COMMISSION
OF THE EUROPEAN
COMMUNITIES

JOINT RESEARCH CENTRE
Ispra Establishment
Italy

Service
and Support Activities

High Flux Reactor (HFR)
Informatics ◄
Fissile Material Control
Training and Education
Technical Evaluations in Support of the Commission

PROGRAMME PROGRESS REPORT

January-June 1977

ABSTRACT

T.he project "Informatics" aims at providing a public service in the field of automatic collection, analysis, automatic treatment and dissemination of technical-scientific information and the underlying techniques. Four activities are included in the project, staffed yith 37 research men:

a) Contribution to the European Informatics Network (EIN)

b) The European Computer Program Institute (EUROCOPI) with an information service on computer programs and their application

c) The European Shielding Information Service (ESIS), a specialized information centre on shielding data and shielding computer and calculation methods

d) Methodological studies, including:

 - Development of automatic documentation techniques. Contribution to EURONET.
 - Studies on software engineering as a support to the Community policy in the field of Informatics.

For each of these activities details are given about the planning for the reporting period, the results obtained and the orientation of the future work, both in a condensed form in the summary and in more technical detail in the main report.

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Summary

1. SCOPE

Automatic collection, treatment and dissemination of information is of high importance in every field and particularly for technical-scientific activities. Advanced techniques and new systems are constantly appearing in Informatics and a continuous effort is needed in order to make them available for various purposes and promote their use.

The scope of the project "Informatics" at the JRC is to contribute to the practical introduction of advanced techniques in a number of selected fields, in connection and in support to the Commission policy and in relationship with other activities of the JRC research programme.

In particular the fields chosen are four, selected on the basis of their character of public service and of the specific experience available:

a) contribution to the research work for the set up of the European Informatic Network (EIN)

b) European Computer Program Institute (EUROCOPI) aiming to disseminate knowledge of computer programs and applications

c) European Shielding Information Service (ESIS) with the task of analyzing, evaluating and synthetizing information on shielding data and computer and calculation methods

d) development of automatic documentation techniques as a contribution to the set up of the European Network for Scientific and Technical Information (EURONET) and some methodological studies on software engineering which are intended to contribute to the Community policy in the field of Informatics.

2. OBJECTIVES (for the reporting period)

In the following the main objectives set for the first part of 1977 for the four activities mentioned above are summarized:

a) European Informatics Network (EIN)

- Implementation of the "Transport Station" which provides the basic interface to all correspondents

- Definition of a standard "Virtual Technical Protocol" that allows terminals to connect to remote applications.

b) European Computer Program Institute (EUROCOPI)

- Formalization of the cooperation among European program libraries/ program information centres/users groups

- Gradual development and maintenance of a comprehensive computerization data base on programs information

- Operation of the already acquired Program Libraries.

c) European Shielding Information Service (ESIS)

- Evaluation of reaction cross sections: five isotopes of Barium, interpretation of measurements for Iron

- Completion of the MODESTY computer program for the calculation of reaction cross sections

- First measurements at the EURACOS-II experimental facility.

d) Methodological Studies

- Automatic Documentation
  . Preparation of the retrieval system STAIRS for the purpose of the experiment on Automatic Indexing System.

- Software Engineering
  . Completion of the previous activity on Computer Performance Evaluation
  . Exploration of a new activity on Application Program Reliability and Correctness.

3. RESULTS

a) European Informatics Network (EIN)

The preparation of the JRC connection to EIN progressed by preparing a number of hardware and software items to be operated at the Ispra site and by contributing to the joint EIN cooperative effort. In particular a standard "virtual terminal" for the network, based on IBM 2741 and 3270 units, is now operating and a contribution was made to the definition of the "data entry virtual terminal"; a "Transport Station" has been implemented and fully tested locally in loops; a network test program has been set up and used to debug the subnetwork system; the preparation for the acquisition of a new front end processor is now completed.

b) European Computer Program Institute (EUROCOPI)

An active contribution was given to the creation of EASIT (European Association for Software Access and Information Transfer) which will promote the improvement of services in support of European users of software. In particular a preparatory study on thesaurus construction and program classification for EASIT has been carried on; the final realization of it is now under way in cooperation with the EUROCOPI staff.

The work on preparation and updating of abstracts continued: about 100 new abstracts and 200 updated abstracts were produced in the reporting period. Conversion to EUROCOPI standard of about 800 new abstracts is in progress.
The distribution service resulted in 60 programs and 600 manuals distributed and in printing five new manuals.

c) European Shielding Information Service (ESIS)

A considerable part of the effort was dedicated to collect and improve nuclear data for shielding. In particular the evaluation of reaction cross sections for five isotopes of Barium was completed; a coupled shielding standard library was extended (EURLIB 3) by adding 20 gamma groups to the 100 neutron groups and improved in the flux weighting for both neutron and gamma radiations; progress in the interpretation of iron measurements performed at Winfrith was made: three-dimensional effects in sensitivity studies were analyzed.

A program for the calculation of reaction cross sections based on the statistical model for nuclear reactions was developed (MODESTY) and it is now available from the NEA-program library. The EUR.'COS II installation was completed and tested. The first measurements on iron took place and the data obtained are now being treated and interpreted.

The support activities were concentrated on the calculations for the shielding of the FINTOR reactor (for nuclear fusion power application).

d) Methodological Studies

    - Automatic Documentation

        The main effort was devoted to the preparation of the experiment on the assessment of the effectiveness of automatic indexing with an existing thesaurus in mechanized information retrieval and in the evaluation of the usefulness of the thesaurus enrichment procedure. The experiment has now been performed and the results which will be available in the second part of 1977, will indicate the lines of development of the future work.

    - Software Engineering

        The activity on computer performance evaluation continued with the aim to round it off by the end of the year. In the meantime an exploratory study on the application program reliability and correctness was launched and a state-of-the-art survey on software reliability was made under contract. The final report is now available.

4. CONCLUSIONS

For the major part of the project the work in the reporting period has to be seen in the light of the work going on since the last multiannual programme. This is the case for EIN, EUROCOPI and ESIS.
The EIN activity advanced to the point that a cocrdinate network demonstration will be possible towards the end of 1977, in spite of some inadequacy of total resources made available by the EIN signatories.

Demand for the EUROCOPI routine information service continued to be high; the basis was laid for strengthening the service and improving its quality in the frame of the European Association for Software Access and Information Transfer, created in April 1977. It was realized that, on the basis of the total staff allocated to EUROCOPI, some reorientation and focalization of the programme towards a limited number of goals will have to be seeked.

ESIS progressed as usual, special contributions were given in the report-
ing period in the field of nuclear data and for the shielding calculations
of fusion reactors. The EURACOS-II installation was completed and the
first measurements done.

For other actions, as the automatic Documentation and Software engineer-
ing, the reporting period was essentially dedicated to establish the basis
for the future developments or to find new orientations for skills and expe-
rience available. In this sense the results of an experiment on an Automa-
tic Indexing System are awaited in the second part of 1977 and an explora-
tory study in the field of computer program reliability was made under con-
tract.

Programme
Progress Report

1. INTRODUCTION

The project "Informatics" includes those activities on 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.

Four 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 for the set up of the European Informatics Network, COST 11 project, and which shall lead to extend and improve the communication between computers geographically disseminated

- management of the EUROpean COmputer Program Institute (EURO-COPI), with the aim of disseminating knowledge of computer programs and applications throughout the Community. This 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 analyzing, evaluating and synthetizing information on shielding data and calculation methods.

This information is systematically collected and distributed to the interested organizations and firms in the European Community

- some methodological studies, including:
  . development of automatic documentation techniques with the aim of contributing to the set-up of the European Network for Scientific and Technical Information (EURONET). The scope of JRC scientific contribution is to provide the European action with efficient methods of automatic thesaurus construction, automatic query processing and advanced retrieval techniques

  . other methodological studies in the field of software engineering which are intended to give a contribution to the Community policy in the field of Informatics. The specific actions being developed in this frame concern the development of an automatic classification tool for computer performance evaluation and exploratory study on software reliability.

