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Esprit Information Exchange System

iesnews

Issue No 22, June 1989

The European Parliament is nearing completion of its office automation project, which started in 1986. The project is part of a broader information technology programme aimed at helping Parliament to provide improved services whilst coping with an increasing workload. The office automation project contributes to this programme primarily through the installation and interconnection of multipurpose workstations, with the emphasis on document preparation and handling capabilities. By the end of 1989, some 1,300 workstations will have been installed, connected via a system based on 10 Local Area Networks (LANs), 40 minis and a wide area network (X-25), linking the three main centres of Parliament activity: Strasbourg, Luxembourg and Brussels.

THE OFFICE AUTOMATION PROJECT OF THE EUROPEAN PARLIAMENT

The objectives are:
-to improve productivity and quality for the processing of documents, including overcoming the problems of incompatibility between different suppliers' word processing equipment;
-to facilitate text transfer to and from different offices;
-to establish the basis for an electronic mail system within Parliament.

In addition, certain conditions were set:

-the operation of multi-terminal stations under the UNIX operating system (UNIX SYSTEM V - X-OPEN) and of stand-alones under MS-DOS.

-the adoption of standard communications interfaces between the Parliament's office automation system and data processing systems, also external data processing and office automation systems, to be based in particular on the Open Systems Interconnection (OSI) model and the X-25 standard.

LATE NEWS

CROSS REFERENCE TO ISO IT VOCABULARY

People who use the ISO 2382 Information Processing - Vocabulary already have one of the most widely applicable guides to terminology and definitions in this field as well as a means of standardizing usage. It is published in parts, of which 22 have already appeared, whilst five more are issued as Draft International Standards or are at an earlier stage. ISO has now produced a very useful adjunct to the vocabulary in ISO/IEC TR 12382 Permuted Index of the vocabulary of information processing which includes terms under development in DISs and in the published parts of ISO 2382.

This is not an International Standard but a Technical Report containing information of a different kind from that normally published as a standard

LATE NEWS

FUSION RESEARCH AND NETWORKS

Computer networks were a major factor in the rapidity of researcher response to the initial fusion claim. Only two years ago, the superconductivity advance was disseminated in the research community by fax. Among advantages of computer networks for researcher's communications are informality and "broadcast" features.

REMINDER:
THE 1989 ESPRIT WEEK WILL START ON NOVEMBER 27.

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THE OFFICE AUTOMATION PROJECT OF THE EUROPEAN PARLIAMENT

-the adoption of a local network standard, which would simplify cabling and facilitate future installations.

It was with these objectives and conditions that the European Parliament launched a call for tenders in July 1986, for the provision and implementation of office automation facilities. At that time, the European Parliament had approximately 400 workstations installed and was using four different types of word-processing software.

USER CHARACTERISTICS

Geographical

The European Parliament operates in three cities:
- Luxembourg, the seat of the Parliament's secretariat;
- Brussels, where committees and political groups meet;
- Strasbourg, where part-sessions are held.

In all, the European Parliament occupies some 20 buildings in Luxembourg, Brussels and Strasbourg.

In principle, any user in a particular building must be able to connect with any user or host in any other building; in practice, this occurs on a regular basis only between certain user groups.

Character handling

The workstations have to permit the simultaneous display of all characters and special symbols (e.g. £, $, etc.) used in the nine official languages of the European Community: English, German, French, Italian, Dutch, Danish, Greek, Spanish and Portuguese.

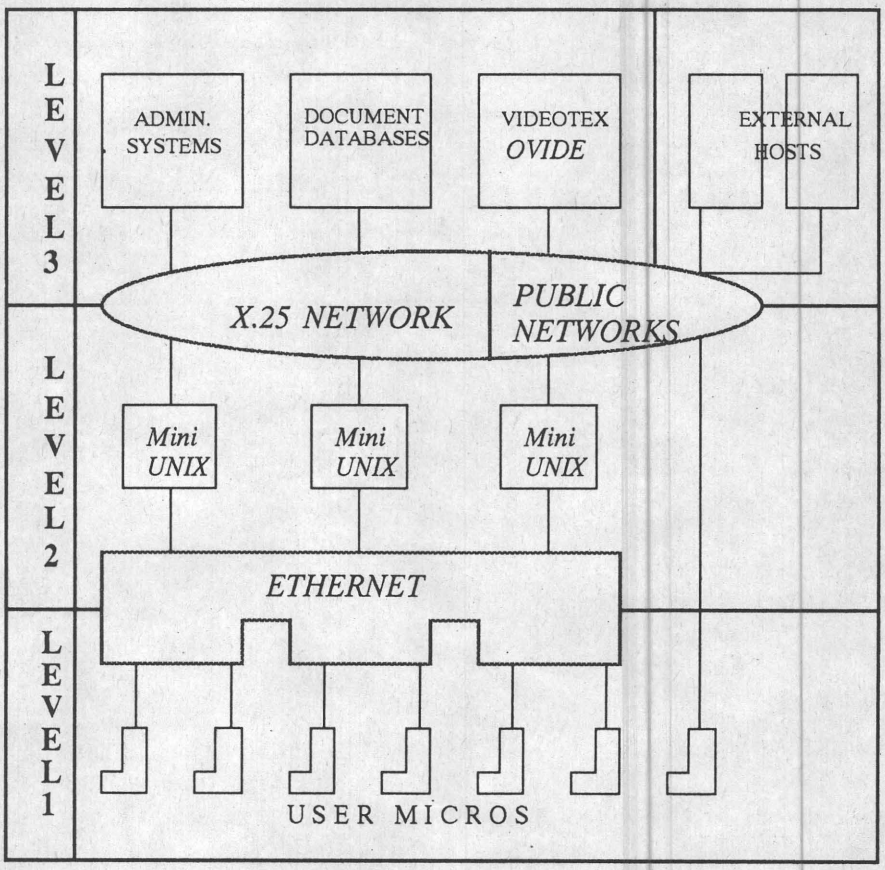
Accents must be displayed in their true position in relation to the alphabetic character concerned.

Number of workstations

The number of workstations directly related to the office automation project will have increased from a mere 150 at the end of 1987 to 1600 by the end of 1990.

Main applications

The dominant need of the users of the office automation project is the ability to prepare documents, including translations into all the Community languages. Although document preparation is the central application, there is a variety of related activities which need additional information technology support. One such example is the access to documentary databases on the mainframe system, another is the exchange of data with other Community institutions.



Architecture of the European Parliament's Office Automation System

THE OFFICE AUTOMATION PROJECT OF THE EUROPEAN PARLIAMENT

System architecture

The structure of the office automation system and its links to the systems used by the European Parliament are illustrated in Figure 1. Workstations in level 1 of the architecture are connected via Ethernet to each other and to hosts, which are located:
-in level 2, as minis operating under UNIX
or
-in level 3, where access to various hosts such as the Parliament's mainframe, OVIDE and certain services in the Commission's computing centre, will be available via X-25. Access to other external hosts will be offered in the same way, via the Parliament's own X-25 facilities linking to public data networks.

Current status

In May 1989, about 1000 workstations are operational. The majority of these are supplied by Olivetti, the main contractor selected to install the system. About 600 workstations are working via LANs, primarily in Luxembourg, where the cabling is almost complete. Access to and transfer of documents has taken place between Luxembourg and Brussels, and Luxembourg and Strasbourg, using the Parliament's X-25 network.

