Published on behalf of the DGXIII: Telecommunications, Information Industries and Innovation
Responsible Editor: Peter Popper
European Institute for Information Management
13, rue de Bragance
L-1255 Luxembourg
Production: Editions Saphir
23, rue des Genêts
L-1621 Luxembourg
ISSN 0257-4373

Esprit
Information Exchange System

iesnews

Issue No 16, June 1988

1 Introduction

ISO and CCITT have been working for nearly 8 years on standards for FDTs (Formal Description Techniques). The objectives of these FDTs are:

- unambiguous, clear and concise specifications
- a basis for determining completeness of specifications
- a foundation for analysing specifications for correctness, effectiveness, etc.
- a basis for determining consistency of specifications relative to each other
- a basis for implementation support.

Formal Description of OSI Standards

Work is now reaching completion on standards for the FDTs Estelle (Extended Finite State Machine Language), LOTOS (Language Of Temporal Ordering Specification), and SDL (Specification and Description Language). Final texts of the Estelle and LOTOS standards should be produced in September 1988. The final text of the SDL recommendation was approved in March 1988. It has sometimes been assumed by experts outside the field that the three FDTs are in competition with each other. In fact, their individual strengths and weaknesses make them suitable for different tasks and for different purposes, so they should be seen as complementary.

The European Commission has strongly supported the development and application of FDTs. Projects wich have been funded include ABM (Cost 11 ter), BEST (RACE), PANGLOSS (ESPRIT), SED (ESPRIT), SEDOS (ESPRIT), and SPECS (RACE). National programs such as Alvey (UK) have also supported FDTs.

LATE NEWS

IES Data Collections Password

Please note that as of 1. September 1988 the free public password "IES" to the DC service will no longer be operative. Access to these databases will still be free, but you will have to register as an ECHO user. To do this, either leave a message on ECHO the next time you long-in using the IES password (with the relevant instructions given by typing "Info Mailbox) or write to ECHO, 170 Route d'Esch, 1471-Luxembourg.

DRIVE: Call for Proposals

Following the expected adoption on 29 June of the DRIVE (Dedicated Road safety system and Intelligent Vehicles in Europe Program), a Call for Proposals will be launched in July. Further information from the DRIVE Central Office, 200 Rue de la Loi, B-1049 Brussels (Tel. +32-2-236-1130).

THIS ISSUE:

Formal Description of OSI Standards

2 Benefits of FDTs

With a specification written in an FDT, an accurate description of system behaviour can be given. Descriptions written so far with the FDTs mostly deal with the behaviour of data communications services and protocols, and with telecommunications switching systems. Other kinds of behaviour could be specified, for instance the description of the dialogue between a user and a system.

A high-level description explains exactly how a system should behave. It describes only its behaviour, not the realisation of that behaviour, implementation details are excluded. The description is also exact: there are no loose ends or specifications gaps, and behaviour is described for all possible system inputs. Since an FDT is defined mathematically, computers can be used in the development process.

A high-level description focusses on system functionality; such an implementation-independent description is appropriate in a definitive Standard. Implementation-independence can also make descriptions re-usable for future systems. Howewer, it may also be advantageous to give a more implementation-oriented description so as to assist the production of conforming implementations.

Getting a complete and unambiguous high-level description before most of the detailed design decisions are made is one of the most important benefits of using an FDT. A high-level description is the basis for further development of the system, leading to more detailed descriptions, and finally to an implementation. At each step in the design process, implementation decisions and restrictions are made more explicit. Each detailed description can be checked (with computer assistance) for conformance to the specification it is derived from. In principle, implementation tests can be derived automatically form the original specification. A formal description also gives the precise relationship between components of a system. It can therefore be a good basis for project planning.

3 Tools for FDTs

FDT tools are needed for writing and changing descriptions. These tools can incorporate some kind of source version-control system to keep track of different versions. Verification tools are also important: a description which is not checked for correctness loses much of its value as an exact description of a system or a standard.

FDT tools can be divided into two categories: static and dynamic. Static tools deal only with language aspects of the FDT used for a description. Into this category fall editors, formatters, syntax and static semantics checkers, teaching tools, and static report-generators which analyse the use of language constructs. Dynamic tools deal with the behaviour of the specified system. They can be used to verity whether the system will behave as required, for example to bee free from (unwanted) deadlock or livelock. Useful tools in ths area are simulators, prototype generators, and theorem-provers. The benefit of these tools is that it is possible to experiment with a system at an early stage, thus giving confidence in its behaviour. If the description is of a system to be built, dynamic tools can help to discover misunderstandings between the client and the specifier.

FDT tools can also be used to assist implementation and to verify whether an implementation conforms to its specification. When stepwise refinement technques are used in the process of going from the specification to an implementation, verification can be done for each refinement step. The tools in this category include compilers, code generators, interpreters, validators, and test sequence generators. The benefit of these tools is that they help to avoid the introduction of errors during the design process.

4 Overview of the FDTs

The following is a brief and non-technical overview of the FDTs. Apart from the defining documents there are tutorials on the FDTs. Other source of information are comparative studies and guidelines for FDT application.

4.1 Estelle

Estelle is a formally-defined specification language for describing distributed or concurrent processing systems, in particular those which implement OSI services and protocols. The language is based on widely used and accepted concepts of communicating, non-deterministic, finite state machines. An Estelle specification defines a system of hierarchically-structured state machines. The machines communicate by exchanging messages through bi-directional channels connecting their communication ports. These

messages are queued at either end of the channel. The actions of machines are specified in a dialect of Pascal, hence familiarity with Pascal makes Estelle specifications easily readable.

Estelle language mechanisms allow modeling of synchronous and asynchronous parallelism between state machines of a specified system. They also permit dynamic development of the system configuration.

Estelle specifications can be prepared at different levels of abstraction, from abstract to implementation-orented. The latter may be derived from the former with the aid of supporting tools. Since all Estelle concepts are rigorously defined, tools which accurately reflect the language can be developed.

4.2 LOTOS

LOTOS is a mathematically-defined FDT, developed from a large, well-established body of theory based on the formal specification languages CCS (Calculus of Communicating Systems), CSP (Communicating Sequential Processes), and ACT ONE (for description of Abstract Data Types). The well-defined mathematical foundation of LOTOS provides a solid basis for analysis and for development of reliable tools, including simulators, compilers, and test sequence generators.

The basic constructs of LOTOS allow modeling of sequencing, choice, concurrency, and non-determinism in an entirely unambiguous way. LOTOS also permits modeling of synchronous or asynchronous communication. LOTOS may be used to specify exactly the allowed behaviours of a system, i.e. the set of all behaviours which may be observed of a conforming implementation. Furthermore, LOTOS permits the description of allowed behaviours without describing how is may be achieved, or by describing particular mechanisms which achieve the required behaviour.

4.3 SDL

SDL is based on a extended finite state machine model, supplemented by capabilities for Abstract Data Types which are very similar to those used in the ACT ONE part of LOTOS. This combination is supported by a well defined formal semantics.

SDL provides constructs to represent structures, behaviours, interfaces, and communication links. In addition, it provides constructs for abstraction, module encapsulation, and refinement. All of these constructs were designed to assist the representation of a variety of telecommunications system specifications, including aspects of services and protocols. SDL is widely used in the telecommunications community, and is well supported by a variety of tools, some of which are generally available.

5 Application of FDTs

The FDTs have been used to produce formal descriptions of many OSI and telecommunications Standards. Examples of formal descriptions include: ODP (Open Distributed Processing), FTAM (File Transfer and Manipulation), ACSE (Application Control Service Elements), X-25, ISDN, and Signalling Systems No. 7. A number of formal descriptions has also been written of OSI Services and Protocols.

6 Finding out More

The References give some pointers to the large number of documents on FDTs. As well as the defining standards there are a number of tutorial articles and training courses for those who want a more gentle introduction. A timely Conference devoted exclusively to the FDTs will take place at the University of Stirling from 6th to 9th September 1988. For more information please contact the Conference Chairman:

Prof. Ken Turner
Department of Computing Science
University of Stirling
Stirling FK9 1LA
Scotland
Telephone: +44-786-73171
Facsimile: +44-786-63000
Telex: 777557 STUNIV G
Email: kjt@cs.stir.ac.uk
EuroKom: Ken Turner UST

7 Acknowledgements

This article is based in part on the joint ISO and CCITT document 'Guidelines for Application of Estelle, LOTOS, and SDL', for which I am the editor. I am grateful to my FDT colleagues for their contributions to this work, and also to the FDT cause generally.

Prof. KEN TURNER
University of Stirling

8 References

[1] Bolognesi, T. and Brinksma, H.: Introduction to the ISO Specification Lan-

Formal Description of OSI Standards

guage LOTOS. Computer Networks and ISDN Systems, 14 (1), pp. 25-29, North-Holland, Amsterdam, 1988

[2] Budkowski, S.: Estelle Tutorial, Proc. 7th International Conference on Protocol Specification, Testing, and Verification, Zurich, May 1987

[3] CCITT: Specification and Description Language International Consultative Committee for Telephony and Telegraphy, Z.100, Geneva, March 1988

[4] ISO: Information Processing Systems – Open Systems Interconnection – Estelle, A Formal Description Technique based on an Extened State Transition Model, International Organisation for Standardisation, DIS 9074, Geneva, July 1987

[5] ISO: Information Processing Systems – Open Systems Interconnection – LOTOS, A Formal Description Technique based on the Temporal Ordering of Observational Behaviour, DIS 8807, International Organisation for Standardisation, Geneva, July 1987

[6] ISO: Guidelines for the Application of Estelle, LOTOS, and SDL, ISO/IEC JTC1/SC21/WG1 Mcl 65, International Organisation for Standardisation, Geneva, March 1988

[7] Saracco, R. and Tilanus, P.A.J.: CCITT SDL: Overview of the Language and its Applications. Computer Networks and ISDN Systems, 13(2), pp. 65-74, North-Holland, Amsterdam, 1987

[8] Turner, K. J.: LOTOS – A Pratical Formal Description Technique for OSI, Proc. International Conf. on Open Systems, pp. 265-280, London, March 1987.

