INT-0074

~~E/CEPAL/1497~~

Santiago, 7 de abril de 1972

ELECTRONIC DATA PROCESSING FOR CLADES: FIRST STEPS

Report on four month mission
(15/12/71-15/4/72)

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data processing systems to ECLA

72-4-568

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* It will be separately distributed

7 April, 1972

Dear Sir,

Herewith I present my conclusions regarding the role of electronic data processing methods in the Latin American Centre for Economic and Social Documentation (CLADES) and a report on initial progress in achieving the goals set.

It was a pleasure for me to contribute to the development of CLADES, because I share the opinion of its founders that the value of a properly functioning information service on economic and social aspects of Latin American development can hardly be overestimated, for the Centre should develop into a major tool, both for ECLA and for the world outside.

I should like to express my appreciation for the wholehearted support I have received from numerous sides. If, nevertheless, some criticism may be observed in my report, it should be noted that my objective has been to indicate possibilities for improvement, rather than sum up existing virtues.

I should in particular like to recall my fruitful co-operation with programmers R. Rodríguez de Cora and J. Morandé O'Reilly, and also CLADES Director a.i., R. Rodríguez Delgado.

Yours sincerely,

A. L. Dekker

Dr. A. L. Dekker

Mr. Enrique Iglesias,
Executive Secretary,
Economic Commission for Latin America
SANTIAGO

ELECTRONIC DATA PROCESSING FOR CLADES: FIRST STEPS

Report on four month mission (15/12/1971-15/4/1972)

A.L. Dekker 1/

1. Introduction

1. The Latin American Centre for Economic and Social Documentation (CLADES) was established in early 1971 as part of the activities of the United Nations Economic Commission for Latin America (ECLA). Steadily trying to extend its capabilities, the Centre is preparing for a difficult task in a large region. The objective is to direct the flow of valuable information which is produced by many research-workers, governmental offices, etc. to the place where it belongs: i.e. the desk of the specific official who should make use of it. The weakest links in the chain of information production, transmission and use, namely selection according to personal interest profiles and interconnexion of geographical, organizational and language entities should be reinforced.

2. It is obvious that modern computer technology is an indispensable tool for handling the present flood of documentation. There is no other way to siphon out of the huge input a manageable small number of really relevant items for every individual. For this reason, CLADES asked for the assistance of an expert in the automatic documentation field in August 1971, which request reached the present author on August 25th. After completion of the required administrative arrangements, the assignment began on 15 December 1971.

2. Information storage and retrieval systems

3. Although this report is primarily aimed at giving a practical account of the results of the author's mission, the following general comments on information retrieval have been included by way of background. Computer programmes especially designed for the handling of document data come in ranging degrees of sophistication. Basic systems generally allow the build-up and maintenance of a data base that may be used for the print-out of full bibliographies, and the computer production of multiple-entry listings (author indexes, subject indexes, country indexes), which are useful tools in the manual retrieval of relevant items. Some form of search module, enabling computer selection from the data base of items which fit into user provided queries, is also usually a standard feature. (See figure 1).

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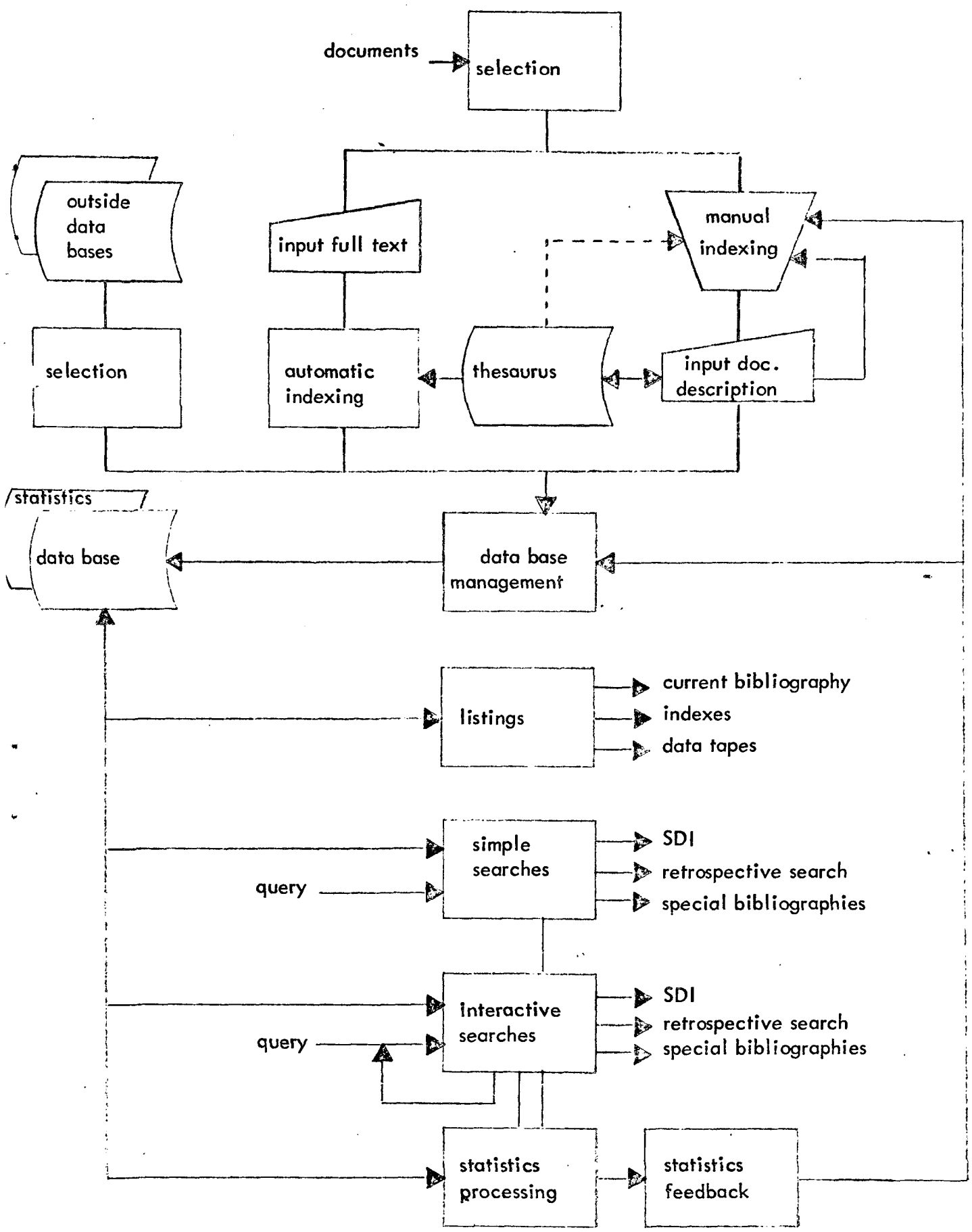
/ 4. It is

Figure 1

Functions in information retrieval systems



4. It is rare for complete documents to be recorded in the system. The general approach is to make a "document description" 2/, which consists of bibliographic information plus analytical data (abstract, keywords). Powerful automatic methods have been developed to perform this task, at least as far as the analytical information is concerned, by computer. They require, however, machine reading of the full text of the document and involve complicated programmes which require a great deal of computer time and expert attention. Therefore up to now analysis has mainly been carried out by human analysts. The computer input of the DDs made by human analysts may be computer controlled for format (e.g. a year of publication has to be preceded by the subject tag "17" and should consist of four numerics) and for proper formal use of keywords or "descriptors". The latter feature presumes the existence of a computer-based thesaurus or wordlist, with attached updating possibilities.

