

INT-2328

*Submissions*

NEED FOR AND VIABILITY OF A UNITED NATIONS COMPUTATION  
CENTRE IN SANTIAGO

Santiago, 21 June 1970

Mr. M. Robert Mantz  
Computer Consultant to ECLA

This report has not been cleared by the United Nations and therefore does not necessarily express the opinion of the Organization.



	<u>Page</u>
Letter of transmittal	v
1. Introduction .....	1
(a) General considerations .....	1
(b) Conclusions and recommendations .....	3
2. Expected advantages of computer use .....	4
(a) Promoting effectivity and productivity .....	4
(b) Computer requirements for information storage and retrieval .....	6
(c) Promotion of standardization and dissemination of know-how .....	6
3. The present use of computer services at ECLA and the expected needs .....	7
4. Justification for the installment of an ECLA computer in Santiago .....	12
(a) Centralization versus decentralization of computer facilities .....	12
(b) Particular reasons for the control of the computer centre by the United Nations in Santiago .....	14
(c) Summary .....	15
5. Plan of action .....	16
(a) The preparation phase .....	16
(b) Organizing for information processing and know-how interchange .....	17
(c) Place of the computer centre within the United Nations organizations in Santiago .....	18
(d) General comments .....	18
6. Suggested computer configuration; equipment, personnel and accomodation .....	19
(a) Computer configuration and quotations received .....	19
(b) Terminals .....	20
(c) Personnel .....	21
(d) Accomodation .....	24
(e) Total costs .....	26
Annex I .....	29
Annex II .....	32
Annex III .....	36
Annex IV .....	1

Faint, illegible text, possibly bleed-through from the reverse side of the page. The text is too light to transcribe accurately.

23 June, 1970

Dear Mr. Quintana,

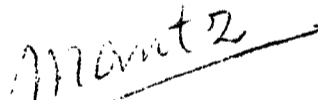
On request of the Netherlands Government and according to your terms of reference I prepared a feasibility study for an United Nations Computation Centre at Santiago de Chile. I am now pleased to present you the report which contains the result of this study.

Thanks to the fine co-operation of every one involved, a plan of action could be drafted which will enable ECLA to work in future on a completely different level.

What is presented is just a plan, the computer facilities proposed are only tools, the achievement must come from ECLA itself. I sincerely wish and expect that ECLA will succeed.

Finally I want to thank you very much for the opportunity which I was given to collaborate with ECLA in this project.

Yours sincerely,



M.R. Mantz  
Consultant in Computer  
Methods for ECLA

Mr. Carlos Quintana  
Executive Secretary  
CEPAL  
Santiago



NEED AND VIABILITY FOR A UNITED NATIONS COMPUTATION CENTRE  
IN SANTIAGO

1. Introduction

(a) General considerations

1. This report is the result of a feasibility study for the establishment of a Latin American regional electronic data processing centre in Santiago which was requested by the ECLA secretariat. According to the job description, this centre should:

- Facilitate and streamline the work of a number of continuous and special projects and carry out operations for the administration of ECLA, ILPES and CELADE;
- Be at the disposal of the regional offices of the United Nations specialized agencies located in Santiago;
- Help national statistical offices in Latin American countries with possible peak loads and with electronic data processing (EDP) methods in general;
- Form an intrinsic element in the operation of the Centre for Documentation and Research, to be established with the proposed financial assistance of the Netherlands.

2. The study should therefore deal with the present and future needs of computer services at United Nations offices in Santiago, both for substantive and administrative matters, prepare suggestions on the best ways to satisfy these needs, and make a study on the alternative financial implications, inclusive staff necessities.

3. This report is in part based on many interviews held with representatives of the specialized agencies offices in Santiago and with the chiefs of divisions and units of ECLA and ILPES. A list of the interviews is appended to this report (annex I). Visits were paid to the available computer centres in Santiago (IBM, Universidad de Chile, Universidad Católica de Chile, Empresa Nacional de Computación - EMCO), and contacts were established with the representatives of the main manufacturers with facilities in

/Santiago (IBM

Santiago (IBM, NCR and Burroughs). In the presentation of ECLA needs, use was made of the Report on Electronic Computer Requirements of ECLA, presented informally by Mr. Oscar Varsavsky in July 1968 at the request of Mr. Mendive.

4. The main object of the study was to work out a classification of the needs on which a specification of the desired computer facilities could be based. It was, however, not possible to discuss in detail all the substantive projects of the United Nations agencies in Santiago.

5. A plan of action was designed which would make it possible to introduce the appropriate tools to develop the necessary training and to establish the desired organization, in accordance with the presently available computer technology. Due regard has also been had to the situation in Chile and to the development of application software.

6. Before starting the feasibility study in Santiago, a visit was paid to the United Nations International Computing Centre at United Nations Headquarters in New York, where I met Mr. P.J. Loftus, Director of the Statistical Office. During my work in Santiago I maintained close contact with Mr. Gustaaf Loeb, Chief of the Statistical Division of ECLA, and during his stay in April, with Mr. Gunnar H. Berggren, United Nations Inter-Regional Adviser on Computer Methods. Regular meetings took place with a committee consisting of Mrs. Maria Benson, former Chief of the ECLA Library, Mr. José Ibarra, Deputy Chief of ILPES Training Programme, and Mr. Pedro Sainz of the same Programme. Among many others who contributed to this study the valuable assistance of Mr. Ricardo Luna, Chief of the ECLA Public Administration Unit, should be mentioned. Of course, the responsibility for the conclusions rests with the consultant only.

7. Special attention was paid to the information storage and retrieval system. The expert to make a study in depth on this subject will arrive in Santiago in mid-June 1970 for a three-month stay. However, from the information already obtained from Mr. G.S. Martini, Chief Documentation Division, Dag Hammarskjold Library, New York, the presently available techniques and the development trends in this field, it was possible to estimate the computer facilities which should be available to the centre with ample provision for further extensions to cope with future developments.

/(b) Conclusions



(b) Conclusions and recommendations

8. The following are the conclusions and recommendations which emerge from this report:

- (1) Instead of a leader in development, ECLA and the other United Nations agencies in Santiago are under-developed themselves in applying computer methods. On the other hand the Universities at Santiago and the Government Data-Processing Centre, EMCO, are much more advanced and lead the progress in Chile.
- (2) A conventional computer with only card input, working in batch processing mode, could take over the statistical part of ECLA's work now being done in service. This load alone is not sufficient for a computer at ECLA and the suggestion that it could be done just as well in New York or Geneva is valid.
- (3) Computerization means operating at a completely different level. The productivity of the professional officers experimenting with economic and social models, can be greatly improved by introducing man-computer dialogue. The duration of projects can be reduced, more complex problems can be handled, the output made available earlier and the output per man raised.
- (4) Without the aid of a computer the service of the documentation centre will gradually degenerate, unable to handle the huge amount of information received. Computerization is an absolute necessity for this work.
- (5) With a computer installed for information storage and retrieval purposes, almost the same installation can serve for the other applications as well.
- (6) Even the workload in 1972, consisting only of statistical processing and heuristic processing by terminal, makes an ECLA-owned computer US\$ 44,500 less expensive than working in service. Note: We do not expect the computer building to be ready before 1973.
- (7) A computer installed at the ECLA premises will have enough over-capacity to allow a great expansion of the use of computer methods at ECLA and the dissemination of this know-how to the Latin American Governments. The computer can also serve as a high level training centre for the application of computer methods.
- (8) It is strongly recommended that ECLA should take most determined steps and give constant attention to starting computation.

/(9) As

- (9) As soon as possible, a permanent staff to take care of all aspects related with the implementation of the computation centre should be recruited. During the first phase, additional assistance by consultants may be necessary.
- (10) The only manufacturer established in Santiago who can meet the desired requirements, both during the preparation phase and in the implementation phase, is Burroughs de Chile S.A.
- (11) It is recommended that, as soon as possible, a few terminals be installed with connexion to a Burroughs computer in Santiago for substantive projects.
- (12) In close co-operation with other United Nations agencies, the computerization of the documentation centre should be started.

## 2. Expected advantages of computer use

### (a) Promoting effectivity and productivity

9. It is clear that the productivity of ECLA and other offices can be greatly improved by applying advanced computer techniques. Discussions held revealed many applications where the development work can benefit from computer-aided methods which would improve its effectivity and efficiency, in the sense that results will become available earlier, before the corroding effect of time has affected the value of the results obtained for further application.

10. The productivity of the professional staff can be raised by a factor three or more, if computer capacity with a short turn-around time can be offered. This estimate is based on experience with a large number of time-sharing centres in the United States and Europe. A short turn-around time means that the results of computation are available to the man working with the computer immediately after a request is made. With advanced computer techniques, using terminals in the offices of the professional staff, a turn-around time which nowadays takes a number of days is then reduced to the same number of seconds or minutes. This man-computer dialogue is of great value to professional staff members involved in experimental research work using an heuristic approach. It is only possible with advanced computer systems having an operating system which allows a multitude of persons direct access to the computer from remote locations whenever and  
/as long

as long as is necessary. It will not only have the effect of permitting final results to be obtained much more quickly, but also of definitely enhancing the quality of the results, as all reasonable alternatives can be easily tested.

11. This technique, although very new and advanced, is becoming widely put into regular use. Also the Universities at Santiago and the EMCO (the Government Computer Service bureau) will offer such facilities in the near future.

12. There are many applications within the professional offices at ECLA, ILPES, CELADE, PAHO, ILO, UNESCO, etc., that require or can benefit from a heuristic approach e.g.:

- The testing of data on coherency;
- The testing of computer programs and modification of programs for errors;
- Experimenting with simulation models of economic and social systems, also regarding the sensitivity of these models to certain parameters;
- Information retrieval from the fast-growing files of the Documentation Centre.

13. Till recently a computer was treated as a factory for centralized data processing. Sufficient workload should be provided for the economic justification of its exploitation. However, the development of hardware and software and the reduction in cost obtained has now reached a stage at which computers can play the role for which they were intended, i.e., just a tool to serve an enterprise to achieve its goals. Many constraints which prevented computer power from being used as an extension of mental power are now lifted. Computer power through terminals can now be made available where, whenever and as long as it is needed.

14. The writing of programs has become so easy that, with some training, the professional staff can write their own programs. The computer system accepts programs written in a symbolic or problem-oriented language not very different from a common language. In short, the intermediate services hitherto supplied by professional programmers and operators, which involved many delays before a program could be executed, have now been replaced by automatic services by the computer operating system through its housekeeping programs.