Future developments

The core project ends in autumn 1989, when the main infrastructure, together with the workstations installed for initial applications in the user departments, will be operational. Planned further growth will bring the number of installed workstations to around 2000 by end-1990, at which time it is expected that local applications will take over as the driving force of future developments. Although these applications will focus on departmental needs, efforts are now being made to provide for expansion or interconnection to other applications, for example through the use of common database software.

Some of the local applications are expected to become important contributors to the information services arising out of the Parliament's OVIDE project. OVIDE will focus on services for MEPs and their supporting staff, and will draw on a number of different services for information supply. Although OVIDE itself will be based on videotex technology, some of the information to which it will offer access will depend on traditional data processing and on information prepared in the Parliament's strategy to provide an information technology infrastructure which will allow different kind of information services to be offered to varying user groups.

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Luxembourg.

COMCENTRE

The Centre for Communications Standards (ComCentre) was established in 1987 jointly by the Department of Trade and Industry (DTI) and the Production Engineering Research Association (PERA) to provide the United Kingdom with an information and an awareness service by encouraging and supporting the introduction of open systems technologies not only for the manufacturing and process industries, but also in government and the field of financial services.

ComCentre assists clients by helping them understand the different communication standards available such as Manufacturing Automation Protocol (MAP), Technical Office Protocol (TOP) in order to allow the integration of new or existing islands of technology either on the shop floor or in the office; providing guidance on how to automate the office by taking advantage of the latest technologies best suited to meet particular requirements; providing training on how to implement chosen technologies; assembling and dissemination of information in relation to technical documents and specifications, and acting as a link to other sources of specialised help. With its network of subscribers, callers can direct their enquiries to relevant experts.

INFORMATION SERVICE ON COMMUNICATION TECHNOLOGY

COMCENTRE

Other services provided by ComCentre include:

-the answering of OSI enquiries;
-the sale and loan of key publications which are held in stock;
-the quarterly publication of "Communique" reporting on recent development, events and opinions;
-the bi-annual presentation of the MAP/TOP Forum;
-active participation in the European Map Users Group (EMUG) and Open Systems Interconnection Technical Office Protocol (OSITOP).

ComCentre considers that the driving force behind open systems will be electronic data inter-change (EDI) rather than computer integrated manufacturing (CIM). The use of OSI is a necessity with EDI as there is very little control over the systems used by others.

For further information about ComCentre, contact:

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A Newsletter is only as good as its contributions. We welcome any ideas, comments, letters and suggestions, which should be addressed to

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IMPROVING THE UTILISATION OF PUBLIC AND PUBLICLY FUNDED R & D

There has been growing concern in recent years that the results of publicly funded research and development should be fully exploited and that society should derive maximum benefit from them. This concern has shown itself in a number of ways, and indeed, the Commission of the European Communities has taken positive steps to ensure that the results of Community Research and Development and Technology programmes are exploited. The Community Framework Programme for R, D & T foresees specific programmes for this purpose, and it is also dealt with under the Community Innovation and Technology Transfer Programme (SPRINT).

In order to identify measures which might have general utility, the Commission initiated a series of studies by groups of independent consultants. The objectives of these studies were to examine the procedures adopted in each Member State to promote the effective utilisation of publicly funded R & D and to suggest measures which, in the opinion of the consultants, would be useful at both the National and the Community level.

As a result of this initiative by DG XIII-C, Exploitation of R&D, Technology Transfer and Innovation, a series of reports covering the Member States has been published under the title: Utilisation of the Results of Public Research and Development:

COUNTRY	AUTHOR
Spain and Portugal	P. Nueno
Italy	G. Bellei, D. Corradetti, R. Facci
Denmark	L. Christensen
France	Th. Durand, T. Gonard, R. Schell
Luxembourg	Y. Oestreicher
Germany	G. Bräunling, M. Maas
Netherlands	F.A. de Jonge
United Kingdom	R.E. Quince
Greece	D. Deniozos, T. Giannitsis, H. Tsipouri
Ireland	B.A. O'Sullivan, D.J. Cogan

The project "Improving the Utilisation of Public and Publicly Funded R & D" was carried out by the Commission of the EC under the SPRINT programme.

These reports are available from the Office for Official Publications in Luxembourg and the usual sales points for European Commission Publications.

Further details can be obtained from : DG XIII-C, CEC, Jean Monet Building, L-2920 Luxembourg.

EUROTRA

AN EUROPEAN APPROACH TO MACHINE TRANSLATION

INTRODUCTION

Being unable to communicate is undoubtedly one of man's most frustrating situations. Although international teams normally agree on English as their working language, any citizen of the European Community (EC) has the right to communicate in his/her mother tongue. In 1977, as part of the second programme of the Commission to overcome language barriers in the Community, Machine Translation (MT) was brought to the fore as one of the research and development areas. In February 1978, a panell consisting of experts in the field of Natural Language Processing and MT met in Luxembourg to evaluate the feasability of MT in a multilingual environment. Existing commercial products, systems under development and research projects were presented in order to answer two questions:

- do the experts know of a system which can be used as or extended to a multilingual tool?

- do the experts think that a multilingual MT is achievable?

The answer to the first question was NO, for several reasons, the main points of which were:

- all existing systems were designed as bilingual or
- the multilingual approaches were not extendable.

The answer to the second question was YES, although nobody really knew how such a system could be designed.
The Commission decided in collaboration with its political and technical committees to ask European experts for further specifications in order to answer the question of HOW the goal of a fully automatic high quality multilingual MT system could be achieved. At that time the EC consisted of nine countries some of which did not have such high expertise in what is nowadays called Computational Linguistics, especially not in Machine Translation. This turned out to be a problem, which had to be met on a broader scale. Some aspects were solved by organising the experts in national groups headed by a coordinator, who met once a month with all the other national colleagues in the Coordination Group in Luxembourg and Geneva (the town of the secretariat). At the end of 1978 these activities converged under the name of EUROTRA (European Translation System).

THE HISTORY OF EUROTRA

A sequence of scientific and opinion papers formed the basis for further discussions, concentrating mainly on the system design and its users, data structures and linguistic specifications. More information with deeper insights was obtained through a series of study contracts on software and linguistic phenomena and during the EUROTRA annual workshops, which started in 1979.
In November 1982 the Council of the EC approved the EUROTRA programme, the aims of which were:
- installation of national centres for computational linguistics
- transfer of know-how in the field of computational linguistics i.e. MT
- research and development of a prototype Machine Translation system of advanced design for all official languages of the EC.

The integration of Portugal and Spain into the EC was met by the Council with a financial and temporal extension of the programme. The amount of 45 million ECU, cofinanced by the CEC and the Member States spans a seven year period.

Since 1986 groups within each of the member countries have been fully operational and are involved in parallel with the EUROTRA programme producing comparable results. This has become possible due to centralised management with clearly defined legislative and executive bodies.

MACHINE TRANSLATION

A brief discussion of the term and content of Machine Translation will be helpful because it seems that many ideas about MT exist without specific knowledge about its principles.

