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**Multiannual Programme
of the Joint Research Centre
1980 - 1983**

1980 Annual Status Report

Informatics

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INFORMATICS

1980

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Projects:

- Teleinformatics
- Eurocopi
- Esis

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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" (data-banks, 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 synthesizing 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 project is 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 new public services provided by EURONET and similar national networks and the expected developments of satellite networks, suggest new applications to be proposed and tested.

The rapid growth of the market of miniinformatics and distributed processing also requires research efforts aimed toward the integration and standardization of the facilities for interconnection.

The research work carried out during 1980 contributed to provide new services to the users of EURONET, the European Network for Scientific and Technical Information, in particular in connection with the use of the databases offered by the DIANE community. In addition, the cooperation work was initiated within the international concerted research action COST-11 bis, dealing with problems of standards for the operation of computer networks. The preparation to a concerted action in the field of computer networks based on satellite transmission took also place. Finally special attention was devoted to the analysis of technical solutions for advanced experiences in distributed processing, by the realization of an internal network and the study of the JRC information distribution system.

The main results achieved during the reporting period are the following.

Contribution to EURONET-DIANE

In the framework of the contribution of the JRC to the development and operation of EURONET, a Reference and Test Centre for EURONET higher level protocols was set up at Ispra. Up to now two facilities were developed and made available for regular service via EURONET by this Reference and Test Centre: the Data Entry Virtual Terminal and the Remote Printing Terminal. Both these realisations contribute to the process of standardization of the interfaces to EURONET. Experts of the Departments of Industry of two Member States, which plan to establish their national certification centres, visited during 1980 the Ispra Reference and Test Centre and a permanent collaboration has been envisaged in these first contacts.

Several software developments were carried on in order to improve the access to the data bases through EURONET. Some of them were aimed to simplify the use of data bases for inexperienced users and to prevent such users from entering unauthorized resources of the computing centre.

Modifications of the query language in use at Ispra for data bases were also performed in order to make it similar to the general query language used by EURONET-DIANE bibliographical data bases.

COST 11 bis action

The Cost 11 bis Concertation Committee, which was set up following the termination of the international research work known as COST 11 action, has decided to launch a series of activities with the aim of contributing to the development of standards for internetworking, in line with the needs and recommendations of the International Standards Organization (ISO) and of the European Computer Manufacturer

Association (ECMA).

Three working groups have been set up, charged with the task of producing technical proposals for concerted research and development actions in the transport service, message exchange and file transfer areas.

Progress reports of the working groups show that experiences on the emerging ISO-ECMA standard protocols are likely to be performed by mid 81 by a number of European research laboratories.

Networking via Satellites

At the beginning of 1980, in the framework of the CREST (Committee for Scientific and Technical Cooperation) initiatives, the JRC was charged to investigate the feasibility of an European concerted action in the field of computer communication via satellites.

The JRC has organized a meeting of national experts aimed at providing CREST with a detail "state of the art" report and suggestions for the technical and organizational framework for a possible research.

Subsequently, the possibility for the JRC to participate to one of the European satellite data communication project has been discussed mainly in view to contribute to the solution of the problem of interconnecting terrestrial and satellite networks. For this purpose, the installation is foreseen at Ispra of a 3 metres antenna pointed to OTS-2 and equipped with the appropriate computer communication interfaces.

Internal Network

Experts say that only 15% of the data traffic on the emerging integrated service digital networks will be of the same nature as today's (transaction oriented traffic, access to time sharing or information retrieval systems).

Data traffic will originate mainly from new types of applications such as distribution of documents and newspapers, electronic mail, office automation, environment and social monitoring. Those applications require a network system capable of supporting multi-partner communications as opposed to today's point to point (two partners) communications. The JRC contribution to the problem is to develop a prototype for a distributed network machine capable of supporting distributed processing and to use it for a real application such as the internal circulation of documents.

A kernel of such distributed network machine is now being built which should operate on a system of interconnected mini-computers working as a private packet switching network appearing to the users as a local extension of EURONET.

In addition, work is in progress for developing an advanced computerized message exchange system capable of supporting intelligent word processing equipment, archives of documents and correspondance functions.

Eurocopi

The main purpose of the EUROCOPI project is to help the users of scientific/technical computer programs by performing research activities in the field of programming and pro-

gram library techniques and by providing a program information and a program distribution service.

Programme techniques

The research activity was devoted during the reporting period to the study of a Programme Oriented Language which provides the user with a command language close to natural language for specifying his problem and controlling the various computational steps and has proved to be particularly suitable for engineering applications. The main result of the work was the development of a compiler and of a command interpreter written in portable FORTRAN and now ready as WESPOL compiler and command interpreter and already successfully used on a variety of computers such as G.E., Honeywell, IBM and TI-ASC.