/15. Consistent

15. Consistent with this way of data processing is the fact that the professional staff members themselves will do most of what is called information analysis, i.e., describing the problems and the algorithms in a language that can be understood by the computer. At this moment FORTRAM IV is the most used language for mathematical problems, but several other easy-to-learn languages are available.

(b) Computer requirements for information storage and retrieval

16. It is a common and widely accepted opinion among experts in information storage and retrieval that documentation centres of the size and nature of the one contemplated in Santiago and which are expected to grow so rapidly can only operate effectively with the aid of computer facilities.

17. Such a service cannot be rendered effectively by one United Nations centre in New York or Geneva in view of the practical difficulties involved. Of course, a good division of labour is necessary and provision for information interchange should be made so that the whole network can be integrated in the interest of better performance and reduction of costs. Decentralizing operations does not mean that each centre should develop its own retrieval system, starting from scratch. As much as possible, the regional centres should benefit from a centralized pilot study in this field.

18. Though the documentation and information retrieval expert who will arrive at the end of June may present detailed suggestions on this aspect, the proposed action is based on this generally accepted consideration and on the conclusions reached by Mr. Berggren, the Inter-regional Adviser, in his report.

(c) Promotion of standardization and dissemination of know-how

19. The introduction of computer methods is a necessary contribution to the establishment of disciplines and standardization, so much needed for further development and integration of Latin America. Without this standardization, the dissemination of know-how cannot be promoted efficiently either.

20. The characteristics of the basic statistical information have to be more strictly defined when it serves as input for computer use. Information has to be complete, exactly defined and completely reliable in order to

/avoid inefficiencies

avoid inefficiencies and spoiling of computer time. It should however be pointed out that these characteristics are always desirable, and even necessary, and that the use of electronic data processing only makes the need more important.

21. When advanced computer systems with remote access are installed at key-points, such as Santiago, several other regional centres and United Nations agencies located elsewhere will have access to the ECLA data banks. Besides the interchange of information in the form of source data, the possibilities of interchange of know-how by computer programs also have to be considered. The computer facilities already available at ECLA will motivate the experts to look for programs in their field, now developed at an increasing rate in the developed countries, and give them an opportunity of experimenting with these programs and of adapting them to the situation in Latin America. Without ready and easy access to computer facilities the task is too cumbersome to be undertaken.

3. The present use of computer services at ECLA  
and the expected needs

22. At present, ECLA makes only limited use of computer services through different ad hoc methods. Statistical tabulations are obtained by use of services from the IBM Service Bureau and the University of Chile, mathematical models are processed with contracted programmer services and use of block-time, and use is also made of private connexion with EMCO and the universities. The most developed stage is reached by CELADE, which has its own programming staff with its own archive of magnetic tapes and a room in permanent use at the University of Chile's Computing Centre.

23. It is obvious that this situation is far from satisfying the needs of the organization, and it can be said that ECLA is years behind in the application of presently available work methods. If this situation continues the danger exists that ECLA will be unable to recover its backlog and to maintain its position as a pioneer in scientific research on economic and social development.

/24. The

24. The same can be said for ILPES, which is partly solving its problems through the use of the computer facilities of CENDES, a university institute at Caracas, Venezuela, and partly using the University of Chile's computer with the assistance of a CELADE programmer.

25. During my interviews it was obvious that although some ECLA professionals are aware of the potential advantages of the use of modern EDP methods, many are insufficiently prepared to make full use of it. Much training has to be given in order to break through a certain barrier of insufficient information and in order to create the desirable demand for computer services. The present lack of computer use, partly due also to financial limitations, should therefore by no means be interpreted as an indication that ECLA would not need computer services beyond the present limited use.

26. Obviously, the following forms of computer application are required in ECLA and other United Nations agencies in Santiago:

- (a) Statistical and administrative applications;
- (b) Scientific applications;
- (c) Information retrieval;
- (d) Education.

27. The statistical applications will partly depend on the availability of basic information in a directly usable form, e.g., on magnetic tapes. Experience has shown that this problem will be easier to solve once the equipment to use the information is available. But ECLA should concentrate its efforts, in collaboration with countries, on standardizing methods in accordance with United Nations Headquarters world recommendations on concepts and methods. In these circumstances, full use can be made of the statistical tool which now is only available in a limited form, and all required classifications, breakdowns and calculations of subtotals can be reproduced by the computer. We estimate that about 300 machine hours a year will be necessary for this purpose in batch processing in ECLA. This estimate includes the expected load of the Statistical Division, of related work to be performed at the request of other substantive divisions and units, and of administrative work at the Offices of Personnel, Finance

/and General

and General Services. For the preparation work, testing of programmes and data consistency, the use of terminals is most appropriate. A same number of terminal hours for this man-machine dialogue is estimated for this purpose.

28. Scientific applications are required for the work of the majority of ECLA's substantive divisions. Though it seems to be premature to give an estimate for the computer time desirable for this purpose, a rough estimate for the number of hours was based on the discussions with ECLA staff and other available information and refers to a situation of two years hence, after which ECLA will have become reasonably "computer minded".

29. A computer is urgently needed for simulation by econometric models and operational research projects. The advice based on the manipulation of models has proved to be so valuable, leading to cost savings of such large amounts, that countries interested in these projects are in most cases willing to pay for the costs of the study. It is in this respect that the United Nations agencies in Santiago can give a very valuable contribution to the development of Latin America. Moreover, very valuable software on this subject can be obtained from outside research centres, but it has to be generalized or modified to meet the specifications of a particular project. The work in this field, impossible without a computer, is developing fast. In general it can be said that there is almost no limit to the application of computer capacity in the scientific field, and that the figures have to be based on the constraints presented by manpower, funds and tools. Once opened, this field will develop with an increasing rate. There is not the slightest doubt that the over capacity available during the first phase after the installation of the machine will soon be taken up.

30. The documentation centre is supposed to require roughly 3,000 terminal hours a year for the updating of files and 300 terminal hours for the consultation process. The figure of 3,000 hours is based on the assumption that with two visual display terminals 4,000 hours is the maximum amount of time available to build up and update the system files. This figure may change after the report of the expert working on the information storage and retrieval system.

/31. It

31. It is obvious that a regional development centre has a great educational task. This educational task is very well expressed by the recommendations of the first Latin American Conference of Government Information Authorities, held in Buenos Aires from 1-10 April 1970. The subject is treated in the report of Mr. Ricardo Luna, "Considerations on the installation of a computer centre in ECLA", Santiago, Chile, June 1970 (see annex IV). We see the education task of the United Nations agencies in three fields:

- Education in any field of development through computer programmed instructions;
- Education in a field where computer-aided methods are applied;
- Education in the use of computers.

Much has been published about the role a computer can play in education, but the high cost of computer time has prevented implementation on a large scale. This situation is changing now through the concept of time-sharing, which allows many students to work with the computer concurrently in conversational mode, sharing the costs of the system.

32. As the installation designed for ECLA is a time-sharing system, of this kind the United Nations agencies will be well equipped for the educational task. For this reason we expect that in the year of installation the required number of terminals will have to be reconsidered in accordance with the educational projects at that time. UNESCO has already some far-reaching plans in this direction.

33. Table 1 presents the expected yearly workload for the computer after the first phase, i.e., in 1973. The expected demand is divided into computer hours and terminal hours. For ECLA and ILPES separate estimates are presented for the several application groups. For CELADE and the specialized agencies only over-all estimates are given. The total for 1973 amounts to 1,000 hours computer time and 6,800 hours with four terminals. This does not include the potential requests for use of computer time from outside clients, among whom the ECLA's neighbour ESO, the European Southern Observatory, should be mentioned. ESO has expressed a definite interest in buying computer time on an ECLA installation, and this fact should be taken into consideration when a decision is taken regarding the financial plans.

/Table 1



Table 1

EXPECTED YEARLY WORKLOAD AFTER FIRST PHASE

	Batch processing computer hours	Man-machine dialogue terminal hours
ECLA		
Statistical and administrative applications	300	300
Scientific applications	200	1 000
Information retrieval	-	3 300
Education	-	400
<u>Subtotal</u>	<u>500</u>	<u>5 000</u>
ILPES		
Statistical and administrative applications	100	100
Scientific applications	100	600
Education	-	300
<u>Subtotal</u>	<u>200</u>	<u>1 000</u>
CELADE	<u>200</u>	<u>500</u>
<u>United Nations specialized agencies</u>	<u>100</u>	<u>300</u>
<u>Total</u>	<u>1 000</u>	<u>6 800</u>

34. For 1971 and 1972 a lower estimate of the use is presented, namely 600 and 800 hours in computer time and 3,000 and 5,000 hours in terminals, respectively. In this respect it should also be remembered that ECLA, ILPES, CELADE (and others) are presently already using about 500 hours of the computer facilities available in Santiago and elsewhere.

/4. Justification

4. Justification for the installment of an ECLA  
computer in Santiago

(a) Centralization versus decentralization of computer facilities

35. The International Computing Centre (ICC) in New York is planning to install an IBM 360 model 65. This machine has ample overcapacity to do all the data processing for ECLA, etc., and perhaps for many more United Nations agencies spread over the world as well. Centralization of all data processing should no doubt reduce costs, duplication in programming effort could be more easily avoided, standardization more easily applied, etc.

36. These are basically sound arguments, but in this stage of development such a plan could never be put into practice. No human staff exists that can handle and co-ordinate the operations required; no human staff can provide the handling of requests and programming service to all United Nations agencies at once. Such a centre is unable to correct at a distance all the unpredictable errors in data input, which can only be corrected on the spot where the data are collected.

37. The simplest and fastest solution is to look for a computer already existing in Santiago. However, if the costs of a reserved telephone line New York to Santiago are not prohibitive, and ICC, New York, is already prepared to operate as a tele-service, it might perhaps be possible, though not recommended, to connect the terminals to the New York centre. The establishing of tele-service at such a distance would impose a very heavy burden on the ability of the technical staff of ICC, particularly as the aid of a trained and experienced staff is not yet available in Santiago.

38. Perhaps, at a later stage, when world-wide data communication networks may offer cheap service, the need for local processing power may be more or less covered by terminals connected to one huge remote United Nations centre. But even then, the development trends are already pointing towards another and better solution, i.e., the interconnexion of geographically spread computer modules, each serving a certain area or dedicated to a certain task.