The term "Machine Translation" consists of two parts, "Machine" and "Translation" both of which are

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understood adequately. "Machine" is an old word for "computer" and "translation" means changing text into another language. The combination of the two indicates that for example you can obtain a translation of a written English text into French by means of a computer. The procedure could be quite simple by writing a computer program that simulates the human ability of translating. This seems to be a good approach, but - as the history of MT has proved - it is not.

The history of MT started with knowledge about programming of computers and some rudimentary ideas about the nature of translating. The result of the first approach was a system that identified words in a sequence of signs, compared them with a bilingual dictionary and replaced the original word with the target language expression. The end result was discouraging from a linguistic point of view, but the computer scientists were quite content with it because it proved that the computer could handle data that were regarded as being only suitable for human treatment.

The second major approach improved the system dramatically with the integration of syntactic analysis and syntactic generation (ie. the correct sequencing of the word order). Morphological analysis (the study of the internal forms of words) in combination with a stem-based dictionary facilitated the use of all words in all inflectional forms. This was necessary for the analysis of Russian, being a language with a great number of different inflectional endings.

The next steps included the addition of a real bilingual transfer section and a semantic analysis to the existing system structure. In parallel a major qualitative step was taken with the implementation of multilingual systems which produced a representation of a unit of translation (normally a sentence) in a way that it could be used for a transfer into more than one target language. This representation was a formal semantic description stating linguistic interpretations of the source input. Further improvements were made by the separation of linguistic data (grammar, dictionaries) from

A NEW APPROACH TO AN OLD PROBLEM

the programs which executed the grammatical rules. The integration of non-linguistic knowledge (world knowledge) into the system, which was favoured especially in the Japanese projects, was unsuccessful.

Though the history of MT started around 1947, even recent projects follow the same strategy as the historical ones; they try to simulate the human ability to translate while sequencing the translation process into morphological, syntactic and semantic analysis, transfer (or interlingual representation) and semantic, syntactic and morphological generation. Up to this point, doubts about the general strategy with respect to human translation have not been verbalised.

HUMAN TRANSLATION

Translation theory states that translating is a process of reading a unit of text, understanding it and generating a new text from it in relation to the original text. Many principles are arranged around this kernel which describes and guarantees the qualtiy of the translation. The mode of the description and its content could meet the needs of the human translator, because a person can evaluate his own work in a critical manner.

A computer however, is very much different from a human being, because its understanding is not intelligent in the sense of having creative power as defined in intelligence research. The computer is not self-critical, it cannot "look at itself" and it cannot evaluate its products. A "tertium comparationis" and the ability of inferencing is missing.

EUROTRA

EUROTRA is the first project that leaves the old tracks. The term "translation" must receive a new definition, allowing a translation by non-intelligent (in a human sense) computers. Translation can be regarded as a mapping mechanism, transferring information, ar-

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AN EUROPEAN APPROACH TO MACHINE TRANSLATION

ranged in a specific form according to a set of rules from a source code into a target code which obeys yet another set of rules. Formal mappings are possible with sets of objects, e.g. words, word groups or with sets of relations, e.g. grammatical rules, describing the relations between words. If languages are regarded as being sets of objects and sets of rules, a mechanical translation can be defined as a process of mapping sets of objects and relations onto other sets of objects and relations.

Another problem is: A computer cannot understand the meaning of text in the same way as a human. But why is it necessary to understand text to be able to translate it? It is necessary because it is taken for granted that text has a meaning. This axiom only holds as long as the author and the reader of the text share that part of knowledge and experience which is necessary to understand the text. If they do not share it, we tend to claim that it is the author who has not understood and not the text, as the text must be seen as a representation of the author's understanding of an utterance. This becomes quite clear when the author does not write a sequence of sentences which means a sequence of graphics, but represents his utterance verbally. If sequences of vocals and sequences of alphanumerical signs can be regarded as equivalent (bearing the same meaning), the nature of words cannot be the meaning itself but only the representation of meaning.

GRAMMAR COMES INTO ITS OWN

With this definition of text as a representation of meaning, the translation process needs no understanding of text. The formal process consists of a complex translation that is split into a sequence of simple translations. Even though the translation between "similar" languages e.g. Dutch and German or French and Italian is simple, the pressure of the most complex translation dictates the strategy.

EUROTRA is designed for 9 languages with 72 language pairs where a simple transfer is one of the basic principles. Simple transfer means that structural changes cannot be foreseen to be made during transfer. An example, though it does not appear in EC texts, will illustrate that:
"Peter likes swimming" and in German
"Peter schwimmt gerne"
(the German example has the same structure as the English sentence)
"Peter swims quickly"

Radical changes in the sentence structure would be necessary during transfer, if the "gerne" would not be represented in a language-independent way, a restriction which is true also for the English verb "to like".

From this point of view it is necessary to analyse units of translation (e.g. paragraphs, sentences, ...) in a syntactic and semantic respect and to represent them in a language-independent scheme with a canonical order of elements. According to these principles the complex mapping process must be broken up into simple processes and several system levels (representations) have to be defined between which the system performs simple translations. One of these translations is the bilingual part which is called "transfer".

The rules in the system must be so general, that their number is as small as possible. Similarly the rules must be specific, so as to not produce too many different interpretations. As the system cannot be general and specific at the same time, EUROTRA uses two different mechanisms to perform a mapping from one level of representation to another - the translator and the generator. The translator maps substructures of the source level onto objects of the target level and the generator produces all valid (on this level) structures from the objects. The software tool is based on the term unification, a function of the Prolog programming language. Unification is some kind of "intelligent" pattern match device. The definition of the software, of the levels of representation, of the translators and generators provides a well defined system with well-formed results.

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This leads to the translations produced by the EUROTRA MT system and their correctness. From the definition point of view, all translations (the results of the translation process) are correct with respect to the definitions.

The correctness from the evaluation point of view is another problem to be answered by (human) translators. The evaluation will take all the principles into account that are due to "human" translation, such as the main four quality criteria informativeness, understandibility, readability and fidelity. Another result of the evaluation will point out if mistakes derive from a type of information that cannot be included in a computer process, e.g. cultural information, questions of personal taste etc. or from defective definitions which can (easily) be corrected.

THE STATE OF THE ART

Nowadays EUROTRA is the name used for a collective of political programmes, research projects and development enterprises. The programme is agreed in all 12 Member States involving 21 sites and a total staff of 242 people, more than 80% of whom are computational linguists, linguists, translators, computer scientists and mathematicians. The groups are locally linked to universities and nationally managed by a head of research. Concerning the organisation of tasks, the scientific personnel is specifically grouped nationally and internationally in monolingual and multilingual groups, in task forces, specialist groups and research subprojects.

EUROTRA as an MT system exists in the form of several laboratory prototypes with identical software in stand-alone configurations. Apart from the centrally provided software, various test implementations are being produced for exemplification.

The definitions for the intermediate levels of representation are operational, but the interface between analysis and transfer (for the exchange between different languages) is only finished in some formal respect; it still lacks representations for an open set of linguistic phenomena.

The dictionaries currently contain approximately 5000 entries and they will be expanded to 20000 entries by the end of the project. The problem with dictionaries is that they are an integral part of the system and undergo the same changes as the system i.e. concerning the linguistic definitions.

THE FUTURE

EUROTRA is still under construction and the result in 1990 will be an operational laboratory prototype of a multilingual MT system.