5. In simple searches, the data base or part of it is scanned for items which fit into a preformulated interest profile. Selective dissemination of information (SDI) may be undertaken, i.e. the attention of individual people or groups may be directed to documents which, from the description, should be of interest to them. SDI is a current awareness service, operating on newly registered material. Searches in depth of the data base are called "retrospective". They may be executed prior to undertaking an SDI-profile, or for the production of special, partial bibliographies. More sophisticated systems sometimes allow the reshaping of a query in the light of the preliminary information yielded by the first search (e.g. number of relevant items in the data base). This is shown in figure 1 as the "interactive search".

6. Statistical modules combined with manual or automatic feedback can be developed into useful tools for optimizing the system. If, for example, the bookkeeping indicates that a particular document is never relevant to any query, it may then be deleted from the data base. Excessive use of certain descriptors is a sign of inadequacies in the thesaurus or wrong indexing habits.

7. The functional tasks which information storage and retrieval systems perform may be undertaken using quite different software strategies and a number of hardware approaches. Some consequences of the possible choices will be mentioned in the following paragraphs, in the context of the possibilities which are at CLADES disposal. The present section has been designed to make clear that automatic documentation systems are logically - at least for the basic modules - closely related. It is in determining the degree of sophistication ultimately to be reached that the particular needs, resources and environment of the documentation centre have to be taken into account.

2/ The term document description will be often abbreviated to "DD" in this report.

/3. Initial

3. Initial situation

8. The situation to which CLADES had evolved near the end of 1971 has been described in detail by Dr. Verhoeven (Ve 72). A number of abstracts in different formats had been produced and published with small distributions (generally less than 250), after manual preparation of master stencils. Automation activities were limited to voluntary work by two interested students from the University of Chile. In the mother organization ECLA, employing about 400 people, no EDP installation was available, nor could any general service contract with a computer service centre in Santiago be traced. However, the existence of several reliable service centres in the city, among them the computer centre of the University of Chile, the National Computer and Information Enterprise (ECOM), and IBM de Chile, made it possible to start processing activities without delay. In fact, informal arrangements to use the University's facilities were made by CLADES prior to the author's arrival.

9. The job description (appendix 1) referred to the "design" of information systems and retrieval programmes. However, several systems of this category have already been developed - often after many man-years of systems design and programming - by different United Nations organizations, and it was decided therefore to investigate first whether duplication could be avoided by tracing an existing system that would fit into CLADES needs. A number of systems were investigated, the most important ones being PRIS/CAIP (United Nations Headquarters), ISIS (ILO, UNIDO, UNESCO), SIRIUS (UNCTAD), PRIS (WHC), FAO's system and INIS (IAEA). Visits were paid by the author to United Nations Headquarters in New York and to the Geneva-based agencies to discuss the possibilities of systems with the designers. The results of this work were described in a memorandum, which is attached to this report as appendix 3. Only the conclusions and recommendations of this memorandum will be repeated here.

10. Conclusions and recommendations:

1. CLADES should decide upon a format for document description as quickly as possible, and at the same time also choose a related information storage and retrieval system.

2. The beginning of routine CLADES services should be purely conventional. Then, after thoroughly testing, automated operations can be gradually introduced to replace manual tasks.

3. Any information storage and retrieval system should not be developed in the absence of permanent programming and maintenance staff.

4. From the technical standpoint, at the present time the ISIS system would be the best choice for CLADES.

/ 11. The ISIS

11. The ISIS system was recommended since it is a fairly well developed, compact and modular system and fits into Chilean computer configurations. However, the recommendation could not result in immediate action given the complexity of the issue. In view of the United Nations pattern of decision-making, the author could foresee that it would take a number of months for a final choice to be made, and he therefore decided to continue his work by implementing some simple programmes that could temporarily do most of the job (see: Programme of work, appendix 2). The indexing programme KWIC/360 (Wh68) was used as a basic tool. In the meantime, a letter was written by Mr. R. Rodríguez Delgado, Director a.i. of CLADES, to Geneva, in which ILO was asked to make the basic modules of ISIS available to CLADES, so that preliminary studies for the final system could commence.

4. Implementation of software for temporary use

12. The main goals of the intermediate automation activities were:

- to make CLADES "computer-conscious";
- to multiply the output possibilities of CLADES, both quantitatively and qualitatively;
- to establish firm relations with existing computer service centres.

In this work the author was able to build on earlier work undertaken by the students mentioned, who also co-operated at this stage, one of them on a short-term contract, the other completely voluntarily. Their assistance as programmers and partners in discussions was of great value. However, their presence being temporary, it was repeatedly stressed (appendix 2 and 3) that continuity in computer expertise should be considered a basic necessity for the work to be successful. Because no other CLADES employee has EDP knowledge, serious problems are likely to arise after the departure of the author and his two assistants.

13. The KWIC/360 package can be used mainly for the production of a number of different types of listings, among which are bibliographies, authors indexes, subject indexes and KWIC-indexes on titles (see figures 2, 3, 4 and 5). In addition, a simple data base of document descriptions can be built up, with the programme supplying updating facilities. In order to ensure maximum compatibility with major United Nations documentation centres, a DD format almost identical to that of ISIS was chosen. Because ISIS is directly related to MARC-II 3/, a link with the most important non-United Nations abstract services is established. The KWIC/360 programmes, originally designed by P. L. White of I.B.M. U.K. (Wh68), are described in detail in a report by Rafael Rodríguez de Cora and Juan Morandé O'Reilly, which is appended

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3/ MARC-II. Internationally accepted format defined by the United States Library of Congress.