/39. In

39. In this respect attention should be drawn to the Henderson report on electronic data processing in the United Nations.<sup>1/</sup> The suggestions contained in the present report for the establishment of a computation centre for Latin America are in principle completely in line with Mr. Henderson's report. There are two points we consider essential:

- (a) First, a central body taking care of the system concept with all its implications of research and development of software, providing for compatibility and standardization or, as Mr. Henderson put it "a vehicle for necessary and effective interorganizational co-operation and co-ordination in the development of data processing systems" (para. 82).
- (b) Secondly, "The approach must motivate individual organizations to use the facilities provided" (para. 15, point 7). If by "facilities" computer-aided methods and application programs are meant, the use of such facilities is impossible without easy access to local computers of the advanced type, without experienced personnel, and with the present restraint of small budgets for every project undertaken. Motivation cannot be cultivated by words only but requires the right environment to develop and the tools to accomplish it.

40. Therefore the suggested plan of action (section 5) is primarily intended to create the environment for motivation by: (a) introducing experienced high-level system analysts at the earliest time possible, preferably already this year; (b) introducing man-computer dialogue for the substantive activities as soon as there is an advanced computer (end of 1970) available in Santiago to which a number of terminals can be connected; (c) creating the possibility of obtaining ample computer capacity immediately available on easy conditions resulting from the overcapacity expected when ECLA's own computer is installed.

---

<sup>1/</sup> United Nations, Electronic Data Processing in the United Nations Family of Organizations, by A.M. Henderson, vol. I, A Concept for Effective Growth and Utilization (May, 1970).

41. If there is a sincere interest in the United Nations to motivate the use of computer-aided methods, it implies that the barriers now killing human motivation have to be lifted, even at the cost of some local overcapacity. This overcapacity will fade away when development takes off.

(b) Particular reasons for the control of the computer centre by the United Nations in Santiago

42. Confidential data. It is not easy to persuade all Latin American countries to provide full information about the economic and social situation. Although in a good time-sharing system the information stored in the system can be protected against illegitimate access from outside, this protection cannot be provided at the Centre itself. For this reason, it is advisable that the centre should be run by the United Nations personnel.

43. Cost savings. The computer-based information storage and retrieval system will require the permanent use of a considerable amount of mass storage and the handling of many tapes. As soon as computer facilities are permanently used, private exploitation will be much cheaper and easier than tele-service.

44. Creating an environment for development stimulation. It is the merit of the proposed system that, thanks to the sophisticated operating systems now available, processing power otherwise inaccessible and lost can now be made available to many users simultaneously. As a customer of such tele-service system ECLA would only help to make profits for the supplier of the time-sharing service. However, having its own system, ECLA will be in the favourable position of distributing surplus capacity to experts with initiative and bright ideas, which additional use does not increase exploitation costs. This will greatly stimulate much needed development. Applying for computer capacity when working in service would require the writing of appropriation requests to get funds, which, at an early stage of development, is very difficult to do and is very time-consuming, both in preparation and in approval procedures.

/45. Everybody

45. Everybody who is aware of the direction in which computer methods are developing and is also aware of the tremendous rate of development knows how important, easy and cheap access to computer-facilities is for ECLA.

(c) Summary

46. Taking all these points into consideration, the installation of a computer in Santiago is already justified as the only technical solution to a very urgent problem. Moreover, the installation of a computer in Santiago can also be justified for reasons of economy. The minimum system able, in a qualitative sense to handle the information storage and retrieval problem mentioned can, when equipped with a card-reader and high-speed line printer, easily deal with the large volumes of data for statistical purposes as well. In 1973 the United Nations agencies in Santiago will need some 1,000 hours for batch processing, i.e., half a shift on a conventional computer. Double that load makes the computer economically justified for batch processing alone.

47. However, with a very few additional facilities, i.e., a good operating system and a dozen terminals, the same equipment can offer the much needed computer service with short turn-around time right in the offices of the professional staff. The terminals can be used for the many operations, so typical of a development centre such as: working and experimenting with simulation models, testing data for coherency, education, computer-checked data-input and many other applications now emerging from time-sharing experience all over the world.

48. From the statistics of running time-sharing centres of the size proposed, it can be learned that the exploitation of such a system is justified with a load of 50 terminal hours a day. We think that the load of the Santiago centre in 1973 can be estimated at about 25 terminal hours a day.

49. As all the three services run here on the same equipment, using the same operating personnel at the centre, an economical exploitation can easily be obtained by the combined load.

## 5. Plan of action

50. This chapter contains suggestions on the several development phases in the installation of the computer and indicates the steps to be taken during these phases. The United Nations computation centre for Latin America in Santiago will be built in two main phases: preparation and installation.

### (a) The preparation phase

51. The first step, to be taken as soon as possible, is to recruit at least two highly qualified system analysts who will have to prepare the United Nations agencies in Santiago for the use of computer methods. This can be done by education, by motivation, by making further detailed and more specific feasibility studies, and by giving every form of support needed to get the professional staffs acquainted with computers. The computer manufacturer will be glad to organize training courses at ECLA without additional cost.

52. The second step is to rent and to connect at least two terminals to existing computers in Chile offering computer capacity in the dialogue mode to ECLA and ILPES. This step is very important to:

- Train professional staff members in writing their own programs and in operating the computer through terminals.
- Experiment with terminals. As working through on line terminals is becoming widespread and commonly accepted, better and cheaper terminals will be announced from 1970 on. It is recommended that a final decision about the type of terminals should be postponed as long as possible.
- Testing the manufacturers' software. For the time being visual display terminals with provisions for obtaining hard copy output are contemplated also for the documentation centre.

At the same time another terminal should be installed for CELADE on its own premises.

53. The third step would consist of the installation of an additional terminal in the Library, for the information storage and retrieval system. This terminal would start with the testing and implementation of the information storage and retrieval system.

/(b) Organizing

(b) Organizing for information processing and know-how interchange

54. The second phase starts with the installation of the Commission's own computer in the newly built documentation centre on the ECLA premises. The first step within the second phase is to make the system fully operational. With ample computer capacity and experienced personnel now available, computerization of the work can now be accelerated.

55. The next step is to widen the scope of the United Nations computation centre in Santiago from giving only local services to serving as a regional centre for Latin America in the sense expressed by the General Assembly at its twenty-third session when adopting resolution 2458 (XXIII), in which the Secretary General was requested "to prepare a report which will give special consideration to the situation of the developing countries with regard to:

- (a) The results already obtained and the needs and prospects for the use of electronic computers in accelerating the process of economic and social development;
- (b) The various forms which international action may take to intensify co-operation in the field of computers;
- (c) The role which the United Nations can play in promoting international co-operation in that field, with emphasis on questions concerning the transfer of technology, the training of personnel and technical equipment."

56. In this phase the computation centre for Latin America will become one of the sub-centres of a United Nations network for information interchange by its data base for know-how dissemination through its library of selected programs. The educational task, in particular, for the application of computer methods will become relatively more important. This report has not made estimates for the future personnel needed for this purpose. It is not expected that the computer facilities would need much expansion or renovation for this purpose, except for the kind and number of terminals. The recommendations of the first Latin American Conference of Government Information Authorities held at Buenos Aires, 1-10 April 1970. (see report of Mr. Ricard Luna, op. cit. annex IV). give an illustration of the role a United Nations regional computation centre can play in the development of computation in Latin America.

/(c) Place

(c) Place of the computer centre within the United Nations organizations in Santiago

57. In view of its typical service characteristic, the centre should be available to all divisions of ECLA, ILPES, CELADE and all the United Nations agencies located in Santiago. Therefore it is recommended that it will receive functional guidance from a computer steering committee with representatives appointed by the main customers of the centre.

58. When, after 1973, the scope of the computation centre is widened to include the provision of computer-aided methods to the Governments of the Latin American region the centre will take on the character of a substantive professional office. To clarify the miscellaneous characteristics of the computation centre it can be said that it supplies:

- Complete programming aid and operating service to the general service departments, and batch processing service to the offices engaged in statistical work;
- Automatic computer service through terminals to the documentation centre and the offices for research and development;
- Educational service to Governments in Latin America, through the application of software packages, courses, demonstrations, etc.;
- Information service from its data base to other regional centres.

(d) General comments

59. The preparatory work to enable ECLA to step into the computer world does not end with this report; it has only just started. Although the impact of many aspects of a local and interregional character have already been taken into account, much still remains to be done. Constant care should be taken to push this project through. The dynamic growth in the kind and number of computer applications, the opening of new fields of activity, the expected announcement of new terminal equipment, all will require constant attention and modification of the plan of action.

60. The plan may be considered ambitious, but a more modest approach will spoil 80 per cent of the performance for a 20 per cent reduction in costs. UNESCO, WHO, ILO, ITU and IAEA are now updating and expanding computer facilities. In order to enable ECLA to co-operate effectively with such agencies and to make the interchange of know-how technically

/possible, ECLA



possible, ECLA should aim at least at the same level of sophistication. A greater step and accordingly a greater effort is required now than if ECLA had entered the computer field a few years earlier.

61. For ECLA, computerization means operating at a completely different level. Without that, the role of ECLA in the development of Latin America will gradually fade away, for it will be unable to bridge the development gap between obsolete and modern techniques in its own organization.

6. Suggested computer configuration; equipment, personnel and accomodation

(a) Computer configuration and quotations received

62. A draft configuration of the system needed was sent to Burroughs, IBM and NCR, the only computer firms with agencies in Santiago (see annex II). The configuration to be proposed was not difficult to design. The minimum installation to be considered would have to meet the qualitative requirements, i.e., the simultaneous processing of the mix of jobs typical for ECLA. At this level the quantitative aspect could be neglected. Typical hardware features for such an equipment are: relatively large working store (about 200 K bytes), large random access mass storage (about 40 M bytes) and on-line terminals. The size of the mass storage can be debated. Burroughs made a generous offer to install 100 million bytes at once for a considerably reduced cost. Although this size is not needed at the beginning, we recommend the acceptance of this offer. Big and fast mass stores are a basic need when establishing data-bases, program libraries and information storage and retrieval systems.

63. Because in the quantitative aspect ECLA is under-developed, we laid great emphasis on starting as soon as possible in order to make up arrears and to develop enough workload to make an ECLA-owned computer economically justified at the time of installation. We have expressed this idea many times in the plan of action.

64. From the three computer firms invited, only Burroughs could meet the requirements to the full extent, in particular for the coming years. Significant for the situation in Santiago is that ENCO, up till now the greatest IBM customer, has ordered two Burroughs computers for applications

/similar to

similar to those that are typical for ECLA. As the first of these computers will already be installed in September 1970, it offers the possibility to connect some of the ECLA terminals to this computer or to other Burroughs installations in Santiago.