Normes Européennes de Télécommunications - NETs

One of the little publicised and hence less well known, although most important activities of the Commission in the area of standardisation and harmonisation relates to the setting up of a mechanism in conjunction with CEPT for technical recommendations on terminal equipment to be converted formally into standards known as NETs, which will apply in all CEPT member countries. A recent development to simplify procedures has been the setting up of the Technical Recommendations Applications Committee (TRAC) which guides the various CEPT technical working groups.

One of the major steps forward in European standardisation is the mutual recognition in the 17 CEPT countries (Table 1) of test results and type approval. This means, that equipment permitted for use in one CEPT member country automatically is admitted for the same application in the other 16 members, i.e. one approval by a relevant PTT for a potential user population of 350 millions. In addition the use of NETs wills be mandatory for network operator (including PTT) purchasing specifications. The driving thought for the evolution of NETs was the fear that various national ISDN developments might lead to incompatibilities or differences, which could be avoided from the start by ensuring common standards.

TABLE 1

Countries in which NETs will apply

Austria
Belgium
Denmark
Finland
France
F.R. Germany
Greece
Ireland
Italy
Luxembourg
Netherlands
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom

Initial guidelines set up by TRAC recommend that potential NETs should contain both exact technical requirements described in clear and concise terms and conformity tests and methods for all potential requirements; in addition differences in existing national specifications in present networks should be clearly identified. A program of NETs to be elaborated has been prepared by TRAC (Table 2). Of this list of ten, half cover terminal facilities (NETs 5-9), with the others dealing with network access.

One of the basic considerations relates to safety requirements: these must be common to all networks and CENELEC, the European electrotechnical standards organisation, is currently working on a draft European standard (ENV) for safety of telecommunication networks. It is the intention that separate access NETs will apply to each type of network, laying down common requirements (additional to safety considerations) which must be com-

Normes Européennes de Télécommunications - NETs

plied with by all terminals which are to be type approved.

A terminal-specific NET with functional requirements may apply in addition to an access NET, or, where a specific NET does not exist, a terminal may have to satisfy published national standards. In some instances there may be no additional terminal-specific requirements and compliance with the access NET may suffice for approval to be given.

Differences could arise on details contained in NETs when used for type approval or as part of a purchase specification. Too few or too simple requirements laid down in a NET could endanger correct network operation, whilst the other end of the scale could inhibit introduction of innovations in equipment or testing expenses would become prohibitively high. Before such conflicts could become damaging to the work on NETs, TRAC has specified minimal contents to meet the aims of an access NET. These are avoidance of disturbance to the network, successful routing of calls but no guarantee of terminal-to-terminal operation. The last stipulation may appear surprising, but in expectation that an access NET may have to serve a number of terminals or applications, including some not yet thought of, avoidance of requirements which could act as brake on new developments is important. As far as terminal NETs are concerned, only those requirements should be included which ensure compatibility with an international service or achieve end-to-end compatibility of a defined telecommunication service.

Successful implementation of the work program of TRAC will have a significant influence in setting type-approval requirements and procedures for ISDN terminals in the CEPT member states and ultimately throughout the rest of Europe. Fears were expressed some time ago that major differences could arise in ISDN establishment in individual countries, but the road ahead looks good for the creation of a single European market for terminals and related equipment. A further proof, if that be needed, of full European collaboration and Community initiatives at the right time and place.

TABLE 2

TRAC program of NETs

NET 1	X-21 Access
NET 2	2 X-25 Access
NET 3	ISDN Basic Access
NET 4	PSTN Basic Access
NET 5	Digital Telephony
NET 6	Analogue Modem (V. 32)
NET 7	Group 3 Facsimile
NET 8	Teletex
NET 9	ISDN Terminal Adaptor (X-21)
NET 10	Pan-European Digital Cellular Radio Access

IT Press Release Bulletin Board

Following the announcement of this new IES service in our last issue, this Public Conference is now open on EuroKom. We would like to remind you that we expect details of new developments in your institution or enterprise for posting. Please remember to alert your colleagues responsible for press releases to put us on their mailing lists.

The Helpline (+ 352-453030) and the other IES services are also available to assist you.

The Editor

Computer "Viruses"

The brief note in the April issue of IES News has brought a number of comments and references to recent literature. The most extensive note appears in the May - June issue of "The Computer Law and Security Report" and makes horrifying reading. Leaving aside the "humorous" attempt of causing a network breakdown by a self-multiplying X-mas message, the carefully prepared plans of sabotaging all governmental files in one country, fortunately prevented at the last minute, clearly show the dangers of such manipulations. There also is a telling note in the May issue of "Connectivity" and attention has also been drawn to an article by M. Dubash in the April issue of "Pratical Computing". One suggestion received warns of software obtained from "bucket shops", especially when the origin is not clearly documented. Any reader experiences?

Data Broadcasting and CD-Rom offer new Solution to Data Base Delivery

The development of CD-ROM has provided a high-density data storage medium for inhouse use, where frequent access offers substantial advantages over online usage on a remote host. One of the major disadvantages is that the data on the disk are not up-to-date, with the intervals between remastering sometimes extending over more than 3 months in view of the high cost involved. This problem faced the Educational Counselling and Credit Transfer Information Services (ECCTIS) in the UK. ECCTIS hold a data base of some 40.000 higher education courses and indications of available places: this was made available over PRESTEL, Brit. Telecom's videotex service, but demand proved so heavy that access difficulties were encountered and potential students found the expense high. Using the CD-ROM was considered to offer a cheaper, multisite solution, but information had to be updated daily, not feasible with this medium.

However, BBC ENTERPRISES have developed a data broadcasting system, in their DATACAST division, which utilises spare capacity in the broadcast television service. Transmissions are received by micros equiped with TV aerials and small decoders. Suitable software then enables data transmitted via the Datacast service to be deposited on a floppy disk and to be read simultaneously with the CD-ROM in such a way as to be transparent to the user who is directed to the most up-to-date information.

The advantages of the hybrid system are self-evident:

- the information is distributed widely, so the cost of delivery decreases,
- users have access to a large database at low cost with a simple interface and lack of time pressure (to hold down costs) compared to online.
- updating is very fast and can be in real-time.

ECCTIS plans to introduce a subscription scheme for its CD-ROM which will be updated every 4 months. To exploit the daily updates, an interface board will be required as well as an aerial and a decoder. The service should be fully operational by mid-1988 and contracts between ECCTIS and Datacast are about to be finalised. A further contract will aim at examining whether the interface should be put in RAM, on floppy or hard disk. Efforts to reduce the cost of the workstation are also in hand.

DATA BROADCASTING is becoming very populuar in the UK with the possibility of encrypting services to restrict access to the information by non-subscribers. BBC Datacast is a packet-based system (not, properly speaking, teletext), transmitted along their open-access teletext service CEEFAX. (A parallel service operated by the Independent Broadcasting Authority goes out alongside the ORACLE service.) A further service is the Public Display Quote service on FM radio offered by TELERATE for financial information to some 130 subscribers in the London area. Datacast services are not restricted to the ECCTIS application but also service the Stock Exchange, the Financial Times, the Post Office and a chain of betting shops.

Current regulations in the UK prohibit using data broadcasting for closed user groups. It is not intended for data broadcasting to be used to bypass the public switched network, and computer communication functions should be handled through lines or by using BT International's SatStream data transmission service. The implication for other data providers wishing to exploit the ECCTIS/Datacast technique for database distribution is that applications must be available to anyone wishing to subscribe.

Another exciting CD-ROM project that has now become a reality is ADONIS: the distribution of full texts (facsimiles) of papers published in over 200 medical and biochemical journals. Turn-round time for mastering has been reduced to three days and distributed disks have reached Australia or Mexico before the printed journal. Each new disk supplied carries on its index information which is downloaded on a PC and updated, so that there is a complete up-to-date index available to users who can locate the CD-ROM they wish to use to retrieve the full paper they need. Currently, all data are bit-mapped, giving each CD-ROM a capacity of 6.000 printed pages (the copies printed out by laser printer reproduce exactly the original journal pages). By splitting text and diagrams, with the former stored as ASCII file, each disk will in future hold 30.000 pages. This ambitious project, which has been in the wings for many years, is now available and working. Having seen a demonstration and also examined some of the feedback from remote users, your Editor freely admits that his scepticism of the early days of ADONIS was misplaced – I am glad that I was wrong.

Information on the DELTA Program

DELTA

(Development of European Learning through Technological Advance)

DELTA takes a systems view of European learning, and puts forward an exploratory action for providing Europe with learning equipment and systems for the future. It is to be a collaborative Research and Development program of the European Community – one of three designed to help the application of information technolgy and of telecommunications (IT & T) to key areas of economic and social importance. It is aimed at IT & T industry, multi-media publishers and educational technologists.

The rapid rate of change of technology implies the need for continuous training and retraining. **The most economical way to meet this challenge is to use the same technologies of information and telecommunication which are re-shaping our whole environment.**

A DELTA Exploratory Phase, to which the Council has provisionally agreed on the 11th of April 1988, will last for a maximum of 24 months, with a contribution of 20 million ECUs from the Community Budget. The basis of the projects will be cost sharing between the participants and the Community. The contribution of the participants will be not less than 50% of the total cost of the project. For universities and research institutes, funding may be 100% of the additional costs involved in participation. Proposals should reflect industrial, media and learning interests. **It is hoped that commercial interests will take up the challenge, and lead in putting forward proposals.**

The research is to be pre-competitive; that is, it must relate to that stage of cooperation between the various partners at which they can work together without affecting their will or their ability to compete in the market-place. The work in the exploratory phase must have value in its own right for the industry at large, and the action must also consider how to capitalise on the output of this exploration.

The research is also intended to be incremental. This means that DELTA will be based on other developments already in the pipeline; for example the emerging results of ESPRIT and RACE. **DELTA will support the research and development required to enable these emerging technologies to be utilised for the benefit of learning.** The devices and techniques to be addressed include: higher functionality in hardware design, including image processing, larger and cheaper storage, with relevant techniques of data organisation, Direct Broadcasting by Satellite, the Integrated Services Digital Network, the use of artificial intelligence, access by near-natural language and in the more distant future switched broadband communications. In the initial action, the emphasis will be on building synergy between learning requirements and emerging technology, while creating the European critical mass dimension by the development of an intercept strategy between these technologies, learning interests and industry.

