

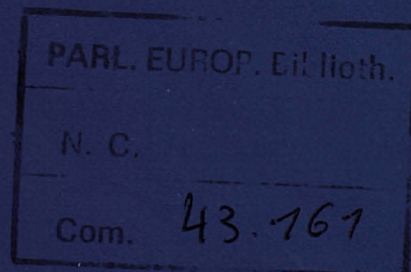


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1982

Annual Status Report

Informatics



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INFORMATICS

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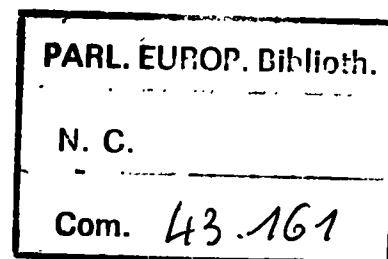
Research Staff: 34 men-year
Budget: 3.835.000 ECU

Projects:

- Teleinformatics
- Eurocopi
- Esis

Programme Manager:

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1. INTRODUCTION

The programme «Informatics» includes those activities in which efforts have to be concentrated in order to make contributions to the Commission policy in this field and to promote the use of advanced and efficient systems for the automatic collection, analysis, automatic treatment and dissemination of information and the underlying techniques.

Three main items make up the programme, selected out of the public service activities, that can be expected to be performed by the JRC and on the basis of the specific experience available:

- contribution to the research work in the field of Teleinformatics which shall lead to extend and improve the communication between geographically disseminated computers. The research is centered on the two subjects of «network» (language, operation, protocol) and «data» (databanks, standards, processing).
- management of the EUROpean COmputer Programme Institute (EUROCOPI), with the aim to integrate closely the

research and service activities in software evaluation and dissemination. The research is oriented on programming techniques and software information transfer problems; the information service is pursued by setting-up a computerized data base on program information and by the organization of a program distribution and program information service.

- running the European Shielding Information Service (ESIS), which in a specific field, where very relevant experience has been accumulated at Ispra, fulfills the task of analysing, evaluating and synthetizing information on shielding data and calculation methods, as well as performing a shielding benchmark experiment. This information is exchanged with the interested organizations and firms in the European Community.

The work is in general pursued in collaboration with a range of bodies in the Community countries and is closely coordinated with the activities of the Commission services which are in charge of the various European actions in the field of Informatics.

2. RESULTS

Teleinformatics

The Teleinformatics activities are intended to explore the problems related to the connection of heterogeneous data processing systems via public data transmission networks. The logical connection of computers of different kinds requires the definition of network wide standards and the adaptation of real environments to these standards. The availability of the public services provided by EURONET and similar national networks and the development of satellite networks, suggest new applications to be proposed and tested.

The JRC research project develops as a contribution to four major Commission initiatives:

- the COST 11 bis research project which offers the international framework for joint European research ventures in the field of teleinformatics.
- the INSIS (Interinstitutional Integrated Services Information System) project, an inter-service activity, which aims to stimulate European informatics activities through development of a system to facilitate information flow amongst and within Community Institutions and member State Governments.
- the Working Group on Standards which assists the Commission in formulating the policy guidelines on information technology standards.
- the proposed ESPRIT project which aims at sensitively promoting European R/D in the areas of microelectronics, software technology, advanced information processing, robotics and computer integrated manufacturing.

While actively contributing to the technical success of those initiatives, the JRC is also concentrating on a limited number of independent research themes, which are felt of particular interest. The challenge for research activities arises in the fields of local networking and satellite data communication. These two technologies are both providing wide band with transmission means which can properly support the traffic for the new types of applications such as office automation, file transfer and distributed data base. In particular the rapid evolution of the microcomputers, which allow an effective decentralization of the functional capabilities, requires that new flexibility and capacity be provided at network level.

The current research activities can be classified as follow:

- computer networks: Internal Network, new network services, Hermes network on fiber optics satellite networks.
- information distribution system: SCRIBA, Postman, advanced facsimile station.
- standardization of services and protocols: transport layer, certification methodologies, teletex testing.
- human and organizational aspects of new office technologies.
- development of a generalized query language compatible with the common command language of EURONET-Diane.