Data base development

During 1980 emphasis was put on the development of a new data base containing information on computer program characteristics and availability, including computer program abstracts. About 2000 abstracts of the old EUROCOPI data base were converted to the new input format and data structure and about 600 new abstracts, obtained through regular literature screening, were computerized. A major change in content and structure of the classification file has been performed; programs and procedures for loading data into the new data base were finished and tested.

Modifications of the query language for the EUROCOPI data base were designed in order to conform to the recommendations issued by the Commission of the European Communities for data bases to be operated on EURONET.

Finally several data evaluation routines were applied in order to investigate on the feasibility of estimating input data sources and the total data base content by counting and rating the different categories in an abstract. The results showed the usefulness of such an automatic content control.

Program library

Concerning the Program Library service, in addition to the implementation and maintenance of large computer programs which is a continuing task, administrative and organizational actions were performed to adapt daily library operations to a more computerized service.

Two new specialized sectors were selected in which the computer program library will be enriched in priority, namely: programs in the field of new energies and programs in the field of remote sensing.

The operation of the European distribution agency for the programs contained in the Integrated Civil Engineering System (ICES) continued.

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 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

The research activity on nuclear data for shielding is supported by benchmark measurements which are being performed with the EURACOS facility installed in the thermal column of the TRIGA type reactor at Pavia University. During 1980 experiments on iron blocks continued, measuring neutron penetration at different depths from 22 cms to 86 cms, and for various neutron energies, ranging from 20 KeV to 20 MeV. Most of the measurements on iron which were planned are now completed and their theoretical interpretation went on by the use of several computing tools adapted to this purpose and in particular of the newly developed recursive adjustment procedure.

Computation method development

In addition to the above mentioned development of the iterative multigroup cross-section adjustment procedure, the theoretical work carried on in the reporting period concerned the validation of a three dimensional perturbation and sensitivity analysis which was obtained by carefully comparing the results of two different computational approaches (Monte Carlo and Sn).

For the retrieval and checking of data contained in coupled neutron-gamma libraries the specialized computer program CAT (Choice and Test) was written and debugged. It allows to handle large amounts of data, especially to pick up subassemblies of the data which then can be transferred to other output units, it permits a series of tests as finding and printing of extreme values, etc. . .

Technical support to shield design

The contribution to shield design given during the reporting period concerned the calculation of angular gamma fluxes in concrete, iron and tin shields and the analytical evaluation of buildup factors in two-slab geometry which was programmed for the computer and applied to a number of typical cases.

Information service

Regular dissemination of information was insured by the publication of the quarterly ESIS Newsletters plus one special Newsletter issued on the "Specialists' Meeting on Radiation Damage in Reactor Components", Hannover, March 1979. The operation of the Shielding Data Bank was also pursued.

3. CONCLUSIONS

In 1980 a new multiannual research programme for the JRC has started. In the field of Informatics a concentration of efforts was operated on three subjects: Teleinformatics, EUROCOPI and ESIS.

The Teleinformatics activity, also called Data and Communication project, covers research in an up-to-date and very dynamic field today: computer networking by terrestrial or satellite connections and the related data management and transmission problems. The JRC, working in tight collaboration with the Commission General Directorates in charge of the Community policy in the field, plays for a number of subjects a central role for the European research activities, by contributing or leading cooperative research actions and by developing and testing prototypes. In particular the operation of the Test and Reference Centre for EURONET higher level protocols has to be mentioned, as well as the contribution to the COST 11 bis project whose technical secretariat will be hosted in the Ispra Establishment.

The connection with outside organizations is strong, through collaborations with the EURONET-DIANE community, with International Organizations responsible for standards as ISO and ECMA, with the Post Office Authorities for the packet switching and satellite networks, within the international research action promoted by COST.

The EUROCOPI project responds to the ever lasting need of facilitating the software sharing by increasing the portability of computer programs, avoiding duplications and

disseminating the information. Beside a limited research activity in the field, EUROCOPI provides a service by building up a Data Base on computer program abstracts which will be soon made available through EURONET and by operating a computer program library which is now being specialized in fields, like new energies and remote sensing, having high topicality.

A close connection with the research activities developed in Europe is facilitated by the promotion and participation to the European Association for Software Access and Information Transfer (EASIT) which gathers a major user community.

ESIS is a project based on an existing long experience of work in the field of radiation physics and reactor shielding at the JRC-Ispra. It has been orientated so to provide an information service to the European shielding community and it is actually a way of keeping strong links among the European research laboratories active in this field. The work performed on nuclear data for shielding, including the current benchmark experiment on iron blocks, complemented by the theoretical interpretation and developments, gives an acknowledged contribution to the improvement of basic data useful for shielding designers.

Finally, it has to be noted a follow up of the work performed during the past programme in the field of automatic indexing; the relevant software was successfully implemented at Gesellschaft für Information und Dokumentation mbH, Frankfurt, with plans for further developments.

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