The total DELTA concept distinguishes three time horizons which DELTA will traverse, each bringing its contribution of identifiable technological advances. Annex 1 sets out these horizons.

The program is currently divided into five lines of action which are listed in Annex 2. The call for proposals (see below) is likely to be based on tasks related to these headings.

Preparing to apply (a call for proposals should be issued in July 1988). It is to be emphasised that DELTA is a program for research and development in **learning technology;** it is **not intended to support the writing of courseware** – which is part of COMETT's brief. Intending participants would be well advised to take note of the content of the work program as it stands at present, since the call for proposals will relate to the headings und subheadings of the program of work as it is approved by the DELTA Management Committee. The need for a commercial participant in each proposal is particularly to be noted, and, of course, for partners in other Community countries. Ideally, organisations wishing to participate in DELTA should already be clearing their lines with possible partners in advance of the call for proposals. To this end, the **Eurocontact** facility is being made operational for DELTA, as is **Eurokom,** the European E-mail system.

Other DELTA activities. During the preparatory phase there were two DELTA Seminars, at the second of which, in October 1986, the Reports of 16 contractors on the workplan were presented. These have since been published. This activity, and the latest developments, have aroused considerable interest, and as a result **some 2000 individu-**

Information on the DELTA Program

DELTA

(Development of European Learning through Technological Advance)

als and organisations have expressed an overall interest in DELTA. These will be kept informed of progress with the timetable and development of the DELTA Exploratory Phase.

There is also a growing database – over 800 entries so far – containing classified details, European-wide, of organisations involved in learning research and their interests in the DELTA domain. Those who return their questionnaire will receive in return a full set of responses and an index. The details of these returns are soon to be available online as part of the Eurcontact database. This should be useful both in its own right and as an eventual help to potential DELTA participants seeking partners.

For further information please contact DELTA Central Office, TREV 00/1, C.E.C., 200 Rue de la Loi, B-1049 BRUXELLES.
Tel. +32-2-236-20 76,
Fax: +32-2-236-239 2.

Annex 1
Time Horizons

The three time horizons which DELTA aims to traverse are:

Exploratory Phase: 1989-1990
Enhancement of Current Technology
Planning the synergy and standards strategy for success.

Level II: 1990-1995
ISDN (Intergrated Services Digital Network)
More powerful PC's (32/64 bit, >100 Mbyte)
Image processing
Direct Broadcasting by Satellite
Artificial Intelligence components.

Level III: 1995-2000
Integrated Broadband Communications
Characteristics of Intelligence in Systems
Natural Language / Voice interfaces.

Annex 2
DELTA Action Lines

Action Line 1 is a concertation on system requirements via a Reference Model, which will also serve the planning and management of the program. The tasks include evolution and maintenance of the model, and the cration of a grouping that enables the actors to articulate technical and related factors.

Action Line 2 provides for the collaborative research and development of the equipment and systems required – both hardware and software. The items covered under this line of action include:

1. **Learner Environment - Home, Office, Specialised**
   Portable Educational Tool Environment (PETE)
   Training Server
   Learner Expert System
   Personal Electronic Library
   Electronic Notebook
2. **Authoring Facility**
   Software Workbench
3. **Production Environment**
   Multimedia integration
4. **Tutoring and Monitoring**
   Tutoring Facility
   Intelligent monitoring of performance
5. **Information Resource Management**
   On-line European Learning Resource Directory
   Intelligent Information Accessing

Action Line 3 comprises testing and validation, including the communications; an important component is **"SOFT" - Satellite Open Facility for Testing,** aimed at the trial use of satellites for learning. It includes:

1. Video-audio conferencing
2. Information and program exchange system.
3. Adaptation to ISDN
4. SOFT operational plan
5. Design and spcificatio of a Satellite Educational Channel
6. Controlled experimentation via SOFT

Action Line 4 has the obejctive of **"interoperability"** - i.e. support for the participation of the learning interest in the ongoing work on standards of all sorts.

1. Identification of standards relevant to learning
2. Organisational support for learning standards.

Action Line 5 seeks the **creation of favourable conditions** for learning:

1. Fiscal Treatment
2. Regulatory conditions
3. Telecommunications policy
4. Copyright and author's policy

COSINE NEWS

Cooperation for Open systems Interconnection Networking in Europe.

COSINE News intends to cover viewpoints of all parties with interest in COSINE.

Chairman of COSINE calls for alliance between industry and PTTs

Planned approach required to realise federative and user-driven networks

Under the aegis of COSINE, common principles for the future of networking have now been established by the major research networks. European industry will develop a market; the PTTs, a pilot community; and the user's satisfaction, if research networks, governments, the Commission of the European Communities, PTTs/PTOs, the industry and local facilities managers adopt a joint planned approach. This was the message of Dr P. Tindemans, Chairman of the COSINE Policy Group to the audience of the Nachrichtentechnisches Kolloquium, Institut für Mathematik, Universität Bern (Switzerland) held on 5 May 1988.

He stressed the importance of strongly coordinated actions in the implementation phase, in order to arrive at the federative solution that COSINE has adopted. For managerial, technical and financial reasons, closeness of operationl responsibility to the user seems advisable. Another reason is that the telecommunications world is undergoing fundamental changes due to recent deregulatory moves, which are expected to trigger a considerable increase in the number of services offered. A distributed set of networks may be able to achieve a better synergy between the greater variety of network services and the user requirements.

Current ideas within RARE and COSINE on the project's implementation phase focus first of all on the need for a Program Management Unit to manage international service-related and user-group-related projects. The Program Management Unit's task will be to support, monitor and coordinate the migration of national networks by providing technical and managerial assistance and promote the availability of services and products from PTTs/PTOs and industrial suppliers.

Secondly, it seems advisable that an informal alliance of industries and PTTs be established to express the commitment of industry and PTTs/PTOs to support the COSINE implementation. The CEPT, or at least several PTTs, and those supplier industries which are playing an active role on the European IT stage or have a dominant position in the research community, would participate in this alliance. Its informal nature should reflect that the participants support a common objective: it would not be a joint venture, but rather serve as a vehicle for the harmonisation of the policies of participants in scientific networking in Europe. Such an alliance could be of help in the management of network services, in the development, testing, provision and operation of products, in the managerial performance in the Implementation Phase, as well as in the training and education of technical and managerial staff.

In his lecture Dr Tindemans stressed the importance of the economic aspects of COSINE. European industry should be able to find in OSI an opportunity to regain lost ground. In his opinion, it is a matter of concern that European based manufacturers do not yet lead the way. RARE and COSINE are working to involve companies in the Specification Phase activities. As Dr Tindemans put it: "While industry should do it, governments and the CEC might provide the carrot and sometimes point at the stick. Each effort to bring together European IT industry, as well as other companies who have a strong European presence and dominate the research community's IT-equipment market, deserves consideration very urgently."

Successful RARE Networkshop 1988

This year the fourth international RARE Networkshop took place in Les Diablerets, Switzerland from 16 to 18 May. RARE (Réseaux Associés pour la Recherche Européenne; the European organisation of national research networks and their users) each year organises a Networkshop in order to have a broad discussion related to the harmonised use of research networks, to review the progress in this area and to stimulate new work within the organisation. To ensure a broad involvement, both geographically and by interest, participation to the Networkshop is by invitation via the RARE members.

Last year's Networkshop was held in Valencia, Spain, and was attended by about 130 people. This year 177 people attended over 40 presentations concerning the various aspects of networking. Some major topics were: The COSINE project, Overview of RARE activities, LAN/WAN Interworking, Future high speed and broadband services, Service management, and the various migration paths of existing networks towards OSI.

The Networkshop was hosted by SWITCH, the Swiss research network and CERN, the European Institute for High Energy Particle Physics. Prof. Hochstrasser (Swiss Ministry of Education) and Dr. Thresher (CERN) delivered the opening speeches. Prof. Hochstrasser stated that Switzerland wants to contribute as much as possible to the European integration efforts on networking. Dr. Thresher underlined that RARE has achieved much in the last few years. The opening speeches were followed by an overview of the RARE activities, where the RARE working groups delivered their yearly reports.

The presentations were not restricted to the European situation. Xiaofan Zhao (North China Institute of Computing Technology) presented the current networking situation in China, where the use of OSI is required by law (cf. the European situation for public purchasing following Council Decision 87/95 EEC) and a part of the Chinese 5-year plan. Mr. Zhao said: "China is much more open than ever before and will surely be more open in future, we therefore welcome co-operation." (See also p. 19) China is considering becoming an Associate Member of RARE. Steve Wolff (National Science Foundation, USA) gave an overview of existing research networks in the US which have come together to form the FRICC (Federal Research Internet Coordination Committee), namely NSF, NASA and the federal departments DOE, DOD and DHHS.
FRICC hopes to foster better co-ordination between the US and Europe through yet another committee which met just before the Networkshop. Early goals include an OSI-gateway between Europe and the US.
At the Networkshop a plenary discussion was held on the Implementation Phase of the COSINE project. The Eureka project COSINE intends to establish rapidly an OSI environment to make data communication services available to users from academia and industrial research organisations. RARE is currently undertaking the COSINE Specification Phase, which includes the identification of user needs, selection of urgently needed services and if possible future services, evaluating the existing European telecommunication services as well as identifying the range of systems to be provided with communication facilities. The first reports of the COSINE Specification Phase are now ready and will be published shortly. The Specification Phase ends on 1 July 1988. RARE is now in the process of preparing a proposal for the COSINE Implementation Phase, which it is hoped to start on 1 January 1980.

RARE's first Annual Report was presented at the Networkshop. This report gives an overview of the main activities of RARE in 1987: the Message Handling Services (MHS) project, the COSINE project, Activities of the RARE Working Group, the 1987 Networkshop and the Opening of the RARE secretariat in Amsterdam, The Netherlands. An overview of all presentations at the Networkshop will be given in the Proceedings that will be published in a special RARE issue of the Elsevier journal "Computer Networks and ISDN Systems" in September.