The work is in general pursued in collaboration with a range of bodies in the Community countries and in close contact with the relevant Commission services.

The total number of research-men attributed to the project "Informatics" is 37 and the efforts are distributed as indicated in the following table:

	research-men
1. European Informatics Network	5
2. European Computer Program Institute (EUROCOPI)	12
3. European Shielding Information Service (ESIS)	13
4. Methodological Studies	7

Sub-Projects

2. SUB-PROJECTS

2.1 EUROPEAN INFORMATICS NETWORK

OBJECTIVES

The sub-project - known as the COST 11 Project - is intended to explore the problems related to packet switching networks connecting heterogeneous data processing installations. The logical connection of computers of different kinds requires the definition of network wide standards and the adaptation of real environments to those standards.
Two items of investigation were considered as having first priority: the "Transport Station "(TS) which provides the basic interface to all correspondant processes and the "Virtual Terminal Protocol" (VTP) that allows terminals to connect to remote applications.

METHODS

Network wide protocols are discussed within the EIN technical committes taking into account the process for standardisation at international level and trying to influence it toward the definition of higher level interfaces.
In this sense the EIN proposal for TS and VTP are considered as extremely important contributions.
The JRC connection to EIN will be heavily modified by the introduction of a Front End Processor which will introduce additional flexibility and capabilities.

RESULTS

1) Virtual terminal protocol

If a remote application has to be driven by a locally connected terminal or viceversa a local application has to be accessed by a remote terminal through the network, several problems are to be solved in order to bypass the incompatibility and establish the connection.
Within EIN the approach was to define a logical unit called Virtual Terminal, to which all connected systems adapt their own terminals. The idea is to define a common standard terminal.

A first class of existing terminals were examined and a "scroll mode virtual terminal" was defined which is able to properly represent the functions of all teletype like terminals. At JRC the IBM 2741 and 3270 units are now driven by special handlers that make them appear to the network as "standard" terminals.

The JRC also made "contributions" to the definition of the "data entry virtual terminal" which, once agreed by the members, will allow network wide support of intelligent terminal with field addressing capabilities. In this direction the IBM 3270 display unit is now handled by a special software which will make the network connection easier.

2) Experiments of the logical connection with remote systems

The "Transport Station" provides a basic interface to all correspond-
ant processes willing to communicate via the exchange of data elements.
Elements are to be delivered free of errors and in the same sequence
they were generated by the source. The TS has been implemented and
fully tested locally in loop.
Its basic services, like the lettergram delivery, were successfully
tested with the Milan subscriber.

An EIN demonstration took place in Venice during the EUROCON
congress May 2-5, 1977. All the available connection capabilities
were shown to the participants using terminals located in the con-
ference rooms.

3) Network Test Program (NTP)

This has been conceived as an interactive facility to load and test the
packet switching subnetwork.
The NTP provides capabilities to define bursts of packets to be sent
to whatever destination and to superimpose traffic patterns. It is
extremely useful in monitoring the network behaviour.
It was also used to debug the subnetwork system during its warranty
period in order to stress the contractor's interventions.

4) Front End Processor

The present JRC connection to EIN is largely unsatisfactory. It has
been conceived three years ago as a first solution to the problem.
At that time no HDLC line couplers were available on the market and,
beside that, the budget constraints imposed the utilisation of the
already existing IBM front end and mainframe.

The accumulated experience now suggests a different approach in the
sense that all network oriented software is to be run by a dedicated
mini processor. A world wide call for tender was issued and the
replies were carefully analysed taking also into account the compat-
ibility with the developments of the internal teleprocessing services.
It was decided to place the order to the European SEMS company
which offered a system with the required flexibility.

CONCLUSIONS

The work made good progress in the first part of 1977, however there
are difficulties of different nature we have to cope with. The project as
a whole relies largely at its present phase on the research and develop-
ment work performed at the five "Centre signatories" and the coordina-
tion provided by the Executive Body (central unit of the project) in inter-
action as far as possible from interested research environments in the
other signatories. It is not always possible to bring together as many
ressources as really needed for the action seen from the overall level.
The Management Committee is presently planning for the future of the

action which should include projects allowing for EIN to keep the leadership in network research.

PLANNED ACTIVITIES

The project team will be busy with the planned "EIN Demonstration" which is supposed to be a milestone in the EIN life.
EIN will concurrently demonstrate network services to national and international audiences.

The next protocol to be designed and agreed upon, is the "file transfer protocol".

COLLABORATION WITH EXTERNAL ORGANIZATIONS

The EIN community officially or unofficially participates to all the initiatives which involve qualified debate about networking.
EIN members directly or indirectly make input to the various bodies which have the authority to define standards: ECMA, CEPT, CCITT, ISO, IFIP.

EIN members sponsor the European Network User's Workshop in order to catalyze common approaches in network design. EURONET officers benefit from EIN experiences and proposals. EIN has decided to develop a X25 interface based on a feasibility study already performed.

Within EURONET, we collaborated to the design specification for an IBM-X25 interface and now we participate to the analysis of the contractor's proposals.

Quite recently two research contracts were proposed by the JRC with national organisations active in the field of networking. They are the Italian National Council of Research (CNR) represented by CNUCE which developed the RCPNET, and the University of Liège which will be a member of the planned Belgium University Network. The contracts will allow common research activities in the field of "high level protocols" like file-transfer and remote job entry.

REFERENCES

"Scroll Mode Virtual Terminal Protocol", EIN/CCG/77/02

"Screen Mode Virtual Terminal Protocol", EIN/EUR/77/01

WEAVING, K.,
"The Design of the Network Control Program for the Ispra Connection to EIN". EUROCON, Venice, May 3-6, 1977

WEAVING, K. et al.,
"The Connection to EIN Packet Switched Network", EUR-5695 e, 1976.

Note: The EIN Documentation can be obtained by addressing:

D. L. A. Barber,
EIN Director,
National Physical Laboratory,
Teddington TW 110 LW,
United Kingdom

2.2 EUROPEAN COMPUTER PROGRAM INSTITUTE (EUROCOPI)

OBJECTIVES AND METHODS

In spite of the number and variety of the attempted solutions, the situation of software sharing in Europe is still far from being satisfactory. The principal reasons seem to be the sectional and national character of the existing activities and the lack of sufficient cooperation at a European level.

In 1971 an activity was initiated at the JRC with the longterm scope of:

- promoting cooperation on a full European basis for a complete information service on scientific-technical software;
- improving programs exchange and users support.

The short-term objectives of this action, known as EUROCOPI, were the organization of a programs distribution and programs information dissemination service on an experimental but operational basis and the development, through contacts and cooperations with other bodies, of a framework which allows users of software to go easily across disciplines and machine ranges.

The results obtained and the users interest proved the feasibility and the usefulness of such an activity and gave good arguments for its continuation into the present four-year programme.

In addition the efforts made by EUROCOPI to promote cooperation resulted in the formation of an European Consortium (called ECSIR).
Two workshops (Ispra, Feb. 1976 and Edinburgh, Oct. 1976) with more than 20 institutes represented gave useful indications for a more close and effective cooperation in Europe.

The objectives are better described in relation with the basic lines of activities:

1) Programs Information Service

   a) Formalization of the cooperation among European program libraries/program information centres/users groups operating in the field of scientific-technical software to improve the exchange of information and finally the sharing of software within the European Community.

   b) Development and maintenance of a comprehensive computerized data base on programs information. (Gradual increase of the data base size from 3.000 abstracts to 10.000 abstracts at the end of 1980).

   c) Diffusion of information by issuing Program Catalogues, by answering specific queries and by offering the data base on use through EURONET (beginning 1979). The number of publications sold should grow up to 4.000 per year.

2) Program Distribution Service

a) Promotion of actions aimed at improving application software portability and documentation quality.

b) Operation of the JRC Program Library, the SEAS Program Library and the European Distribution Agency of the ICES Users Group (EIDA).
Promotion of other libraries to make the acquisition of programs, developed outside Europe, easier and less expensive.