/ to this

Figure 2

Full bibliography in ISIS-format

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C0501                    1970                    ILPESEC22
ARUMADA J
ILPES
TEORIA Y PROGRAMACION DEL DESARROLLO ECONOMICO.=
SANTIAGO DE CHILE, 1970. 87 P. (CUADERNOS DEL INSTITUTO
LATINOAMERICANO DE PLANIFICACION ECONOMICA Y SOCIAL,
SERIE 1, APUNTES DE CLASE N  1)
   /PUB ILPES/. /LIBRO DE TEXTO/ SOBRE LA NECESIDAD Y
   CARACTERISTICAS DEL /DESARROLLO ECONOMICO/ -
   CONSIDERA LOS OBJETIVOS DE LA PROGRAMACION,
   */PROGRAMACION GLOBAL/ Y /POLITICA ECONOMICA/.
   FLEXIBILIDAD Y APLICABILIDAD DE LA PROGRAMACION GLOBAL.
   ETAPAS EN LA ELABORACION DE UN */PROGRAMA/: DIAGNOSTICO,
   PROGRAMACION Y EJECUCION. DIAGNOSTICO DE LOS PROBLEMAS
   DEL DESARROLLO ECONOMICO. /CLASIFICACION/ DE LA
   /ECONOMIA/, ELEMENTOS PRODUCTIVOS, /PRODUCTIVIDAD/,
   FORMAS DE ORGANIZACION Y CAMBIOS HISTORICOS. INCLUYE
   /CUADRO/S.
ESP

C0502                    1970                    ILPESEC22
IBARRA J
ILPES
ASIGNACION DE RECURSOS, PROGRAMACION LINEAL Y TEORIA
ECONOMICA.=
SANTIAGO DE CHILE, 1970. 48 P. (CUADERNOS DEL INSTITUTO
LATINOAMERICANO DE PLANIFICACION ECONOMICA Y SOCIAL,
SERIE 1, APUNTES DE CLASE N  2)
   /PUB ILPES/. /DOCUMENTO TECNICO/ SOBRE
   /ASIGNACION DE RECURSOS/ DENTRO DE UN PLAN DE
   /DESARROLLO ECONOMICO/ Y /DESARROLLO SOCIAL/ Y LA
   /PROGRAMACION LINEAL/ APLICADA A LOS PROBLEMAS DE
   /ECONOMIA/ EN /AMERICA LATINA/ -
   ANALIZA LAS TECNICAS DE PROGRAMACION MATEMATICA COMO
   INSTRUMENTO PARA CALCULAR LOS /PRECIO/S DE OPORTUNIDAD
   SOCIAL. USO DEL METODO SIMPLEX MODIFICADO. POSIBILIDAD
   DE AMPLIACION DEL /MODELO MATEMATICO/ ESTATICO DE
   PROGRAMACION LINEAL CON FINES DE
   */PROGRAMACION ECONOMICA/.
ESP

