ASSESSMENT INDICATORS FOR THE IMPACT OF INFORMATION ON DEVELOPMENT:

PRELIMINARY REPORT OF AN INTERNATIONAL COMPUTER CONFERENCE

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CHAPTER 1

THE COMPUTER CONFERENCE

1. THE PROBLEM

1. For several decades, institutions in developing countries and development assistance agencies have supported the development of information infrastructures in developing countries. This encompassed the establishment or strengthening of information services at all levels, corporate, local, national, regional and international; facilitating access to the world's information resources, education and training of information specialists and users, elaboration of information policies and plans.

2. Even though we have witnessed a steady growth in the provision of information services in the developing countries, a number of fundamental questions remain unanswered. The people in developing countries question the relevance and appropriateness of the services offered. Development assistance agencies are concerned about their sustainability. The extent to which they in fact contribute to empowerment of people and the accountability of the institutions concerned are subjects of controversy and concern. Logic dictates that information is an essential resource for the social and economic development of Third World countries, but how can this be demonstrated? Information can be a powerful catalyst to transform society, but how tangible is the linkage between information investments and the achievement of specific development goals? The limited status accorded to information in most developing countries suggests that its potential value is not self-evident.

3. Up to now, the assessment of development efforts has mainly relied upon measures of input or immediate output. While information specialists point to internal developments and claim, for instance, that a 5 000 records database is now operational, policy-makers and decision-makers understandably look for a clear indication of its overall socio-economic benefit, and thus they ask the question: "So what ?"

4. The answer has been so far provided in the form of the axiom "Information is the most critical resource and plays a fundamental role in development". Yet, as pointed out by Saracevic some ten years ago, there is no systematic body of empirical evidence to support this assertion, especially no quantitative one. Unless a more appropriate answer is offered, information related programs will have difficulty justifying a high level of priority and a share of scarce resources when competing with other disciplines, whose relationship to development is better established.

5. The challenge before the information science community is to identify meaningful parameters or indicators, qualitative or quantitative, by which the overall socio-economic impact of information programs and services can be assessed and the procedures which will allow the gathering of relevant data. These parameters or indicators should be likely

to offer a concrete enough answer to those who control the allocation of resources at whatever level in the process of policy formulation and decision making.

6. In this context it is not appropriate to restrict information activities to those of any particular institution, such as libraries or documentation centres. One must rather consider all roles and functions in the communication cycle, from information generation to information utilization, and not exclude either any medium, process or organizational set-up.

2. THE PROJECT

7. The computer conference had been designed as the first step in a longer term effort to explore the above mentioned apparent dilemma.

8. This first step could only have an exploratory nature. Its aim was to attempt as thorough and systematic as possible an analysis of the benefits likely to be associated with investments in the information infrastructure, and information activities in general, and then to identify meaningful indicators, qualitative and quantitative, by which these benefits and their impact can be measured.

9. The outcome of this computer conference will then be reviewed at a workshop with several developing-country policy makers and practitioners, who will examine whether the theoretical models and conclusions can be validated in practical applications.

10. The outputs of this workshop lead to a third phase in which a number of action-research projects would be undertaken in order to validate the selected approaches to the assessment of the impact of information on development and gather related evidence.

11. It is indeed hoped that the pace set by the project will result in a continuing effort within the information science community and others toward the investigation of these issues.

12. IDRC and the participants were fully aware of the fact that the computer conference was a pioneer endeavour and of the risks and challenges this involved. To the best of our knowledge, it was to be the first time in the information science community an international research computer conference was organized, a thorough examination of the role of information in development and its assessment was undertaken, and a structured collective effort toward such an investigation was attempted.

3. RESULTS EXPECTED FROM THE COMPUTER CONFERENCE

13. The computer conference was expected to allow for the identification of:

- significant short term and long term benefits resulting from the various kinds of information activities;

- the meaningful parameters, or indicators, both qualitative and quantitative, by which these benefits can be assessed;
- the procedures which will allow the gathering of relevant raw data;
- when appropriate, the methods by which the suggested indicators could be calculated.