3) Advertising, Administration

EUROCOPI is expected to become at least partly self-supporting. To achieve this goal, not only the quality of the service, but also the number of customers is important. An efficient monitoring of the various operations has to be implemented, together with efficient administrative procedures.

RESULTS

The main achievements of the first half of 1977 can be summarized as follows

The ECSIR Consortium evolved into a more formal association, EASIT (European Association for Software Access and Information Transfer), which was officially created at the first EASIT Conference held in Bonn, April 4-6, 1977.
The aim of EASIT is to promote the improvement of services in support of European users of software and in particular by:

providing a framework for cooperation between groups or bodies in Europe, which are
- software libraries and consultancy support to users of networks or computer centres
- software documentation and information services
- program distribution agencies
- users groups
- originators of major packages

promoting exchange of information and technical expertise

developing links with appropriate scientific, professional and governmental organizations

providing
- a forum to achieve a consensus of opinion of members
- the means to communicate with the appropriate European or international bodies (e.g. Standardization Organizations, Software Producers, CEC General Directorates).

In particular the following work has been done:
- preparation of the EASIT Constitution and cooperation to the
preparation of the Conference
- a preparatory study on thesaurus construction (analysis of existing
Thesauri) and program classification has been carried on; a subset
of the Thesaurus for engineering has been prepared.

A research contract has been passed to an external expert for perform-
ing a study on and setting down the basis of the EASIT Indexing and Classi-
fication Standards.
More precisely the work will consist of:
- a review of the existing classification schemes with a particular
attention to the philosophy behind them;
- the definition of a suitable approach for the compilation of the
EASIT Thesaurus and Classification Scheme, in tune with similar
developments being undertaken by other International Organizations
like IFIP, SHARE and ACM;
- compilation of the EASIT Thesaurus of keywords for indexing
program abstracts covering the area of scientific and technical
programs;
- preparation of a report on the results of the study.
  The work is executed at Ispra in cooperation with the EUROCOPI
  staff.

A research Contract has been passed to an expert on "Program
Documentation Standards" in 1976 and the work has been executed
at Ispra in Jan.-Febr. 1977. A report is in preparation.
It contains:
- a critical analysis of existing standards and conventions for soft-
ware documentation (as it can be derived from documents produced
by Manufacturers, Software Houses, Universities, Standardization
Institutes),
- a review of existing informatics tool for aiding in documentation
production.

About 100 new abstracts has been prepared and about 200 existing
abstracts updated. The conversion to the EUROCOPI standard of about
800 abstracts submitted by the Program Library Unit of Edinburgh is
in progress. They had to be supplemented with additional information
and classified according to our schema.

The publication of the new issue of the Program Index had to be
delayed due to lack of man-power (man-power, is however, now
increasing).

Diffusion of information has continued at a low level by answering specific
enquiries coming from the customers.

The program distribution service resulted in:

60 programs distributed with a gross revenue of 25, 800 UA
600 manuals   "   "   "   "   "   " 10; 200 UA

Five new manuals have been printed.

Figures 1 to 3 give the distribution of the institutions using EUROCOPI services by country, field of interest and type respectively.

CONCLUSIONS

Making reference to the objectives listed in the appropriate paragraph herewith, we can say that:

1.a the goal has been met with the creation of and the participation to EASIT;

1.b the present staff of EUROCOPI is too small for the planned expansion of the EUROCOPI data base by its own efforts only. However the setting up of a network of readers, as described below, and the cooperation with partners within EASIT will provide the practical and realistic means to meet the goal;

1.c the enlargement of the data base size (1.b) is the first condition for the improvement of the information dissemination service.

2.a good results can be obtained in cooperation with EASIT;

2.b the operation of the existing libraries is satisfactory; the setting up of new specialized libraries remains a goal but it can not be met before the end of this year.

PLANNED ACTIVITY

We intend to stimulate and contribute to the activity of the EASIT Working Groups so that standards for indexing and classification of programs and for program abstracts are produced and adopted by the EASIT members by the end of the year. This will result in a better use of resources by making easier the exchange of abstracts.

We are working to the setting up of a network of readers to search the literature for announcements of new programs and to prepare program abstracts. This should result in the production of about 150 abstracts per month and in a rapid increase of the EUROCOPI data base. EURO-COPI staff will coordinate the work and will do the actual input to the data base. We plan to have the network established during the second half of the year.

COLLABORATION WITH EXTERNAL ORGANIZATIONS

Various forms of cooperation exist with the following organizations:
- EASIT (European Association for Software Access and Information Transfer)
- IUG (ICES Users Group)
- GENESYS Ltd. , Loughborough, U.K.
- N.E.A. (Nuclear Energy Agency) Computer Program Library OECD, Ispra, Italy

- PLU (Program Library Unit), University of Edinburgh , U.K.
- Steinmetz Archives, Amsterdam, The Netherlands
- CACT (Centre d'Assistance au Calcul Technique), Paris, France
- Universitaet Geissen Abteilung Biomathematik, Giessen, FRG
- ZUMA (Zentrum für Umfragen, Methoden und Analysen), Mannheim, FRG
- NAG (Numerical Algorithm Group), Oxford, U.K.
- Rurh-Universitaet Bochum, Rechenzentrum, Bochum, FRG
- SCI (Service Central de Informatica, Government of Spain), Madrid, Spain
- IMD der GSF (Institut f. medizinische DV, Gesellschaft f.Strahlen- und Umweltforschung), München, FRG
- GMDS (Deutsche Gesellschaft für Medizinische Dokumentation, Informatik U. Statistik e.V.), Wiesbaden, FRG
- GMD-IST-SIZSOZ (Gesellschaft fuer Mathematik und Datenverarbeit- ung mgH, Bonn, Inst. f. Software-Technologie, Projekt SIZSOZ), Bonn, FRG
- Universitaet Freiburg, Rechenzentrum , Freiburg, FRG
- Universitaet Koeln, Zentralarchiv, Köln, FRG
- CSATA (Centro Studi e Applicazioni in Tecnologie Avanzate), Bari, Italy
- Universitaet Bielefeld, Rechenzentrum, Bielefeld, FRG
- CERN (Conseil Europeen pour la Recherche Nucléaire), Geneva, Switzerland
- LPCU (London Polytechnics Computer Unit) , London, U.K.
- Universitaet Wien, Interfakultaeres Rechenzentrum, Wien, Austria
- DFVLR (Deutsche Forschungs-u. Versuchsanstalt f. Luft-u. Raumfahrt),
- University of Leuven, Computing Centre , Leuven, Belgium
- BASS (Belgian Archive for the Social Science), Louvain-la-Neuve, Belgium
- ALLC (Association for Literary and Linguistic Computing)
- DDA (Danish Data Archive), Copenhagen, Denmark
- PCL (Physics Communication Library, Queen's University of Belfast), U.K.
- ZGCP (European Center for Geographic Computer Programs), Bonn, FRG
- CEA (Commission à l'Energie Atomique), Saclay, France
- INITEC (Centro Operativo de Plantas de Proceso), Madrid, Spain