C0503                    1970                    ILPESEC22
PAZ P
RODRIGUEZ O
ILPES
CINCO MODELOS DE CRECIMIENTO ECONOMICO.=
SANTIAGO DE CHILE, 1970. 99 P. (CUADERNOS DEL INSTITUTO
LATINOAMERICANO DE PLANIFICACION ECONOMICA Y SOCIAL,
SERIE 1, APUNTES DE CLASE N  3)
   /PUB ILPES/ DESCRIPCION DE 5 /MODELO ECONOMETRICO/S DE
   /CRECIMIENTO ECONOMICO/ APLICABLES EN /AMERICA LATINA/,
   ELABORADOS EN BASE A LA /TEORIA ECONOMICA/ DE DAVID
   RICARDO, MARX, MEADE, DOMAR Y HARROD.
   /BIBLIOGRAFIA EN NOTAS/ Y /GRAFICO/S.
ESP
```

Figure 3

Author index (KWOC-format)

Figure 4

Subject index (KWOC-format)

Figure 5

KWIC - index on document titles

ACION Y DESARROLLO, LA GRAN TAREA DE LA	AMERICA LATINA.=	TRANSFORM	00530
	ASIGNACION DE RECURSOS, PROGRAMACION LINEAL Y TEORIA ECONOMICA.=		00502
ESTADISTICA	BASICA PARA PLANIFICACION.=		00533
LA	BRECHA COMERCIAL Y LA INTEGRACION LATINOAMERICANA.=		00535
	CINCO MODELOS DE CRECIMIENTO ECONOMICO.=		00503
LA BRECHA	COMERCIAL,Y LA INTEGRACION LATINOAMERICANA.=		00535
CINCO MODELOS DE	CRECIMIENTO ECONOMICO.=		00503
DOS POLEMICAS SOBRE EL	DESARROLLO DE AMERICA LATINA.=		00524
LOS RECURSOS NATURALES EN EL	DESARROLLO ECONOMICO.=		00523
TEORIA Y PROGRAMACION DEL	DESARROLLO ECONOMICO.=		00501
PLANIFICACION DEL	DESARROLLO INDUSTRIAL.=		00525
HACIA UNA DINAMICA DEL	DESARROLLO LATINOAMERICANO.=		00529
ARROLLO LATINOAMERICANO Y LA TEORIA DEL	DESARROLLO.	EL SUBDES	00534
FILOSOFIA, EDUCACION Y	DESARROLLO.=		00528
SECTOR PUBLICO EN LA PLANIFICACION DEL	DESARROLLO.=	EL	00526
TRANSFORMACION Y	DESARROLLO, LA GRAN TAREA DE LA AMERICA LATINA.=		00530
HACIA UNA	DINAMICA DEL DESARROLLO LATINOAMERICANO.=		00529
	DISCUSIONES SOBRE PLANIFICACION.=		00527
	DOS POLEMICAS SOBRE EL DESARROLLO DE AMERICA LATINA.=		00524
LOS RECURSOS NATURALES EN EL DESARROLLO	ECONOMICO.=		00523
TEORIA Y PROGRAMACION DEL DESARROLLO	ECONOMICO.=		00501
CINCO MODELOS DE CRECIMIENTO	ECONOMICO.=		00503
FILOSOFIA,	EDUCACION Y DESARROLLO.=		00528
LA PLANIFICACION DE LA	ENCUESTA INDUSTRIAL.=		00522
	ESTADISTICA BASICA PARA PLANIFICACION.=		00533
	ESTUDIOS SOBRE LA JUVENTUD MARGINAL LATINOAMERICANA.=		00531
	FILOSOFIA, EDUCACION Y DESARROLLO.=		00528
TRANSFORMACION Y DESARROLLO, LA	GRAN TAREA DE LA AMERICA LATINA.=		00530
	HACIA UNA DINAMICA DEL DESARROLLO LATINOAMERICANO.=		00529
LA PLANIFICACION DE LA ENCUESTA	INDUSTRIAL.=		00522
PLANIFICACION DEL DESARROLLO	INDUSTRIAL.=		00525
LA BRECHA COMERCIAL Y LA	INTEGRACION LATINOAMERICANA.=		00535
ESTUDIOS SOBRE LA	JUVENTUD MARGINAL LATINOAMERICANA.=		00531
DESARROLLO, LA GRAN TAREA DE LA AMERICA	LATINA.=	TRANSFORMACION Y	00530
OLEMICAS SOBRE EL DESARROLLO DE AMERICA	LATINA.=	DOS P	00524
ESTUDIOS SOBRE LA JUVENTUD MARGINAL	LATINOAMERICANA.=		00531
LA BRECHA COMERCIAL Y LA INTEGRACION	LATINOAMERICANA.=		00535
EL SUBDESARROLLO	LATINOAMERICANO Y LA TEORIA DEL DESARROLLO.		00534
HACIA UNA DINAMICA DEL DESARROLLO	LATINOAMERICANO.=		00529
ASIGNACION DE RECURSOS, PROGRAMACION	LINEAL Y TEORIA ECONOMICA.=		00502
ESTUDIOS SOBRE LA JUVENTUD	MARGINAL LATINOAMERICANA.=		00531
CINCO	MODELOS DE CRECIMIENTO ECONOMICO.=		00503
LOS RECURSOS	NATURALES EN EL DESARROLLO ECONOMICO.=		00523
LA	PLANIFICACION DE LA ENCUESTA INDUSTRIAL.=		00522
	PLANIFICACION DEL DESARROLLO INDUSTRIAL.=		00525
EL SECTOR PUBLICO EN LA	PLANIFICACION DEL DESARROLLO.=		00526
	PLANIFICACION Y PRESUPUESTO POR PROGRAMAS.=		00532
ESTADISTICA BASICA PARA	PLANIFICACION.=		00533

to this report. A number of minor errors detected in the programmes during the implementation and testphases are also discussed.

14. The definition of the DD format is as follows (see also appendix 4 and figure 2):

Level 0 Access number (sequential, 5 digits)
Year of publication (4 digits)
Call code (12 characters)

Level 1 Author level
Personal authors maximum 18 characters, 1 per punched card, collective authors maximum 60 characters, 1 per punched card

Level 2 Document title

Level 3 Bibliographic data
Series notes, if applicable
United Nations document symbols, if applicable (on a separate punched card)

Level 4 Descriptor level
Descriptors consisting of more than one term have to be interlinked by breaks and may not be divided over two cards
This level is the only one not to be printed in the bibliography (figure 2)

Level 5 Abstract, consisting of the descriptors interlinked by other words, so that a narrative text is formed

Level 6 Language (s)

Levels 7, 8 and 9 are still free.

15. During the processing of the data for the first computer-produced abstract bulletin (C172), a modest beginning was made with the build-up of a data bank on magnetic tape. This data collection consists of a sequentially ordered full bibliographic file, and is updated in the KWIC/360 module KWICB (see appendix 4). The present rudimentary data collection is recorded on tape CEC 331 of the University's computer centre. The updating options allow deletion of an existing DD, insertion of a new one in the sequential order of access numbers, as well as partial modifications in existing items. The data base will serve two purposes:

- to allow the printing of cumulative publications, and
- to be used as a universe for specific searches.

/ 16. The runs

16. The runs with KWIC/360 were done on the IBM S/360-40 computer of the University of Chile. Several reasons, among which the continuously increasing turn-around time at the University, made it advisable to have a second facility available, and this was found in the IBM S/360-50 computer of ECOM. A note was written (appendix 5) suggesting that permission should be given to make use of ECOM services. However, to date no decision has been made on this.

17. A major deficiency in the KWIC/360 programme set is that it contains no search module, although the development of such a programme has been announced 4/ (Wh68). Therefore a simple search programme (Me69) was selected out of the small programme library brought by the author in order to be implemented and added to the KWIC-decks. The search programme is written in FORTRAN-IV and developed by the United States National Bureau of Standards to be usable on the maximum number of different computer systems. Searches are possible with combinations of keywords related by logical ANDs or keywords related by ORs. Quite different types of DD formats may be handled by this programme because the search is completely sequential (the items are investigated one by one and word by word), and different items may be separated by, for example, any special sign, a blank line or any other separation mark specially defined for this purpose.

18. The searching power of the NDS program being very limited, because of the lack of flexibility in the definition of the search question, it was decided to make some alterations in order to allow for more sophisticated searches. The creation of programme additions for this purpose would also help to build up a certain amount of non-numerical programming experience in CLADES, which is essential for the proper running of information retrieval programmes. The FORTRAN source deck was rewritten in such a way that arbitrary combinations of ANDs, ORs and NOTs are now allowed. For example a query micht be formulated as follows:

((EDUCATION. AND. WOMEN).OR.ILLITERACY).AND.LATINAMERICA.NOT.BRAZIL

Owing to the fact that the work had to be done with the time-consuming University facility, the search module has not yet left the testphase. Once the programme is ready, virtually any type of special bibliography may be produced and selective dissemination of information according to the interest profiles of persons or organizations will be possible. However, it has to be kept in mind that the solution is only temporary. Only the really optimized and integrated systems mentioned earlier will perform similar tasks with maximum efficiency at minimum cost, for several reasons, a major one of which is discussed in the following paragraph. 5/

4/ No further information on this subject could be obtained until now from IBM U.K.

5/ In this report, theory and basic experiences of information storage and retrieval can be touched on only superficially. It is a work report, not a textbook. For those readers interested in reference reading, the "Introduction" of S. Artandi (Ar68) is strongly recommended. It can be obtained on loan from CLADES.

/ 19. An important

19. An important difference between the present solution and more sophisticated systems is in the organization of the storage of the document data, the "data base". As explained, KWIC/360 searches are sequential, and so is the data file used. In searching for documents on EDUCATION the computer has to scan every item for this word. ISIS, PRIS/CAIP, etc. have so-called inverted files and direct access possibilities. In a special file, following the indication of the word EDUCATION, the identification of all documents featuring this descriptor word are stored: EDUCATION: 1013, 1267, 1401, and so on. Thus, after querying a specific descriptor, the numbers of the relevant documents become available, and the complete document descriptions can be retrieved without consultation of other DDs. For more complicated queries, some manipulation with the inverted files is necessary, for example:

EDUCATION	:	1013, 1267, 1401 , ...
WOMEN	:	1101, 1267, 1367 , ...
ILLITERACY	:	1126, 1219, 1385 , ...
LATIN AMERICA	:	1126, 1267, 1385 , ...
BRAZIL	:	1126, 1232, 1378 , ...

As can be seen, the search question in paragraph 13 would retrieve here the documents 1267, 1385, ... The "inverted file" search strategy is certainly more complicated to programme, but appreciably more effective in use of computer time. In practice a number of about 10 000 is mentioned for the amount of DDs that will make sequential searching prohibitively expensive.

5. Infrastructure of CLADES

20. The personnel resources of CLADES are still very limited (Ve72), and understandably the author became involved in a number of side problems in his efforts to incorporate EDP activities into the flow of operations in a developing institute. These problems can be classified under three heads: selection of input documents to be processed; organization of the actual processing; and output of the results that become available. These three items make up the subjects of the following paragraphs.

21. The input selection determines the contents of the data base, and thus to a large extent determines the quality of the secondary services that can be provided. The importance of the selection step can hardly be overestimated. For proper selection, two requirements have to be met:

- a clear definition of the field of interest has to be available;
- experts have to distinguish between material of major and minor importance.

/ Now that

Now that the build up of an abstracting and indexing group is progressing (Ve72), the input selection should receive the attention it warrants. The first steps have already been taken to co-operate in this respect with the many experts ECLA has available in different fields, who are also an important group of potential users of CLADES services. Apart from the documents to be abstracted and indexed by CLADES itself, an important input may come from other abstract services who supply DDs on magnetic tape, describing documents already analyzed by them. Here, the definition of CLADES field of interest is indispensable for the proper formulation of the collective interest profile which will retrieve the relevant items. In this respect it has to be mentioned that the choice of Spanish as a working language raises major incompatibility problems, which can only partially be solved by automatic translation of descriptor words.

22. In the actual processing of DDs and search questions the absence of any computer facilities at ECLA is a serious shortcoming. Service processing in the city of Santiago has the drawback of lack of easy access and control, and physical distances are significant. Some pedestrian problems concerned with punching were solved by renting a keypunch in recent months. A primary matter of concern in the future will have to be the improvement of this situation, most probably at first by renting terminal equipment and perhaps later by ECLA obtaining its own computer facility, as suggested earlier by Mantz (Ma70). This question cannot be considered outside the context of general automatic data processing needs in ECLA. Unfortunately chances to co-operate in this respect with the neighbouring European Southern Observatory, also pointed out by Mantz, have not been realized. This organization has now ordered independently a Hewlett Packard 2100 configuration with 16k 16 bit words, which is barely usable as a general-purpose computer.

23. Just as the input determines the inherent quality of a data base, the output determines its value to the outside world. Output may be divided into requested and unrequested information. Because CLADES is not yet generally known, few information requests are received. Therefore in the initial stage, much emphasis should be placed on the forwarding of unrequested information in the form of abstract bulletins, special bibliographies, etc. First the addresses of possible information users, for example university and public libraries, international agencies, government planning offices, etc. should be determined 6/. Then the distribution of output publications, now generally less than 250, should be substantially increased. Once questions begin coming in spontaneously and CLADES starts to become known, a more critical distribution pattern may be considered or a small charge may be made for publications.

24. An aspect not yet covered but certainly to be mentioned is that of speed and up-to-dateness, which should be of major concern to every documentation centre. The printouts for the first computer produced CLADES bulletin (Cl72) have been waiting for more than 25 days for permission to be duplicated in offset: a regrettable delay.

6/ This work is in progress.

/ 25. For the

25. For the interlinkage of input, processing and output, the flow scheme of documentary information, a summing up of the specific tasks to be performed, and the characteristics of the jobs involved, reference is made to Dr. Verhoeven's report (Ve72). Sections 13 and 14 in particular, which were written in co-operation with the present author, give a fair idea of the opinions formed in this respect and it would be superfluous to repeat them here.

6. Automation and what to do next

26. It is worthwhile stating once again at this point that continuous availability of at least one programmer experienced in information retrieval is a sine qua non for serious automatic documentation work. In the absence of such a person, it is almost certain that what has been achieved will not be properly used and that CLADES will have to fall back on manual methods. An anachronism will be created, instead of a leading documentation centre.

27. Secondly, it should be emphasized that the attractive trap of own developments and inventions has to be avoided. As soon as possible, conversion to the generally accepted United Nations system has to be undertaken and even if there continue to be a number of competing systems, it is better to join one of them rather than to proceed independently. The resources of CLADES are simply too limited to compete, apart from the waste of money that would be involved.

28. To sum up, a number of electronic data processing tasks can be outlined that require attention:

(a) the development of the retrieval module has to be completed;
(b) a module for automatic translation of descriptors in the context of document descriptions has to be further elaborated;
(c) the basic software of the preferred United Nations information storage and retrieval system has to be studied, implemented, tested and put into operation;
(d) studies on compatibility with other information retrieval systems have to be made in order to interchange data collections on tape and the appropriate conversion programmes have to be written;
(e) the possibility of installing a terminal station for remote data input and querying at CLADES has to be further investigated;
(f) preliminary studies of the possibility of interactive querying have to receive proper attention;
(g) the performing of routine operations, for example producing indexed bibliographies, processing queries and the production of data tapes for exchange has to be supervised;
(h) the usefulness of selective dissemination of information services has to be investigated;

/ (i) advice

(i) advice about the creation of national systems for automatic documentation and training of documentalists in EDP techniques should be provided;
(j) a small library of programmes for information processing has to be made available to Governments and interested institutions;
(k) a small data processing group has to be trained, in order to ensure continuity in the tasks performed.

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Wh68 P.L. White: "KWIC/360 - Keyword in context indexing program for the IBM System/360", IBM (U.K.) Ltd., Wilmslow (1968).

APPENDIX 1

United Nations
Economic Commission for Latin America
Latin American Centre for Economic
and Social Documentation (CLADES)

CONSULTANT ON ELECTRONIC DATA PROCESSING SYSTEMS

Short-Term Expert Mission

Request from	U.N.Economic Commission for Latin America(ECLA)
Duty Station	Santiago, Chile
Duration	Three to four months, starting about August 1971
Duties	Design of Information retrieval systems for economic and social documentation. The system should allow for several levels of complexity and volume of bibliographic data in order to be easily adapted to different environments and hardware capacities. General design of a library of programs for electronic retrieval and updating.
Qualifications	Scientific or technical education with wide experience in implementing information retrieval systems through electronic data processing. Knowledge of use of descriptors should be an advantage.