14. In other words, it was to offer a comprehensive and systematic overview of what is to be monitored and how to do so. The conference theme may otherwise be stated as: "What is the contribution of information activities to development and how can it be assessed?". There was however no intention to provide a complete nor final answer to the many problems raised by this question. The ambition was to possibly develop an initial workable framework for undertaking impact assessments in the future. This required the conference to take a broad perspective at the inception, which may result in misleading interpretations of its objectives.

15. Meaningful answers, even though incomplete and preliminary, to the above question are long overdue requisites for a more appropriate design of information systems and services which would increase their utilization, their relevance to both development and the organizations in which they operate, their chances of sustainability. They may as well contribute to a better understanding of the "information society" and "knowledge society".

16. This is of immediate concern to all those who need a rationale for their decisions regarding the support or management of information activities, whether they belong to the public, private or not-for-profit sector of the developing countries or the donor countries, in particular development agencies.

17. Although the subject is obviously relevant for societies at different levels of development, to which reference could be made in the discussions, the focus of the conference was clearly on developing countries.

18. While it was anticipated that the conference was likely to address a number of theoretical and conceptual issues, it was expected to produce in first place results which can readily be applied. Those benefits and related parameters or indicators which are amenable to measurements or concrete assessments were to be focused on. Special attention was to be given to those indicators likely to produce the required evidence of socio-economic benefits, and possibly returns, as a basis for making decisions about investments in information activities.

19. The resulting framework may possibly be used in retrospective evaluations or decisions regarding ongoing information activities. It was however primarily expected to offer guidance in the design of future field studies and action research for the evaluation of information services and programs. Meanwhile, it was anticipated that the computer conference may incidentally suggest new forms of information related projects, or components to be included in traditional ones, in order to carry out such assessments, as well as items to be part of an agenda for future research on the relationship between information and development.

20. The computer conference was not expected to produce actual evaluations or measures, nor an appraisal of current information related programs. It was however suggested that possible limitations of the latter with regard to their capability of yielding the identified benefits or allowing for their assessment could be highlighted.

4. WHY A COMPUTER CONFERENCE

21. The complexity and difficulty of the subject are fairly obvious. Not only was little empirical research ever attempted in this area but there is no commonly agreed upon model to guide the investigation. An uninhibited and in-depth discussion over a long enough time was therefore felt necessary.

22. Conventional methods would have required much of the participants time for the preparation of papers, their review and a collective synthesis. At least two meetings would have been necessary. This approach would not have allowed for the level and duration of interaction which the scope and purpose of the conference required.

23. In view of the time constraints and geographic scatter faced by those who were likely to contribute, a computer conference then appeared to be the more appropriate mechanism, in spite of the fact that it excluded a number of potential participants based in parts of the world where telecommunication facilities are not adequate.

24. IDRC selected the COSY computer conferencing system of the University of Guelph, Canada, as the facility for holding the conference in view of its previous involvement in similar endeavours.

25. Even though it was fully realized that the use of a technology, with which a number of participants may possibly be unfamiliar, might result in some degree of inhibition, a computer conference was felt to offer a better opportunity to follow Robert Jungk's advice (Imagination and the future. International Social Sciences Journal, 1969, 21/4, P. 560) that such an effort should be "Devoted to speculative thinking about the subjects under discussion and at such "crystal-ball" sessions the old style of presenting findings together with the corresponding evidence will be replaced by a spirit of bold speculation, of free-ranging intellectual experimenting and of relaxed give and take. An atmosphere of gaiety and of joint search might then replace the atmosphere of so many gatherings today, marked as it is by self-assertiveness, aggressiveness and possessive pride."