Computer network

The JRC contributes to the COST 11 bis by hosting the technical secretariat and by actively participating to the implied R/D effort. In particular joint research ventures are undertaken in the fields of Local Area Networks. Satellite Data Transmission and Internetworking with various national laboratories.

The Local Area Network project develops in the form of a collaboration between DTH Copenhagen, CNUCE Pisa, ETS Barcellona, J. Stefan Institute Ljubljana and the JRC. A parallel arrangement, in the framework of the Real Time Data Processing Project (forming part of the 4-year Informatics Programme 1979-83, like the COST 11 bis Project), has been set up between Politecnico di Milano, NPL Teddington, the TITN company Paris and the JRC for the design and the development of the Hermes network based on a fiber optics ring.

The technical approach to the Hermes services and protocols proposed by the JRC has been considered with great interest by the members of the two projects mentioned above. This makes us believe that the Hermes project is activating a beneficial flow of expertise between industrial and research teams in Europe.

The Hermes project aims at the set up of a new internal network, based on fiber optic technologies, performing at high speeds and offering enhanced connectivity. In addition Hermes constitutes the test bed for demonstrating the feasibility of some original ideas developed by JRC staff on broadcast services and protocols.

A major effort has been performed aimed at defining all services and protocols of Hermes. This allows to follow a top down approach in the design of the basic firmware whose performance and capability are crucial to the success of the project. Indeed the prototype three node network firmware which has been recently demonstrated, already includes the features required by the software layers that are to be developed on top of the basic ring controller.

The networking capabilities of Hermes have been recognized of great interest by the experts of the Real Time panel, who feel that such a network satisfies the real time constraints which are imposed by advanced parallel processing and control systems.

The JRC is involved in a COST 11 bis Internetworking experience that utilizes the OTS satellite for the transmission of data between terrestrial networks.

Since the OTS satellite is believed to be at the end of its lifetime, the decision was taken not to install an OTS earth station in Ispra and to wait for the Italian PTT provide us with an antenna pointing at the announced ECS satellite.

Meanwhile our INET system is connected via Euronet to the OTS earth station located in Pisa. Our Link Driving Computer is an exact reproduction of the one installed at Pisa.

This allows CNUCE and JRC to share the development effort implied by the Internetworking experience.

A common internetworking protocol has been discussed and defined in the framework of COST 11 bis between the STELLA partners and the members of the UNIVERSE project

(UK). The protocol will be implemented at Pisa and a copy of it will be transported and installed on our PDP system which performs several gateway functions.

This PDP is presently a subscriber of the Ispra internal network and also a node of our internal DECNET system (four PDP's are interconnected). Following the installation of this software, INET will be able to communicate with the local networks at CNUCE (Pisa) and at CERN (Geneva).

The simultaneous use of Euronet, Stella internetworking software and the Satellite link will provide JRC with a remote transport station to CERN.

JRC is also a member of the COST 11 bis Theoretical Group. Other institutions involved in the meetings are: CERN (Geneva, Stella project), CNUCE (Pisa, Stella project), INRIA (Paris, Nadir pilot project), Rutherford Lab. (UK, Universe project) and Centernet (Denmark). A very profitable discussion is taking place between experts who exchange their various experiences and their points of view about common problems. The goal is to define a common solution which optimizes the use of the satellite links. The proposed solution must be in accordance with the O.S.I. reference model. Each participant is contributing to the draft of a joint technical document on the subject.

Information distribution system

This activity aims at the integration of data base, network and office systems technologies for the purpose of demonstrating the feasibility of an advanced computerized mail service.

The computerized mail service provides for the transport of «messages», composed by means of terminals or word processors, from the source terminal to the destination terminal. Telecopiers can also be used for «mailing» a document.

The sender operator has three types of services at disposal:

— the *quick mail*:

the sender operator establishes a network connection between his terminal and the destination terminal and operates himself the transfer of the message.