Two problems have to be envisaged for the future:

- the research is not finished, as a number of linguistic phenomena still have to be treated
- the algorithmic and linguistic specifications have to be made explicit for an industrial implementation

A third problem arises with the dictionaries as they are not complete in any sense; they have to be enlarged as the existing content is just an exemplification for the prototype, but does not meet the needs of any real translation department.

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THE RARE 89 NETWORKSHOP

TRIESTE, 8 - 10 MAY

In reporting on conferences, it is all too easy to slip into a mere listing of presentations with virtually expanded titles serving as summaries. This however tends to miss the flavour and spirit of a meeting such as this which really is a formalised exchange of ideas, renewals of friendships and making of new ones. Researchers from more than twenty countries took part.

The conclusion of the COSINE Specification Phase and the proposals for the Implementation Phase were a central discussion point both during the various sessions and outside. The brief review by Peter Tindemans (Chairman of the Cosine Policy Group) of the achievements to-date and the future plans, with the emphasis that COSINE was a cooperative venture where all organisation were required to be involved actively, helped to clarify the current position. One of the refreshing aspects was that hardly had the ink dried on the final Specification Phase Documents when a host of new suggestions and challenges was presented. Formal submissions are in process of being presented to RARE for possible inclusion in the COSINE work - these range from proposals for coordination of directories to a PanEuropean Information Service, not forgetting the need for security provisions, as in any network. Other points were the response of network administrations and architectural requirements resulting from accomodating output from supercomputers or tying these into networks; or the effects of the growing use of workstations. Another innovation requiring accomodation might be the multimedia aspects of messaging where text, graphics and voice would all have to be transmitted.

In discussing the impact of OSI, the strength of OSI was seen in the standardised applications, in using existing technology and in providing an open toolkit. Certainly, availability of proprietary off-the-shelf solutions was an attractive alternative, but in the long term would not give researchers the full connectivity they needed. It should also not be forgotten that whilst research networks may not be the largest in terms of volume of data handled, it was the research community which brought innovations, posed new problems and provided the solutions for these, and it was these achievements which made the big commercial uses possible. The challenge set by the Commission through ESPRIT, RACE and the other IT and T initiatives, and the EUREKA project COSINE, with the growing importance of Electronic Data Interchange (EDI) a further factor, was perhaps not always fully and adequately matched by interest from industry. The COSINE implementation will require much support from this.

The need was also expressed repeatedly for a reference manual or information source on available OSI products. Whilst there were some National lists, a full European one was essential - the EPHOS (European Procurement Handbook for Open Systems) once completed would address this requirement.

A particularly interesting session dealt with network developments in disparate countries - Italy and Hungary, and on the U.S. Internet Activities Board and its plans. In Italy, following the change earlier in May of the Ministry of Research to the Ministry of Research and Universities, a speeding up was to be expected of the plans prepared by GARR (Gruppo Armonazzio Rete della Ricerca) involving the setting up of a high-speed (2 Mb/sec) backbone network with links to all other national international networks and facilities. The main nodes will be at Milan, Bologna and Bari and the users will include over 100 000 researchers in academia and industry, with finance coming to 51% from government and the balance from private and public industries. The Hungarian activities are reported elsewhere in this issue (see page 10).

This participant left Trieste full of the conviction that RARE was moving forward at a far greater speed than one could have hoped for when launched.

NETWORK FOR THE HUNGARIAN R&D COMMUNITY

Introduction

In the last couple of years it has become more and more evident that Hungary cannot bridge the gap and integrate with the world economy unless it keeps step with the global trends of computerizing its information infrastructure and develops a computer network-based information system which is vital to integrate Hungary into the changing face of Europe. In January 1986 the Committee of Science Policies established an R & D Information Infrastructure Development Programme (its Hungarian abbreviation is IIF).

Objectives and Main Features of the IIF Programme

The purpose of the programme is to meet the above aim in order to support research and technical development in Hungary. The Hungarian PTT has the main role in the provision of the network infrastructure for this.

By 1990 the information infrastructure will include the following services:

-access to databases
-management information services for R & D community
-office automation services
-E-mail
-text processing
-desktop publishing
-teleconferencing
-remote file access and management
-computing

The main services promoting these applications are:

-line mode terminal access (XXX)
-full screen terminal access
-E-mail
-file access and management
-directory

The architecture of the IIF system also enables companies, institutions and government authorities to set up and integrate their own local network thus increasing the number of users. By linking the IIF system with specific sectoral information systems now being installed the range of services can be increased considerably.

The network of IIF is characterized by connection to the packet switched data network. In the course of the development phase of the IIF system network architecture and network tools were designed and implemented, network services were documented and hardware/software tools were produced for supporting the realisation of the planned services. The IIF is an open system, i.e. all institutions which comply with the architecture as well as purchase and operate the necessary equipment will be able to supply and use services.

The Architecture of the IIF System

The IIF system is an open system due to two basic feature

-the managed data network of the Hungarian PTT
-the uniform architecture of connected end systems.

In the first phase of the implementation we were not in the position to accept all of the standards relating to Open Systems Interconnection (OSI) as being the base of our architecture since the necessary hardware/software means were and are still not accessible. For this reason the system has been based upon the PAD recommendations X.3, X.28, X.29 of CCITT as well as on the X.25 recommendation.

In the second phase we will introduce the ISO OSI standards and the European functional standards in the following order:

-X.400
-Directory services
-FTAM
-Virtual Terminals

The Data Network

In the course of IIF implementation a packet switched data network has been designed and implemented. The range of products includes a national public (PTT operated) managed data network, some private managed data networks, miniswitches and terminal concentrators (PAD).

The public circuit switched data network and the telephone network provide for terminal access to the PAD of the packet subnetwork.

The PTT operated main switch at present has seventy X.25/X.75 interfaces, and sixteen PAD ports.

The throughput of the switch is 200 packets/sec and the speed of the international and national interfac-

es is 9,6 kbit/sec. We are working on the 64 kbit/sec interface. Negotiations between the Hungarian and Austrian PTT to interconnect the system with the European packet network are in hand.

To provide OSI Network Services for end systems some modifications of our equipments will be needed.

Conclusions

The first phase of the IIF programme has been completed successfully. All the important Universities, Academic Institutions and some large companies have joined the IIF system. The different services have been put into operation and the first statistics show that the E-mail and FTAM services are used most.

There is a very high demand by the Hungarian researchers to use the international E-mail facilities. The most important task is therefore to find solutions to ensure early full OSI compliance which will make possible ready access to the international networks for Hungarian scientists in an environment similar to that in which their western colleagues work.

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THE "MULTIVENDOR OSI SHOP" AN ENVIRONMENT FOR CONFORMANCE AND INTEROPERABILITY TESTING IN BELGIUM

The Inter-university Institute for High Energies at the Free University of Brussels has developed a concept called the "Multivendor OSI Shop". This provides an environment which enables computer manufacturers or software vendors to test the performance of products against international open systems standards.

The OSI shop is staffed by a team of young experts operating under the name of "HELIOS-B", some of whom participate in the standardisation process at the national or international level. Members are familiar with formal conformance testing methods and tools as well as the more "practical" aspects of interoperability. A number of computers which support some wide area and local area connectivity (X-25 and Ethernet) are located on the premises and are operated under contracts with different manufacturers, namely Bull, DEC, NCR and Unisys. The computers are provided with all the lower layer OSI and TCP/IP (Transmission Control Protocol/Internet Protocol) software, and with OSI application software such as message handling, file transfer, access and management, and directory services.