Fig. 1 — Institutions using EUROCOPI Services: Distribution by Country

Fig. 2 — Institutions using EUROCOPI Services: Distribution by Interest

Fig. 3 — Institutions using EUROCOPI Services: Distribution by Type
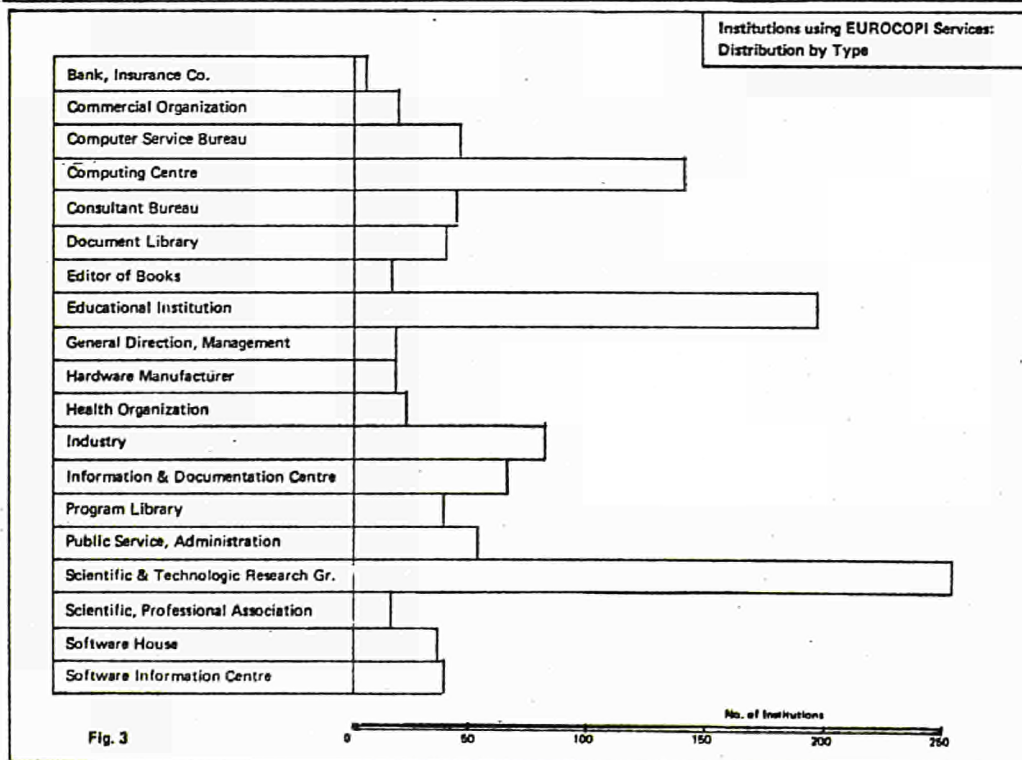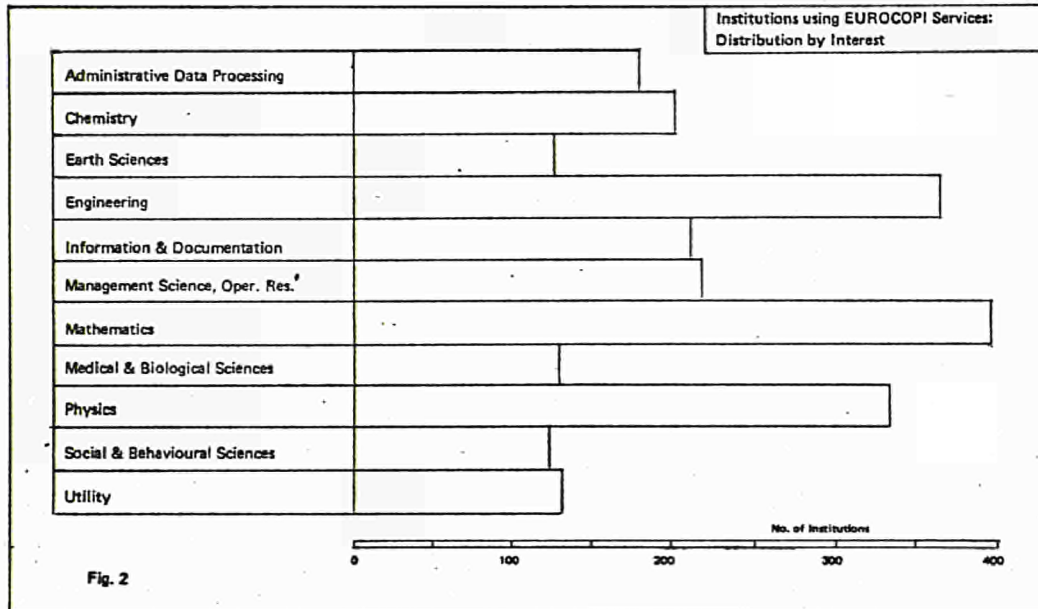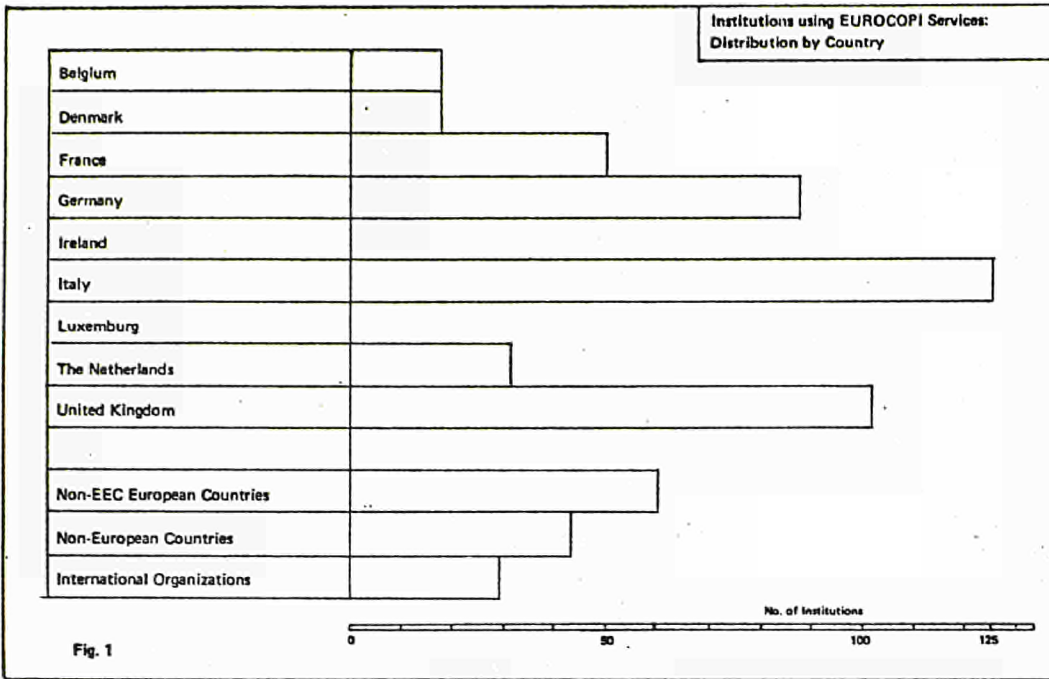
2.3 EUROPEAN SHIELDING INFORMATION SERVICE (ESIS)

OBJECTIVES

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 which allows qualified support to be provided 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 programmes, 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 shield configurations. To facilitate information exchange it also maintains and updates a shielding data bank and issues regularly a newsletter.

METHODS

The nuclear data assessment has been carried out by sensitivity analysis and cross section evaluations. In sensitivity analysis the classical one dimensional codes have been applied together with our own 3D sensitivity program. Multigroup coupled neutron-gamma libraries have been generated by AMPX and cross section evaluation has been performed by nuclear model calculations. The integral measurements of neutron penetration in thick iron layers are performed at the high flux irradiation facility EUROCOS II, which consists of a convertor plate (enriched uranium disk of 80 cm diameter) at the end of the thermal column at the LENA-TRIGA reactor in Pavia.

RESULTS

a) Nuclear Data for Shielding

Evaluation of the Reaction Cross Sections for the Five Isotopes Ba 134-138

The evaluation of the Ba 134-138 has been completed. The results are at present being updated in ENDF/B4 format. In this study considerable emphasis was placed on the calculation of the gamma production cross sections. (ref.1)

The Coupled Shielding Standard Library EURLIB 3.

In collaboration with the IKE Stuttgart, the neutron shielding library EURLIB (ESIS Newsletter 12, January 1975) was extended. 20 gamma groups were added to the 100 neutron groups; their group structure consists of 18 gamma groups of CASK, to which two further groups between 10 and 14 MeV were added. Thus fusion problems can also be treated.
Coupled libraries generated from ENDF/B-4 data files have been obtained by the new version AMPX-1.

