320000	3960000	101000	16300000
ENV	2520000	7200000	218000	29000000	ENV	302000	860000	26200	3480000
LAW	5100000	6700000	406000	19500000	LAW	610000	800000	48800	2340000
PAT	5300000	11300000	387000	43100000	PAT	640000	1350000	46400	5200000
PUBAD	6600000	19300000	640000	78000000	PUBAD	790000	2310000	77000	9300000
SDC	10700000	32200000	820000	133000000	SDC	1290000	3860000	98000	15900000
GENST	2650000	4860000	212000	17000000	GENST	319000	580000	25500	2040000
TOTAL	148000000	464000000	12100000	1930000000	TOTAL	17700000	56000000	1460000	232000000

GB2	TOTAL TRAFFIC			
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	3410	8900	273	34900
BIOL	11900	30900	950	122000
CHEM	229000	930000	19400	4010000
EARSP	850	2210	68	8700
MED	298000	770000	23800	3050000
PHYS	73000	190000	5900	750000
AERO	52000	134000	4130	530000
CIVIL	14400	37400	1150	147000
EL EC	15300	39700	1220	156000
MECH	25000	65000	2000	256000
METMI	6700	17300	530	68000
NUC	40500	105000	3240	414000
PET	17300	45000	1380	177000
TRANU	455	1180	36	4660
ABME	28200	77000	2490	305000
DEMO	2	3	1	6
EDUC	25500	66000	2040	261000
ENV	610	1590	49	6200
LAW	22	29	2	86
PAT	8	17	1	64
PUBAD	292	800	26	3170
SDC	31200	81000	2490	319000
GENST	38100	99000	3050	390000
TOTAL	910000	2710000	74000	11000000

GB2	TOTAL TRAFFIC			
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	158000	550000	12100	2330000
BIOL	880000	3830000	66000	16900000
CHEM	2890000	12200000	239000	53000000
EARSP	343000	1020000	28400	4140000
MED	3920000	12200000	305000	51000000
PHYS	1180000	3970000	96000	16700000
AERO	438000	1370000	34000	5700000
CIVIL	760000	2360000	59000	9800000
EL EC	900000	2790000	70000	11600000
MECH	1600000	4980000	124000	20600000
METMI	372000	1160000	28900	4810000
NUC	550000	1730000	43000	7200000
PET	265000	820000	20600	3420000
TRANU	710000	2220000	55000	9200000
ABME	1570000	5200000	144000	21400000
DEMO	244000	390000	81000	810000
EDUC	1340000	4170000	104000	17300000
ENV	249000	740000	20600	3010000
LAW	231000	305000	18500	890000
PAT	1080000	2300000	79000	8800000
PUBAD	1050000	3250000	98000	13300000
SDC	1180000	3670000	91000	15200000
GENST	530000	1160000	42700	4320000
TOTAL	22400000	72000000	1860000	301000000

GB2	TOTAL TRAFFIC			
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	650000	2240000	54000	9500000
BIOL	2730000	10200000	221000	44000000
CHEM	5800000	21800000	470000	94000000
EARSP	1580000	4640000	154000	18700000
MED	9600000	35200000	710000	152000000
PHYS	3430000	11200000	288000	47000000
AERO	1060000	3550000	79000	15100000
CIVIL	3010000	9000000	229000	37100000
EL EC	3460000	11700000	259000	49400000
MECH	4810000	15300000	362000	64000000
METMI	1280000	4070000	96000	17100000
NUC	1410000	4980000	105000	21300000
PET	720000	2300000	54000	9600000
TRANU	2980000	9500000	224000	39800000
ABME	6700000	21300000	640000	88000000
DEMO	580000	920000	192000	1920000
EDUC	5300000	15800000	402000	65000000
ENV	1210000	3440000	105000	13900000
LAW	2440000	3220000	195000	9400000
PAT	2550000	5400000	186000	20700000
PUBAD	3150000	9300000	307000	37400000
SDC	5200000	15400000	392000	64000000
GENST	1270000	2330000	102000	8200000
TOTAL	71000000	223000000	5800000	930000000