Areas which have already been handled by the HELIOS-B group include the following:

-an in-depth study of layers two and three in the context of high speed (satellite) communication and LAN-WAN interworking;
-performance studies conducted over the international public packet switched networks;
-the implementation and testing of message handling systems and file transfer services;
-the study of directory services and other OSI functionalities.

The HELIOS-B group members feel that, within a university environment, they are provided with an excellent opportunity to practise their theoretical/technical skills and to simultaneously improve their "hands on" experience. Furthermore, they have been able to develop numerous international relations through the various CEC initiatives, such as : ESPRIT Information Exchange Services, DELTA and Conformance Testing Services. Other projects with which it has had contact are RARE (Réseaux Associés pour la Recherche Européene), the EUREKA COSINE project, EWOS (European Workshop for Open Systems), ETSI (European Telecommunications Standards Insititute) and ECTUA (European Council of Telecommunication Users Associations).

For further information, contact:

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CORDIS DATABASES WILL IMPROVE INFORMATION ON COMMUNITY R & D

Under the VALUE Programme, the Commission is planning to set up a new electronic information service covering Community R & D programmes within the Framework Programme.

This service, called CORDIS (Community Research and Development Information Service), will disseminate:

- information on each of the Community RTD programmes and its projects and results;

- associated information on these programmes to assist policy makers and researchers in the Member States to better coordinate their activities at Community level. (In that capacity relevant information from initiatives outside the Commission, such as the EUREKA Programme, might also be available.)

This service is intended to provide the following categories of information:

1. Information for Planning and Programme Participation

References to programme definition documents, lists of expressions of interest in assisting in partnership formation, reference listings of R & D organisations, references to Commission public policy papers, sources of information associated with Community research, and announcements for related tenders or calls for proposals.

2. Information for Programme Execution

Objectives, structures and organisation of various programmes, project information within each programme, project participants, news on various programme activities and developments, announcements of major meetings, interim results of projects, reference to key Programme documentation.

3. Information for Exploitation of Results

Announcements of final project results, expressions of interest in cooperation for commercial exploitation, general programme evaluations, information and statistics for policy makers, reference to documents resulting from projects.

CORDIS will be based on the following key implementation principles:

The system will consist of a reference database and associated service components operated under the responsibility of the Commission. Copies or extracts of the database might in due course be made available for commercial external hosts in the information market.

In its final stage, CORDIS is intended to contain the following major visible components:

1. Information Computer Host -
through which the databases of the service will be available. This host will be accessible through all European public data networks and possibly some specialised videotex or teletext services.

2. Documentation Service -
expanding the present activities of DG XIII-C and including:

a. A reference and ordering service for documents published in association with Community RTD activities by the Commission Publications Office or external publishers.

b. Production of a series of reference documents based on material available to the service.

c. A periodical publication for service users reporting on new developments and facilities.

3. News Service -
which will collect news items and disseminate these through different media, such as electronic bulletin boards, videotex services, etc.

4. Telephone Enquiry Service -
which will be associated with a User Support Unit and will provide, in all major Community languages, information about the Service itself.

Of course it will take several years before all these components and services are fully operational. A first stage of CORDIS with some of the above features is planned to be operational in 1989.

The experience drawn from the SDC1 database of the IES-Data Collections on publicly funded Information Technology projects has contributed significantly to the development of some of the information to be offered by the CORDIS service.

Note: We will keep our readers informed of all developments relating to the CORDIS service.

INTERNATIONAL COUNCIL FOR SCIENTIFIC AND TECHNICAL INFORMATION (ICSTI)
1989 GENERAL ASSEMBLY

There is a number of issues which cross the delineations drawn between information handling and its technology which make a report on the 1989 ICSTII meeting at Orleans, France, of interest. High on any list is the question of liability - the responsibility seen to exist in the acquisition, handling and distribution of information and data. With the growing use and spread of numerical databases (as evidenced for example by the Commissions programme on materials databases), the placing of a decimal point or one zero too many can have a considerable effect. Whose responsibility is it to check data - the researcher submits his findings, the journal publishes, and the user receives the data - where along the chain is the responsibility of checking, and errors are human, although not always in the eyes of a civil litigation suit.

Then there are the problems of information availablility - there was much discussion at Orleans on the many research initiatives of the Commission, but a feeling that the results were not always as easily accessible as would be desirable. The CORDIS programme, which was mentioned briefly, was welcomed as promising an effective solution.

Language problems were also seen as a major problem - machine translation is considered to offer one approach to making technical literature in "foreign" languages more widely used.

Work is also going on to provide a directory of numeric databases worldwide. Electronic publishing too is a topic of considerable interest and will probably be the subject of a technical session at next years' meeting. At Orleans, the technical session dealt with the role and use of citation analysis as a tool in policy-making especially for directing science policy and research funding.

Economics were a further topic for much discussion: the failure of the online information market to come up to the forecasts of twenty, or even five years ago, was considered by many to be an economic issue: the costs of data transmission had not decreased in parallel with the other cost factors in information handling (labour costs excluded).

ICSTI is one of the Member Services of the International Council of Scientific Unions (ICSU) established in 1949. The parent body, ICSU, was founded in 1931 as a successor to the International Research Council (established in 1919) to co-ordinate international efforts in the different branches of science and its applications; to initiate the formation of international associations or unions deemed to be useful to the progress of science; and to enter into relations with governments of the countries adhering to the Council. Over 70 countries and 20 international unions are members, with UNESCO being the co-ordinating and representative body of the scientific unions. It is thus one of the senior organisations in the field of science (and technology). ICSTI in turn is a peer body concerned with information acquisition and distribution, and not primarily with the technologies involved.

THE ANALYSYS STEM MODELLING SYSTEM

In any fast moving field of technology crossing many frontiers, such as Information Technology and Telecommunications, and where investments can run into several hundred million ecu, anything that can facilitate the evaluation of alternative strategies can be of major importance to decision makers and strategy planners. Such help can frequently be provided by the use of technoeconomic tools which enable the user to construct complex models with ease.

One such tool is the Analysys STEM™ modelling system which is a framework within which models can be constructed to enable the comparison of alternative strategies and implementation policies over time. By allowing the user to control the most important assumptions such as growth in demand, the cost of new equipment, depreciation and tariff policy, implementation strategies can be examined under a variety of conditions and constraints, and alternative strategies can be assessed when subjected to similar conditions thus allowing the strengths and weaknesses of different policies to analysed.

STEM requires three main types of input information:

Demand, which can be expressed in many ways (e.g. in terms of demand for a service, from a particular group of customers or geographic area), and in whatever units are suitable (e.g. number of connections or erlangs per second).

Costs of the specific parts of the network involved, and cost trends of their component parts.

Tariff policy (including its degree of

THE ANALYSYS STEM MODELLING SYSTEM

dependence on or independence from the costs of provision).

THE CONCEPT

The concept on which the STEM modelling system is based is a four-tiered classification of the elements involved in the network architecture. The four key categories are:

Services: which in effect can be specified as anything that describes a change of demand over time, e.g. demand for voice telephony or requirements of residential subscribers.

Classes: the functional blocks that make up the network, e.g. access links, terminals.