Languages	English and/or Spanish.

/Appendix 2

APPENDIX 2

A.L. Dekker 27/12/1971

Plan of work 27/12/1971 - 15/3/1972

27/12 - 22/1

Interviews, discussions and reading on:

- What information retrieval systems are available within the U.N. family of organisations;
- What programming work according to the subject has been done at CLADES already;
- What computer facilities are available;
- What are the specific needs of CLADES' users;
- Other related subjects.

22/1 - 29/1

Writing of a memo indicating usable systems and preferences.

Remark:

Essential for the pertaining success of computer-related activities at CLADES is the continuing availability of knowledge according to computers and programming in general, and the CLADES-software more specifically. This is so because external and internal parameters will inevitably undergo evolution, which makes program maintenance and development essential. Therefore the following activities will have not much sense if this continuity lacks.

29/1 - A (A= date of CLADES' choice for specific system)

Experiments with present document descriptions and software.
Adding of some software components.
(Goal: improving computer-consciousness of CLADES' staff, further establishing of relations with computer facilities).

A - 15/3

Preparations awaiting the arrival of programtapes and documentation of the adopted system.
Partial implementation.

/Remark:

Remark:

The time available will of course not suffice for the implementation of any complete system. It is advisable to run a conventional system with computer-comparable output during the first one to two years, and to gradually replace manual tasks by automated service. Steadily the amount of abstracted documents will be growing, which pile-up is in fact the major justification for automation.

A.L. Dekker 30/12/1971

Plan of work; addenda and some details

1. The study of U.N. information retrieval system links up with recent visits on this subject to Geneva and New York.

2. Preliminary experiments will also serve the build-up at CLADES of some experience in data preparation for automatic processing.

   Remark: In this respect it is advisable to realize the obtainment of a cardpunch, as proposed earlier. *

3. As to the present available software, after the KWIC/360 package has been brought into a production state, a choice of one or more of the following possibilities may be made:

   a) implementation of a search module;
   b) introduction of more substantive document description records;
   c) completion of automatic go-list control;
   d) extension of output lay-out possibilities.

4. When interest meets minimum requirements some readings on information retrieval may be given.

* F.R.J. Verhoeven: "Feasibility study for the establishment of a regional information, documentation and research centre", ECLA, Santiago (1970).

/Appendix 3

UNITED NATIONS  NATIONS UNIES

INTEROFFICE MEMORANDUM — MEMORANDUM INTERIEUR

TO: A: Mr. Rafael Rodríguez Delgado

DATE: 21 January 1972

REFERENCE: ADM 322/2

THROUGH: S/C DE:

FROM: DE: A. L. Dekker

SUBJECT: OBJET: Considerations regarding the choice of an information storage and retrieval system for CLADES, with main emphasis on data processing aspects

Contents:

1. Introduction [1]

1.1 At least twenty to thirty of fully developed information storage and retrieval systems (to be called ISR-systems from now on) do exist nowadays. This high number is partly due to unnecessary duplication of work, caused by the well known "not-invented-here" principle. On the other hand organisations and persons differ in their information needs, and for this reason it is sometimes worthwhile to tailor new systems to different needs as these have become apparent from analysis prior to the design.

1.2 The intention of this memo is to express an opinion about what ISR-system would best fit CLADES from a technical point of view. The form of a memo preliminary to the mission report of the author has been chosen because CLADES is rather anxious to take a decision in this matter, the lack of which would tend to hamper the development of activities. The evaluation given here is based on an interpretation of the motives which have led to the establishing of CLADES; in fact, the major part of the computerized system will replace services which could also - at the expense of a growing and on the long run unbearable burden of routine work - be realized manually. In order to make a smooth start it is even advisable to start operation on a pure manual basis. Automated tools can then, while the amount of data is steadily growing, gradually take over parts of the work in the course of the first one to two years of service.

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1 The meaning of professional terms in this memo may be found by consulting the references Ha70 or If68.

1.3 In a more comprehensive study than the one presented here, discussions about costs, introduction pattern and computer choice might have been expected. In view of the need for an early report these have been postponed to a later stage, and only those aspects considered to be essential for a technical evaluation of the available ISR-systems have been considered. A few remarks about the items passed over:

As far as costs are concerned, generally speaking, the exists an inverse relation between the depth of abstracting and the number of documents that can be processed on a fixed budget. Preference here is a matter beyond the scope of the present author's mission; generally the limitations on, for example, abstract length in a document description (to be called DD from now on), imposed by a specific ISR-system, may be altered without major difficulties. It is worthwhile to recall that common experience (Il71, Ha71) indicates that even in a largely automated system the costs involved with the human activity of DD-creation dominate the budget.

Nearly all ISR-systems have a modular build-up which allows gradual implementation. In the first stage bibliographic lists may be produced in batch processing, while later modules introduce search capabilities, on-line operation, etc.

With more or less technical problems, the main ISR-systems discussed here may be housed in available Chilean computers.

1.4 After consultation of available information sources, some premises were formulated as follows:

a) A data bank has to be formed, containing descriptions of documents (DD's) on economic and social phenomena, with main emphasis on material related to Latin America. The material will be drawn from all available sources. U.N. project reports are of primary importance, but do not form a major part of the collection.

b) From the data bank the following services have to be supplied:

- a periodical current awareness bulletin in the form of a full bibliography and subject index on newly analyzed material;
- retrospective searches in broader fields (specific bibliographies);
- (in a later stage) selective dissemination of information services to persons and institutions according to preformulated interest profiles.

c) The DD will have Spanish as its basic language.[1]

d) The DD will not be so exhaustive that consultation of the original is made unnecessary. Microfiching and photocopying services will enable the distribution of the primary publications on request.

e) The system will have to be compatible with and to the largest possible extent identical to existing U.N.-systems. This in order to

- facilitate data exchange
- minimize systems design and programming efforts

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1 In the opinion of the author of this note it is questionable whether this decision is the best one. It will tend to isolate CLADES from relations outside the Spanish speaking world, one of the main drawbacks being the immediate exclusion of all major possibilities to exchange DD's on tape without manual interception.

1.5 It should be stated already here that, even in the case system requirements and available hardware allow the nearly complete duplication of an existing ISR-system, temporary computer expertise will not suffice. The hardware and the systems software of the computer centre will certainly not stop evoluating after the installation of the retrieval system. Among CLADES' users a growing awareness of automation possibilities - from accumulating experience and user training - will bring about the demand for minor or major extensions to the services. Thus after the implementation phase continuous maintenance of the programs will be necessary. It may even be said that the prospect of continuous programming support is a conditio sine qua non for the implementation of an ISR-system, which in the absence of this support will flounder on the first few minor software problems which come up after departure of the implementators.

2. ISR-systems in the United Nations