This is the case of a document prepared at one location which has to be delivered «immediately» to another location. Clearly the destination device must be in a non busy state otherwise the sender operator must keep retrying.

— the computerized *postman*:

in this case the sender operator establishes a network connection between his terminal and the «postman» function installed on the computers of INET. Those computers accept the messages, store them, deliver them to destination according to instructions and according to the availability of the receiving terminals.

Once the message has been passed to the postman, the sender may assume that it will be delivered as soon as the destination resources will be made available.

The addressed person can be associated to some secretary's terminals, who is authorized to collect the incoming mail for a group of people. The mail addressed to a person or a

group of people can also be automatically printed by a printing station located close to them.

If the addressed person is not associated to any terminal, the postman will store his messages into his computerized mailbox. In this case it is up to the addressed person to «connect» to his mailbox via the network and to retrieve his mail.

The following are examples of some services offered by the postman:

- person to person correspondence
- a circulaire addressed to the JRC personnel
- a note by the president of a club to the members
- a working document addressed to the members of a task group
- public or private archives of documents which can be accessed according to predefined access rights (e.g. announcements of lectures, libraries of technical documents, etc.).

— the *telex*:

Telexes to be sent are composed on word processors and transferred to the postman service which in turn submits them to the automatic telex station.

The operator of the telex station is not required to retype the telexes in departure.

Incoming telexes are passed from the automatic telex station to the postman which in turn distributes them according to destination.

The data base which holds the structure of the overall distribution discipline is called SCRIBA. It contains the description of the membership to the conferences and working groups and the description of the access rights to public and private archives belonging to the groups or people.

Whenever a letter is addressed to a named group, SCRIBA automatically performs the broadcasting of the required copies and stores them into the mailboxes of the individuals.

The prototype version of SCRIBA is now operational and is made available to a limited population of volunteer users who are expected to collaborate in the evaluation of the proposed services.

The POSTMAN functionality allows to distribute the overall «mail» collection and delivery intelligence over several network machines, thus offering to the users a more reliable, comfortable and efficient service. Postman is also responsible for the automatic submission and distribution of telexes to/from the telex automatic station.

The postman software has been designed and all error and flow control protocols as required by a fault tolerant system have been defined.

The interface and the dialogue with the telex automatic station conforms to IATA standards.

Telecopiers offer a solution to the problem of exchanging documents which contain graphic symbols and drawings. Unfortunately the quality of the received copy is sometimes poor especially in case international telephone calls are required. In addition the procedure required by the transmission

over the public telephone networks is rather difficult to be automatized.

The JRC is developing a cheap interface for telecopiers which allows to connect them to data transmission networks which are provided with error and flow control procedures.

The advantage is twofold:

- the received copy will always be an exact reproduction of the original.
- the digital form of the document can be automatically stored, broadcasted and delivered by the computers that perform the computerized mail function.

The station consists of a cheap terminal, which is used to define the «envelope» of the message, a facsimile device and a microprocessor which translates the digital representation of the copy into a format which is suitable for transmission on an error and flow controlled data transmission network.

The design of this station is started.

Standardization

The JRC is contributing to the overall process of standardization. The implied activities are carried out at various levels of technicalities and in the framework of various contexts.

In particular the JRC leads a COST 11 bis initiative aimed at producing the «Basic specifications of Transport protocol and services» according to recent working documents elaborated by ISO in the framework of its Open System Interconnection Chapter.

The «Pre-development study of testing techniques for implementations of High Levels Protocols», which is partly financed by the Commission under the 4-year informatics Programme 1979-83, is carried out by NPL (UK), GMD (D), Adl (F) under the technical leadership of the JRC.

The intention is that these Institutions develop techniques and tests in view of installing national certification centres for the emerging ISO-OSI standards.

A first collaborative effort, which has been carried out in parallel to each centre continuing its individual work, is the agreement of a common set of terms, which has been produced as a «glossary». The use of this common set is seen as a first step in the process of convergence towards a commonly agreed solution to the overall problem of testing implementation.