65. No other manufacturer could offer such a solution. Moreover, IBM is only offering terminal services with APL language and could not accept Fortran programs working from terminals. This is unacceptable for ECLA. the Burroughs operating system is very advanced and efficient, and the price is moderate in comparison with IBM. Moreover, Burroughs offered a 25 per cent discount, with the result that the B 3500 installation will be US\$ 500,000 cheaper than the comparable IBM installation. Burroughs is well established in Latin America, it has also a factory in Brazil. Without acceptable alternatives and with a very attractive proposal from Burroughs we have no hesitation in recommending that ECLA should proceed with Burroughs. The figures in our estimates are based on the Burroughs quotation.

(b) Terminals

66. Neither Burroughs, nor IBM nor NCR could offer us low-priced terminals comparable with the Teletype 33 in common use with the General Electric time-sharing systems. As there is not much choice we have to accept the much higher priced visual-display stations, but, in compensation, these provide faster communication, at least from computer to user. Facilities for hard copy output should be provided, for the information storage and retrieval system.

67. We consider the acquisition of the four terminals in the first phase of the plan of action as a preliminary choice for the first two years. The kind and number of terminals will demand further study, also because we expect the announcement of better and lower priced terminals in the near future. It is impossible to make an exact estimate of the terminal costs after 1972. The expected number of terminals after 1973 could increase to 20 or more.

68. No concrete recommendation is presented on the choice between purchasing or renting the equipment. The benefits of one solution are balanced against the benefits of the other, but they are different. Renting gives more freedom to change from one computer manufacturer to another, and the customer is in a somewhat stronger position in negotiations with the supplier. As differences between the equipments are becoming less and the economic life cycle of computer equipment is becoming longer, purchase is expected to be more profitable. The choice between purchasing and renting will depend on the conditions of the financial resources to be obtained, and on the Chilean tax import duties and regulations. However, terminals, specially designed for computer usage have only just been fully developed. Competition and mass-production are expected to result in price decrease in a few years. Therefore we advise renting the terminals.

(c) Personnel

General considerations

69. The United Nations agencies in Santiago are mainly involved in scientific development studies. The organization must be such as to create an environment that will stimulate development. It is well known that the worst environment for research and development is created when the man responsible for operations is made manager of the centre. This situation should be avoided at any cost.

70. However, research and development work is done to achieve results and to reach goals. Every planning and implementation cycle can therefore only be complete with the inclusion of an evaluation function with feedback to the planning cycle and reporting to a higher level. Feedback can easily be obtained by combining the functions of system design and programming with evaluation of system performance. Results should be reported to the steering committee mentioned in paragraph 57. The manager of the computation centre has to be selected from the application support and development group of the centre. The organization of the centre has two levels of hierarchy:<sup>2/</sup>

---

<sup>2/</sup> This holds good both for a hierarchy in process functions and for a hierarchy in authority.

/First (highest)

First (highest) level: program creation - implementation - evaluation  
of system performance;

Second level (which is a further differentiation of the implementation  
function): scheduling - machine operations - checking  
of outputs.

71. In view of the rapid development of computation centres in Chile, and the urgent need for the United Nations agencies in Santiago to get used to computer-aided methods, the organization of a computation centre at ECLA should start as soon as possible and not wait till a machine can be installed on the ECLA premises. The computation functions to be performed are discussed below.

(1) Information analysis

72. One of the features of modern computation in conversational mode is that programming is becoming so easy and problem-oriented that the professional staff members are able to express solutions to their problems directly in the form of a computer program. Therefore the information analysis task, i.e., to find a solution for some substantive problem through the computer, will mainly be performed by regular staff working at the different United Nations agencies, such as ECLA, ILPES and at CELADE, etc.

(2) Application support and development

73. To educate and to support the scientist in the use of problem-oriented and symbolic languages, to provide programming aid when necessary, etc., a central body of application support analysts should be created; it will form the nucleus of the computations centre organization.

74. Other tasks of the application support and development group are:

- To keep records of all computer programs and application software developed at the United Nations agencies in Santiago; to see that programs are well described and documented; to distinguish between programs of incidental value and those of general value; to inform other United Nations agencies about the availability of this application software; to inform Latin American Governments about the programs and methods available;

/- To collect

- To collect and prepare catalogues of programs in the field of applications covered by the United Nations agencies in Santiago from other sources such as United Nations centres outside Latin America and other scientific centres;
- To discuss with United Nations agency experts in Santiago this know-how can contribute to the studies undertaken at Santiago;
- To promote standardization, whenever appropriate.

Application support and development may start with two experienced system analysts and will gradually enlarge its field of work after the computer has been installed to become a Latin American software house to serve the Governments with computer-aided methods according to needs.

(3) Computer system software group

75. As operating systems and standard system software for remote, multi-, and direct access are supposed to be supplied by the computer manufacturer, this group can be kept small. However the computation centre must act as a counterpart, at an equal level, to the manufacturer, and must be able to adapt and modify the system to the needs of the centre, to handle new operating systems, etc. Two system software programmers are required, one of whom could devote himself to the implementation and modification of the United Nations information storage and retrieval system, now being developed by the Dag Hammerskjold Library, New York. The system software programmers will report directly to the manager of the computation centre. The system programmers will also participate in application programming when circumstances require. It is not expected, at this moment, that the number of system programmers will be enlarged as the centre develops.

76. The further development of the application support and development group depends on the future role ECIA will play in the development of computer applications in Latin America and the role the computation centre will have in the United Nations network for information and computer program interchange. As this is not known at present, no firm figures can be given for after 1973.

/77. The

77. The following is a summary of the personnel requirements.<sup>3/</sup>

(a) <u>During the first phase:</u>	<u>Grade</u>	<u>Annual Salary</u>
1 Manager Computation Centre	P5	\$ 25,000
2 Application Analysts	P4	40,000
2 System Programmers	P3	32,000
1 Secretary	GS-6	<u>4,500</u>
		\$ 101,500
 (b) <u>After the installation of ECLA's own computer the following operating personnel will also be necessary:</u>		
1 Chief Computer Room	GS-8	8,000
1 Tape Librarian	GS-6	4,500
2 Operators	GS-5	<u>8,000</u>
	Total Phase 2	<u>\$ 122,000</u>

(d) Accommodation

78. The time when computer rooms were built like show rooms has gone past. For functional reasons, temperature should be as constant as possible, and the equipment should not be exposed to direct sunlight. A computer room in the basement would be a good solution. Modern computers have only very few persons working in the machine room. False flooring and suspended ceilings are no longer necessary, but this point should be discussed with the manufacturer.

79. Air conditioning should have excess power to permit expansion; the same holds true for the emergency generator. It is not expected that more than 130 m<sup>2</sup> will be needed for the computer room. The computation centre should have a lecture room for 50 students, a conference room for 15 people, and working accommodation for about 10-25 people. Also 10 working cells, each equipped with a working table, terminal blackboard, and two chairs are recommended.

---

<sup>3/</sup> As it will be difficult to find persons with the right qualifications; rather attractive conditions will have to be offered also to younger persons.

80. The costs for furniture and non-expendable supplies are estimated as follows:

<u>Item</u>	<u>Quantity</u>	<u>US\$</u>
Magnetic tape reels	750	14,500
File cabinets/4 drawer	1	320
Tape cabinets - 1,000 tape capacity	15	2,500
Card cabinets - 900,000 card capacity	1	1,000
Tape, card and paper cards	5	200
Typewriters	2	1,000
Decollator	1	500
Burster	1	500
Card racks	10	1,000
Tape carriers	10	620
Terminal projector <sup>a/</sup>	1	1,000
Office furniture		10,000
Miscellaneous		2,860
		<u>36,000</u>

81. The costs for site preparation are estimated as follows:

	<u>US\$</u>
Generator to handle air conditioning and computer	9,000
Air conditioning	25,000
Recorders	700
Miscellaneous site preparation	<u>10,300</u>
	<u>45,000</u>

Further yearly supplies should be budgeted at \$ 20,000 after the installation, but at \$ 10,000 for the first two years.

a/ To project terminal display onto a screen for demonstration purposes.

/(e) Total

(e) Total costs

82. In the years 1970 through 1972 the United Nations agencies in Santiago are expected to continue to work in service. To allow for a comparison between the costs of working in service and the exploitation of an organization's own computer, the assumptions made about expected workloads in 1971 and 1972 are repeated in table 2.

Table 2  
EXPECTED WORKLOADS, 1971 AND 1972

	1971		1972	
	Computer hours batch	Terminal hours	Computer hours batch	Terminal hours
Documentation centre for filing updating		2 000		3 000
All other applications	600	1 000	800	2 000
<u>Total</u>	<u>600</u>	<u>3 000</u>	<u>800</u>	<u>5 000</u>

Note: The average rate for one batch processing hour is US\$ 200.-  
and for one terminal hour 15.-

83. The Documentation Centre has also to pay for mass storage, which is to be rented from the supplier for a price estimated at two times the costs of the equipment.

For 1971 costs for random access storage 20 M bytes are estimated at US\$ 15,000  
and for 1972 (40 M bytes) 22,000

The rental costs of 4 terminals are \$ 11,200 a year.

84. Based on these assumptions, the total costs for the years 1971-1975 may be estimated as shown in table 3.

85. The costs of the terminal hours for updating files at the documentation centre can be reduced by working off-line. The difference in cost between use of service and use of own equipment can be seen by comparing the figures for computer lease and maintenance in 1974 (\$ 192,000) with the figures for rentals in 1972 (\$ 257,000), i.e., \$ 65,000, minus the cost of operating personnel, indicated in paragraph 77, to the amount of \$ 20,500.