2.1 In the context of this memo it is impossible to survey all different systems presently in existence. They vary from those basically intended to produce exhaustive secondary publications (abstract journals or tapes) for specific disciplines (Chemical Abstracts Service, Inspec) to systems intended to prepare for the "paperless office" (application of IBM-STAIRS in the Shell Benelux Computing Centre), and from retrieval programs for the maintenance of partioned files of personal collections of documents (TRIAL: Northwestern Univ., UWIS: U. of Wisconsin) to library catalogue systems (Library of Congress). The discussion here will be limited to those systems which bear main importance for CLADES: prominent storage and retrieval applications within the U.N. family of organisations.

2.2 As the "Henderson-report" (He70) indicates, most U.N.-organisations have recognised important consequences for their activities of the new documentation techniques. Adequate information about the situation in the field and easy availability of the result of preceeding work on a subject are of high value for every organisation. But the flood of data can only be controlled with modern means, even more for an international body with such broad a gamma of activities as the U.N.

2.3 The author of this memo was given the opportunity to visit Geneva (IOB, ILO, ICC, UNCTAD and WHO) and New York (Dag Hammarskjöld Library, New York Computer Centre), where the available ISR-systems were discussed. A short sum-up of these discussions follows [1]

2.4 Geneva (December 2nd and 3rd, 1971)

- Inter-Organisational Board of Information Systems and Related Activities (Mr. H.B. Drucks)

  The task of the IOB is to coordinate the activities mentioned in its name. Mr. Drucks underlined the necessity for project-oriented approaches, and mentioned the plan for a future IOB-pilot project. More contact with CLADES would be appreciated.

- International Labour Organisation (Mr. George K. Thompson, Mr. George Thomas and others)

  The ILO works with an interactive (display terminals)retrieval system, called Integrated Scientific Information System (ISIS). This application may well be named the most elaborated coherent application now available in U.N. The system will be discussed further in section 3.

- International Computing Centre (Mr. W.A. MacKay, Miss Helen Seymour and Mr. B. Korevaar)

  The ICC is operated as a joint computing centre for U.N.-partners in and

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1 For those interested in more details, informal notes about the visits are available.

near Geneva. Up to now the main sponsors (and users) are U.N., WHO and UNDP. The ICC has no own ISR-projects, but runs the jobs for WHO and others. The need for compatibility was stressed during this visit. The implementation of a PRIS-like (see 2.5) system at CLADES was advertised as the most advisable approach.

- UNCTAD (Mr. Jean Gurunlian)

  UNCTAD is doing a combined effort in ISR with the Economic Commission for Europe. Some results of a system currently under development for personnel data, called SIRIUS, were shown. No consistent documentation is yet available, nor are the programs fully operational.

- WHO (Mr. G. Delmas et al.)

  No less than three retrieval oriented programs are completed or under development, each of them for rather specific applications and therefore not easy reusable for other goals. The applications are retrieval of medical MEDLARS (Ha70) data, the Program Information Retrieval System for monitoring WHO field projects (Za71) and finally the computer-based production of the yearly World Health Statistics.

2.5 New York (December 16-22, 1971)

- Dag Hammarskjold Library (Mr. G.S. Martini) and the New York Computer Centre (Mr. S. Cashton and Miss Carole Thompson)

In September 1971, the so called "Interoffice Advisory Group on PRIS" made an important proposal concerning a possible improvement of the accessability of technical and scientific U.N.-reports (± 900 per year). The software for the Project Reports Information Subsystem (PRIS) could be approximately identical to that in use for the CAIP (Computer Assisted Indexing Programme), already operational for official minutes of U.N. meetings and similar documents. PRIS is further discussed in section 3.

2.6 Other systems for automatic documentation in the United Nations [1]

The most well known other systems in the U.N. are those of FAO, UNESCO and IAEA.

- FAO features a DD rather similar to that of ISIS. An "abstract" is formed of descriptors and "keywords" (descriptors proposed but not yet accepted officially), these terms being linked as required by other words to form a narrative text. The central processor of the FAO-configuration is a Honeywell 1250; the present Honeywell - General Electric - Bull company (Honeywell Information Systems) is not marketing computers in Chile. Therefore the introduction of the FAO retrieval system in this country would involve the extra complications due to the use of a different configuration. As the programs are written in a procedure-oriented language (COBOL), the compatibility problem could however be overcome. An amount of about

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1 The data for this section has been mainly drawn from (He70).

30 000 DD's has been produced by FAO until now. Search and retrieval capability are only recently under development, because the system is mainly oriented to the printing of several types of lists.

- UNESCO implemented the ILO-system for indexing and, eventually, retrieval on its ICL-1902 A computer. ISIS is considered as relatively simple, suitable to UNESCO's needs and fully developed.
- IAEA works with an IBM S/360-30, to be upgraded to a - 40. The International Nuclear Information System (INIS) is implemented on a gradual basis after the start in 1970. INIS involves the storage and retrieval of nuclear bibliographic data provided by the member States of the Non-proliferation Treaty.

  The system has drawn wide interest because of its MARC-II [1] oriented record structure and collective approach. However, the specialistic field of interest and relatively modest experience make it less suitable for immediate duplication by CLADES.

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1 MARC-II is a universal record structure proposed by the U.S. Library of Congress and finding a good deal of critical acceptance.

3. ISIS and PRIS/CAIP

3.1 Surveying the situation it may be said that in fact only the two systems mentioned in the title of this paragraph are the real alternatives for CLADES' choice of an ISR-system. In an oversimplementation could be stated that the former is the more developed one, offering a rich experience, while the latter - originating right in the heart of the U.N. organisation - promises the better guidance and exchange possibilities for a more peripheral United Nations documentation centre.

3.2 A more comprehensive comparison of the two systems is presented in Table 1, where some aspects have been roughly classified by valuation marks.

		ISIS	PRIS
a	preparation time DD	+	//
b	profoundness DD	//	+
c	system experience	+	//
d	retrieval possibilities	+	-
e	programming language	+	//
f	position in U.N.	-	+
g	available data for CLADES	+	-
h	operationality	+	-

(for legend see next page)

Table 1: Comparison ISIS-PRIS for the present situation

+ : positive valuation mark

// : neutral valuation mark

- : negative valuation mark

3.3 To the entries in Table 1 the following comments may be added:

a) Recent experiments at CLADES made clear that for the production of a PRIS-DD about twice as much time is needed as for one in ISIS-format (Jo71). This implies that, on the basis of a fixed budget, about twice as many documents might be fed into the system with ISIS.

b) Because the PRIS-DD is on the average twice as long in number of characters as that of ISIS, more information is stored. ISIS allows for maximally 600 characters per DD, while PRIS is in principle unlimited. The existence of one-page-papers and voluminous works pleads for this flexibility. It may be expected that in a number of cases PRIS will make consultation of the original unnecessary, while ISIS gives no decisive information.

c) ISIS has been developed since 1963 (Il71), with the first elements of the system being operational since 1966. As regards PRIS, only a limited pilot study conducted in 1970/71 has up to now been realised (Ha71). The CAIP-system for indexing conference documents, however, has been longer in existence and it should be recalled that this is the one on which PRIS is to be based.