Further information on RARE and copies of the Annual Report can be obtained from the RARE secretariat, Postbus 41882, 1009 DB Amsterdam, The Netherlands, tel. +31 20 5925078.

Procurement Policy and Autonomous Decision-Making: UK Project GOSIP as an example of Procurement

Should public procurement policies be imposed or not? This is the question examined in this article, against the background of the main policy goals of COSINE. In the opinion of Dr. John Beale, COSINE's project officer, the answer is yes, with good reason. The goals of COSINE are on the one hand to establish a European network-

ing infrastructure for researchers based on OSI standards, and on the other hand to create a market pull effect for OSI products and services in the European research community. In the near future, even user groups beyond this community, such as information technology professionals in business, industry and government, will benefit from the achievements of COSINE. This article does not give definite answers, but hightlights the GOSIP initiative in the UK (Government Open Systems Interconnection Profile, not to be confused with the GOSIP project in the USA), which may give European government officials an idea of the procurement regulations developed for UK and provoke discussion. (See also p. 22)

Most COSINE member states are in favour of adopting OSI, but await the availability of stable industrial products in order to implement transitions. However, because the emergence of such products cannot at present be predicted, firm governmental procurement plans have not yet been drawn up. Therefore serious consideration must be given to the way in which a market pull effect will be generated.

GOSIP: The most effective way

The UK Government is a major user of Information Technology, operating a wide range of data processing systems, office automation facilities and telecommunications networks handling all forms of information. The Central Computer and Telecommunications Agency (CCTA) seeks to promote the best use of IT and to assist Government Departments with the formulation and implementation of their IT strategies. CCTA's business is to supply knowledge, information and advice to assist Departments in effective planning, implementation and use of IT. The Agency publishes a quarterly magazine called BITS (Buying Information Technology Systems), which covers a wide variety of procurement-related topics. CCTA reported recently on the supply of current OSI products and the plans of fourteen of the most significant vendors.

Proliferation subsets OSI protocol layers

The OSI layered architecture supports the objective of achieving interworking. However, the range of users, application services and network types which have to be supported demands a complex proliferation of subsets, classes, options and other variations on relevant OSI protocol layers in order to meet the requirements and characteristics of specific interworking environments. To address real user needs in terms of profiles covering all the communications aspects of a distributed system, management services, security services, naming and addressing conventions, directory services and registration procedures will all be necessary. The Government OSI Profile (GOSIP) was developed by the CCTA to provide further specific guidance to Departments and suppliers. GOSIP is the expression of CCTA's policy commitment to OSI as the most effective way of ensuring that Departments can make best use of IT. GOSIP sees functional profiles as a necessary further step in the application of OSI in practice. GOSIP may perhaps be described as a "narrow stack" selection of particular OSI protocols for a particular user environment, primarily in areas of distributed data processing and office automation. The standard profiles of GOSIP are seen as an important development for the UK public sector. They facilitate procurement and acceptance testing of communications based products, ensuring that different and separately procured departmental systems can interwork, and provide clear specifications to manufacturers.

Commonality of functional profiles

GOSIP recognises that a careful selection from the OSI base standards is necessary, often at a very detailed level, in order to make such standards suitable for use in procurement and to ensure that appropriate products and testing services are available. Therefore, GOSIP gives authority to the development of functional profiles. CCTA aims to achieve a degree of commonality of these functional profiles. GOSIP utilises international standards and the output of the functional standards groups such as CEPT, CEN/CENELEC, NBS, SPAG, British Telecom, COS, MAP and TOP user groups and the GOSIP equivalent for the US. These are to be applied in the context of the UK Government for procurement purposes. With this approach not only is interworking achieved between user groups whose functional requirements result in different profiles, but the scale of the implementation task for manufacturers is also mimimised.

Encourage suppliers

The GOSIP specifications are made public in order to encourage suppliers to develop conforming products and testing facilities. It can be argued that with a proliferation of features and facilities even the largest manufacturer is unlikely to have the resources to satisfy all possible demands. This should not only encourage a greater number of suppliers to embark on OSI implementation programs, with increased confidence that a definite market exists, but should also ensure that a sufficient choice of real supplier products is available to meet a particular procurement specification. CCTA expects that much of GOSIP will have wider application in both commerce and it is keen to encourage other major users to adopt identical or equivalent specifications so as not to fragment suppliers' development resources.

Sources: COSINE national activities report by Dr. John Beale, Project Officer COSINE, CEC; speech at COMPAT 88 by Norman Lamb, Head of Standards, CCTA, on GOSIP; article provided by CCTA GOSIP Scope & Design Consideration; BITS special edition October 1987.

EWOS to define functional profiles for interworking

The European Workshop on Open Systems (EWOS) is a recently established open forum which aims to reach consensus on functional profiles and corresponding test specifications in order to allow interworking between various computer systems on the basis of international standards. The forum structure was chosen in order to enable EWOS to address the requirements of a range of different user groups. EWOS provides the workshop function which allows wider participations in the technical work on profiles and takes a global approach to standardisation and coordinates with both the Asian and Oceanian Workshop for Open Systems in Tokyo and the NBS Workshop for OSI implementors in the USA. Its founding members are: CEN/CENELEC, the supplier groups SPAG and ECMA, OSITOP, EMUG, RARE and COSINE.

EWOS held its first Technical Assembly on 1-2 March in Brussels. Some 40 organisations were represented at the event, amongst them COSINE and RARE, and Mr. Ulrich Hartmann of Siemens (Munich) was elected Chairman. The Technical Assembly defined its first program of work for the coming year, which will include: MHS (message handling systems); FTAM (file transfer, access and management); lower layers (physical connection layers of the OSI model) and ODA (office document architecture). Other suggestions for new work items included virtual terminal connection, directory services and high performance OSI – real time processing for MAP and TOP applications.

The technical work in EWOS will be covered by a number of Expert Groups reporting to the Technical Assembly, which will meet four times a year to examine the results of their work. A meeting was scheduled for June 13-14.

The results produced by EWOS will be set out in EWOS Documents (EDs). Once an ED has been approved by the EWOS Technical Assembly, it may be submitted to CEN/CENELEC where it can be ratified firstly as a European PLG-standard (ENV) and eventually as a European standard (EN). An ED may also be submitted to ISO/IEC for international ratification.

The corresponding Working Groups of CEN/CENELEC will act as the starting point for EWOS Expert Groups, but wider participation is required and any organisation – supplier, service provider, user – is welcome to join. However, only those which participate in the EWOS Expert Groups will have a vote within the forum. The main representative of the research community in EWOS is RARE, which is expected to participate in the Expert Groups. COSINE is represented in EWOS since it has a strong interest in ensuring that functional profiles acceptable to its target community are definded as quickly as possible. Mr. Keith Bartlett of DTI (UK) has been nominated as COSINE's representative on the EWOS Steering Committee, alternating with Mr. Lars Algotsson of Televerket (Sweden). COSINE will rely partly on RARE for experts, but urgently requires more from industrial research and development institutes. Those interested in participating may obtain details from Dr. John Beale, COSINE's project officer and representative at the Technical Assembly.

Iceland Recommends OSI as a Future Objective

In Iceland most of the work related to networking for R&D is being done at the University of Iceland and at individual research institutes. In 1987 the "Association for Research Networks in Iceland" (SURIS) was formed, in which all major publicly funded research and higher education institutes participate, and most of the country's major software houses and computer suppliers are supporting members. SURIS has declared support of open systems in its statutes. The most significant contributors to networking development in Iceland, both in terms of time and money, are the University of Iceland and the Marine Research Institute.

The Research Council (RC) of the Ministry of Education and Culture coordinates all R&D activities and advises the Icelandic government on policy matters. It has not yet issued a policy on communication protocols or networking but OSI was recommended as a future objective in a 1986 report on the status of information technology.

There are approximately 800 workstations, all of which require electronic mail, file transfer and remote login. There are signs of increased cooperation between Icelandic scientists and their counterparts in other countries using data transfer.

Current Infrastructure

The state-owned PTT operates a PSDN with seven domestic nodes and two physical connections out of the country, through which access to most other PSDN services is available. PSDN tariffs in Iceland seem to compare favourably with those operating elsewhere. Iceland has just one domestic WAN consisting of some 15 nodes running UUCP on UNIX operating systems, using both dial-up lines and

the PSDN. This network is also connected to the international EUNET nodes of EARN and the R&D MHS network at the University of Iceland, but these are only accessible via the university data switches.

SURIS plans to establish a national gateway to the major foreign networks. Furthermore, it tries to influence and harmonise its domestic networks. In doing so it emphasises the importance of conformance to OSI, but lack of central funding and the insufficient availability of OSI products are likely to cause problems. It is therefore possible that Institutes will in the short term have to use whichever protocols are available and affordable, in the hope that these will eventually become OSI compatible. As the only body in Iceland fully committed to OSI, SURIS has limited means. It will however continue to participate in NORDUNET and RARE, and relies on COSINE to accelerate the development of a market for OSI products and services.

Denmark Harmonises Networks

In Denmark existing networks are currently being harmonised and a country-wide network of Ethernet sites is under construction. Publicly funded research is carried out by institutions in several ministries and computing resources are funded by the individual institutions with little inter-ministerial coordination. The Ministry of Education – which administers the universities and funds individual research projects through Research Councils – has established a Computing Board to advise on funding computing resources for its institutions. The major part of the money administered by the Computing Board is for common facilities and networks, operated by the National Computing Centre for Research: UNI-C. This centre, established in 1985, serves both public and private research institutions and plays an active role in coordinating networking for researchers.

The actual and potential network users include researchers working at the institutions mentioned above, about 3000 university researchers, and a similar number at the other institutions. With users from industry, the total size of the community is about 10.000. Today, the number of actual users of networking facilities ist estimated at around 1.000. The services used comprise remote login, electronic mail and conferencing, file transfer and remote job submission and retrieval. The networks used are EARN, EUNET, a pilot X-400 network and a number of DEC-nets. Electronic mail is available between all networks using gateways inside and outside the country, but file transfer and remote job handling is limited to one single network. Remote login via X-28 is generally available.