/Table 3



Table 3

TOTAL COSTS OF A UNITED NATIONS COMPUTATION CENTRE  
IN SANTIAGO, 1971-1975  
(United States dollars)

	<u>Service</u>		<u>ECLA computer</u>		
	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Computer lease			174 588	174 588	174 588
Maintenance			17 316	17 316	17 316
Air freight and insurance			15 000		
Batch processing hours	120 000	160 000			
Terminal hours, file updating Documentation Centre	30 000	45 000			
Terminal hours, other applications	15 000	30 000			
Mass storage rentals	15 000	22 000			
Terminal rentals	11 200	11 200	30 000	40 000	50 000
Personnel	101 500	101 500	122 000	122 000	175 000
Ancillary equipment			6 000	6 000	6 000
Furniture and non-expendables			36 000		
Site preparation			45 000		
Supplies, expendable	10 000	10 000	20 000	20 000	30 000
<u>Totals</u>	<u>302 700</u>	<u>379 700</u>	<u>467 904</u>	<u>379 904</u>	<u>452 904</u>



Annex I

LIST OF INTERVIEWS

1. New York

Mr. P.J. Loftus	Director, Statistical Office of the United Nations
Mr. S. Cashton	Assistant Director-in-charge, International Computing Centre
Miss Helen Seymour	Deputy Director of Policy Co-ordination, Office of the Controller
Mr. G.S. Martini	Chief, Documentation Division, Dag Hammarskjold Library
Mr. Jacob Mosak	Deputy to the Under-Secretary-General in charge of economic planning, projections and policies
Mr. Carlos Dabezies	Planning and Evaluation Section, Office of Technical Co-operation

2. Santiago

(a) Economic Commission for Latin America (ECLA)

Mr. Carlos Quintana	Executive Secretary
Mr. Jorge Alcázar	Assistant Director, Office of the Executive Secretary
Mr. Ricardo Luna	Chief, Public Administration Unit
Mr. Eric Calcagno	Economic Development and Research Division
Mr. Francisco Azorín	Chief, Economic Projections Centre
Mr. Marshall Wolfe	Chief, Social Affairs Division
Mr. César Peláez	Social Affairs Division
Mr. Roberto Matthews	Chief, Industrial Development Division
Mr. Daniel Bitrán	Industrial Development Division
Mr. Stanley Braithwaite	Chief, Special Studies Section
Mr. Nicasio Perdomo	Deputy Chief, Trade Policy Division
Mr. Luis López	Joint ECLA/FAO Agriculture Division
Mr. Eduardo García	Chief, Natural Resources and Energy Programme
Mr. Jules Dekock	Chief, Transport Programme

Mr. Gustaaf Loeb	Chief, Statistical Division
Mr. Mario Movarec	Chief, External Trade Statistics Section
Mr. Donald Kennedy	Chief, Division of Administration
Mrs. María Benson	Chief Librarian (until 30 April)
Mrs. Lilian Ewer	Deputy Chief Librarian

(b) Latin American Institute for Economic and Social Planning (ILPES)

Mr. Benjamín Hopenhayn	Chief, Projects Division
Mr. José Ibarra	Deputy Chief, Training Division
Mr. Pedro Sainz	Training Division
Mr. Norberto González	Chief, Research Division
Mr. Juan Ayza	Research Division
Mr. Angel Fucaraccio	CELADE Officer, assigned to Research Division project
Mr. Mario Testa	Health Planning Course

(c) Latin American Demographic Centre (CELADE)

Mr. Jorge Somoza	Deputy Director
Mr. Valdecir López	Expert in demography
Mr. Albert Struyk	Expert in demography

(d) Others

(i) United Nations

United Nations Development Programme (UNDP)

Mr. Luis María Ramírez-Boettner	Resident Representative
Mr. Paul Frings	Deputy Resident Representative

International Labour Organisation (ILO)

Mr. Jorge Ricca	Deputy Chief, ECLA/ILO Liaison Office
-----------------	--

Food and Agriculture Organization of the United Nations (FAO)

Mr. John Menz	Regional Officer
---------------	------------------

United Nations Educational, Scientific and Cultural  
Organization (UNESCO)

Mr. Jacques Torfs	Educational Planning Officer
-------------------	------------------------------

United Nations Children's Fund (UNICEF)

Mr. Víctor Raúl Montesinos	Programme Officer
----------------------------	-------------------

(ii) Non-United Nations

National Computation Centre, Chile (EMCO)

Mr. Efrain Friedmann	General Manager
Mr. Mario Pardo	Chief, Training Department
Mr. Keith Pendray	United Nations expert in computation

University of Chile

Mr. René Peralta	Director, Computation Centre
------------------	------------------------------

University Catolica of Chile

Mr. Bollo	Director, Computation Centre
-----------	------------------------------

Representatives of IBM, Burroughs and NCR

European Southern Observatory (ESO)

Mr. Bengt E. Westerland	Director in Chile
Mr. James Richard	Astronomer

Annex II

ECO 621/1(2)

Santiago, 11 May 1970

Dear .....: <sup>a/</sup>

Our feasibility study for ECLA and associate U.N. agencies in Santiago has now reached a stage in which we are able to discuss with you the computer configuration that is supposed to meet ECLA's requirements. We should like to receive a preliminary cost estimate and to discuss arrangements to meet immediate requirements for computer facilities e.g. installation of one or more terminals at the ECLA site.

As you may need some preparation before entering into  
... discussions I enclose you a draft description that may offer some guidance.

As I am rather pressed to proceed with the study I would appreciate you to contact me as soon as possible.

Sincerely yours,

M.R. Mantz  
Computer Consultant to ECLA

---

<sup>a/</sup> This letter was sent to the representatives in Santiago of Burroughs, IBM and NCR.

COMPUTER CONFIGURATION FOR ECLA AND SHARING BODIES

Preliminary Considerations

1. Central processing unit

A 256 Kb workingstore is recommended to house an advanced operating system capable of providing for multiprogramming.

Programmes to be run simultaneously are for:

- Information storage and retrieval by visual display terminal, together with character-printer for hard-copy output;
- Testing and debugging of programs written in Fortran or PL/1;
- Experimenting with economic and other simulation models requiring about 20 Kb space in workingstore each;
- Running a batch-processing program with magn-tape input and line-printer output;
- Card to magnetic tape conversions;
- Duplication of tapes.

At least three programs should be able to run simultaneously.

Operating in time-sharing mode is under consideration.

- Floating point arithmetic should be provided either by hardware or software.

Please specify operating times.

2. Card reader

A high speed card-reader of about 800 cards/minute should be provided.

3. Line-printer

1,000 lines/minute, 136 or 160 characters/line. Good quality output should be provided, at least at reduced speed, which can be used directly (without re-typing) for reproduction purposes.

4. Magnetic tape controller

As source data are received from many other centres, it is recommended that any type of tape can be read. However if this facility requires considerable extra investment, conversion, e.g., of 7 track tapes to 9 track tapes, may be done elsewhere. It is expected that the other centres in future will provide 9 track tapes. The minimum number of tape stations

required are 4 MT, 9 track, ca 60 kb/sec, 800 and 1,600 BPI. The other two tapestations to provide for conversion are optional. The controller should have two channels to the CPU to provide for simultaneous reading and writing. Please specify price-difference between 1 ch and 2 ch controller.

5. Random access mass storage

Information storage and retrieval requires a readily accessible data-base of at least 20 million bytes on an removable discpack. Besides that min. 8 million bytes on another discpack is required for other purposes, such as programme library, storing the operating system, space for overlays, etc. It is known that more and more customers are going to use high capacity disc stores instead of magnetic card storage devices.

6. Multiline controller and on-line terminals

The terminal for the documentation centre should provide for one or 2 visual display units for search purpose and one high speed character-printer if hard copy is required. At the moment 30 ch/sec printers are on the market. For research and development applications, working in conversational mode is emphasized. Visual displays are recommended, either with or without connected character-printers. As hard copy output can - with some delay - also be obtained through the already available line-printer, the character printers are not needed to start with. As the whole world of conversational mode is in rapid development, new and lower priced terminals are expected to come on the market soon, e.g., the Viatron terminal. As the use of terminals, especially with ECLA, will probably increase rapidly, an operating system offering time-sharing facilities will favour the choice of a certain type of computer. The coupling of many terminals through a multiplexer in party line mode (with polling selecting) will be useful for processing surveys (censuses) and for educational purposes. The availability of proven software for operating terminals will influence the choice of the computer.



Symbolic languages

As ECLA is typically an internationally oriented organization, working in the vast area of Latin America and co-operating with United Nations agencies all over the world, standardization is highly favoured. At least Fortran IV should be available in conversational mode, also a Cobol Compiler is required.

Santiago, 7th May 1970  
M.R. Maritz  
Computer Consultant to ECLA

Annex III

GLOSSARY OF TERMS USED

Application software

The program devoted to a specific application, also called user programs.

Batch processing

Mass processing of data. Data which can be handled and processed by the same computer program are collected in batches (groups) to pass through the computer in one run.

Note: Batch processing is commonly used for the statistical and administrative data processing but is not very well adapted to other applications.

Computation centre

The centre which is dealing with all the problems related to computer applications in an organization.

Computer centre

The term computer centre is reserved for the building or room, where the computer is located.

Computer hour

One hour charged to the customer for running a program on a computer not equipped for computer time-sharing. See Terminal hour.

Conversational mode

Direct and immediate contact between person and computer for man-machine dialogue.

Data-bank

The equipment containing the data-base(s).

Data-base

The collection of source data used for many applications.

Effectivity

Related to the reaching of an objective.

Efficiency

Related to the performance/price ratio.

Hardware

Other term for equipment.

Heuristic approach

Used in experiments based on the trial and error method. The next step to be performed depends on the result obtained.

Information storage and retrieval system

A (computer) system to store information so that it can easily be retrieved (by a computer).

Multi-direct and remote access

Features of a computer designed for working in conversational mode.

Operating system

The program(s) for the internal housekeeping system of a computer. Modern computers allowing simultaneous processing of a number of computer programs have a complicated housekeeping system.

Productivity

Related to a performance standard, in this report in particular to human performance.

Program

Computer program, i.e., a sequence of instructions which enables a computer to process data.

Programme

List of objectives and/or steps to attain certain objectives.

Software

General term for the collection of programs to be used with the equipment.

System-software

The programs not related to a specific application but to the general abilities of the computer as a data processing system, such as sorting, editing, conversion from card to tape, data transmission, compiling, etc.

Terminal

A device connected to a computer to establish man-computer dialogue.

Terminal hour

One hour charged to the customer for access to the computer through a terminal. Roughly speaking, the central processing unit is only used one or two minutes during that time. As a computer can serve many terminals simultaneously the rate of a terminal hour is a fraction of a computer hour, e.g., 7 per cent, depending on the number of terminals the system can handle. See Computer hour.

Testing of programs

To make the program free of errors.

Visual display

The results are displayed on a television screen (oscilloscope).

Annex IV

UN - ECLA  
Public Administration Unit

Santiago, Chile  
June 1970

CONSIDERATIONS ON THE INSTALLATION OF A COMPUTER CENTRE IN ECLA

I. Introduction

There is a real possibility that a computer centre will shortly be installed in ECLA, and if it is it will undoubtedly considerably improve the work done by the various United Nations agencies in Santiago. In view of this possibility, it is as well to furnish some brief information about electronic computers and their applications, particularly in the field of public administration.