The Reference and Test Centre service offered by the JRC to the implementors of standard protocols has now been provided with a new feature for testing teletex compatible devices.

The major effort was concentrated on the multilingual aspects of the teletex document definition. Indeed the Commission services are interested in the possibility to exchange documents between word processors having multilingual keyboards.

The proposed test facility is capable of activating a number of test scenarios that imply the exchange of «conformance» documents which prove the capability of the equipment under test to send/receive documents written in various languages according to the CCITT teletex recommendations.

The architecture and the user interface of this new tester are very similar to the already well established TTY, DEVT, FTP testing tools.

Human and organizational aspects of new office automation

Following a major workshop on this topic, which was held in Varese in June, an Executive Summary of the workshop has been drafted and approved by the INSIS Working Group. The Executive Summary will be translated in all Community languages and distributed to workshop participants and others interested in the INSIS Programme.

An 80.000 word book text has been prepared from the eight workshop presentations, augmented by five additional commissioned chapters. This book will be printed commercially by Francis Pinter Publishers, Ltd and is expected to be available in Spring 1983.

Work in this area is centred on three major topics:

- education and training
- ergonomics
- organisational implications.

In the ergonomics area work is in progress to develop Commission internal ergonomics guidelines for the specification of hardware and to prepare an ergonomics brochure for the information of system users. A status report on psychological ergonomics has also been initiated.

Organizational activities include the start of two studies aimed: at identifying the possible effects of autonomous organisations using a common information system (e.g. on communication patterns, cooperation); and at an analysis of the changes within organisations due to information technology (e.g. skills requirements, recruiting needs). A start has also been made on a study to evaluate the proposed video conferencing pilot experiment from the standpoint of user satisfaction, economic effectiveness and changes in communications patterns.

A programme of research into appropriate training methods for INSIS has been started. Given the complexity of the training task, with the probable need to train large numbers of Community officials simultaneously and to give different types of training to different classes of users (including the anticipated large numbers of occasional users) particular emphasis is being placed on investigating the potential of training systems employing interactive, selftraining elements within the general area of what has become known as educational technology.

Data Base query language

The development of a generalized query language based on the ADABAS DBMS and compatible with the grammar/syntax of the Common Command Language (CCL) of EURONET DIANE has been pursued and new facilities have been programmed to improve the capability of the language.

A contract with an external firm has been prepared in order to accelerate the implementation of a series of features of immediate relevance.

In the frame of the Automatic Indexing activity, the contract on the dictionary construction to be used in the Automatic Indexing System (SLC II) has been successfully terminated.

Some Indexing runs were performed on Food Science & Technology material using this new dictionary with promising results.

The collaboration between University of Linz, G.I.D. Frankfurt and Ispra will go on for further development of the system.

Eurocopi

The main purpose of the EUROCOPI project is to provide EC users of scientific/technical computer programs with a program information and program distribution service. These services and additional development activities, including related research activities, are as follows:

- computer program information service;
- computer program library techniques;
- practical programming and documentation techniques and aids for the development of computer programs which are structured, flexible, and portable.

Programming techniques

As to applied research and technical development there has been a steady emphasis on the implementation, use, and maintenance of engineering packages. In relation to the Toolpack activities some mention should be made of the necessary basic contacts and agreements set up to ensure quality control, it can be activated as soon as the software is released for selected test sites.

Data Base development

During the past half year emphasis has been laid on extending the functions of the data base towards the commercial operation phase.

The adaptation of the data base to the DBMS ADABAS version 4 has been successfully completed. During this process certain operational procedures were changed, and the data base can be considered to be fully operational in this new improved version. The first step has been taken towards future data base improvements. These improvements concern data input management such as the development of a general input data converter, and also the general operation of the data base and its usage (retrieval functions) in general. As far as data input in relation to information quality, format, and structure compatibility are concerned the data collection of a well-known computer program library has been converted.