GB3	TOTAL TRAFFIC			
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	2840	7400	227	29100
BIOL	9900	25800	790	102000
CHEM	191000	770000	16200	3340000
EARSP	710	1840	57	7200
MED	248000	640000	19800	2540000
PHYS	61000	158000	4880	620000
AERO	43000	112000	3440	441000
CIVIL	12000	31100	960	123000
EL EC	12700	33100	1020	130000
MECH	20800	54000	1670	213000
METMI	5600	14400	444	57000
NUC	33700	88000	2700	345000
PET	14400	37500	1150	148000
TRANU	379	990	30	3880
ABME	23500	64000	2080	254000
DEMO	1	2	0	5
EDUC	21200	55000	1700	217000
ENV	510	1320	41	5200
LAW	19	25	1	71
PAT	7	14	0	53
PUBAD	244	670	22	2640
SDC	26000	68000	2080	266000
GENST	31700	82000	2540	325000
TOTAL	760000	2250000	62000	9200000

GB3	TOTAL TRAFFIC			
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	131000	458000	10100	1940000
BIOL	740000	3190000	55000	14100000
CHEM	2410000	10100000	199000	44300000
EARSP	285000	850000	23700	3450000
MED	3270000	10200000	254000	42200000
PHYS	980000	3310000	80000	13900000
AERO	365000	1140000	28400	4710000
CIVIL	630000	1970000	49100	8200000
EL EC	750000	2330000	58000	9600000
MECH	1330000	4150000	104000	17200000
METMI	310000	970000	24100	4000000
NUC	462000	1440000	35900	6000000
PET	221000	690000	17100	2850000
TRANU	590000	1850000	46100	7700000
ABME	1310000	4310000	120000	17900000
DEMO	203000	325000	68000	680000
EDUC	1120000	3480000	87000	14400000
ENV	207000	620000	17200	2510000
LAW	193000	254000	15400	740000
PAT	900000	1910000	66000	7300000
PUBAD	880000	2710000	82000	11100000
SDC	980000	3060000	76000	12700000
GENST	444000	970000	35600	3600000
TOTAL	18700000	60000000	1550000	251000000

GB3	TOTAL TRAFFIC			
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	540000	1870000	44900	7900000
BIOL	2270000	8500000	184000	36700000
CHEM	4850000	18100000	392000	78000000
EARSP	1320000	3870000	128000	15600000
MED	8000000	29300000	590000	126000000
PHYS	2860000	9400000	240000	39200000
AERO	880000	2960000	66000	12600000
CIVIL	2510000	7500000	190000	30900000
EL EC	2880000	9700000	216000	41100000
MECH	4000000	12800000	302000	54000000
METMI	1060000	3390000	80000	14200000
NUC	1180000	4150000	87000	17700000
PET	600000	1910000	45200	8000000
TRANU	2480000	7900000	187000	33200000
ABME	5600000	17700000	530000	73000000
DEMO	481000	770000	160000	1600000
EDUC	4410000	13200000	335000	54000000
ENV	1010000	2870000	87000	11600000
LAW	2030000	2680000	163000	7800000
PAT	2120000	4510000	155000	17200000
PUBAD	2630000	7700000	256000	31100000
SDC	4300000	12900000	327000	53000000
GENST	1060000	1950000	85000	6800000
TOTAL	59000000	186000000	4850000	770000000