5. PARTICIPANTS

26. In view of the complexity of the subject as well as the objective of producing concrete results within a relatively short time, it was felt necessary to restrict participation to a limited number of specialists having a recognized expertise in the conference theme. The number of regular participants was decided upon considering that it should also allow for the most effective interaction within the group and a joint commitment toward the achievement of the objectives of the conference. These conditions might have been more difficult to fulfil within a broader group.

27. It was also realized that the conference theme required a multidisciplinary approach. The usefulness in principle of the participation of specialists from a number of disciplines and backgrounds outside the information community was fully acknowledged. But it was felt inappropriate at this stage, because of the inconsistencies in the respective experiences, reference frame-works, concepts and vocabulary it was likely to introduce. This interaction was thus foreseen for the following stages.

28. A core group of 15 specialists from the private, government and academic sectors in North America, Europe, the Caribbean, Latin America and the Middle East, was selected by IDRC on the basis of their previous work on related issues, to form the core group of participants. Attention was paid to the fairest possible representation of the various parts of the world within the group, even though this criterion was a secondary one compared to a relevant experience. IDRC supported the cost of their participation. The list of the participants can be found in Appendix 2. Michel J. Menou, an international consultant in information management systems from France, was appointed by IDRC as the moderator of the conference.

29. Participation in the conference was in a purely personal capacity, even though it did not preclude parallel contacts and discussions within the respective communities or organizations.

30. As a means to ensure the free expression of the participants and to avoid possible slow downs and repetitions as a result of the entry of newcomers in the course of the proceedings, it was further decided to keep the conference closed. Access to the full proceedings was to be restricted to the participants. The summaries (see below 38) were to be used in the personal communications with colleagues outside the conference.

31. On the basis of suggestions made by the participants, IDRC identified at a later stage a second group of 15 specialists having expertise and a keen interest in the theme of the computer conference, to form a "consultative panel". The list of the consultative panel members can be found in Appendix 2. In many instances they were specialists who might as well have been called to the core group, but did not wish or could not participate in the computer conference proper for various reasons, in particular lack of adequate telecommunication facilities. Most of them received a printed copy of the initial input and contributed comments to the conference as part of the personal contacts within the moderator's own network. Once the final list had been established by IDRC, all of them received, toward the end of the conference, printed copies of the summaries to which they were asked to react.

32. Participants were further encouraged to freely discuss the conference contents with colleagues and share their comments within the conference. A standard model of a press release was prepared to this end at the beginning of the conference. At various times during the conference, the release was sent by the moderator to some ten information science journals and newsletters and to a computer conference concentrating on information technology in developing countries (STIDEV on COSY). In addition to STIDEV, only 3 announcements were actually published in time (Bulletin of ASIS, ASIS SIG/III Newsletter and Documentaliste-Sciences de l'Information). Various professional meetings provided further opportunities for external contacts. About 12 information specialists

expressed general interest in the conference theme and requested more information. Some 26 information specialists were approached as part of these personal contacts. Eighteen of them actually offered comments which were shared within the conference. The list of these external contributors can be found in Appendix 2.

6. GENERAL COMMENTS ABOUT THE PROJECT

33. Both from within and outside the group of participants, the project was welcomed as an important, exciting worthwhile and timely endeavour. It was also stressed that it was a challenge. The extreme difficulty of devising criteria and a framework for assessing the impact of information on development was mentioned. Discomfort was also expressed because of the need to accommodate quite different and often incompatible perspectives, such as the communication cycle versus information economy. The availability of solid data and possibility of gathering them are also perceived as a major obstacle.

34. Reaching a better understanding of the role of information in development is nevertheless seen as a fundamental question for the future of the information field. While a focus on developing countries is legitimate in this respect, the same problems and questions hold for industrialized countries as well.

35. It was also mentioned that a discussion of the effectiveness of the present information systems and services and of the support granted to them could hardly be left out of the scope of the project.