II. The United Nations and the computer

For several years a number of United Nations departments at Headquarters have been interested in acquiring a theoretical and practical knowledge of the use of computers. The following studies have been issued by the Public Administration Division in the last five years:<sup>1/</sup>  
Mechanized Data Processing in Government Operations - a preliminary appraisal for developing countries, 119 pp., 1964; Orientation Course in Mechanized Data Processing, 129 pp., 1966; Studies Preceding the Acquisition of Mechanized Data Processing Equipment, 24 pp., 1966; Introduction to Systems Analysis for Data Processing, 45 pp., 1967. In addition, the computer occupied an important place in the United Nations Programme in Public Administrations: Report of the Meeting of Experts, a meeting held in New York from 16 to 24 January 1967.<sup>2/</sup>

<sup>1/</sup> See "The work of the Public Administration Division in computer technology", in Public Administration Newsletter (circulated within the United Nations Secretariat and to United Nations experts in the field), N° 31 (April 1970), p. 2.

<sup>2/</sup> United Nations E/4296 - ST/TAO/M/38, New York, 1970, paras. 179-183.

/The United

The United Nations Statistical Office directs the activities of the International Computing Centre in New York, and furnishes technical advisory assistance to governments.

The United Nations General Assembly, at its twentieth session, held from 24 September to 21 December 1968, adopted resolution 2458 (XX) on international co-operation with a view to the use of computers and computation techniques for development. It recognizes in this resolution that "international co-operation in the field of science and technology is essential in order to accelerate progress and narrow the gap between the developing countries and the economically advanced countries". In compliance with this resolution, in February 1970 a Panel of Experts submitted to the United Nations a working paper on "The application of computer technology for development", as a basis for the Secretary-General's report which is now in course of preparation.

### III. Applications of the computer

The applications of the electronic computer in economic and social development are so varied that it would be difficult to find an area in which its use would not be feasible. While this is not a complete report on the subject, it presents some considerations which seem useful at this time.

Briefly, the general characteristics of the electronic computer are: (a) accurate operations, provided there are no programming errors; (b) high-speed computation; (c) data storage capacity; and (d) extraordinary volume of work.

In view of these characteristics, the computer has a very wide range of applications, notably: (a) the possibility of obtaining comprehensive, timely and easily accessible data through the "data bank"; (b) its usefulness in government planning, first by providing information based on trying out hypotheses, thus enabling planners to perfect the economic and social development plan under study,<sup>3/</sup> and secondly by facilitating

---

<sup>3/</sup> Arturo Núñez del Prado, "Necesidades de información para el desarrollo económico", in EMCO/UNDP, Seminario sobre sistemas de información en el gobierno (Santiago, Chile, July 1969), p. 62.

/more detailed

more detailed and accurate planning because of the huge number of variables with which the computer can deal; and (c) its specific use in public administration, in the operation of statistical systems, wage and salary calculation and registration, tax control, budgeting, censuses, public health, the housing situation, etc.

#### IV. The computer in Latin America

Both in the private and in the public sector, there has been a significant increase in the use of computers in Latin America over the past few years. While statistics are not available for all countries in the region, there are sufficient data to indicate that computer techniques are being applied more and more in the field of public administration.<sup>4/</sup>

Between 28 and 31 July 1969, a Seminar on Government Information Systems was held in Santiago, Chile, under the auspices of the Empresa de Servicio de Computación Ltda. de Chile (EMCO) in collaboration with the United Nations Development Programme (UNDP). The report that was published as a result of the Seminar is a valuable contribution to the application of computers to the public sector.<sup>5/</sup>

Another notable instance of the general concern felt by governments in the region for the practical application of computer techniques to the public sector is provided by the Technical Seminars on Automated Data Processing in Tax Administration, organized by the Inter-American Centre of Tax Administrators (CIAT), whose headquarters are in Panama. The latest in this series of seminars was held from 25 to 31 January 1970 in Bogotá, Colombia, and the working documents and the conclusions contained in the subsequent Report are of considerable interest to the public administration field.<sup>6/</sup>

---

4/ See, for example, the reports of the Argentine and Chilean delegations to the Latin American Conference of Government Information Authorities, Buenos Aires, 1-10 April 1970.

5/ EMCO and UNDP, Seminario sobre sistemas de información en el gobierno, Santiago, Chile, July 1969.

6/ CIAT, Informe del II Seminario Técnico (Procesamiento de Datos en la Administración Tributaria), Panama City, 1970; Informativo/Newsletter, vol. 2, Nº 6 (March 1970), Panama City. (P.O. Box 215, Panama 1, Panama.)

/The interest

The interest of the governments of the region in the introduction of computer techniques found expression in the first Latin American Conference of Government Information Authorities, which was held in Buenos Aires, Argentina, in April 1970. This Conference was sponsored by the Argentine Government and UNESCO through the International Computation Centre -- Intergovernmental Bureau for Information Technology (ICC-IBI) in Rome, and its main objectives were the following: (a) to define the role of Government Information Authorities, their functional relationship to the public administration and their influence on development; (b) to define the sphere of responsibility of Government Information Authorities, their characteristics and their relations with other government sectors; and (c), to formulate an international action programme designed to establish permanent Government Information Authorities as the most effective and rapid means of speeding up development in developing countries.

In view of the importance of the recommendations adopted by the Conference in Buenos Aires, they are given in their entirety in annex A of this document.

V. Installation of a computer centre at ECLA

Ever since 1964, there have been discussions at ECLA regarding the possibility of setting up a computer centre. Last year, the Netherlands Government offered funds for the establishment of an information and research centre at ECLA. At the beginning of March this year, ECLA's Executive Secretary asked all divisions and units for their collaboration in a study of the feasibility of a documentation centre and the use of computers. Shortly thereafter, two international experts Mr. Marius Robert Mantz and Mr. Gunnar Berggren, came to ECLA to give their technical opinion on the type of computer most suited to the requirements of the United Nations regional agencies in Santiago, Chile.

/In April,



In April, the Public Administration Unit submitted a memorandum <sup>7/</sup> which rise to an extensive exchange of ideas between the above experts and the personnel of the Unit. There was above all complete agreement on the need to use computer techniques to build up a whole information and documentation system, along the lines of those of the ILO and WHO, as a vital aid to the research work conducted by the ECLA staff.

Within the bounds of its small staff and the limited time available to it, the Public Administration Unit has been taking a close look at the benefits of installing a computer, which can be summed up as the multiple purposes that it can serve. More detailed information is required on this point so as to ensure that maximum advantage is taken of this new technology by its users in the United Nations agencies in Santiago.

A certain number of basic considerations have to be taken into account before actually deciding to install a computer centre, quite apart from all those that must be included in a careful study of the project as a whole.

For obvious reasons, one of these is the high cost both of initial investment and of subsequent maintenance. Another important point is whether there is now or will be in the near future <sup>8/</sup> a sufficient volume of work to justify the installation of a computer. Both considerations are of fundamental relevance to the order of priorities determining the allocation of resources on which the eventual decision will depend.

Another significant aspect that must be borne in mind concerns the personnel requirements of a computer centre. Its proper use demands imagination, ability and even a change of mentality in the people who are going to use it and/or operate it. This means that one of the measures that has to accompany this installation of a computer centre must be the proper training of personnel under a scheme comprising separate programmes

---

<sup>7/</sup> ECLA, "Some views on the advantage to the Public Administration Unit of installing a computer at ECLA headquarters, Santiago", Ramón Oviedo, ECO 621/1(2), 14 April 1970 (annex B of this document).

<sup>8/</sup> The greater the risk of obsolescence, the greater the importance of this point.

/for analysts

for analysts and programmers, for providing general technical information and for bringing about the above-mentioned change of mentality in the research workers, professionals and others directly benefiting from the system.

VI. Important considerations at the government level

If computers are to be installed at the government level, there are other complementary measures which should be taken into account, namely, measures to prevent possible unemployment as a result of the displacement of labour which is an inevitable side-effect of technological progress. Opinions are, however, divided on this question:

On the one hand, it is asserted by some that the installation of computers does not produce unemployment since "the availability of such a machine immediately creates the need to supply the computer with more and better data to obtain more and better information, which in turn creates new posts, at least equivalent in number to those eliminated."<sup>9/</sup>

Similarly, it has been observed that the use of computers in public service does not have the same effect as mechanization in an industry, where the workers replaced by a machine automatically become redundant and are dismissed.<sup>10/</sup> The installation of computers may deprive many officials of the work they were doing, but the civil service regulations, and, as a rule, the need of the organization concerned to assign staff to other duties normally guarantee employment of the displaced staff.

On the other hand, it is said that the use of computers leads to the redundancy of the officials engaged on the routine and accounting work which can be taken over by the computer. The low level of occupational mobility in the public sector makes it difficult to assign such officials to other tasks.

---

<sup>9/</sup> See EMCO/UNDP, Seminario sobre sistemas de información en el gobierno (Santiago, Chile, July 1969) p. 17.

<sup>10/</sup> See Pablo Huneeus, El Problema de Empleo y Recursos Humanos: Ideas para una Política (Santiago, Chile, Andrés Bello, 1970).

One last important point in connexion with computer services concerns the different problems which the Latin American countries have had in the past or are currently experiencing, which vary according to the sectors which have taken the initiative in the acquisition and use of computer centres. In some countries the initiative for the creation and increased use of such services has come from private firms or autonomous public enterprises or institutions; while in others the State has come to play a dominant role through the creation of State computer centres.

The problems facing the former may be summarized as follows:

- (a) High prices for computer services;
- (b) Inadequate use of computer capacity;
- (c) Accentuation of the problem of absorbing staff with university or intermediate training, particularly in the private sector;
- (d) The out-of-date administrative procedures of the public services; and
- (e) Consequently, the possible necessity of introducing computers in the public sector.

Where State computer services already exist, a different set of problems arises, of which mention may be made of the following:

- (a) The need to lay down priorities in the use of computer services, so that they may become an effective instrument of support for the efforts towards economic and social development; some of the possible applications have already been mentioned: government planning and administration, programming and production control, statistical services and health and education programmes, scientific research, etc.<sup>11/</sup>

---

<sup>11/</sup> United Nations, "The Application of Computer Technology for Development", February 1970 (Working Paper).

- (b) In particular, the need to study how computer methods are to be fitted into the procedures of the public administration in such a way and to a degree which will increase the administrative capacity of the State institutional machinery, without, of course, affecting the important functions which every country assigns to its public administration in the light of particular circumstances.

These are only a few of the problems facing the governments of the region in the application of computer technology to development. There are grounds for hoping that within a reasonable time - once its staff have been familiarized with this technology and a computer centre has been installed - ECLA will be in a position to provide the governments of the region with technical co-operation in this field in the form of advisory services and training courses at the region level.