A main effort has been devoted to the improvement of the flux
weighting for both neutron and gamma radiations. For neutrons,
in thick layers of reactor steel narrow resonance weighting is
necessary and a weighting function $1/\sigma_\tau$ E has been used below
0.825 MeV and fission spectrum weighting above.
For the gamma rays one difficulty had to be overcome:
the three lowest groups (energy limits 20 keV - 50 keV - 100 keV-
200 keV) are rather large, and in materials with medium and
high Z the gamma flux is no longer flat at low energies but
decreases by orders of magnitude.
There, a realistic weight function is the resonance escape probabili-
ty p(E) (this can be proved by generalising the neutron slowing
down theory for the gamma case). p(E) was approximated as the
product of the survival probabilities for successive average
scatterings. This weighting was applied below 100 keV for elements
from Cr (Z=24) to Zr (Z=40), and below 200 keV for the two uranium
isotopes. The elements and isotopes now covered are : H, He, Li6,
Li7, B10, B11, 0, C, Na, Al, Si, Ca, Cr, Mn, Fe, Ni, Cu, Zr,
U235, and U238. He, Li, B, and Cu were processed in P5 approxi-
mation, the others in P3. If possible, ENDF/B4 data were used; but
some (n, gamma) data had to be taken form elsewhere, for instance
POPOP and ENDL.

Interpretation of the Winfrith iron measurements (ref. 2)

In the ASPIS experiment the source is a 60 cm radius converter,
and the shield mock-up consists of 24 iron plates each 183x191 cm
wide and 5 cm thick.

Neutron spectra have been measured by Mc Carter & Packwood at
depths of 20,51, 76 and 102 cm in iron, from 5 MeV to 7 keV.

During 1976, DOT-3 transport calculations have been performed
on this configuration using the EURLIB cross section library, based
on ENDF/B-III, and EURLIB-3, based on ENDF/B-IV. In general,
there is good agreement between calculation and measurement,
however the calculated fluxes are much lower than the measured
fluxes at 76 and 102 cm depths above 0.3 MeV. The difference
between the EURLIB and EURLIB-3 spectra is relatively small.

Work has continued to ascertain the cause of these discrepancies.
To estimate the influence of the angular quadrature order the initial
S4 set has been changed into S8 and the EURLIB calculation repeated
down to 2.46 MeV : the fluxes at 102 cm increased by 10-15%, and
by up to 40% above 10 MeV.

The axial interval width in iron, was then reduced from 1 inch to
0.5 inches. The fluxes increased by 20-30%. These two increases
are too small to improve significantly the agreement.

Also ANISN (1-dimensional) calculations have been done to estimate
the approximation of the reduction to 2-dimensional DOT geometry.

The ANISN geometry and source density have been set equal to
that existing on the axis of the DOT case; three similar calcula-
tions (S/1", S/1", S/0.5") have been done using EURLIB, but the
ANISN/DOT factor has resulted lower than expected, being about
1.5 between 15 MeV and 1 MeV, and increasing to 3 by 10 keV
(below this energy the three ANISN fluxes differ by less than 1%).

It is concluded that neither the space/angle discretizations, nor
the reduction to r-Z (DOT) geometry are the main causes for the
discrepancy at high energy between measurement and calculation of
neutron spectra at 3/4 m - 1 m depth in iron.

It is possible that a systematic error in both EURLIB and EURLIB 3
could be the cause.

Before considering experimental errors (or numerical errors
corrected with unfolding of experimental data), the cross section
library could be extended to higher Legendre terms than the P3
used here; the fact that discrepancies increase with increasing
energy, as do Pn terms, is an argument for this approach.

Threedimensional effects in sensitivity studies; multigroup calcula-
tions for the transmission of a neutron beam through iron slabs.

(ref. 3, 4, 5)

Neutron transport calculations in 3-D geometries are almost exclu-
sively done by Monte Carlo techniques. For this reason the associat-
ed sensitivity studies require the application of the same methods.

A rather detailed description of this approach has been presented at
the Meeting on Sensitivity Studies and Shielding Benchmarks (Paris,
Oct. 1975) and is available in the proceedings of that Conference.
Since then the proposed methods have been programmed, tested and
incorporated into the Monte Carlo program TIMOC-72.

At present the program allows for the calculation of energy integrated
sensitivity factors in multigroup, 3-D multimedia geometries and of
energy dependent sensitivity profiles in 3-D single media geometries.

As a typical example of interpreting a three-dimensional benchmark
experiment, the neutron transmission measurements at the fast
source reactor "YAYOI" were chosen. In one of these experiments a
narrow collimated neutron beam penetrates a 9.6 cm or a 19.2 cm
thick iron slab.

The spectra are measured at two positions, both at a distance of
100 cm from the surface of the iron slab. One detector is located on
the beam axis (0° position) and the other at 30° off the beam axis.
The calculations were performed again by the use of the previously
mentioned 55 group cross-section set.

In the calculations the source was represented by a monodirectional
beam of 20 cm diameter.

The energy spectrum of the emitted neutrons was measured at the 0° position in the absence of the iron slab, and it was this spectrum which was used in the calculations. Unfortunately the spatial source distribution on the iron slab and the degree of collimation is not well known. For this reason the calculated spectra ere normalized to the experimental ones. For both slabs there is an excellent agreement in the 0° position between measurements and calculations up to 13 MeV. The same holds over the whole energy range for the calculated and measured values in the 30° position with one exception. This is the energy band from approximately 5 to 7 MeV in the 19.2 cm iron slab.

The sensitivity profiles which correspond to the four measurements described above, show an approximate proportionality with the flux-spectra and there are, at least for the group structure considered, no group cross sections of very pronounced importance. Fluxes in the range 1-3 MeV and above 10 MeV are most sensitive to total cross section changes in the 19.2 cm iron plate direct transmission (i.e. 0°) experiment. The 9.6 cm plate direct transmission experiment and the 19.2 cm experiment with a detector position 30° off the beam axis show a very similar behaviour. The least sensitive measurement is the 30° position in the 9.6 cm plate experiment.

b) Code Assessment

MODESTY, a Program for the Calculation of Reaction Cross Sections Important for Reactor Shielding and CTR Applications

The code MODESTY was designed to calculate all energetically possible reaction cross-sections and particle spectra within a possible decay chain initiated by a nuclear reaction.

The code is based on the statistical model for nuclear reactions, so that the results will be of sense only within the limitations of this model; about 2 MeV to 25 MeV. This energy is important for shielding in fission reactors and in particular in fusion technology.

The partial width's for particle decay are calculated using the optical model, for γ-decay the Blatt-Weiss-kopf single particle model. The programme was made to simplify the evaluation of cross-section data by giving maximum output information for minimum input. All necessary nuclear data are automatically searched from an external library of fundamental data.

The output of the programme contains the : reaction cross sections, particle spectra, level activation cross sections, production cross sections for discrete γ-lines.

For further cross-section date evaluation some modifications of the code are however still desirable (e.g. addition of the pre-equilibrium model, refinements in the interpolation of transmission coefficients, a more flexible treatment of the γ-decay by including the Brink-Axel

model for the Υ-ray strength functions).

To simplify such modifications the code is written in the "Structured Programming" style that means the code is linearly unfolded and contains no explicit "GO-TO" statements.

The computer-time T needed to sweep through a whole cascade depends strongly on the energy E of the incoming projectile. Calculations (IBM 370/75) give roughly the following figures:

E = 10 (MeV) T about 1' , E = 16 (MeV) T about 10' and E = 20 (MeV) T about 20'.