36. A number of external contributors, especially from the developing countries, expressed criticism about the relative under-representation, in their view, of specialists from the developing countries in the core group of participants, even though they acknowledged the material obstacles to their involvement. They stressed that an effective interaction at later stages of the project should be given the highest consideration.

37. Similarly, the mostly library/information science background of the core group participants was questioned. Some people felt that, even at this early stage, the inquiry could have benefited, more than been difficultated, from the participation of specialists drawn from other fields than information science and systems, in particular economists and development sociologists, and from decision-makers in developing countries.

7. STRUCTURE AND SCHEDULE OF THE CONFERENCE

38. As a means to facilitate interaction and the synthesis of the proceedings, the theme of the computer conference was broken down in a series of ten discrete sub-themes, or topics in the COSY terminology, as follows: General, Policies, Benefits, Indicators, Calculation, Field projects, Research agenda, Literature, Others and Digests. A detailed description of their scope can be found in Appendix 3.

39. The conference began with a face to face meeting of the participants, held on April 6-8, 1992 at IDRC's Headquarters. The meeting aimed at facilitating a better personal

acquaintance among all members of the group and establishing the required group dynamics. It further allowed to review the scope, objectives, agenda and procedure of the conference. Participants also received on this occasion a basic training in the use of the COSY computer conferencing system.

40. The computer conference was scheduled to then proceed for some five months, from April through mid-September. IDRC provided the participants with technical back stopping in relation to access to or use of the system as well as off line liaisons in case of difficulties. Input received in printed form from external contributors was posted in the conference by the moderator.

41. While all the conference topics were open from the inception, it had been foreseen that the conference would take a stepwise approach. The conference structure, which had been approved in principle at the initial meeting was to be tested during a trial period corresponding to the first month and possibly revised on this basis. The discussions were supposed to concentrate on the various topics in accordance to the following schedule:

1st and 2nd months:	General, Benefits, Policy, Literature
3rd month:	Benefits, Policy and Indicators
4th month:	Completing discussion of Policy, Benefits and Indicators; Discussion of Data gathering, Field Projects and Research
5th month:	Completing discussions on all topics
6th month:	Preparation of the draft report.
7th month:	Discussion and revision of the draft report

42. Participants were expected to contribute facts and personal ideas on each of the above mentioned topics. This exercise was not meant as a formal international conference with balanced representation, diplomatic concerns and corporate images to serve. Except for the fact that each one's contribution needed to be easily understood by all other participants, whose fluency in the conference language, English, may not match the sophistication of native speakers, there was no restraint upon the free and thorough expression of all participants. "Crazy ideas" and "Iconoclastic" contributions were indeed expected. To a large extent, the conference was seen an exercise in brainstorming. This did not however exclude the eventual production of evidence, articulated justifications or cases in point. In the meantime, since the conference was meant to bring about practical results (a conceptual framework, parameters or indicators, data gathering procedures, project ideas, a research agenda), participants were urged to give due consideration to the applicability of their proposals under real life conditions.

43. With a view to facilitate interaction among the participants as well as with members of the consultative panel and external contributors, it had been planned that, throughout the duration of the conference, discussions on each topic would be synthesized by the moderator at regular intervals and as often as required.

8. PROCEEDINGS OF THE COMPUTER CONFERENCE

44. Four phases can be identified in the implementation of the computer conference:

- a start up phase corresponding to the first month;
- a second phase, covering the two following months
- a third phase, from the fourth to the sixth month
- a last phase, corresponding to the seventh and eighth months

45. Before the opening of the conference, 19 messages were posted under all the topics in order to provide a starting point to the discussions.

46. Since only six participants had an opportunity to interact through the computer conference system at distance during the first month, it was decided to extend the trial period was extended for one more month.

45. The second phase showed a relatively slow start, with respect to both the number of active participants and the number of messages posted, mostly under General or Others. This led to the decision to extend the duration of the conference for another 2 months, until mid-November. Participants were asked at this time to avoid discussions under General, to focus on the discussion of benefits for specific communities and problem areas, and to mention as far as possible the related indicators and data gathering methods.