Annex A

Recommendations adopted by the Latin American Conference of  
Government Information Authorities  
(Buenos Aires, 1-10 April 1970)

RECOMMENDATION Nº 1

CONSIDERING THAT:

- a. The Latin American Conference of Government Information Authorities represents a major effort on behalf of the organizers and the participating countries, from the point of view both of the personnel mobilized and of the material resources invested;
- b. The exchange of experiences and the conclusions reached are particularly important for the rational development of information in Latin American countries;
- c. Communication channels and exchanges of information are being set up and the Governments themselves have only been adopting planning measures on the subject for a relatively short time;
- d. It is important to prevent the conclusions and recommendations of this Conference from remaining mere declarations, without being put into practice;

The First Latin American Conference of Government Information Authorities therefore

DECIDES:

"That Argentina should organize a Permanent Secretariat of the First Latin American Conference of Government Information Authorities to promote, vis-à-vis the appropriate agencies, persons, and countries, the dissemination and implementation of the decisions and motions adopted at the Conference."

/RECOMMENDATION Nº 2

RECOMMENDATION N° 2

CONSIDERING THAT:

- a. The experience being acquired by Latin American experts in their respective countries is of great value, especially as they gain such experience in very similar environments;
  - b. One of the most effective teaching methods in the field of electronic computation is to impart knowledge by illustrating actual examples;
  - c. It is a matter of urgency that Latin American countries exchange their experiences in view of the possibility of applying them in a generalized manner;
- The First Latin American Conference,

RECOMMENDS:

"That, on the basis of bilateral and multilateral agreements between Latin American countries, a programme for the exchange of specialists in the use of electronic computation in the public sector be carried out in order to take fuller advantage of the specific experience achieved by each country in specialized areas and subjects."

RECOMMENDATION Nº 3

CONSIDERING THAT:

- a. There is only a small number of high-level technicians engaged in computation and information work in the vast majority of Latin American countries;
- b. This shortage of specialized personnel has caused problems for the development of information and, in some cases, has even stopped it altogether;
- c. It is necessary for each country to possess a team of technicians capable of absorbing the rapid changes that are taking place in the information field;
- d. The cost of organizing high-level courses are usually very high and may prove prohibitive for a single country;
- e. Well-known international experts and technicians do not have enough time to give continuous courses;
- f. Latin America urgently needs high-level experts;  
The First Latin American Conference,

RECOMMENDS THAT:

"High-level medium length international courses be held in Latin America as soon as possible and through the best possible machinery for technicians from all the Latin American countries."

RECOMMENDATION N° 4

CONSIDERING THAT:

- a. Constant progress is being made and changes occurring in the use of computers in the information field;
  - b. Modern data-processing equipment is being increasingly used in the public sector;
  - c. Latin American countries are gaining more and more local experience every day;
  - d. This experience is not usually publicized for lack of an information service;
- The First Latin American Conference,

RECOMMENDS:

"That an information bulletin on applications, experience and projects under way in connexion with information in the public sector, particularly of the Latin American countries, be published periodically."

This service will be conducted in association with agents responsible for collecting information in the various countries and obtaining adequate connexions with manufactures of equipment and institutions specializing in research and its application in this field."



RECOMMENDATION Nº 5

CONSIDERING THAT:

- a. There are countries in Latin America that are still at the early stages of applying information techniques;
- b. Some of these countries do not even possess data-processing centres in an operational state;
- c. Advantage should be taken of the fact that other Latin American countries have already acquired valuable experience regarding problems involved in applying information techniques in similar economic, cultural and administrative conditions;
- d. In the light of the foregoing, it would be useful to apply specific information techniques, for limited periods and on a restricted geographical scale, in areas whose compatibility could permit passing on experiences from one country to another, covering such aspects as:
  - payment of salaries of national agencies
  - sales invoicing for state or semi-public enterprises
  - certain accounting controls and/or controls of administrative management.

The First Latin American Conference,

DECIDES:

1. "To apply computation techniques in specific economic sectors and/or government services in the Latin American countries, taking advantage of the experience of other countries which are more advanced in this field.

/2. To

2. To conclude, for purposes of applying such techniques, bilateral or multilateral agreements which will take especially into account for feasibility of the projects, economic and social returns, and the greatest possible multiplier effect of the resulting changes. To that end, the following steps should be taken in each case:
  - (a) A study in depth in order to obtain the best possible information service in question;
  - (b) Gradual absorption of the human and physical media required for preparing the system or systems.
3. To request support from the United Nations or other international agencies, on behalf of the interested countries, to help finance projects in specific fields."

RECOMMENDATION Nº 6

CONSIDERING THAT:

- a. The development of the use of electronic computers in the information field is a recent phenomenon, particularly in Latin American countries, and that new and interesting experiments revealing many similar characteristics are constantly being made by these countries;
- b. The repetition of experiments that have already proved unsatisfactory elsewhere entails unnecessary expenditure in terms both of time and of human and material resources that are in any case scarce;
- c. More advanced countries are testing new criteria, processes and equipment and thus acquiring valuable experience in a relatively short space of time;
- d. It would be useful for persons entrusted with similar tasks in the information field to exchange their experiences and discuss their problems;

The First Latin American Conference,

RECOMMENDS:

"That the Latin American countries hold regular meetings, which experts from the more advanced countries would be invited to attend, for the exchange of experiences and the co-ordination of action in connexion with information, particularly in the public sector, at the level of:

- (a) Authorities responsible for the management of computation equipment in public services and enterprises;
- (b) Information specialists working on applications in areas related to those where electronic computation is being used (health, education, tax collection, etc.);
- (c) Specialists, technicians and scientists working on the application of specific techniques which involve the use of computers (simulation models of administrative and economic process, long distance transmission of data, etc.);
- (d) Teachers and research workers employed in agencies concerned with training information technicians."

/RECOMMENDATION Nº 7

RECOMMENDATION N° 7

CONSIDERING THAT:

- a. The processing of information and allied activities are nowadays deemed as important, from the point of view of basic resources, as the availability of vital raw materials and should therefore be promoted and introduced;
- b. This situation is even more apparent in developing countries in view of the need to provide them with the means of arresting the hitherto growing technological and industrial gap between them and the more developed countries;
- c. There is a serious shortage of electronic computation experts and knowledge of the subject is very poorly disseminated among head office and senior officials of the public administration;
- d. A programme capable of satisfying the vast training requirements of Latin American countries, in terms of the quality, quantity and speed that are needed if computation is to be introduced on a massive scale, must be assigned human resources of the highest level as well as adequate material resources;
- e. It is still not fully appreciated that, for economic and social planning to achieve its objectives, the services and agencies of the public sector must be highly efficient;
- f. Past and current efforts to promote economic and social planning have been hindered at the implementation stage by the application of anachronistic systems of management and administration of public sector services;
- g. Instruments of international co-operation should therefore be established so as to enable developing countries to introduce the new data processing techniques;
- h. Apart from an analysis of depth of the situation, an assessment of resources and integrated feasibility studies, the effectiveness of such co-operation depends upon the achievement of the objective set and the avoidance of the kind of errors and partial failures that have occurred elsewhere;

/i. The

- i. The United Nations is currently studying or reviewing the entire structure of international co-operation with a view to the use of computation in the developing countries;
- j. If the loss of valuable years for development is to be avoided, steps should be taken to cope with pressing situations and resolve urgent problems, particularly in Latin American countries where the use of computation is still in its early stages;  
The First Latin American Conference,

DECIDES:

1. "To recommend the establishment of one or more Regional Latin American Centres for Information applicable to the Public Sector, with contributions from the interested Latin American countries and support from the United Nations and from other countries or agencies which may so decide, which would have the following functions:
  - (a) Training and retraining of public administration personnel;
  - (b) Exchange of information by stages;
  - (c) Provision of advisory assistance in information applicable to the public sector;
  - (d) Possible provision of limited operational support services.These functions must be performed preferably through recourse to non-permanent staff and to the use of existing operational facilities.
2. That the final establishment of Regional Information Centres, their geographic location and their future organic structure should depend on compliance with the following requirements:
  - (a) Making an inventory and a weighted statistical evaluation of the different situations in the Latin American countries by obtaining internationally comparable profiles. For an analytical inventory of computation facilities, it is recommended that the authorities in the various countries adopt the form prepared for the purpose by OECD and send it to IBI-ICC for registration, summarizing and distribution of results;

/(b) Carrying

- (b) Carrying out a feasibility study which will consider the fullest possible use of existing educational and operational facilities in order as far as possible to reduce the additional investment required from the Latin American countries and the United Nations. To that effect, the host country should possess facilities which will place it at least in the operational category in the proposed conventional classification showing the stages reached in the use of digital computers: primitive, basic, operational and advanced (Report of the United Nations panel of experts);
- (c) Adoption by the United Nations of a definitive structure of international co-operation with a view to the use of computers for development (United Nations resolution 2458 (XXIII)).

3. To recommend the immediate establishment of instruments for a temporary plan comprising a group of measures to solve the most pressing problems in the application of information, e.g.:

- (a) The formulation of specific limited bilateral or multilateral agreements, possibly with the support of existing professional or international agencies or institutions;
- (b) The formulation of a limited temporary plan for training specialists, with the joint support of the interested Latin American countries. To that end, and subject to the agreement of the countries concerned, use will be made of the operational infrastructure, trained personnel, and implementation and educational facilities available in Mexico, Chile and Argentina."

RECOMMENDATION N° 8

CONSIDERING THAT:

The teletransmission of data obviously comes under the same category of public utility services as the transmission of messages by telephone, telegram or television and that it employs the same telecommunications channels and techniques;

The First Latin American Conference,

DECIDES:

"To recommend that the Latin American States duly await the regulation of this aspect of telecommunications."