Specifics: the pieces of equipment that provide the function of a Class, e.g. 2B+D access link, telephone handset.

Components: the parts into which a specific (and its costs) may be broken down, and to which price trends can be attached, e.g. copper cable, opto-electronics, bricks and mortar, labour.

This method of classification provides a structured means of representing the elements of the model. The various elements can then be combined at varying levels of detail to create a complete and consistent description of a complex system.

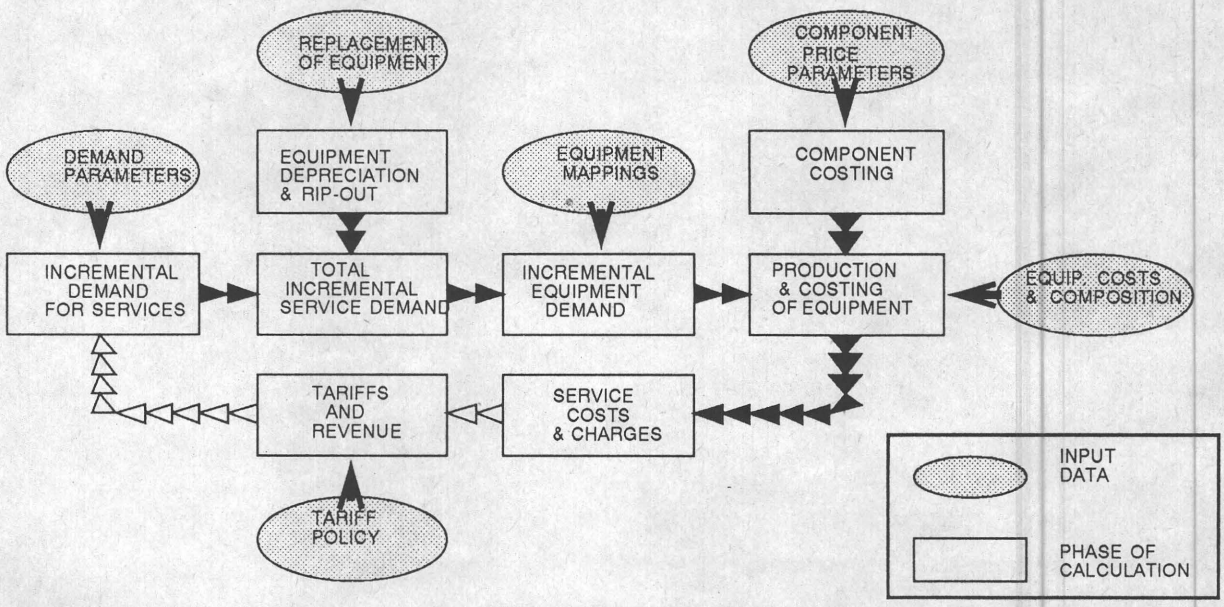
THE CALCULATION CYCLE

STEM models represent the dynamic changes to systems such as telecommunications networks, using an annual cycle which is repeated for each year for a specified time period. The diagram below summarises the basic cycle; it shows how demand for services is mapped on to demand for equipment, which is met by the installation of the additional specifics required (if any) taking into account the existing network and depreciation of existing plant. The newly installed equipment is costed through its components, and the various costs are allocated back to services. Finally the tariff may influence demand as the cycle is repeated for the following year.

USES AND USERS

Strategic models are used because they can provide a coherent and structured approach to the analysis of alternative strategies and give a better understanding of the possible consequences, risks and opportunities of particular approaches. The advantages of using such a system include the following:

-users can build the representation of an issue step-by-step



-first results can be generated quickly

-users can focus in on significant issues as work proceeds

-the representation can be refined once a framework has been established

-the level of detail can be increased without having to reconstruct the model

-users can structure their problems and address common issues within a common framework, so allowing comparison of results and wide communication between users

-the system can help to focus debate, thus making divergence of views and of assumptions explicit

-the understanding of issues between different departments and different companies can be increased

STEM has already proved its value in a number of areas, both within and outside the field of telecommunications. The principal user groups include:

i. Research Consortia running projects under CEC R&D programmes such as Research and Development in Advanced Communications Technologies in Europe (RACE) and Dedicated Road Infrastructure for Vehicle Safety in Europe (DRIVE).

To allow wide communication and comparison of results between the participants, and to aid consensus formation by providing a common framework for the evaluation of alternative strategies.

ii. Telecommunications Service Providers

To estimate the economic effects of alternative equipment provision policies and to examine fluctuations in service demand.

iii. Telecommunications Equipment Manufacturers

To present quantitative economic cases in their marketing activities; to plan future production strategy and company policy; and to develop cost targets in their production.

iv. Telecommunications Service Regulators

To explore the economic effects of alternative tariff policies and to examine the sharing of network equipment between service providers.

Further information can be obtained from:

Graham Daborn
STEM Product Manager
ANALYSYS Ltd
8-9 Jesus Lane
Cambridge CB5 8BA
GREAT BRITAIN
Telephone: +44 223 460600
Telefax: +44 223 460866

BOOK-REVIEW

TELECOMMUNICATIONS FOR EUROPE 1992: THE CEC SOURCES.

Editors: **Ungerer, H., Berben, C. and Costello, N.P.**

Amsterdam: I.O.S., 1989, 487 pp.

This volume presents together for the first time Council directives, regulations or resolutions, as well as reports from the European Parliament dealing with the Commission's initiatives and plans for telecommunications. The seminal Green Paper on the Development of the Common Market for Telecommunication Services and Equipment (now already two years old) is given pride of place in this compilation.

It is certainly appropriate to quote from the foreword written by Michel Carpentier, Director-General of the DG XIII: "Telecommunication is going through dramatic changes in Europe. And this requires a European dimension ..... Access to information has become the key to prosperity and growth .... it binds industry, services and markets together. ... (I) would like to add that the work of developing the policy process which justifies this publication has depended and will continue to depend on the dedicated work of those in the Telecommunications Policy Directorate....."

An introduction by Prof. Jens C. Arnbak of Delft University draws attention to the fact that telecommunications has only recently been perceived as perhaps the socially and economically most significant

area of information technology, and goes on to discuss the European balance between technology supply and user needs.

The volume is concluded by Prof. I.T.M. Schuringa, Director of Telecommunications in DG XIII, who draws attention to the importance of the approval by the Council of the initial proposal of the six action lines contained in the Commission's proposal of May 18, 1984:

1. Establishment of medium and long term objectives at Community level.
2. Definition and implementation of an R & D programme
3. Broadening of the terminal market and development of Community solidarity towards the outside world.
4. Joint development of the transnational parts of the future telecommunications infrastructure in the Community.
5. Intensive use of modern telecommunication techniques for the advancement and development of the infrastructure in the least favoured regions of the Community.
6. Progessive broadening of those parts of the telecommunications equipment market dominated by carrier procurement.

The publishers are offering this publication at a special price of DFL 150 to all readers of IES News for orders received before August 1, 1989, after which the normal price of DFL 185 will apply.

Orders to: I.O.S.
Van Diemenstraat 94
1013 CN AMSTERDAM
THE NETHERLANDS

ASSESSMENT '89: THE STATUS AND DIRECTION OF TELECOMMUNICATIONS POLICY IN EUROPE

LUXEMBOURG, 11-12 MAY, 1989

Leading experts in the field of telecommunications from many countries met at this seminar to present their perspectives on the future of telecommunications policy in Europe.