The complete programme, including a test example and JOB-Control cards, is available from the NEA-program library.

c) **Shielding Experiments**

First measurements at EURACOS II

The EURACOS II installation, at the LENA TRIGA reactor (Pavia), was completed and a series of measurements to test the converter power have been executed. Afterwards the first shielding mock-up (an iron block of 1.50 x 1.50 x 1.00 m) has been installed. It is composed of consecutive iron plates of 4 cm thickness. Every 8 cm a rod for detector loading enters to permit measurements along the central axis of the block. The source (an enriched Uranium disk of 80 cm diameter) is placed at 10 cm in front of the mock-up. With threshold (S32), resonance (Au 197) and thermal (Dy 165) activation detectors, the flux profiles in the empty irradiation chamber have been determined to study the geometrical characteristics of the source neutron emission in both longitudinal and radial directions.
Along the central axis of the iron block the fast flux (above about 2 MeV) has been measured up to a distance of 50-60 cm. It follows very closely the exponential attenuation law. The neutron flux at the gold resonance energy does not however conform to such a simple relationship.
The experimental data are now being treated and interpreted.

d) **Reactor Shielding - Technical Support**

Shielding Problems in the FINTOR Reactor

- Bulk Shield Calculations:

Bulk shield calculations were performed with ANISN.
The 100 group DLC-2D library was chosen as the basic neutron data library. Few group (15 and 22 groups) libraries have been collapsed, using ANISN, from the previous 100 group one. Gamma-production cross-sections were taken from EL-3 and photon interaction cross sections from EL-1.

The main purpose of bulk shielding calculations was to determine a minimum thickness inner shield. The critical quantity is the radiation damage in the magnet, which must not exceed $2.7\ 10^{-5}$ dpa/y.

An analysis was carried out (with the 15 group neutron library) to determine the best configuration of a shield composed of stainless steel (SS) with Boron carbide outside.
The minimum thickness shield to reduce the radiation damage below the critical value, is composed of 40 cm of SS, plus 38 cm of boron carbide. The effect of the space distribution of the two materials is not very important : an homogeneous mixture (with a volume composition of 60% SS, 40% B_4C), needs only a few more cm to reach the same attenuation.

The use of SS and water as shielding materials, brings a further reduction (in the minimum thickness) of about 10 cm. In this case the optimal configuration would be a quasi-homogeneous (alternate layers) mixture with 80% (by volume) SS and 20% water.

In the inner shield, where lithium is not present, the configuration with SS and water may be applied. The neutron shield is followed by 15 cm of lead (gamma-ray shield).

The outer shield has a Lithium blanket of about 70 cm.
The neutron shield consists of a SS layer (which acts also as a reflector to enhance tritium breeding in the blanket) followed by B_4C, with a total thickness lower than that needed in the inner shield (where the Lithium blanket is missing). The gamma-ray shield is the same in both cases.

- Three-dimensional Monte Carlo Calculations:

Neutron streaming through the divertor annular gaps and the injector tubes has been investigated with the 3D Monte Carlo code MORSE-E. A 22 group neutron library, collapsed from the 100 group DLC-2D library, has been prepared for these calculations.

There were essentially two variance reducing techniques implemented in the Monte Carlo calculations : biasing of the angular distribution of the source, and splitting.

The three-dimensional calculations show, on the contrary, that the streaming of neutrons produces higher than admissible radiation levels. Let $D = 2.7\ 10^{-5}$ dpa/y be the maximum damage that can be accepted by the copper stabilizer; the Monte Carlo calculations indicate that the damage to the DFC from neutrons streaming through the divertor annular gap is greater than 100 D in the inner part of the coils, and decreases to about 40 D in the outer part.
Furthermore the neutrons streaming out of the divertor gap inpinge on the upper (or lower) part of the TF coils, the shielding effect of the collector material being small. The damage to the TFC caused by these neutrons can again exceed 100 D.

The presence of the injector tubes considerably weakens the perform-
ance of the outer shield and enhances the fluxes in the neighbourhood
of the TF coils. Lithium is absent in this region, and the neutron
shield is crossed by 60 cm diameter injectors.

Radiation damage to the TFC may be locally enhanced by a factor
3.0. Heat deposition and radiation damage to the electronic equip-
ment of the injectors can also raise problems.

- Gamma Ray Buildup Factors in a Barytes Concrete:

Gamma ray buildup factors were calculated with the transport code
PIPE for source energies from 0.5 to 4 MeV in a barytes concrete
of density 3.3 gr/cc. The results are compared with those of the
moments' method, interpolated with effective Z-values. The method
proposed in EUR 2494 d(pag 102) how to evaluate Z_{eff} was applied.

e)   Shielding Data Bank and Information

The SDB (Shielding Data Bank) has been regularly updated with
bibliographic references from the ESIS Newsletter and others selected
from international journals and reports. Up to now the total refer-
ences are about two thou and.

The ESIS Newsletter has been issued two times according to schedule
in a new and improved format.

CONCLUSIONS

In the frame-work of nuclear data assessment the test of iron cross sec-
tions in deep penetration problems plays a dominant role. This work will
therefore be continued both by calculations and measurements. A valuable
tool to understand discrepancies between theory and experiment will be
the application of sensitivity analysis. Besides the use of the classical
methods the newly developed 3D sensitivity Monte Carlo code might provide
additional information for the solution of this problem, especially since
sensitivities in shielding problems are strongly problem dependent.

As a next step in the interpretation of measurements it is foreseen to
adjust input cross section data sets by linear regression techniques so
as to provide agreement with integral experiments.

The completion of the evaluation of the Ba 134-138 cross sections fills a
large gap existing until now in shielding data of heavy concrete containing
an appreciable amount of this material.

For further work on reaction cross sections the MODESTY Code will be
a very valuable tool to perform routine calculations.

Finally the acquired competence in transport methods and sensitivity
analysis finds ready application in technical support work for fission
reactors and in fusion technology.

PLANNED ACTIVITIES

From the results and the conclusions quoted above the work of the next half year will develop along the following lines:

a) continuation of neutron transport studies in iron deep penetration problems using refined calculational and measuring techniques, backed up by sensitivity analysis and a pilot study on cross section adjustment.

b) Generation of coupled neutron-gamma libraries as requested by the EC shielding community.

c) Implementation of the MORSE-SCG, FORSS and the spectrum unfolding code RADAK and a further development of on-line conversational graphical display programs for histogrammes and plane cross sectional views of Monte Carlo geometry specifications.

d) Technical support will be provided to the design of the fast test reactor PEC for which calculations of neutron streaming will be performed. Furthermore the design calculations for hot cell gamma shielding taking into account the optimization of the sequence of layers, especially in glasses, will continue.

e) The shielding data bank will be updated and the ESIS Newsletter will be edited regularly.

COLLABORATION WITH EXTERNAL ORGANIZATIONS

- In the framework of the Common Benchmark Program, ESIS cooperates with the National Centres of Saclay, Cadarache, Winfrith, Karlsruhe, Casaccia, Wurenlingen, as well as with the Centres of JAERI, the University of Stuttgart and Tokyo.

In the US, close and regular contacts with free exchange of information and materials exist with the Radiation Shielding Information Centre at ORNL, with the National Neutron Cross Section Centre at BNL and with the Nuclear Data Evaluation Group at LASL and the Nuclear Data Section of the IAEA at Vienna.

- ESIS participates in the German "Fachausschuss fuer Strahlenschutz", located at the University of Hannover.

- Research contacts exist with the University of Pavia where the EURACOS II facility is installed and with the Institut fuer Radiumforschung und Kernphysik at Vienna, which collaborates on nuclear data evaluation.

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2.4 METHODOLOGICAL STUDIES

2.4.1 Automatic Documentation

OBJECTIVES AND METHODS

The objective of this activity is to develop methods and procedures for automatic content analysis, indexing and query processing and to assess their effectiveness experimentally on a real-life environment. The procedures of automatic indexing with description of an existent thesaurus have been developed sufficiently to allow a first experimental application, while the automatic vocabulary control is sitll on the implementation phase and is the subject of a doctoral thesis which is being prepared with a J.R.C. grant.

The methods applied are mainly linguistic and statistical. As basic informatics support the software system SLC-II (Simulated Linguistic Computer) is being used, which was developed by the same team.