ND TOTAL TRAFFIC					CH TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	4310	11200	345	44100	AGRI	2720	7100	217	27800
BIOL	10300	26700	820	105000	BIOL	3560	9300	285	36500
CHEM	188000	760000	15900	3280000	CHEM	65000	263000	5500	1140000
EARSP	650	1680	52	6600	EARSP	221	570	18	2260
MED	295000	770000	23600	3020000	MED	103000	268000	8200	1050000
PHYS	54000	142000	4360	560000	PHYS	18800	48800	1500	192000
AERO	38100	99000	3050	390000	AERO	13000	33700	1040	133000
CIVIL	11000	28600	880	113000	CIVIL	3820	9900	306	39100
EL EC	11500	30000	920	118000	EL EC	3950	10300	316	40400
MECH	18500	48100	1480	189000	MECH	6500	16900	520	66000
METMI	4960	12900	397	51000	METMI	1730	4490	138	17700
NUC	30800	80000	2460	315000	NUC	10300	26800	820	105000
PET	14700	38100	1170	150000	PET	4430	11500	354	45300
TRANU	371	970	30	3800	TRANU	123	319	10	1260
ABME	21300	58000	1890	231000	ABME	7300	20000	650	79000
DEMO	1	2	0	4	DEMO	0	1	0	1
EDUC	19800	51000	1580	203000	EDUC	6600	17100	530	68000
ENV	482	1250	39	4900	ENV	166	431	13	1700
LAW	17	23	1	67	LAW	6	8	0	22
PAT	6	12	0	45	PAT	2	4	0	16
PUBAD	222	610	20	2400	PUBAD	76	208	7	820
SOC	24600	64000	1970	252000	SOC	8200	21400	660	84000
GENST	28200	73000	2250	289000	GENST	10800	28200	870	111000
TOTAL	780000	2290000	63000	9300000	TOTAL	270000	800000	22000	3240000
ND TOTAL TRAFFIC					CH TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	172000	600000	13200	2540000	AGRI	93000	325000	7200	1380000
BIOL	710000	3090000	53000	13600000	BIOL	242000	1050000	18100	4620000
CHEM	2200000	9300000	182000	40500000	CHEM	700000	2930000	58000	12800000
EARSP	248000	740000	20600	3000000	EARSP	85000	252000	7100	1030000
MED	3360000	10500000	261000	43400000	MED	1060000	3320000	83000	13700000
PHYS	830000	2800000	68000	11800000	PHYS	275000	930000	22400	3890000
AERO	305000	950000	23700	3940000	AERO	96000	300000	7500	1240000
CIVIL	550000	1720000	42800	7100000	CIVIL	188000	590000	14600	2430000
EL EC	640000	1990000	49700	8300000	EL EC	213000	660000	16500	2750000
MECH	1120000	3490000	87000	14500000	MECH	374000	1170000	29000	4830000
METMI	262000	820000	20400	3390000	METMI	89000	276000	6900	1140000
NUC	392000	1220000	30500	5100000	NUC	122000	380000	9500	1580000
PET	204000	640000	15800	2630000	PET	61000	189000	4710	780000
TRANU	540000	1690000	42200	7000000	TRANU	176000	550000	13700	2270000
ABME	1120000	3710000	103000	15400000	ABME	379000	1250000	34800	5200000
DEMO	176000	281000	59000	590000	DEMO	54000	86000	17900	179000
EDUC	980000	3060000	76000	12700000	EDUC	324000	1010000	25200	4180000
ENV	186000	550000	15500	2250000	ENV	65000	192000	5400	780000
LAW	174000	229000	13900	670000	LAW	60000	79000	4790	230000
PAT	760000	1620000	56000	6200000	PAT	237000	500000	17300	1930000
PUBAD	750000	2320000	70000	9400000	PUBAD	246000	760000	22800	3090000
SOC	880000	2750000	69000	11400000	SOC	298000	930000	23200	3850000
GENST	381000	830000	30500	3090000	GENST	131000	285000	10500	1060000
TOTAL	17000000	55000000	1400000	228000000	TOTAL	5600000	19000000	459000	75000000
ND TOTAL TRAFFIC					CH TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT	1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	610000	2100000	50000	8900000	AGRI	266000	920000	22000	3890000
BIOL	2130000	8000000	172000	34300000	BIOL	660000	2480000	54000	10700000
CHEM	4390000	16400000	355000	71000000	CHEM	1350000	5000000	109000	21700000
EARSP	1110000	3260000	108000	13200000	EARSP	338000	990000	32900	4010000
MED	8000000	29400000	590000	127000000	MED	2470000	9000000	182000	39000000
PHYS	2380000	7800000	200000	32600000	PHYS	730000	2380000	61000	10000000
AERO	730000	2450000	54000	10400000	AERO	221000	740000	16500	3150000
CIVIL	2130000	6400000	162000	26300000	CIVIL	660000	1970000	49900	8100000
EL EC	2410000	8100000	180000	34500000	EL EC	730000	2470000	55000	10500000
MECH	3310000	10600000	250000	44300000	MECH	1020000	3240000	76000	13600000
METMI	880000	2810000	66000	11800000	METMI	270000	860000	20400	3620000
NUC	990000	3480000	73000	14900000	NUC	296000	1040000	21900	4450000
PET	530000	1700000	40200	7100000	PET	152000	484000	11400	2030000
TRANU	2180000	7000000	165000	29200000	TRANU	640000	2050000	48500	8600000
ABME	4700000	14900000	446000	61000000	ABME	1430000	4540000	136000	18700000
DEMO	411000	660000	137000	1370000	DEMO	121000	193000	40300	403000
EDUC	3770000	11300000	287000	46600000	EDUC	1130000	3380000	86000	14000000
ENV	870000	2490000	76000	10100000	ENV	269000	770000	23300	3100000
LAW	1750000	2320000	140000	6700000	LAW	530000	700000	42300	2030000
PAT	1780000	3790000	130000	14500000	PAT	530000	1130000	38800	4320000
PUBAD	2200000	6400000	214000	26000000	PUBAD	660000	1940000	64000	7800000
SOC	3740000	11200000	284000	46200000	SOC	1140000	3420000	87000	14100000
GENST	910000	1660000	73000	5800000	GENST	279000	510000	22300	1790000
TOTAL	52000000	164000000	4260000	680000000	TOTAL	15900000	50000000	1300000	209000000

A TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	890	2320	72	9200
BIOL	2380	6200	190	24300
CHEM	43900	178000	3730	770000
EARSP	121	314	10	1240
MED	105000	273000	8400	1080000
PHYS	10300	26800	820	105000
AERO	7900	20500	630	81000
CIVIL	2050	5300	164	21000
EL EC	2160	5600	173	22100
MECH	3530	9200	282	36100
METMI	930	2430	75	9600
NUC	5800	15100	463	59000
PET	2470	6400	197	25300
TRANU	65	169	5	660
ABME	3940	10800	348	42700
DEMO	0	0	0	1
EDUC	3530	9200	282	36100
ENV	86	225	7	890
LAW	3	4	0	12
PAT	1	2	0	9
PUBAD	40	110	4	436
SDC	4650	12100	372	47600
GENST	6100	16000	491	63000
TOTAL	206000	600000	16700	2430000

IB TOTAL TRAFFIC				
1976	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	1030	2670	82	10500
BIOL	3900	10100	312	40000
CHEM	74000	301000	6300	1300000
EARSP	194	500	16	1990
MED	178000	464000	14300	1830000
PHYS	17200	44600	1370	176000
AERO	12900	33500	1030	132000
CIVIL	3340	8700	267	34200
EL EC	3610	9400	289	37000
MECH	5500	14200	438	56000
METMI	1500	3910	120	15400
NUC	9700	25100	770	99000
PET	4080	10600	327	41800
TRANU	102	266	8	1050
ABME	6400	17700	570	70000
DEMO	0	1	0	1
EDUC	5800	15200	466	60000
ENV	140	364	11	1430
LAW	5	7	0	20
PAT	2	4	0	16
PUBAD	69	189	6	750
SDC	7700	19900	610	79000
GENST	14400	37400	1150	147000
TOTAL	350000	1020000	28400	4130000

A TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	42500	148000	3260	630000
BIOL	207000	900000	15500	3950000
CHEM	770000	3230000	63000	14100000
EARSP	54000	160000	4460	650000
MED	1520000	4750000	118000	19700000
PHYS	202000	680000	16500	2860000
AERO	88000	275000	6900	1140000
CIVIL	124000	387000	9700	1600000
EL EC	150000	469000	11700	1940000
MECH	278000	870000	21600	3590000
METMI	62000	193000	4820	800000
NUC	107000	334000	8300	1380000
PET	47300	148000	3680	610000
TRANU	119000	372000	9300	1540000
ABME	253000	830000	23200	3450000
DEMO	47700	76000	15900	159000
EDUC	214000	670000	16600	2760000
ENV	39000	116000	3240	472000
LAW	33300	44000	2670	128000
PAT	213000	453000	15600	1730000
PUBAD	180000	550000	16700	2260000
SDC	193000	600000	15000	2490000
GENST	101000	220000	8100	820000
TOTAL	5000000	16500000	414000	69000000