Program library

The reorganization phases of the program library have been achieved so far as planned. The 4th and last step is nearly completed and involves storage organization and procedures for retrieval, updating and distribution actions. The procedures

appear to function satisfactorily. Obsolete material has been discarded and the transfer of material onto tapes will begin very soon.

The Green Book, «Computing Centre Program Library, Vol. 1, Program Descriptions», has already been edited and a 2nd Green Book, «The CPC Program Collection», is being prepared for printing.

Esis

Esis is a service activity in the field of radiation shielding dealing mainly, but not exclusively with fission reactors. Its principal aim is to develop and maintain high level competence in shielding problems allowing for qualified support to reactor projects in the European Community.

In particular ESIS is working on cross section assessment for shielding and material damage applications, on the testing and developing of shielding computer programs and on the execution of a shielding benchmark experiment. To remain in close contact with current design problems ESIS participates in the calculations of a few reactor shield configurations. To facilitate information exchange it also maintains and updates a shielding data bank and issues regularly a newsletter.

Nuclear data for shielding

For the iron benchmark experiment, now completed, a series of calibration measurements have been carried out. Parallel to this measuring campaign, the preparatory work for a similar deep penetration sodium experiment was made: completion of the safety report including detailed 3-D activation calculations, planning, construction and mechanical tests of the sodium containers melting of the sodium and filling of the containers under vacuum.

The newly developed data adjustment code ADJUST-EUR has - after improvements and careful tests - been applied to the ASPIS experiment.

In this first application the global detector method was used to fit the sulphur activation measurements. It showed a perfect convergency for the new group data in EURLIB structure with locally dependent resonance weighting.

In a major effort 10 tons of sodium were, under vacuum, filled into seven steel boxes at a temperature of $150 \div 200^\circ\text{C}$. In carrying out this operation substantial assistance was provided by a team from the ENEA Brasimone. After removal of the iron benchmark the sodium assembly is now being installed in the EURACOS facility.

Computation method development

For a quick and reliable evaluation of gamma shields a number of simple approximation formulas were compiled and published.

In this reporting period neutron streaming in ducts of a Pressurized Water Reactor and the experimental facilities of an accelerator were analyzed.

In addition, a set of easy to use approximation formulas for the calculation of gamma shielding was set up. They allow a quick and rather precise estimate of a wide class of photon penetration problems.

Information service

Regular dissemination of information was insured by the publication of the quarterly ESIS Newsletters. The operation of the Shielding Data Bank was also pursued.

3. CONCLUSIONS

During the year 1982, the work for the Informatics programme developed along the three projects: Teleinformatics, EUROCOPI, ESIS.

The activities concerned with the Teleinformatics project were given a major effort, by developing tools and increasing the field of competence. In particular, the activity was focussed on computer networking, including the improvement of the internal network (INET) and the development of a new fiber optic network and services (Hermes), the work on satellite networks and the study of the protocols and of the human and organizational aspects of office automation.

The JRC supports the Commission General Directorates in charge of the Community policy in the field by contributing or leading cooperative research actions and by developing and testing prototypes.

In particular the JRC contributes substantially to the COST 11 bis action whose technical secretariat is hosted at the Ispra Establishment. X Reference and Test Centre for higher level protocols is now operated at Ispra. A general research support to the Commission project for an Interinstitutional Information Service (INSIS) is currently given through participation to and animation of working groups and by testing and developing prototype installations and protocols.

The EUROCOPI project was concentrated mainly on the services activities and in particular on the Data Bank for computer program abstracts.

The Data Bank is now operated under the condition «public test phase». In addition, the computer program library has been reorganized and adapted to the user needs.

The work for the ESIS project was mainly devoted to the completion of the Iron benchmark experiment and to the set up of the new experiment on Sodium blocks. In particular, the installation of the boxes with the 10 tons of Sodium at the EURACOS facility was accomplished successfully. The work on the interpretation of the experimental results and the information service through the ESIS Newsletter and the ESIS Data Bank went on regularly.

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