64 Kbits's Connections for Ethernets

Amongst this variety of networks, EARN has thirteen nodes of Amdahl, IBM, VAX, CDC and Sperry, whereas EUNET has 45 nodes of UNIX systems. The X-400 pilot network comprises five VAX machines with EAN software. These are all connected to corresponding networks outside the country. EARN uses leased lines, EUNET dial-up lines or X-28 PAD, and the pilot X-400 uses X-25 connections. To interconnect Ethernet sites, a national network of 64 Kbit's – 2 Mbit's is currently being installed. Many different services will be available on this network.

There are no specific plans for moving to OSI, but the Computer Board and UNI-C intend to establish and operate an open network infrastructure based on international standards, in close collaboration with the public telecommunications operators. As in most European countries however, the present demand for network services necessitates that any available technology will have to be used to satisfy current demand. Although there are no specific funds earmarked for moves towards OSI, it may nevertheless be expected that part of the Computer Board's networking budget will be made available for OSI activities. About 70 computers will need OSI software and that number is growing. This Computer Board might be expected to finance explicit costs in relation to building up an OSI network but no decisions have been made. Procurement policies are based on directives of the Commission of the European Communities. So far procurements have been made on a purely price/performance/functionality basis. In Denmark, there is little tradition for compulsory purchase.

Factors impeding the move to OSI in Denmark seem to be manpower and availability of products. A smooth transition from current activities will be required, therefore the scenario for moving to OSI is still unclear. Meanwhile, international cooperation is a major factor in the planning. Denmark participates in the NORDUNET program, which has implemented a pilot X-400 service and is planning more OSI services. NORDUNET collaborates closely with RARE and expects the COSINE initiative to be of fundamental importance in defining the path towards OSI.

UNINETT Stimulates Demand and Development of OSI Networking in Norway

The development of R&D networks in Norway has so far been a cooperative effort, mainly between the universities and some research institutes. Funds are provided from the general allocation given to the universities and from grants provided for special projects, mainly from the Research Council for Technology. There are five Research Councils, all of which support projects requiring the use of networks. In addition, various ministries, countries, municipalities and industry, support research programs. In 1987 the Ministry of Cultural and Scientific Affairs set up the organisation UNINETT, which provides an infrastructure for academic networking on the basis of OSI standards. The main purpose of UNINETT is to stimulate demand for and development of OSI products. In principle UNINETT will eventually encompass the entire higher educational sector, which at present comprises about 20.000 employees and 100.000 students.

Current Infrastructure

Norway has seven wide area networks in use in research communities, as well as various dedicated and private networks. The international networks are: – EARN, EUNET (European UNIX Network), ARPA (US research network), and HEPnet (High energy physics). The national networks are: – UNINETT, BIBSYS (networks university library users) and a number of DECnets – general purpose networks for DEC equipment, used for supercomputer communication. The university community requires 24-hour availability of the network infrastructure. Universities are at present connected by various leased lines in addition to packet switched and dial-up lines. The aim is to have 64 Kbit's connections between all universities as soon as possible.

UNINETT to Encompass EARN Functionalities in 1900

In the move towards OSI the aim is ultimately to create a single research network. UNINETT coordinates the various existing networks, promotes their harmonisation, and will organise transition to OSI as soon as the products necessary to maintain existing levels of functionality become available. UNINETT will participate actively in the coordination of EARN activities during 1988 in order to encompass EARN services by January 1989. The EARN transition to X-25 and X-400 should then be completed, and other services will be continued until equivalent OSI based services can be introduced. International cooperation, particularly in the areas of standards and specification, development, testing and implementation, is essential if this transition is to be achieved. COSINE will be instrumental in this context.

COSINE NEWS CONTRIBUTED BY

WERNER & THOOLEN
W.G. Plein 232
1054 SE Amsterdam
The Netherlands

Bridging the Gap between Paper and Electronics

The Paper Interface

Paper has been the traditional medium for storage and transfer of information in offices, as well as trade and privately for many centuries, predating even the invention of printing. The arrival of new media for these functions is of very recent date - telephone, telegram, telex are all less than a hundred years old, and modern electronic means barely twenty. Introduction of computers into offices has brought with it many new and exciting options, but also many new problems.

Paper and electronics, the paperless office, are sometimes regarded as competitors and the question is raised, who will win. A careful assessment of the advantages and disadvantages of handling paper-based and electronically-stored information leads to the not unexpected conclusion that both systems will co-exist for the foreseeable future to form the backbone of office life as we know it today. It seems certain that the electronic office will become the basis of internal communication within large and medium organisations, but smaller companies too will acquire PCs to aid office routines and provide a measure of automation.

On the other hand, paper looks like remaining the standard medium for information transfer between organisations and to some extent also within organisations. The rapid strides in newer technologies like Desktop Publishing combined with laser printers will result in a increasing consumption of paper. The wish to produce high-quality documents which can be distributed will ensure this, and at present only the paper medium meets this requirement.

Even in fully computerised organisations, paper will retain its importance as an information carrier until an equivalent electronic means emerges which permits usage by inexperienced staff members and has paper's ease of portability. Staff will continue to print, read, correct, modify and ultimately store paper documents for themselves.

In order to optimise the benefits of the two media, it will therefore be essential to bridge the gap between them without loss of the information carried. To meet this aim will require powerful tools for the automated transfer of information from paper to electronic documents and vice versa.

ESPRIT Project 295, the Paper Interface, has as its aim the provision of such tools. To achieve this goal, emphasis is on four main points of attack: FROM, TO and WITH PAPER, and INTEGRATION.

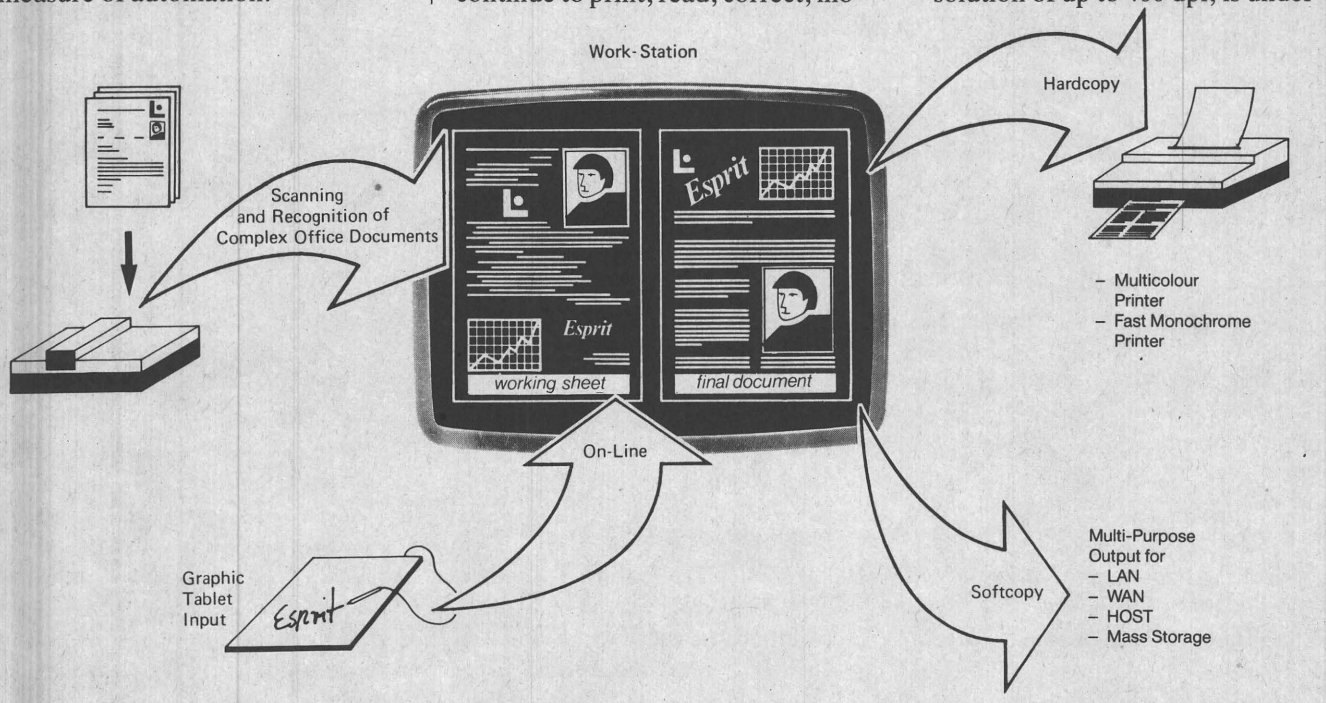
From Paper

To transfer information from paper, composed multicolour paper documents are automatically scanned and analysed. Handwritten and printed text as well as line graphics are recognised and automatically transformed into their electronic equivalent.

Activities are focussed on:

* **Multicolour Scanner Development**

  A multicolour scanner, with a resolution of up to 400 dpi, is under



Bridging the Gap between Paper and Electronics

The Paper Interface

development. The document size can be up to A3 format, scanning will be possible either in a flat bed or pass-through mode with automatic document feed. It will be possible to scan in binary or multi-level mode (monochrome or colour) depending on the selected function.

* **Image Analysis**

After the scanning process a raster image of the page forms the basis for further processing. A subsequent connectivity analysis results in a database containing all connected regions of the images together with their border lines, area measures of roundness, etc. and a description of the hierarchical relationship of the objects. The following task is to distinguish between photographs, text and graphics. Photographic images are extracted, the text/graphics separation yields potential text and graphics objects which then are further processed, text is recognised and graphics objects are analysed.

* **Analysis of Graphics**

Analysing graphical objects implies more than a simple vectorisation of lines. Knowledge about the application context is necessary and is used to handle the problem. All analyses consist of two parts, analysis of allowed symbols within the application context and, if necessary, analysis of connecting lines.