IB TOTAL TRAFFIC				
1980	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	57000	197000	4350	840000
BIOL	390000	1690000	29200	7500000
CHEM	1840000	7800000	152000	33900000
EARSP	93000	277000	7700	1130000
MED	3740000	11700000	291000	48300000
PHYS	397000	1340000	32400	5600000
AERO	196000	610000	15200	2520000
CIVIL	227000	710000	17600	2930000
EL EC	289000	900000	22400	3730000
MECH	520000	1610000	40200	6700000
METMI	115000	358000	8900	1480000
NUC	240000	750000	18700	3100000
PET	96000	299000	7400	1240000
TRANU	215000	670000	16700	2780000
ABME	462000	1530000	42400	6300000
DEMO	110000	176000	36600	366000
EDUC	395000	1230000	30700	5100000
ENV	68000	202000	5600	820000
LAW	55000	73000	4420	212000
PAT	487000	1030000	35500	3950000
PUBAD	362000	1120000	33600	4560000
SDC	343000	1070000	26600	4420000
GENST	255000	550000	20400	2060000
TOTAL	10900000	35800000	900000	149000000

A TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	190000	660000	15700	2770000
BIOL	800000	2980000	64000	12800000
CHEM	1670000	6200000	135000	26900000
EARSP	328000	960000	31900	3880000
MED	3840000	14100000	283000	61000000
PHYS	720000	2360000	61000	9900000
AERO	238000	800000	17800	3390000
CIVIL	630000	1880000	47700	7700000
EL EC	730000	2470000	55000	10500000
MECH	1040000	3320000	78000	13900000
METMI	269000	860000	20300	3600000
NUC	310000	1090000	23000	4680000
PET	155000	494000	11700	2070000
TRANU	650000	2070000	48900	8700000
ABME	1380000	4370000	131000	18000000
DEMO	128000	204000	42600	426000
EDUC	1080000	3240000	82000	13400000
ENV	252000	720000	21800	2900000
LAW	481000	630000	38500	1850000
PAT	570000	1210000	41400	4610000
PUBAD	680000	2010000	66000	8100000
SDC	1070000	3200000	81000	13200000
GENST	280000	510000	22400	1790000
TOTAL	17500000	56000000	1420000	236000000

IB TOTAL TRAFFIC				
1985	MESS IN	MESS OUT	KBITS IN	KBITS OUT
AGRI	376000	1300000	31100	5500000
BIOL	2060000	7700000	167000	33200000
CHEM	4670000	17500000	377000	75000000
EARSP	810000	2380000	79000	9600000
MED	10800000	39500000	800000	170000000
PHYS	1870000	6100000	157000	25600000
AERO	640000	2160000	48000	9200000
CIVIL	1560000	4680000	119000	19300000
EL EC	1930000	6500000	144000	27500000
MECH	2660000	8500000	201000	35600000
METMI	690000	2190000	52000	9200000
NUC	860000	3020000	64000	12900000
PET	411000	1310000	30900	5500000
TRANU	1690000	5400000	128000	22600000
ABME	3460000	10900000	328000	45100000
DEMO	359000	570000	120000	1200000
EDUC	2720000	8200000	207000	33600000
ENV	620000	1770000	54000	7200000
LAW	1140000	1500000	91000	4360000
PAT	1590000	3370000	116000	12900000
PUBAD	1910000	5600000	186000	22700000
SDC	2530000	7600000	192000	31200000
GENST	770000	1410000	61000	4910000
TOTAL	46100000	149000000	3750000	620000000

APPENDIX C : SOURCES

This appendix lists some of the sources of more general coverage that have been useful to the study. It does not include all those listed as sources of detailed input data, and given in Appendix A.

1. European Computer and Communications Markets 1973 - 1985
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