46. During the third phase, the conference was considered to have reached its normal pace, with all participants having succeeded in establishing connections and using the system.

47. The last phase was to be devoted to an overall review of the proceedings and last minute input in the various topics.

48. From November 20, all the topics were turned into "read only" files, while 2 new topics, one for substantive messages (report) and one for general announcements, were opened in order to allow for further interaction in the preparation of the report and sending late input.

49. In total 387 messages were posted: 96 under General, a number of those being in fact related to alternative approaches to the assessment of benefits, 8 under Policies, 83 under Benefits, 26 under Indicators, 12 each under Calculation and Field projects, 1 under Research agenda, 17 under Literature, 98 under Others, and 34 under Digests. A substantial amount of discussion also took place through person-to-person E-mail, which could not be monitored. About 40% of the messages were commented upon at least once in the conference itself.

50. For various reasons, especially difficulties with telecommunications and use of the system, and work pressure, 7 participants contributed a number of messages below the mean for all active participants except the moderator.

51. A total of 24 messages were posted on behalf of 12 colleagues, either members of the consultative panel or external contributors. Half of them provided messages for more than one topic. Two members of the consultative panel contributed each 5 messages.

52. Because the computer conference was primarily conceived as a brainstorming among knowledgeable specialists, no systematic literature review was attempted. Participants were however invited to notify and possibly comment, relevant documents. The list can be found in Appendix 1. With the help of the IDRC library a number of online bibliographic searches were nevertheless attempted at the beginning of the conference. They did not provide significant results because of the peculiarity of the theme, for which consistent and specific indexing could hardly be identified, and because of the scatter of possibly relevant databases. The IDRC library provided the participants with copies of documents at their requests. In addition, a number of relevant documents were circulated among the participants.

53. It was not felt necessary to produce a summary of the discussions at the initial meeting, since all but one participant attended and most of the topics had been mentioned in the preliminary outline. A number of the messages posted during the 1st month did in fact offer some sort of summary on particular issues.

54. The production of the summaries had to be adapted to the flow of messages and level of participation rather than follow a predefined time-table. A first summary, covering the period April 6 to July 6, was produced mid-July, together with some suggestions to the participants in order to achieve a better focus. A second one, covering the period July 7 to September 9 was produced early in September. A third one, for the period September 10 to October 6 was produced before mid-October. A last one, covering the period October 7-November 20, was posted after the closing of the discussions.

9. CONCLUSIONS

55. In retrospect, one may well feel that different options for the design of the conference and its conduct, or additional features, might have been conducive to an increased and more effective participation. Until they have been tested in real life conditions, these are only hypotheses. The computer conference, as a process of group investigation using this particular technology, is subject to a parallel assessment commissioned by IDRC, which might throw some light on these issues.

56. While fully acknowledging the many defects in the design and implementation of this conference, the participants nevertheless feel that the exercise has been a most valuable one and has resulted in significant results, which would not have been otherwise possible.

57. They are of the opinion that carefully designed computer conferences offer an unique opportunity for the conduct of investigations at the international level. Participants in a computer conference can, at their leisure, use the time they want in order to articulate their points and carry out the home work they feel appropriate. They can provide a comprehensive reaction to a series of contributions instead of replying spontaneously to

one portion of a previous statement. Their submissions are not interrupted nor delayed or distracted till the floor is given to them. The interferences from individual roles, group reactions and emotional perceptions are filtered. These advantages by far outweigh the constraints, at least for those people who are concerned with the achievement of the common goal rather than their individual performance.

58. In addition to the technical, economic and psychological limitations which were discussed at length in the literature, two obstacles to the full application of this technology needs to be overcome. First, a minimum level of computer literacy, in particular the ability to handle electronic files, is required. Second, the ease of communication in a distance and time independent environment can by no means be regarded as a substitute for basic communication skills and a strong commitment to sharing ideas and participating in joint efforts. Both aspects call for an appropriate training and the building of a team spirit before embarking into any particular computer conference.