* **Handwriting Recognizer**

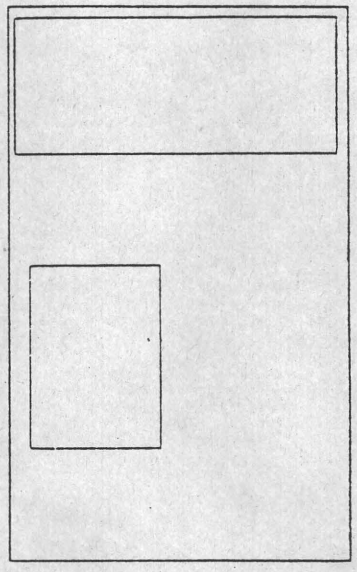
After size and slant normalisation, potential characters are recognised. Recognition is a hierarchical polynomial classifier which was designed and adapted to handwriting.

With Paper

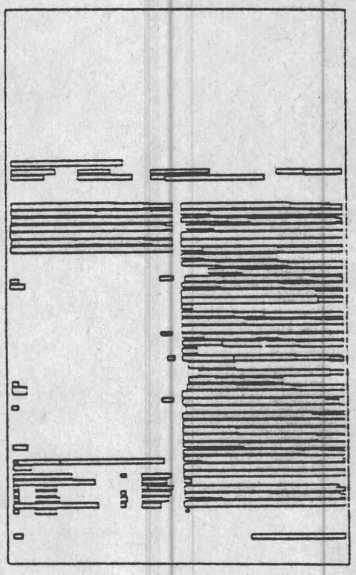
The objectives of the script recognition work are aimed ultimately towards electronic paper, allowing the user a natural medium for generating, editing and annotating documents online. The work is broken down into three key areas:

* Recognition of the lower-case alphabet, initially with a contrained user base.
* Progression towards a user-independent lower-case recognition system, the extension of the character set to encompass upper-case characters and numerals with some special characters, and examination of some basic natural editing functions.
* Investigation into cursive handwriting, and migration of the non-cursive algorithms to cursive handwriting. The initial aim is a writer-dependent system. Inves-

(a) original raster image



(b) extraction of photographic images



(c) surrounding rectangles rectangles of text lines

Sequence of images demonstrating the current implementation status

tigations towards writer independence will be assessed.

The objective of dynamic sketch recognition is to convert a hand-drawn sketch to a drawing of draughtsman-like quality, in real time. That is, as a person draws a sketch he will see each stroke and geometric objects adjusted for alignment and regularity. This feature is intended for use in interactive drawing composition and to be completely user independent. It is anticipated that pen-driven editing will be used in conjunction which sketch recognition so that the recognised drawing can be corrected or amended in a highly interactive way.

To Paper

The increasing complexity of office documents, which may contain text, raster graphics and geometric graphics together on the same page requires high performance printing devices. A further step towards new office applications will be the addition of coloured business graphics and even multicolour images to office documents.

Electrophotographics printers have been improved continuously over recent years with respect to print uniformity, resolution, printing speed and printing costs, to that the generation of high-quality monochrome office documents is basically possible. The question is whether the high standard of performance given with monochrome laser printing can also be achieved in colour printing. Electrophotographic colour printers could probably cope with most of the office requirements, but the printer costs will be too high to employ such a printer in a workstation.

Because of the variety of available printing devices many different incompatible document formats are currently used for these printers. It is likely that this multitude of vendor-specific printing formats will

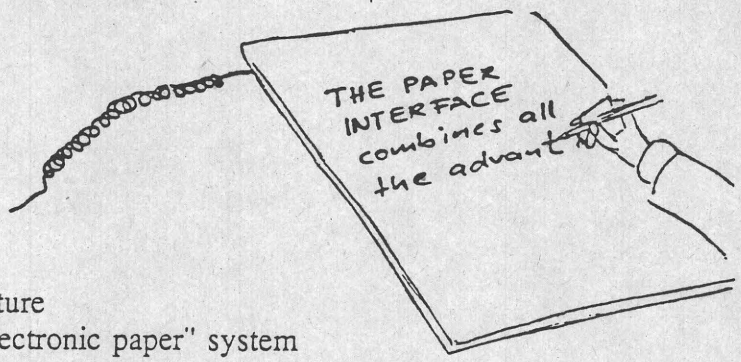
Bridging the Gap between Paper and Electronics

The Paper Interface

disappear due to emerging de facto standards or international standards.

The activities related to the transfer of electronic information aim towards the following objectives:

* Assembly of a printer controller and implementation of available de facto standards or international standards suitable as printer document format.



Future
"electronic paper" system

* Assembly of high resolution printing devices for monochrome and colour printing and connection of these printers to the printer controller.

Integration and Application

The features mentioned above have to be made accessible in an integrated system. The steps being taken in this direction are: integration of the different subsystems, and a common internal document data structure that permits an optimised exchange of information between these subsystems. The selection and use of a standardised office document architecture and document interchange format (ODA/ODIF), the generation and editing of complex documents and finally the design of a suitable human interface.

A completely satisfactory solution to all these requirements cannot be achieved within the framework of the PAPER INTERFACE project. However, it is intended to prepare a final demonstrator than can be used as the basis for future office products.

Outlook

Work is continuing to further refine the FROM, WITH and TO PAPER subsystems and to integrate them into a demonstrator. In addition, a preliminary demonstrator is planned.

It is believed that this project and its demonstrators will provide the basis for new advanced office applications, bridging the gap between paper and electronic representation of documents as needed by users. Response from such users and their participation in future work is very welcome.

The partners in this project are AEG (FRG), Olivetti (I), Philips (FRG), and Plessey (UK).

The contact address is:

AEG Aktiengesellschaft
Information Systems Division
attn.: Dr Dietrich LEVEN
1-5 Bücklestraße
D-7750 KONSTANZ

Letters to the Editor

PPSDN Tarification

Dear Editor,

We would like to make some comments on the letter by the Executive Director from Eusidic which was published in IES News No. 15, April 1988. It expressed a major concern on the policy stated by RARE. We hope that the following additional information might help to avoid this or other misinterpretation of the article in IES News, February 1988.

First of all we accept completely the three general comments on favouring faster communication equipment and a resulting policy which were made by Mr. Collier. Additionally, RARE favours as well not only a harmonisation but also major changes in the tariff structure for data communication in Europe and we consider the RARE/COSINE report on "Tariffs and Availability of Public Packet Switched Data Networks in Europe" as a valuable help for that goal.

But, one has to pay attention that all conclusions made and published in that RARE/COSINE report are restricted to tarification of Public Packet Switched Data Networks since RARE favours the usage of this existing infrastructure which is operated by experienced service providers for the Europe-wide COSINE project.

In Packet Switched Networks the resources needed from providers are time slots on data links and switching equipment. Their usage increases linearly with the number of packets sent or received. Further resources, connected to the duration of the session or the establishment of the virtual link respectively are of minor importance: Only very little table space for routing and accounting is needed in the switching equipment. Thus, for a truely cost based pricing in PPSDNs the emphasis should be based on the number of packets sent or received (volume charges) and not on duration time of the session (time charges). Our results from the survey were the following:

Firstly, this pricing policy is only applied in some countries in Europe even for domestic traffic.

Secondly, the same tarification policy should be applied when crossing intra-European or international borders (e.g. to USA) in order not to discriminate unnecessarily transborder communication. But today for international calls in the tarification scheme of European PPSDNs time charge is increasing twice as much on average as is volume charge.

Thirdly, when experiencing an actual throughput of 1000 bit/sec (sometimes to USA) on a 9600 bit/sec circuit to a PPSDN, the user pays for bad performance with a substantial increase of the session time and therefore, due to the high time charging, with substantial extra money.

Therefore, our conclusion as a statement made in the original RARE/COSINE report reads: "Besides some harmonisation of tariffs which is urgently needed, at least the COSINE users need a better suited tariff policy in national and international usage of a packet switched network: a policy which mainly considers the volume of information transmitted and less the time needed to transmit it."

We like to make an additional personal remark on tariffs of leased lines for data communication. Since there the user rents a fixed transport capacity, a flat charge which is independent of the volume of data transferred would be appropriate.

Yours faithfully

ANNE CORNILLIE-BRAUN
DFN-VEREIN
WULFDIETER BAUERFELD
DFN-VEREIN
& COSINE PROJECT TEAM

Authors of the RARE/COSINE Report 6.1 "Tariffs and Availability of PPSDNs in Europe".

N.B.: Views expressed in "Letters to the Editor" are not necessarily those of the Commission or of the Editor.

OSI Standards in China

The following item reports on the Chinese approach to OSI and on recent developments, both from a technological point of view, and in the context of China's new open policy, which has the aim of greater international cooperation and more collaborative work.

China has recognised the importance of OSI standards and decided to adhere to these and to develop her own OSI products. China also hopes to cooperate with other countries and organisations to make more contributions to the development of the OSI standards.

The China State Bureau of Standardisation (CSBS) is the administration and authority for standardisation in China. The China Technical Committee for Standardisation of Computer and Information Processing (CTCSCIP) is the technical association corresponding to ISO/TC97 (now JTC1). The Open Systems Interconnection Subcommittee (OSI-SC) is responsible for developing the Chinese versions of the OSI standards developed by ISO/TC97/SC21. The Data Communication Subcommittee (DC-SC) is responsible for developing the Chinese versions of the OSI standards developed by ISO/TC97/SC6 (Fig. 1).

The members of OSI-SC are the representatives of universities and research institutes in the field of computer networks. The chairman is Nr. Ma Rushu, North China Institute of Computing Technology (NCI).

There is also an interest group, China OSI Promotion (COSIP) which consists of representatives of manufactures and users. The author is member of both OSI-SC and COSIP.

What should be emphasised is that

- All the standards issued by BSBS, namely GB (abbreviation for National Standard in Chinese spelling, Pinyin) are part of the national law and are strictly enforced in China;
- CSBS has decided to develop a complete set of GB's which is technically aligned to the ISO/OSI Standards.