The first session "Who represents Europe" was chaired by Michel Carpentier, Director-General of DG XIII. He felt that the challenges which currently face the field of European telecommunications are more difficult than those presented to countries such as the United States of America, where an interconnected network is already a reality. Europe is still an agglomeration of different countries, varying cultures and dissimilar communication structures with different operators and regulations which all make the realisation of an interconnected network that much more difficult to achieve. Despite these differences, however, Europe has seen some significant modifications in the last 5 years and this has, very importantly, resulted in a strong will for an interlinked European network and a desire for common standards which would provide the means to reach that elusive goal.

Dr. Andrea Caruso, Director-General of EUTELSAT (European Telecommunications Satellite Organisation) next expressed his concern about how international satellite telecommunications networks were being affected by "the wind of deregulation". Telecommunications which were traditionally considered as a public service of high social importance to be provided under government control at a low cost are now being labelled as monopolistic and are becoming a playground for "commercial speculation" from which only the big commercial users would profit and which would increase costs and affect adversely the quality and reliability of the services. He stressed that if changes were introduced, they should be done in a fair and proper manner so that the principle of deregulation is applicable to all operators, regardless of their nature, quality and objectives and that consistency at government level should be maintained.

J-P Chamoux, in his position as Head of the Regulation Mission of the French Ministry of PTT was also concerned about aspects of regulation. Within France, the operational and economic regulatory functions have been separated in order to create a competitive environment which will guarantee market participation for everyone on a reasonable basis. The French PTT now operates in a different environment, having changed from being preoccupied with engineering considerations to emphasising the user's needs within the market. A public monopoly of telecommunications in France was now no longer a reality.

Olof Nordling, co-ordinator of International Affairs of the Swedish Telecom Group, then drew attention to the fact that Sweden is easily forgotten, yet it contributes significantly to various Commission programmes (eg. RACE). In Swe-

ASSESSMENT '89: THE STATUS AND DIRECTION OF TELECOMMUNICATIONS POLICY IN EUROPE

LUXEMBOURG, 11-12 MAY, 1989

den there is active promotion of liberalisation and it seems that this has resulted in improved services, a very limited degree of regulation. In fact, in Sweden, the word "liberalisation" is preferred to "deregulation". This distinction was expanded upon when Dr. K.H. Neumann outlined developments within the Deutsche Bundespost, from an economic perspective. Dr. Neumann felt that liberalisation could be seen as the introduction of competition in markets, or an opening up of markets, whereas deregulation could be viewed as the reduction of regulatory constraints. It was felt that these distinctions were a useful aid for further debates in this area.

The second session entitled: "An Open Market or Fortress Europe" brought new ideas with Takefumi Kubota of C.ITOH, France, proposing that Japan's attitude towards European investors was far more open than the reverse situation. Philippe Gluntz of Alcatel NV presented the contrasting view by pointing out that it was very difficult for a non-Japanese or non-US company to participate in Japanese or US government funded research projects, but more importantly, he stressed the necessity of working towards global standardisation. Bruce Crockett of COMSAT introduced the American perspective and emphasised that liberalisation would open many doors of opportunity to the EC members, as well as providing opportunities for the non-EC countries and businesses.

At the conference dinner, Jacques Santer, the Prime Minister of Luxembourg, highlighted the important role that the field of telecommunications fulfils in today's dynamic environment and the necessity of converting from a patchwork of national protected areas to open European structures. Additionally, he congratulated the organisers for chosing Luxembourg as the venue for the conference, referring to that country's depiction as "neutral island ... (permitting) the exchange of ideas with the objective of compromise within a complex and often conflictual world".

The deregulation debate was continued on the second day by Dr. Wim Dik outlining reasons for the deregulation of the Dutch PTT and how cumbersome the decision-making process would be were it controlled by the State. This presentation was complemented by Jean Grenier, director of France Telecom, who indicated that the French situation closely parallels that of the Netherlands. He felt that deregulation does not actually exist but that it is rather a case of re-regulation - which provided much food for thought for the delegates. He concluded that we should all strive for a truly free market for telecommunications services and equipment but he also warned that a free market does not necessarily mean a deregulated market and that a deregulated market is not always free.

The title of Mark Fowler's presentation: "Snakes, Toxins and Telecommunications Deregulation: making the most of every bite", lightened the tone of the seminar but this did not undermine the essential message he wanted to convey: that the deregulation of long-maintained government policies must be performed with care. He was able to use examples from the United States experience in telecommunications in order to illustrate how user needs and demands resulted in a policy of deregulation. He felt that the essential question was how much deregulation would be enough to "get the job done".

Richard Butler, Secretary-General of the ITU (International Telecommunications Union) indicated that the ITU would have to adapt to the dynamic situation in the national and international telecommunications environments. He continued by saying that the ITU could be regarded as a mirror of developments within the telecommunications industry and should therefore ensure that it has the means not only to reflect these developments but to adequately deal with them.

The title of the final session, "Mobile Communications and VSATs: Cracks in the Dam?" introduced an interesting facet of the deregulation issue. Luigi Gasparollo of Selena Spazio in Italy outlined the impact which VSATs (Very Small Aperture Satellites) have made in the US and how they could possibly be integrated with existing national telecommunication networks in Europe. The European applications would, however, be more limited than those in the US. If the VSAT concept were extended to the multinational European environment, the complexity of problems would be increased due to the existence of different terrestrial data networks in each country and varying response times, in addi-

tion to the disparate services being offered. In Italy, the PTT policy favours the introduction of VSAT networks and their integration with the public networks and their integration with the public network, and a shared Hub service for the area of Rome and Milan would be operational this year. Guy le François explained how, towards the end of 1985, ALCATEL Telspace, together with an American Company, was involved with the development of a VSAT system. By 1987, FASTAR, the ALCATEL VSAT was a purely European venture. He also drew attention to the necessity of a defined European policy.

The final speaker of the conference was Roland Mahler of the Deutsche Bundespost who informed us that the bill on restructuring the DBP was being passed at the very time that the conference was taking place. What could previously have been regarded as "cracks in the dams" protecting the monopolies of mobile and satellite communications, were being opened up and dealt with in a more competitive manner. He felt that because of the new regulatory economic and harmonisation conditions in Europe, mobile communications seemed to have a bright future.

The conference was organised by:

JOHANNESSON & ASSOCIATES, Luxembourg

from where further details can be obtained.

NEWS FROM EUROKOM

THE NEW EUROCONTACT APPROACH

The personal computer version of the Eurocontact database has now been installed at the National Contact Points (NCPs) throughout the Member States. Potential participants in Commission-funded research programmes can now make the initial approach to their local NCP to get assistance, and to obtain and complete Data Entry forms for the system.

When data have been assembled at the various local offices, they will be transmitted to the central EuroKom host, collated there, and the full database will then be re-distributed back to the NCPs. In this way, each local office will have, in addition to data about local researchers, all the data regarding the researchers from the other Member States. The new system is now being used to register participants for the MEL (Microelectronic) Call, which was announced in May. In parallel with the installation of the PC version in the various countries, the central system is being migrated from the GEC machine to the EuroKom host. This will enable, in the long term, better integration of the EuroKom and Eurocontact services, and to pass information between the two databases.