59. It can only be hoped that this technology will in the near future be increasingly made available in all parts of the world and widely used, and its application monitored, in order to produce the consolidated expertise which is required for its potential benefits to fully materialize.

CHAPTER 2

BACKGROUND CONSIDERATIONS

1. SCOPE OF THE INVESTIGATION (FOCUS)

1. Some preliminary questioning was raised about what is meant by "benefits" and what is their relationship with the environment, whether the project seeks to clarify basic concepts in this area or investigate a limited series of well calibrated cases.

2. Several possible starting points were suggested, such as the:

- impact of the various types of projects which support the development of information activities;
- impact of the roles and functions in the communication or information cycle on the achievement of development objectives;
- impact of information on broad types of information uses, e.g. professional, educational, citizenship, social, domestic, cultural and recreational;
- impact of information in conjunction with specific activities related to the above types of information uses for specific constituencies, characterized by location, group size and educational level,
- impact of information on specific sectors, e.g. legislature and overall political governance, public administration, research, education, social services, security, finance, trade, transport, communications, health services, other services, agriculture, forestry and fisheries, mining, manufacturing, energy, environment;
- impact of information on major problem areas in development, e.g. satisfaction of basic needs, growth of GDP, improvement of trade balance, protection of the environment, debt control and reduction, industrialization, development of small enterprises, international competitiveness, modernization of the public sector, food security, human rights, people's participation, urban development, balanced demographic evolution, literacy, women's status.

3. According to Vitro's "Information sector hypothesis", development may be viewed as "The ability of a society to add value to material and non material resources [which is] the key for generating local wealth and an important factor in contributing to a more equitable distribution of new wealth. To add value is to add to the information content of resources." The production factors and the main areas of benefits could form the rows and columns of a basic matrix, at the intersections of which one could try to identify specific benefits, expressed in terms of value added or otherwise, which may be considered as primarily resulting from the provision and use of information. The matrix itself could be successively considered in conjunction with each of the facets of information uses, possibly combined, when appropriate, with relevant types of information activities and/or roles and functions, at whatever scale, from individual to large groups, e.g. national or regional, use.

4. The factors of production to be considered are: Human resources, Materials, Technology (Machines and Processes) and Money. It would be advisable to also look at other important parameters such as: Markets, Time, Environment, Organizations and Social structures.

5. The following areas of potential benefits, and possibly others, could be considered:
- Quantitative increase of production;
- Qualitative increase of production;
- Higher level of sophistication (or Innovation; this refers to new or enhanced products or processes, while the two previous areas refer to existing ones);
- Appropriateness (better response to the needs);
- Reduced adverse side effects;
- Viability (minimization of failures);
- Completeness (ability to cope with complexity);
- Autonomy (ability to operate with minimal external support and guidance; ability to resist undue pressures);
- Self-reliance (in an international context);
- Competitiveness (alignment on national and international standards of cost-effectiveness).

Special attention needs to be paid to the possible effect of the use of information on the alleviation of the limitations found in the background conditions of developing countries. Among the latter one may cite: Relative remoteness from the major markets and decision centres, social and cultural heterogeneity, institutional instability, instability in the provision of financial resources, etc.

6. Even though this may be required for practical purposes, it is questionable whether specific uses, e.g. professional, recreational, educational, etc., could be dealt with separately or whether they should rather be considered in combination for particular constituencies and problems (e.g. the use of popular drama for disseminating social, economic or technical information).

7. Even though the contribution of information to development at a global, e.g. national or regional level, is often referred to and needs to be elucidated, it seems that sound and reliable assessments at this level are almost beyond reach.