RESULTS

The principal effort made in the reference period was dedicated to the effectiveness assessment of automatic indexing with an existing thesaurus in mechanized information retrieval. For this purpose, the INIS data base was chosen, and a co-operation agreement was concluded with the INIS section of IAEA (Vienna) which acts as a link with the end users of the data base through the network of INIS Liaison Officers. These and users have submitted some 100 search profiles (which are currently used by the national nuclear information centres) and have the task of assessing the relevance of the retrieval results. The evaluation of the assessment is the task of INSPEC (London) who acts under contract. The experiment foresees the automatic indexing of three monthly issues of INIS tapes (app. 15,000 documents), the loading of the data bases on STAIRS (Storage and Information Retrieval System of IBM) and the processing of the three issues against the 100 search profiles using on the one side the normally assigned description and on the other those automatically assigned. While the end users are given a merge of the two searches the results are presented on an analytical form to INSPEC for the evaluation (documents retrieved only with automatic indexing, those retrieved only with manual indexing and those retrieved with both).

This work has been completed, and the results of the searches have been dispatched to INIS and INSPEC.

The system has proved to be fully operational on the technical side, and now we must await the results of the evaluation, in order to be able to assess its effectiveness from the information retrieval side.

A second part of the experiment concerns the evaluation of the effectiveness of "thesaurus enrichment" which is an augmentation of the existing INIS thesaurus with additional non-descriptors and descriptors and with conditional indexing rules. The "enrichment" is performed in coopera-

tion with DG XIII in Luxembourg who can exploit the experience of subject specialists who formerly had been involved on the development and operation of ENDS. For this purpose, a in-house collection of app. 5,000 documents on isotope separation is used. The purpose of this part is to assess the improvement of the automatic indexing effectiveness through "enrichment". A set of some 35 queries was prepared by INSPEC and the relevance assessment will be made by a panel of experts. The computing procedures for this phase are fully developed and tested and the intellectual work is in its last phase (systematic revision of the amendments to the INIS thesaurus). Indexing and retrieval are expected to be concluded in July.

The work on automatic vocalulary control has concentrated on automatic clustering of descriptors. The results so far obtained concern mainly the full implementation of the clustering programs (which were developed previously) and in the critical examination of the statistical aspects.

CONCLUSIONS

The final results of the assessment of the effectiveness of automatic indexing will be available only on the second half of the year. So far one can state that the indexing system works reliably and efficiently. The work on automatic clustering has shown the feasibility of the algorithms, developed for processing large quantities of data. The results of this research will be available only in 1978.

COLLABORATION WITH EXTERNAL ORGANIZATIONS

INIS - International Nuclear Information System of IAEA, Vienna (cooperation agreement)

INSPEC- Institution of Electrical Engineers, London (Contract).

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    "Feasibility Study of Automatic Indexing of INIS Abstracts"
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4)   INTERNATIONAL ATOMIC ENERGY AGENCY
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2.4.2 Software Engineering

OBJECTIVES

a) Computer Performance Evaluation
   The activity was started in the fall of 1975 and aimed at developing appropriate statistical data reduction techniques to analyse accounting data of computer programs.

b) Application Program Reliability and Correctness
   The activity aims at developing machine aids to improve application program reliability by performing some automatic analysis on semantic information attached to programs as formal assertions and specifications.

METHODS

a) As data reduction technique an automatic classification procedure is applied for which a tool has been developed during the course of 1976. Some effort is dedicated to the assessment of the validity of results obtained by automatic classification in general and specifically of accounting data.
   There are two types of evaluation:

   - assessment of an individual classification result
   - comparison of two classification results of the same data or of different samples of data

b) To reach the goal an appropriate specification language to express assertions is to be chosen and adapted to the needs of the user community. Semantic information on the program is then coded by the programmer and automatically verified at run-time during the test phase.

RESULTS

a) For the Computer Performance Evaluation some useful measures of inhomogeneity and concentration (concentration elipsoid) of data have been integrated into the program. Factor analysis of clusters should show that some characteristic semantic information contained in the original data can be also derived from the elaborated data.
   Comparison of two classification results is rather difficult especially in cases where little or nothing is known on the distribution of the raw data. Some distance measures are going to be applied to this problem. A contract with Computer Resource Management S. P. A., entitled "A Dataset Activity Study for the JRC Data Centre", was brought to an end. The final report is available /3/.

b) For the Application Program Reliability and Correctness, in a
   preliminary phase a contract was established between the J.R.C.
   and the Imperial College in London. The aim of the contract was to
   compile a state-of-the-art survey on software reliability and to
   prepare proposals for research areas in the field.
   The final report is now available (ref.1).
   A simple to use tool, which allows PL/1 programmers to introduce
   assertions into their programs as a testing aid has been prepared.
   Assertions are formulated in the predicate calculus. The tool consists
   of a series of macro instructions.
   For a simple program matrix inversion the tool has been success-
   fully applied. An intensive literature study has been performed during
   the first six months of the programme period.

CONCLUSIONS

a) The objective of the activity on Computer Performance Evaluation is
   to dispose by the end of 1977 of a tool to analyse accounting data ap-
   plying a classification technique. The technique was presented at
   the "2nd International Workshop on Modelling and Performance Eva-
   luation of Computer Systems in Oct. 1976" (Ref. 2)

b) The activity on the Application Program Reliability and Correctness
   is in the initial phase and is presently understaffed.
   Therefore there will be delays in preparing a more complex tool.
   Nonetheless the tool could become operational in an early stage since
   it is designed to render it open-ended.

PLANNED ACTIVITY

It is intended to complete the action at point a) by

- developing a measure(s) to assess the similarity of different structures
- preparing a simple to use version of the program
- analysing some specific problem (Comparison of the two operating
  systems MF T and MV T with respect to throughput and "turn-around-
  time").

The planning for point b) includes:

- Preparation of a contract with an external research unit which could
  include joint work on
            - study of the predicate calculus as a specification language
            - developing of a programming style in view of the assertions
              to be integrated in the program.

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Conclusions

3. CONCLUSIONS

For EIN, EUROCOPI, ESIS and a part of the Methodological Studies, the results obtained in the first six months period of the present multi-annual programme have to be considered in the light of the work already done in the past years. For new actions this period was essentially dedicated to establish the basis for the future development and to train staff to their new jobs: this is essentially the case of Automatic Documentation and Software Engineering. For the latter this process did not yet come to an end and should continue in the second part of the year.
Appropriately staffing all the actions through restructuration and training introduced some delays for a few areas.

The EIN activity has now practically reached its full man-power and progressed on schedule along preparation of the Ispra contribution to the European Network. In particular the preparation of combined network demonstrations, scheduled for end 1977, is under way. However, some difficulties derived from the limited overall resources available in the entire EIN project and from the unexpected delay in getting the final decision for the JRC programme.

The staffing of EUROCOPI activity was, in the first part of the year, not completed as foreseen and therefore it was difficult to initiate some of the new actions which were planned. The situation is now, however, improving. It was realized that the development of the activity along the various directions proposed will not be fully feasible and some reorientation and focalization of the programme towards a limited number of goals will have to be seeked. However, the sustained pace of the routine information serivce (60 programs and 600 manuals distributed, preparation of 100 new abstacts and updating of other 200) and the leading position acquired in the European cooperation (e.g. : in the European Association for Software Access and Information Transfer) testify the usefulness and importance of this activity.

ESIS activity made good progresses, deepening the work in the field of nuclear data through the incorporation of previous activities of the Integral Nuclear Data Centre (INDAC), producing original scientific contribution (6 publications) and enlarging the work in particular to the shielding problems of fusion reactors. The first measurements at the EURACOS II plant, now completed, took place in the first part of the year and the regular work of updating the shielding data bank and of distributing information, in particular through the publication of ESIS Newsletter, went on as usual.

The activity on Automatic Documentation is now waiting for the results of the experiment prepared for assessing the effectiveness of the Automatic

Indexing System which was developed in the precedent programme period. The report on these results which should influence the planning for the next period, is expected for autumn 1977. In the mean time the limited staff allocated to the activity was essentially concerned with the preparation of the retrieval system STAIRS for the purpose of the experiment (two utility programs were written) and with some scientific contribution to the work on automatic vocabulary control for text-processing.