The intention is that the new central system will be available from September of this year. This will mean that researchers throughout Europe, who are looking for potential partners, will at that time have two options.

- They can approach their NCPs and get assistance there to perform a database search, or

- They can register as online users of the database themselves, and sign on directly to the system via their local Public Data Network. The mainframe system is now under test; it is a full-screen menu-driven system designed to be used with minimal prior knowledge or expertise.

The combination of the local system and the new mainframe system herald a significant step forward for IES assistance to Community research programmes generally, and are part of an on-going programme to continue to provide improved and integrated services to our user community.

FOR IES SERVICES - CALL 1992

Users will know that there are three separate Network User Addresses (NUA's) for the two IES Services hosted by the EuroKom site, the EuroKom Conferencing service (with two NUA's) and the Eurocontact service (with one NUA).

Since these services are now being combined into one machine, and since it is desirable to add further NUA addresses, to enhance accessibility, "Hunting-Group NUA" has been installed recently. This means that users now only need to know

NEWS FROM EUROKOM

one NUA, since calling this NUA will switch them to whichever NUA is available at the time. This will provide a number of benefits to users:

- Those users who include the NUA into a "Script" or command-file at their local machines will no longer have to change these files if low-level NUA numbers are added or altered. Even if an NUA develops a fault, the group NUA will hunt past it to a functional number.

- Loading will be balanced automatically across the low-level NUA addresses. At the moment, most users call a specific NUA by force of habit, and, if that NUA is busy, often do not attempt the alternative NUA, although both are documented in the User Manual. With the new system, there will be eventually six low-level NUA's, and users calling the hunting NUA will connect automatically with whichever of these is least loaded.

And the rather clever feature of the new NUA is that it is believed that users will have little difficulty remembering the number, as it is made up as follows:

2724 (for Ireland)
31 (for Dublin) and
001992 (for the EuroKom service)

This Hunting NUA is now available, and can be used by all users. Just to reinforce the point, all users can now forget about

~~272431540002~~ and ~~272431540003~~

and use only

272431001992

USER LEVELS AND ACTIVITY

The upswing in user numbers reported in the last issue of IES News continues unabated. Total registered users now approaches 1800. The trend over the last year shows that user levels remained steady during the wind-down of Esprit I projects, and growth has been consistent since last September, as new users from Esprit II and other new programmes began to appear in increasing numbers.

Total number of users, however, although an important measure of growth, is a somewhat meaningless statistic by itself. Comparing the EuroKom service stastistics with those of longer and more established commercial competitors, it is always gratifying to note that EuroKom user activity levels are, in general, much higher, and recent performance is no exception to this.

- In May, for the first time, users passed the 10.000 texts per month barrier. (This means that, on average, each user writes about 6 texts per month. This compares with activity levels in commercial networks of the order of one text per month.)

- Another milestone was passed in May, due to the fact that over a thousand users signed on during that month. This puts overall "activity" level at 57%, that is, 57 out of every hundred users accessed the service. By comparison, the largest commercial network in Europe would be very happy if even 10 out of every 100 users were to sign on in a given month.

A full list of NCP addresses can be obtained from the EuroKom offices or from IES-News.

EuroKom Brussels
Rue Guimard 15
Tel.: +32 2 513 1915
Fax.: +32 2 513 2853
or
EuroKom Dublin
Belfield, Dublin 4
Tel.: +353 1 697 890
Fax.: +353 1 838 605

This issue of "IES-News" is the first for which type-setting and layout, including graphics, were done in-house by a desk-top publishing system.
We would welcome reader comments and suggestions.

Esprit
Information Exchange System

IES NEWS

Issue No 22, June 1989

Having just returned from the RARE Networkshop in Trieste (see page 9) at which the importance of a European Research Network for the future of research progress was stressed, I cannot help but have a feeling of nostalgia. Back in 1947, also in May, the Royal Society of London convened an international meeting in which we all had great hopes as ushering in a new age of information sharing and transfer. Even though computers were then still in their infancy with thousands of valves and of monstrous size, visionaries like Bernal, Blackett and Vanevar Bush talked about scientists worldwide sharing their results using these new media. Science-fiction writers like Clarke and Asimov talked about "knowledge" networks and satellite transmission of data in their writings, and we, their readers, idly dismissed such ideas, forgetting perhaps the lessons which could have been learned by seeing how earlier "eccentric" predictions of Jules Verne or H.G. Wells had been turned into reality. Maybe we should have seen the possible realisation of such wild dreams, so that there

EDITOR'S CORNER

could have been a common pull towards compatible developments.

There are always some opportunities which may be missed by a too conservative outlook. The history of science and technology must be full of such failures, and hindsight is expensive in these cases. Learning from such omissions is therefore a must, and we should consciously avoid taking actions which might fragment a world where networking of scientists for the good of all mankind remains a dream, which today can be realised technologically, but is hindered by other considerations, be they economic or political. Creation of knowledge has become expensive. Two-hundred years ago Diderot set up a detailed tree of human knowledge filling one page. Today this would be impossible and rapid, unrestricted sharing of new knowledge and data may be one easy way of bringing the tree of knowledge back into a manageable perspective. The aims of RARE are therefore welcome news for all.

Esprit
DGXIII
Telecommunications
Information Industries
and Innovation

FUTURE EVENTS

IMAGE PROCESSING.
I.E.E. Warwick,
18 - 20 July, 1989.

INFORMATION TECHNOLOGY AND THE RESEARCH PROCESS.
The British Library R&D Dept., Cranfield,
18 - 21 July 1989

TRAINING FOR THE INFORMATION FUTURE:
Education for Library and Information Sciences.
The British Council, Eastbourne,
16 - 18 August 1989.

MT SUMMIT II.
DGD, Frankfurt
16 - 18 August 1989.

12TH INTERNATIONAL CONGRESS ON CYBERNETICS.
International Association for Cybernetics, Namur,
21 - 25 August 1989.

11TH INTERNATIONAL JOINT CONFERENCE ON ARTIFICIAL INTELLIGENCE.
IJCAII, Detroit, Michigan,
20 - 25 August 1989.,

FUTURE EVENTS

APPLICATION. OF SUPERCOMPUTERS IN ENGINEERING.
Computational Mechanics Institute, Southampton,
5 - 7 September 1989.

EUROPEAN CONFERENCE ON CIRCUIT THEORY AND DESIGN.
I.E.E., Brighton,
5 -8 September 1989.

HOLOGRAPHIC SYSTEMS, COMPONENTS AND APPLICATIONS.
Institution of Electronic and Radio Engineers, Bath,
11 - 13 September 1989.

SOFTWARE ENGINEERING FOR REAL TIME SYSTEMS.
Institution of Electronic and Radio Engineers, Cirencester,
18 - 20 September 1989

EXPLORING NETWORKS.
NCUF Workshop Conference, Nottingham,
19 - 21 September 1989.

EXPERT SYSTEMS 89.
Clearway International, London,
20 - 22 September 1989.

ELECTRONIC DATA INTERCHANGE - 1992 AND BEYOND.
ESC and IDEA, Brussels,
20 - 21 September 1989.

ELECTRONIC MEDIA.
ITU, Geneva,
3 - 8 October 1989.