China OSI Project

There are 76 Key Projects for Science and Technology in the Seventh Five-Year Plan (1986-1990), including the Subproject 68-3-7 Large-scale Networking System Engineering and Technology, and Standardised Network System Development (China OSI Project I, for short).

Nine major Chinese institutes and universities are involved in this project. Most of them are members of OSI-SC. NCI acts as the project leader organisation. The author is the general manager and in charge of implementing the Session Layer in the OSI-Communication Processor (OSI/CP) and MOTIS (MHS) on DEC's VAX minicomputer.

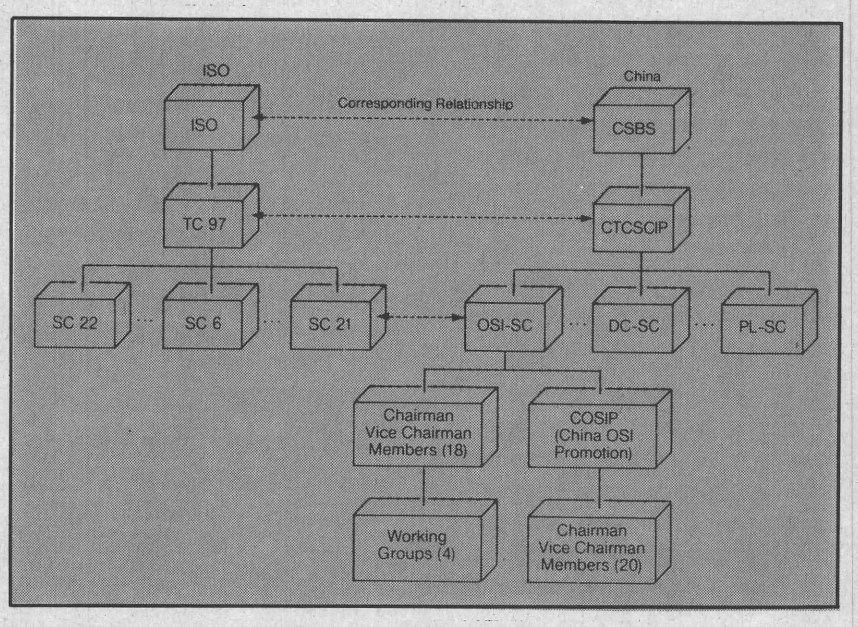


Fig. 1 China Standardisation Organisation for Information Processing

CSBS has now issued several GB's of OSI standards, including

- OSI Basic Reference Model (corresponding to ISO 7498);
- OSI Physical Layer Standards;
- OSI Data Link Layer Standards;
- OSI Network Layer Standards.

China has also started to develop a nationwide information processing system based on the OSI standards which is described below.

Requirements

The major requirements of the China OSI Project I are:

OSI Standards in China

- The OSI standards must be strictly followed;
- A nationwide heterogeneous computer network must be developed as the support environment;
- At least three groups of prefered computers, i.e. IBM mainframes, DEC minicomputers, and supermicro-computers with Intel and/or Motorola 32-bit CPU chips, must be connectable;
- It must be possible to connect other computer systems to the resulting system without much effort;
- At least three OSI-Specific Application Service Elements (SASEs), i.e. (1) File Transfer, Access and Management (FTAM), (2) Message-Oriented Text Interchange System (MOTIS), and (3) Virtual Terminal (VT), must be implemented;
- Most of the national information processing systems, especially the State Economic Information System which is the largest one in China, should be handled;
- Files written in Chinese should be processed;
- An encryption function with considerable security must be provided;
- China must retain the rights for all the developments.

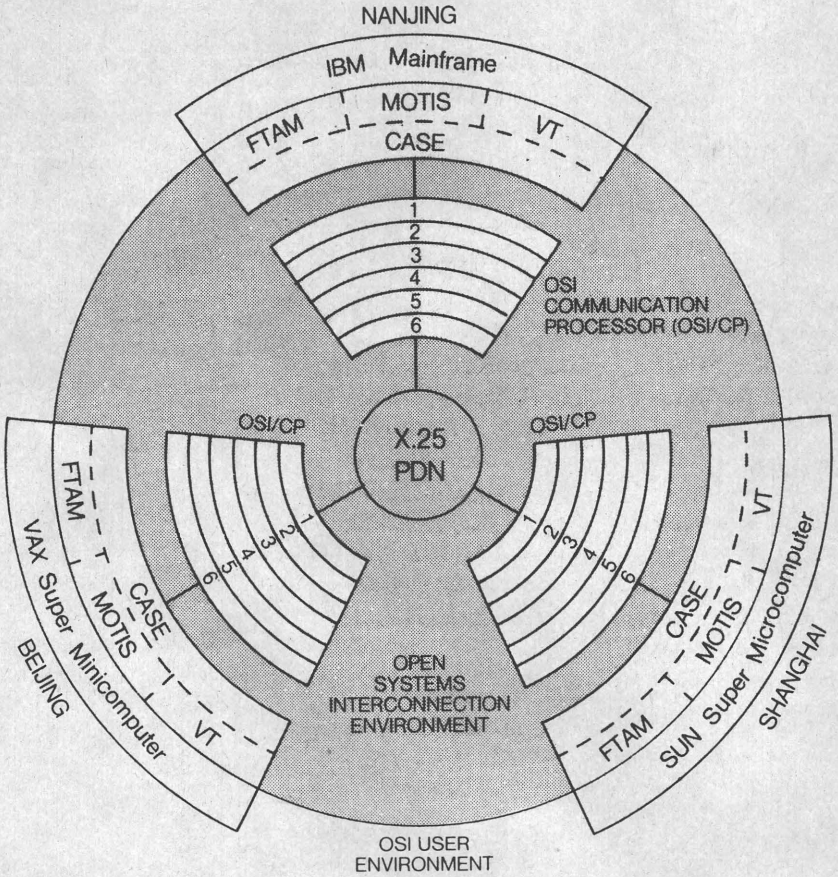


Fig. 2 Functional View of China OSI Project

The China OSI Project I is quite complex and a large-scale system engineering one which has never been attempted in China before and in which computer hardware and software, data communication, networking, distributed databases, Chinese information processing, etc. are closely involved.

The Design and Its Features

After investigation and discussion, the overall plan and schedule (Figs. 2 & 3) consisting of about 20 modules were established. Each host computer system can easily be connected to the Public Data Network (PDN) which is, of course, conformant to OSI standards.

It should be pointed out that the implementation and installation of the nationwide PDN is another key project which will be finished before the implementation of the China OSI Project I.

The unique feature of this plan is that a dedicated stand-alone OSI/CP is used for each host computer, no matter of which type, to implement the lower six layers of OSI standards. Until now, only the implementations of the lower three or four layers of OSI standards in one stand-alone processor have been achieved.

The advantages of this design could be:

- Most of the common communication tasks are processed uniformly in the OSI/CP;
- The number of different modules is greatly reduced;
- The efficiency is increased by re-

OSI Standards in China

locating the communication loads from hosts to OSI/CP;
- The cost is reduced;
- The complexity is reduced by decreasing the number of modules and the interfaces between them.

One disadvantage may be that the OSI/CP is rather complicated and expensive for connecting a single microcomputer to the OSI Environment (OSIE), but it can be used as a gateway to connect a LAN, which consists of several microcomputers, to the OSIE.

Further Development

When China OSI Project I is completed, it could provide many information processing systems with the basic set of reliable, secure and standardised services and, of course, be used as the base for the China OSI Project II to develop the complete OSIE, which has been included in the China High Technology Development Plan.

In the China OSI Project II, the emphasis will be placed mainly on the following:
- Enhancement and improvement of the resulting system of phase one;
- Development of more interfaces to other host computers;
- Installation of gateways to non-OSI information processing systems;
- Development of the OSI management;
- Implementation of more OSI SASEs, including Job Transfer and Manipulation (JTM), Directory Service, Distributed Database, Transaction Processing and Telematic Services.

Therefore, there will be more challenging work in the second phase of the China OSI Project.

Open for Cooperation

It is well known that exchanging information, helping each other's needs, coordinating and cooperating are certainly of benefit in promoting science and technology developments especially in the case of standardisation.

China, a huge potential user and supplier of information processing systems, has adopted an open policy to the world for accelerating the development process. It is necessary to install OSI standardised communication networks as soon as possible in China and interconnect them to worldwide networks.

DFN has made considerable progress and gained a wealth of experience through the practice of establishing the German Research Network. DFN's experience, methodology, policy, strategy and achievements could be used as reference model in China.

China will, as always, try her best to coordinate with all the standardisation organisations and make active contributions. There is no coubt that China will successfully implement the OSI standards and develop a whole set of OSI products. Of course, help and dooperation are always appreciated.

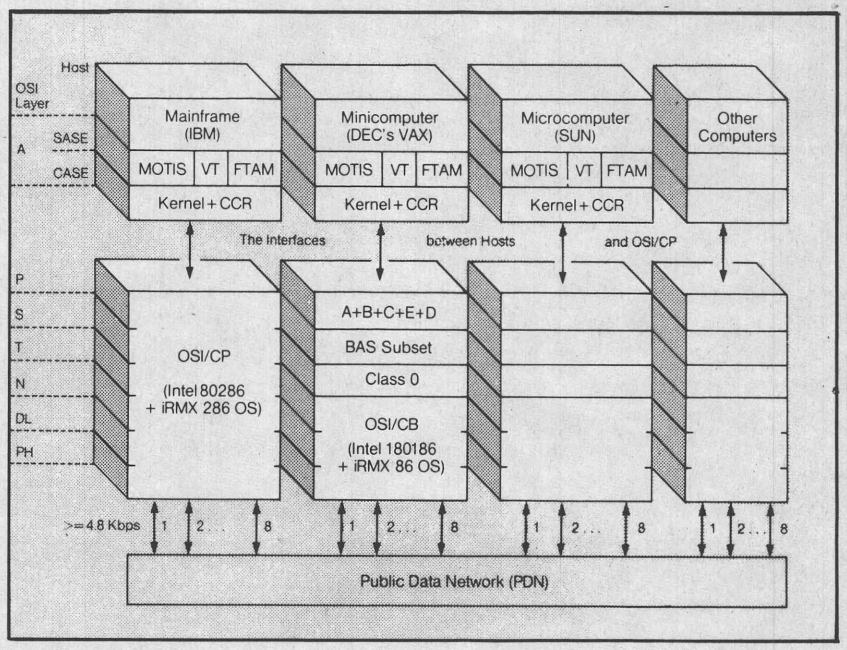


Fig. 3 Architecture of China OSI Project

XIAOFAN ZHAO
GMD, Darmstadt

Reprinted by kind permission of DFN from DFN Mitteilungen

GOSIP – The UK Government OSI Profile

GOSIP is the UK initiative for ensuring reference to OSI Standards in public procurement. It has received a great deal of attention from other European countries. Efforts are underway within the framework of European standards policy to promote a harmonised set of OSI procurement specifications. Although this is still an ongoing process it is felt that the following information may be of interest to readers.