/RECOMMENDATION N° 9

RECOMMENDATION Nº 9

CONSIDERING THAT:

- a. One of the basic requirements for the effective establishment of development policies in Latin America is the existence of an efficient Administration;
- b. The modernization and rationalization of the public administration necessarily entails the collection of information to direct the general improvement and planning process;
- c. Computation systems or data processing, and information techniques generally, are necessary in the public administration to accelerate this process;
- d. It is necessary to direct and plan the introduction and efficient use of information in the public administration in the medium and long term;
- e. It is therefore indispensable to frame national plans for controlling the development of information techniques at the governmental level which would follow clearly defined stages, according to how far each country has progressed in the field and to its particular politico-administrative context;
- f. The modernization and rationalization of the public administration involves transforming its administrative process, especially in the following respects:
  - Standardization of information so that its content can be defined without possible error;
  - Creation of systems capable of receiving the original information in the form required for later stages of mechanized processing;
  - Development of data processing techniques from their conceptual definition of their full installation;
- g. Immediate problems are the provision of the material equipment for introducing the electronic computation of data in the public sector as a whole and the technical organization that the State will need to operate the said equipment efficiently;

/h. The



- h. The kind of multiplication of effort that occurs when several different processing centres apply the same techniques but employ different criteria must be avoided;
- i. Another problem that state policy will have to face is the training of public administration personnel to apply electronic computation techniques rationally in state agencies;
- j. The advent of electronic computation is already bringing certain modifications in positive legislation for the best possible use of information systems;
- k. The problems cited are more or less universal and must be solved within a national context;  
The First Latin American Conference,

DECIDES:

"To recommend that each Latin American country, as convenient and in accordance with the appropriate legislation, establish a high-level institution on a permanent basis to frame government information policy and to co-ordinate and control State action in this connexion."

RECOMMENDATION N° 10

CONSIDERING THAT:

- a. The First Latin American Conference of Government Information Authorities undoubtedly constitutes an excellent and necessary initiative on the part of the IBI-ICC and the Argentine Government;
  - b. The exchange of experiences conducted in the course of the Conference will serve as an excellent basis for future work;
  - c. The continuity of this exchange process cannot be interrupted without causing the loss of all that has been achieved at this Conference;
- The First Latin American Conference,

DECIDES:

1. "To recommend that a second Latin American Conference of Government Information Authorities be held in 1971.
2. To request IBI-ICC to organize this meeting jointly with the Permanent Secretariat of the First Latin American Conference of Government Information Authorities and officials of the country where the Permanent Secretariat is to be established."

RECOMMENDATION Nº 11

CONSIDERING THAT:

- a. The application of long-distance electronic computation and data transmission equipment is likely to develop enormously during the coming years and that there will hardly be any activity that does not employ these modern means of recording, processing, calculating and communicating results;
- b. The production and installation of this equipment and related units will be a major factor in future economic development;
- c. Serious attempts have been made at Latin American economic integration; The First Latin American Conference,

RECOMMENDS:

"To agencies and institutions concerned with advancing the economic integration of Latin America, and to the Latin American countries themselves:

- (a) That they take into consideration in formulating their plans the rapid rate at which the market for electronic calculating machines, computers, peripheral equipment, teleprocessing terminals, inter-connexion media and accessories is likely to grow in Latin America during the next few years;
- (b) That any attempt to produce hardware be made within the framework of Latin American integration."

/RECOMMENDATION Nº 12

RECOMMENDATION N° 12

CONSIDERING THAT:

- a. The acquisition of computation equipment and related units requires intensive investment that governments are not always in a position to make, owing to the accumulation of financial commitments resulting from the economic and social development plans in which they are involved;
- b. Such investment will have a decisive influence in making the public sector more efficient and thereby speeding up and making feasible the due implementation of the said development plans;  
The First Latin American Conference,

RECOMMENDS:

"That the United Nations, jointly with the Latin American countries, propose and obtain from international credit institutions special credit lines from the Latin American countries to purchase computation equipment for the data-processing units in the public sector."

RECOMMENDATION N° 13

CONSIDERING THAT:

- a. Several international organizations exist that are concerned with various aspects of automation and information;
  - b. These organizations are carrying out activities that sometimes overlap;
  - c. Suitable co-ordination of their work will make it possible to make more extensive studies and introduce new subjects, with the attendant advantages of cross fertilization;
- The First Latin American Conference,

RECOMMENDS:

"That the international organizations concerned with various aspects of automation and information consider the best way of co-ordinating their activities at both the international and the regional level."

RECOMMENDATION N° 14

CONSIDERING THAT:

- a. There is a serious shortage of electronic data processing experts, not only in Latin America but in the most advanced countries as well;
  - b. The systematic training of experts is usually a slow process;
  - c. The technology of processing data with computers is undergoing rapid development and change;
  - d. Latin American technicians and authorities must quickly be appraised of these new experiments and, above all, be given the possibility of applying them as soon as possible;
- The First Latin American Conference,

RECOMMENDS:

"That the United Nations be requested to take into account, within the context of its technical assistance plans, the implementation of a programme of support for information which would include:

- (a) The periodic assignment to the Latin American countries of highly qualified experts in electronic computation applicable to data processing in the public administration, so that they can help the Latin American countries by transmitting directly to local technicians and officials their specialized experience in such questions as the organization of data-processing centres; the organization of public services and their adaptation to the use of computation instruments; training methods and techniques in this field, etc.;
- (b) Fellowships for the training of computation specialists and of government information officials at the different levels."

/RECOMMENDATION N° 15

RECOMMENDATION N° 15

CONSIDERING THAT:

- a. It is indispensable that Latin America be included in any programme designed to speed up the economic and social development of the world;
- b. Conditions throughout Latin America are propitious for the rapid spread and application of information pilot programmes that are held in one or more of the countries of the region;
- c. The existing intention of the United Nations to promote a programme of international co-operation with a view to the use of computation techniques for development (Resolution 2458 (XXIII)) implies the need to conduct certain experiments prior to its implementation so that it can be improved in the light of the results obtained;  
The First Latin American Conference,

DECIDES:

"To request the United Nations to arrange for the execution of national information for development pilot projects in the Latin American area."

RECOMMENDATION N° 16

CONSIDERING THAT:

- a. Scientific and technological knowledge in the field of electronic computation in general and in its application to the public sector in particular is new and in process of expansion and development;
- b. The possibilities of applying electronic computation affect not just a part of people's life but virtually every aspect of their activities;
- c. The successful use of newly-acquired technical know-how for the good of the community depends not only on the quality of the scientific and technological innovations but above all on whether there is:
  - An adequate number of experts in the various stages of design and application;
  - A clear and universal understanding of the fundamental technical aspects of this new knowledge within a logical and harmonious framework, the possibilities of applying them, their requirements, their limitations and the proper behaviour to be adopted in this new context of technical elements and possibilities that are different from those that have existed hitherto;
- d. From the start of the training process it is necessary to learn about and, above all, become familiar with the use of the new technical know-how, and the conditions and potential it opens up for satisfying the nations' material and cultural needs;
- e. There are several private training courses in this field which should be encouraged but should at the same time be made to conform to set technical standards as to their quality and bona fide character;

/The First



The First Latin American Conference of Government Information  
Authorities therefore

DECIDES:

1. "To recommend to the educational authorities of the respective Latin American countries that they study the possibilities of intensifying the teaching of electronic computation at the various educational levels;
2. To recommend to the authorities responsible for training public administration personnel that they teach data processing techniques."

/RESOLUTION

RESOLUTION

CONSIDERING THAT:

- a. The initiative of holding the First Latin American Conference of Government Information has been exceptionally timely and important;
- b. The Meeting has been notable for its good organization and for the very special attention and facilities that have been extended to the visiting delegations;
- c. The conclusions reached and results obtained have fully lived up to the expectations of both its organizers and the participating countries;

The First Latin American Conference,

DECIDES:

"To extend congratulations and thanks to the Director of IBI-ICC and the Argentine Government officials for their initiative and efforts in convening and carrying to a successful conclusion the First Latin American Conference of Government Information Authorities."

Annex B

REF.: ECO 621/1(2)  
TO: Mr. Marius Robert Mantz; ECLA's Consultant  
on Computer Methods (Room T-222), and  
Mr. Gunnar Berggren, Interregional Adviser  
on Computer Methods (Room T-224)  
FROM: Ricardo Luna, Chief, Public Administration Unit  
SUBJECT: Some views on the advantage to the Public Administration Unit of installing a computer at ECLA headquarters, Santiago. DATE: 23 April, 1970.

It is thought that a computer can meet the needs of the Public Administration Unit which are summarized below.<sup>1/</sup>

The main activities of the Public Administration Unit include the following:

- (a) Technical assistance to the governments of the countries of the region in administrative matters;
- (b) Organization of seminars on various aspects of public administration;
- (c) Collaboration or participation in seminars concerned with public administration.

All these activities imply the need to assemble data and draw up reports or studies, tasks which would be greatly facilitated and sponsored by the use of a computer the systematic recording of documents and specific data is of special importance.

It is reasonable to suppose that, given adequate means, the Unit would be better equipped to provide other services to the governments and other institutions of the countries of the region. In this connexion, the Unit's programme of work for 1970 provides, inter alia, for the following:

---

<sup>1/</sup> We do not claim that this summary is final and complete, since it appears obvious that, once a computer is in use, a series of other tasks will become feasible which, otherwise, it would be difficult or impossible to carry out.

- the collection and compilation of basic, current information on administrative aspects of the economic situation of the countries of the region (administrative causes of under-development; content, strategy and methodology of administrative reform);
- research aimed at quantifying and facilitating the analysis of the chief administrative aspects of economic and social development.

Following on these studies, which are largely a form of data processing, it may be necessary to investigate one or more specific aspects in more detail, which would be feasible if adequate information was made available in good time, or if the means were provided to re-process the data in the form needed for a new or specific study.

Given the fact that a computer offers the advantage of rapid data processing, it seems reasonable to expect that, in the future, the Public Administration Unit will be in a position to publish statistical data of real interest to the countries of the region, from time to time, if not on a regular basis.

In view of the above-mentioned advantages, it is possible that the use of computers will be encouraged in the public administration departments of the countries of the region in the near future, provided that conditions so require and allow. Such encouragement could extend even to the specification of the computer which is most suitable, in view of the diversity of existing types. In fact, several countries in the region are already using computers in their public administration departments (Brazil, Chile, etc.).

The above could lay the groundwork for bringing to fruition work already initiated in ECLA,<sup>2/</sup> since the relevant agencies in each country could draw up and periodically bring up to date a series of data - in uniform or standardized form - for analysis, which would undoubtedly facilitate surveys connected with the public sector, or to be more precise, with the public administration in the countries of the region.

---

<sup>2/</sup> ECLA, "Necesidades de información para el análisis del gobierno general y su papel en el desarrollo de las economías latinoamericanas", Economic Development and Research Division.

/The following

The following are a few of the many examples of data standardization that could be given:

- Income and expenditure of government agencies;
- Physical data concerning sectors and levels of activity: health, education, housing, public enterprises, etc.;
- Grading of public administration staff;
- Classification of investment by final use;
- Classification of enterprises according to the measure or type of government participation;
- Standardization of the institutional classification of the structure of State agencies.