d) The ISIS-programs allow retrieval via inverted files on logical combinations of subject descriptors and language(s) of publication. Other special features facilitate the search, for which here reference is made to the ISIS-report (Il71). In post-processing the selected set of DD's may be scanned for specific textstrings or publication date boundaries. In Geneva as well batch retrieval as interactive retrieval with display terminals is possible, the latter feature allowing the useful possibility of reformulating queries which would otherwise result in an unwanted small or large number of hits. PRIS/CAIP up to now does not allow mechanical searching, although detailed program specifications indicating the inverted file set up are available. The expansion to off-line search and retrieval service, and eventually an on-line interactive querying, is planned for "phase D", possibly after 36-48 month from the start of activities.

e) The programming language in which the ISIS-package is realised is the 360 Assembler under DOS, while the PRIS-programs are mainly coded in PL/1. It is commonly accepted (Bi71) that assembler coding gives the possibility to create a more efficient and compact object-deck, and in this respect it deserves attention that ISIS may be housed in a 46k bytes partition, while PRIS needs more than 200k for specific operations. On the other hand, once suitable compilers for this language have been developed by other manufacturers than IBM, PL/1 might have the preferable compatibility properties, and the programs in this language are certainly more easy to maintain and expand by non-specialized programmers.

f) PRIS is a project of United Nations Headquarters, ISIS being now in use at two of the specialised agencies. Apart from the discussion of the technical merits of the different systems, headquarters may be expected to be the primary source of cooperation and guidance for CLADES, and there should be convincing reasons to prefer the more peripheral ISIS [1].

g) CLADES will have a quicker start when parts of existing data bases are available for the master file. For PRIS a data base has not yet been formed, while the ISIS file does consist now of about 50 000 bibliographic records in the field of social and economic development (Il71). It is not easy to define which percentage of these would be of interest to CLADES. Following the provisional estimate of dr. Verhoeven (Ve72), this might be some 15%. Additions to the file amount to about 7 000 per year for ISIS, while the PRIS proposal is for 2 000. The estimate (Ve72) yields for PRIS an interest percentage of 33% [2].

h) Due to the delay in the approval procedure for the project, PRIS did not

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1 It should be stressed that adoption of ISIS will not mean that CLADES cannot act as the "essential PRIS service point", as indicated in the PRIS feasibility study (Ha71). For these service points, which act primarily so as to provide inputs to PRIS from the field and supply outputs to users in their region, no own abstracting or automatic retrieving possibilities are foreseen. It is clear that in any case, at the moment PRIS is approved for realisation, CLADES will be inclined to accept the possibility to act as such a service point. This could be a parallel operation to the own task, whereby questions of avoidance of duplication of work and valuation of time schedules should be carefully considered.

2 Because ISIS and PRIS are in English, human translation is necessary at least for the descriptor section.

yet start actual operation. Internal reorganisations in the Office of Technical Co-operation have to be realised first (Ma71). In this situation, no source deck of the PRIS-programs is available, because of copyright problems. The development of the system is an activity of New York State University, and the work is not only sponsored by the Dag Hammarskjöld Library but also by a number of other interested institutions, which implicates that in the present situation the source decks cannot easily be made at disposal of CLADES (the object-decks might be, but attempts to implement these could result in serious technical difficulties). The alternative, ISIS, has been operational for a number of years now, and all programs are available to CLADES free (Th71).

In the opinion of the author of this note, from the points mentioned here a preference for ISIS has to be concluded. Notably the facts mentioned under point h make a decision in favour of PRIS at present unrealistic, as it bears the risk of a delay of undetermined length which might severely setback CLADES.

4. Conclusions and recommendations

1. CLADES should decide for a format of document description as quickly as possible, thereby simultaneously choosing for the related information storage and retrieval system (sect. 1.1)
2. The beginning of routine CLADES services should be purely conventional. Then, after thoroughly testing, automated operations can be gradually introduced to replace manual tasks (sect. 1.2)
3. Any information storage and retrieval system should not be developed in the absence of a permanent programming and maintenance staff (sect. 1.5)
4. From a technical point of view, in the present situation ISIS would be the best choice for CLADES (sect. 3).

References

Bi71 BIFOA: "Die Wirksamkeit von Programmiersprachen", Seminar Universität Köln, Köln (1971)

Ha70 R.M. Hayes and J. Becker: "Handbook of data processing for libraries", Wiley-Becker-Hayes, New York, etc. (1970)

If68 International Federation for Information Processing: "IFIP-ICC vocabulary of Information Processing", North-Holland Publ. Comp., Amsterdam (1968)

Ha71 Inter-office Advisory Group on PRIS (Karl-Erick Hansson, chairman): "Feasibility of a computer-based documentation storage and retrieval system related to technical co-operation project reports", UNO, New York (1971)

He70 A.M. Henderson (Auditor General of Canada): "Electronic data processing in the United Nations family of organisations", Ottawa (1970)

Il71 International Labour Office: "A general description of an approach to computerised bibliographical control", Geneva (1971)

Jo71 Mrs. L. Johnson, pers. comm. (1972)

Ma71 G.S. Martini, pers. comm. (1971)

Th71 G.K. Thompson, pers. comm. (1971)

Ve72 F.R.J. Verhoeven: "Report on CLADES, Evaluation and Future", CLADES, Santiago (1972)

Za71 V. Zammit Tabona and O.W. Christensen: "The WHO Programme Information Retrieval System (WHO/PIRS)", (OP57/68), WHO, Geneva (1971)

APPENDIX 5

On: Using ECOM facilities for CLADES

1. In the time interval between the start of automatic documentation activities by CLADES and the completion of the implementation of one of the accepted U.N. systems here, temporary tools had to be created to come to a start with substantial work. 1/

2. The solution was found in the form of the program package KWIC/360, residing on disk at the computer centre of the University of Chile. This package was made operational for CLADES. Index listings can now be produced which are hardly distinguishable from those of ILO's ISIS system, Headquarters PRIS-proposal, and other prominent U.N. developments. 2/

3. The listings made with KWIC/360 proved to be suitable for operational use, and most CLADES publications could be computer produced from now on.

4. Academic holidays being over, turn-around times at the University's IBM 360/40 computer have increased from one to three or four days. ECOM offers a turn-around time on its IBM 360/50 which is no more than 3 or 4 hours, with a maximum of one day.

5. KWIC/360 object decks and permanent data (go- and stopword lists) reside on public disk. It is not a simple matter to carry them to ECOM in case of technical breakdown at the University, or vice versa.

6. Although prices at ECOM seem to be higher than at the University (E°4.700 per computer hour compared to E°1.716), the three times faster internal memory of the /50, combined with its larger availability of external memory units like disks and tapes, makes it possible that ECOM will work marginally cheaper.

7. The travel time to ECOM is much less than that to the University's facilities.

1/ A.L. Dekker: Plan of work 27/12/1971 - 15/3/1972
2/ A.L. Dekker: Considerations regarding the choice of an information storage and retrieval system for CLADES, with main emphasis on data processing aspects. Memo 21 January 1972

/8. In

8. In view of the mentioned points it is necessary to implement KWIC/360 also at ECOM, and to perform production runs there.

9. This can be done on the basis of a letter of intent to ECOM, followed by the undersigning of a "service contract". Neither of these papers has financial consequences, no obligation is created to spend a monthly minimum amount or to pay a basic charge.

10. According to the financial and technical experiences, the centre of gravity of CLADES' operations will be oriented to one of the available establishments.

11. Another alternative is the IBM service centre. However, in view of the policies of Chilean government, ECOM seems to have the better development possibilities now, and in fact is already in a substancially more favorable hardware position.

12. Every suggestion to reach the goals discussed in another way, will be very welcome.