The Central Computer and Telecommunications Agency (CCTA) issued the final Version 3.0 GOSIP documents in March. The GOSIP project produced its first scoping document in August 1986 and has since employed some one hundred and fifty voluntary contributors, drawn from Government Departments and the trade. The aim of the project was to provide a procurement specification that could be used straightforwadly by experts and non-experts alike for data communications based systems.

Although geared specifically towards a civil administration environment, GOSIP is compatible with most other functional standards and profiles that are similarly based on OSI architecture. The designation of this edition as Version 3.0 has been used deliberately to indicate alignment with MAP and TOP, the General Motors and Boeing specifications, which have also standardised on a Version 3.0. A major thrust behind the project was to bridge the gap between the North American NBS and the European CEN/CENELEC specifications. This objective was critical, not only to allow some degree of interworking between systems adhering to different profiles, but also to minimise the implementation task for manufacturers.

GOSIP subprofiles are confined at the moment to file transfer, message handling and virtual terminal services. ISO timescales preclude any significant specification of other generic support services that are recognised as desirable by the GOSIP team. These include management, security and directory services which have been identified by the project team as areas for future development work.

GOSIP fully addresses the three most widely favoured OSI network types: Ethernet (8802/3); Token Ring (8802/5), and X-25 (1984). These sub-profiles are included in the GOSIP-T model (the lower four layers of the OSI model). This splitting of the OSI stack at the Transport Service boundary reflects the independent requirements of application services (GOSIP-A) and network characteristics. Interchange formats (GOSIP-F) have, as far as possible, been specified separately to provide maximum flexibility for defining particular implementations.

The major technical content of GOSIP is contained within the Specification, which includes a detailed discussion of the overall architecture and associated issues, followed by those subprofiles for which a firm definition can currently be made. Procurement officers, however, should not need to reference the Specification. A GOSIP Procurement Handbook has been written purely for the user summarising all the information directly relevant to procuring equipment. The Handbook also contains a document known as the PICS-Protocol Implementation Conformance Statement – a proforma that can provide a contractually binding definition of requirements for the purchaser, supplier and tester.

CCTA experience has shown that procurement specifications must be testable. Tests need to demonstrate conformance and interoperability to a given level and need to be undertaken by an independent third party. To this end, CCTA worked closely throughout the project with testing centres worldwide, notably the Corporation for Open Systems (COS) in the US. Close liaison with test houses led to GOSIP recommendations of first-party testing by the supplier for acceptance for preliminary tender evaluation (provided certification is supported by the use of recognised test tools) and that third party evaluation should only be undertaken for installed systems. This has led to low-cost fixed-price agreements from test houses who will be acting in most cases simply as an insurance policy for the purchaser.

The recent EEC Decision 87/95/EEC which makes the user of OSI standards mandatory for the majority of public sector procurements, has made the release of GOSIP Version 3.0 even more welcome than originally anticipated. GOSIP has been made freely available to encourage other major users to adopt identical or equivalent specifications so as not to fragment suppliers' development resources. Other Governments are working with the project team to produce versions of GOSIP for their own use; formal alignment with US GOSIP is expected in May. CCTA expect GOSIP to be used outside the public sector, in commerce and industry where applications may be similar to those needed for Government.

Further information from: Caroline Charlton, Marketing Coordinator, GOSIP Project, CCTA.
(See also p. 10)

The International Electrotechnical Commission Quality System (IECQ)

The IECQ System is a voluntary international certification system for electronic components. The system was developed to facilitate international trade through international rules, internationally harmonised specifications, and participating countries organisations that operate in a standardised manner under the system's international rules. This mechanism assures system integrity. The system is designed to benefit both buyers and users anywhere in the world.

It operates in each country through a National Authorised Institution and a National Supervising Inspectorate (NSI) that approves manufacturers, distributors, and independent test laboratories for entry into the system. Necessary surveillance and audits of certified products are conducted.

Internationally, there is a Certification Management Committee (CMC) that is comprised of two delegates from each participating country. The CMC develops and implements operating rules, approves entry of participating countries and approves specifications for the system. The CMC is also responsible for the Inspectorate Coordination Committee (ICC) that is made up of two delegates from each full-certifying country. All IEC countries are participating countries and become full-certifying countries through the addition of a National Supervising Inspectorate to its national organisation. The ICC is responsible to the CMC for Rules of Procedure application in the quality assessment area and in coordinating the activities of the various National Supervising Inspectorates.

Within a full-certifying country, a National Authorised Institution (NAI) is required to manage the system.

Editor's Corner

(Concluded from pg. 24)

The really heartening aspect is the growing liberalisation: PTT administrations are now implementing a nonrestrictive purchasing policy and admitting for use a wider range of equipment, including items not manufactured only within their respective geographic areas – a real step forward. But more importantly, there is a realisation that there are different services offered by PPTs which require different handling. Splitting off telecommunication services from traditional ones allows more dynamic management and quicker readjustment to changed technological conditions. Il also follows, that these services should not carry the deficit of the older, traditional ones. If, and there is not dissent here, say letter post is considered a social necessity, then the costs should be borne by the whole of the community, and not by that small segment represented by telecommunication users. Inflated charges for data transmission act as an unnatural brake on developments and in the long run, are of disadvantage to the whole community, and not to a specific group only. In this context it is interesting to note, that our American friends are surprised at the high interest in Europe in databases on CD-Rom, whilst they see little real market potential for such products in their country. The answer to the difference is not far to seek – the ratio of data costs to telecommunication costs. Full realisation of current PTT plans for ISDN and other improvements will certainly bring with it a change of attitudes in this respect. The influence of the Green Paper is beginning to be seen, not least in the forthcoming realisation of the proposed European Telecommunications Standards Institute. This, following a January decision by the Director General of CEPT will be based in Nice and operated by CEPT in conjunction with industry and users. We look forward to hearing more of this new venture, its responsibilities and activities. It is a welcome step along the lines suggested in the Green Paper.

Esprit
Information Exchange System

iesnews

Issue No 16, June 1988

It is now one year since the Commission published its Green Paper on Telecommunications with the aim of furthering the completion of the internal market scheduled for 1992. The vigorous debate which followed the publication will lead to further more formal proposals which will be released before the end of the year. The Telematics revolution, the convergence of telecommunications and computer technology, is having an increasingly noticeable effect on the social and economic face of Europe. The three main driving technologies are microelectronics (the famous chip), digitalisation of telecommunications and new transmission technologies such as optical fibres or satellites.

Editor's Corner

What is happening now in Europe? Thus in the U.K., digitalisation is rapidly affecting the whole of the trunk network and some 8 million subscribers are expected to be connected by 1992. Much expansion in telex and data communications equipment markets is also foreseen for the medium-term future. In the FRG, the Datex-P service is expected to triple its users by 1990. Digitalisation is proceeding apace with much of the conversion to be completed by the late 1990s. In France, the Minitel continues is market penetration and may be one of the driving forces behind the 98% of households being telephone subscribers. Operational ISDN is due by 1990 (and having just been at Rennes and seen the work in hand at the CCETT there are some startling developments just round the corner). Spain is using the welcome "excuse" of the Olympic Games in 1992 in Barcelona and the World Trade Fair in Seville (also in 1992) to spend enormous sums in installing new telecommunication facilities. Close on 11.000 km of fibre optical cables will link 50 major cities and full ISDN facilities should also be available by them. The Netherlands too are moving ahead rapidly with improved services, inspite of their already highly developed telecommunications systems. Other countries too have ambitious plans.

(Cont'd on pg. 23)

FUTURE EVENTS

SOFTWARE ENGINEERING
I.E.E. and British Computer Society
LIVERPOOL, July 11-15, 1988

OPTICAL COMPUTING
I.E.E.E. and French Society of Optics
ORSAY,
August 30 - September 2, 1988

FORMAL DESCRIPTION TECHNIQUES
Stirling University
and British Telecom
STIRLING, September 6-9, 1988

OPTICAL COMMUNICATION
I.E.E.
BRIGHTON, September 11-15, 1988

THE REALITY OF USING OPEN SYSTEMS
Department of Trade and Industry
and Nottingham University
NOTTINGHAM
September 12-15, 1988

MODELING TECHNIQUES AND TOOLS FOR COMPUTER PERFORMANCE EVALUATION
I.E.E.E., INRIA and A.C.M.
PALMA DE MALLORCA
September 15-17, 1988

FUTURE EVENTS

COMPUTATIONAL INTELLIGENCE
Milan University
MILAN, September 26-30, 1988

APPLICATIONS OF ARTIFICIAL INTELLIGENCE TO AGRICULTURE
Conseil Régional d'Agriculture de Normandie
CAEN, September 29 + 30, 1988

INTERACTIVITY IN HUMAN, CULTURAL AND TECHNICAL EDUCATION AND LEARNING
Netherlands Institute for Audiovisual Media
THE HAGUE, October 5-7, 1988

INTERACTIVE VIDEO AND ITS APPLICATIONS
Centre Informatique Régional
BESANCON, October 25-27, 1988

EDI '88: UK NATIONAL CONFERENCE ON PAPERLESS TRADE
Article Number Association,
National Computing Centre and
Department for Trade and Industry
LONDON, November 1-3, 1988