The Software Engineering activity is a new one and it was possible to allocate to it only very limited staff in the first part of the year. This staff has concentrated on the detailed programme definition, in collaboration with the Imperial College of London (under contract), who prepare a state-of-the-art report in the field of computer program reliability. Using an automatic classification tool developed previously, some work went on for evaluating computer performances; in particular the operating systems were compared with respect to the variables throughput and turn-around time.
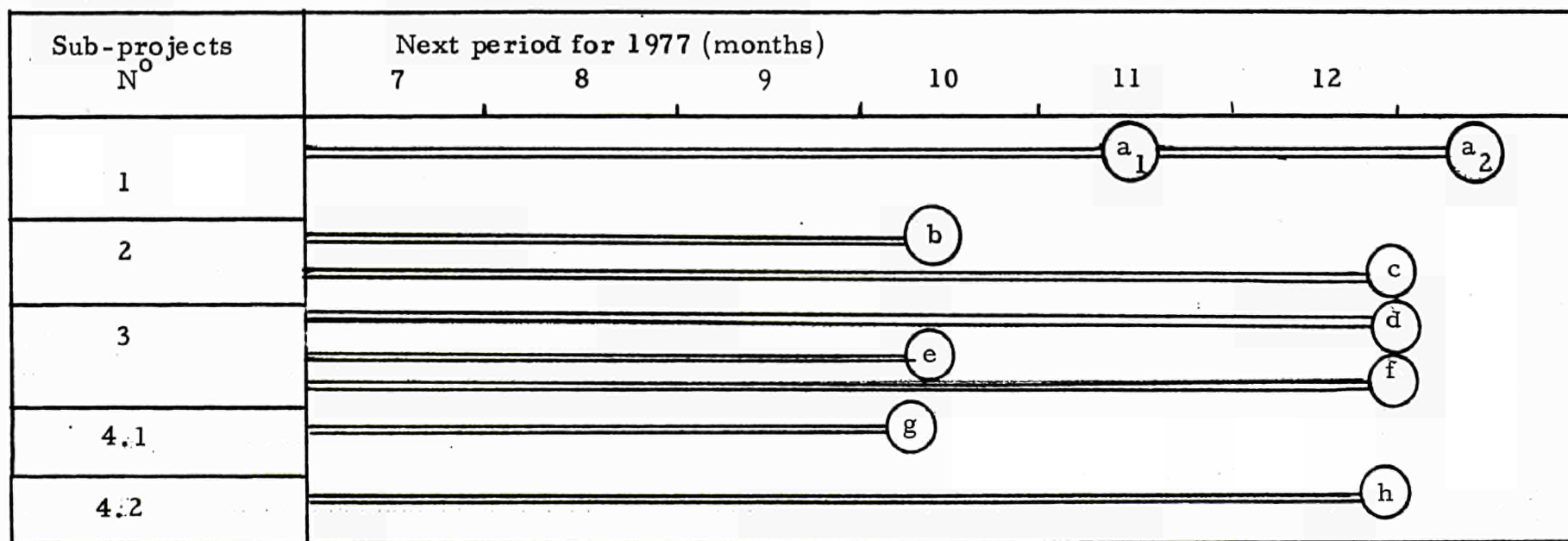
In the attached table (Table 1) the important milestones of the various activities for the next period are indicated. In the longer term it is foreseen that the EIN activities will develop following the planning of the COST 11 action.

EUROCOPI and ESIS will go on performing their usual work, being improved and reoriented following the users´ needs.
The Automatic Documentation work, as well as the Software Engineering activities are expected to follow, in their development, the orientation of the Commission activities and of the Community policy in the field of respectively Scientific and Technical Information and Informatics.

In the context of contracts with the Commission´s actions in Informatics (DG-III) the Ispra Establishment was host for the Purdue Europe Workshop Meeting in March 1977 and participated in the preparation of the CREST Sub-Committee on R&D in Informatics Workshop on Possible Community Projects in Real-Time Data Processing, held in Brussels in May 1977. This might lead to development of new activities in the near future.

For further information, please contact the Programme Manager.

Table 1 : Important milestones

Sub-projects Nº	Next period for 1977 (months)					
	7	8	9	10	11	12
1					a_1	a_2
2			b			c
3			e			d / f
4.1			g			
4.2						h

a_1) Preliminary results of EIN demonstration experiment
a_2) Final results of EIN demonstration experiment

b) Network of readers to prepare program abstract established
c) Standards for indexing and classification of programs produced and adopted by EASIT members
d) Report on the generation of a dosimetry library and various neutron-gamma libraries
e) Implementation of MORSE-SCG and RADAK
f) Report on the hot cell gamma shielding
g) Results of the assessment on automatic indexing
h) End of the present phase of the study on Computer Performance Evaluation

4. JRC PUBLICATIONS

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GLOSSARY

A C M	Association of Computing Machinery
ASPIS	Integral Iron Shielding Experiment carried out at Winfrith
CCITT	Comité Consultatif International des Télégraphes et des Téléphones
CEPT	Comité Européen des Postes et Téléphones
CIDST	Committee for Information and Documentation in Science and Technology
COST	Committee for Scientific and Technical Cooperation
CREST	Committee for Scientific qnd Technical Research
C T R	Controlled Thermonuclear Reactor
D F C	Divertor Field Coils of FINTOR
EASIT	European Association for Software Access and Information Transfer
ECMA	European Computer Manufacturers Association
ECSIR	European Consortium for Software Access and Information Transfer in Research and Teaching
EIDA	European Distribution Agency of the ICES Users Group
E I N	European Informatics Network
ESIS	European Shielding Information Service
EURLIB	JRC Neutron Shielding Library
EUROCOPI	European Computer Program Institute
EURONET	European Network for Scientific and Technical Information
FINTOR	"Frascati-Ispra-Napoli TORUS": Joint conceptual design
HDLC	High Level Data Link Control Procedure
ICES	Integrated Civil Engineering System
IFIP	International Federation of Information Processing
INDAC	Integral Nuclear Data Centre (included in the 1973-76 JRC programme)
INIS	International Nuclear Information System of IAEA, Vienna
INSPEC	Institution of Electrical Engineers, London
ISO	International Organization for Standardization

M F T	Multi-programming with a fixed number of tasks
MVT	Multi-programming with a variable number of tasks
SEAS	Share European Association
STAIRS	Storage and Information Retrieval System of IBM
TF	Toroidal Field of FINTOR
TFC	Toroidal Field Coils of FINTOR

LIST OF AUTHORS

Service and Support Activities
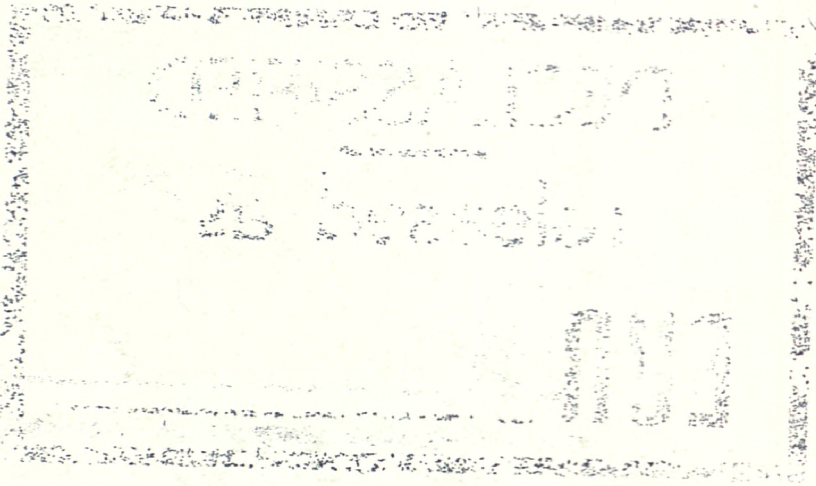   Programme manager (Ispra) : C. Rinaldini

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