8. For some participants, the starting point should be the users, and more specifically the end users. Among them a distinction could be made between the users who actually use information or are likely to do so and the potential users who are not likely, for a number of reasons, to turn themselves into actual users during the time span of the investigation. Some participants are of the opinion that the latter may be disregarded when assessing the impact of information. One may thus focus attention on those users for whom the availability of information is likely to induce a behavioural change and result in actions which will have a significant impact on their well being, and thus possibly on development. In this respect both formal and semi-structured groups, and small enterprises, which are currently the worst served, play a fundamental role. Assessing the role information plays in the actions undertaken by these development actors is possible.

It might be much harder to find out if, and to which extent, their actions have an impact on development, and to qualify the latter.

9. A fair level of consensus emerged from the discussions about the fact that one should rather stick to the micro-scale (projects, clusters of projects or sectors) and leave the macro scale to "theologians". However a certain level of aggregation is required in order for a number of externalities to be taken into account. In this direction it may be appropriate to concentrate on a few critical Information Use Environments or situations.

10. A series of models embedding well delineated types of information, socio-economic goals and specific environments and information use parameters may facilitate the analysis. A major emphasis in these models could be an attempt at tracing how information contributes to the enhancement of the activities by the various categories of development actors, or groups, in relation to the critical aspects of development, or major problem areas, or those depicted by development indicators.

11. A possible further approach may be to select two countries known for their relatively "good" and "bad" performance in a given area, such as health, and do parallel studies of information provision, use and impact in the concerned constituencies.

12. Another key parameter lies with the time span and scale of benefits. One may wonder if the cumulation of short-term or internal/individual benefits is likely to result in long-term or global benefits. Neither is it clear whether benefits are likely to be the same on the short- or medium-term and in the long-term, or whether benefits derived from the support to infrastructures are similar to and compatible with benefits derived from the immediate provision of information services.

13. There are objections in principle to the various types of grouping or differentiation among the countries on the basis of their economic development level, assumed information development level, size or categorization of some sort. However it is acknowledged that developing countries differ widely and are also not homogeneous. The economic development level may be used as one parameter. At least, once potential benefits have been identified, one should specify for which types of countries they are deemed valid and whether it is felt that the benefits can apply for other types of countries or for all.

2. INDICATORS FOR WHOM AND FOR WHAT PURPOSES?

14. The indicators are aimed at offering more convincing justifications for information activities, especially with policy-makers. It may be appropriate to specify in first place which are the main categories of users of the proposed indicators as a basis for selecting the cases to be investigated. A key point of departure may thus be to figure out how to attract their attention, which central argument they are sensitive to, what level of detail they are likely to expect in the indicators, what factual evidence of the returns or impact do they expect, what decisions are expected from them, what solid arguments are required in order to negotiate with them, taking into account their idiosyncrasies.

15. To the extent donors agencies have played up to now a major role in information development it could be helpful to know whether there are constituencies, in their opinion, which should be more aware of information benefits and willing to take action accordingly, whether they pay more attention to certain types of information activities or particular benefits.

16. Since, at least in the formal information sector, the achievement of benefits depends on the activities of the information specialists, who will participate in their assessment, the indicators should also be meaningful and acceptable to them. If the indicators do not match their values and visions, or if the latter are unrealistic, having possibly convinced the policy and decision-makers will not necessarily solve the problem.

3. CAUSALITY

17. To some extent indicators are expected, more or less consciously, if not intended, to demonstrate a causal relationship between information and development and identify ways to quantify the related phenomena.

18. With the present limitations of our knowledge, it is premature to address the question whether information "causes" development, or, conversely, whether development "causes" information. This might even be a false problem. Some earlier studies seem to indicate that, once a minimal level in the satisfaction of basic needs has been achieved, the growth of information resources and their use does not solely occur in conjunction with the further accumulation of wealth but may indeed be comparatively faster in communities or nations which place an higher emphasis on this resource, both in cultural and policy terms.

19. Causal links are difficult to identify because of the complexity of real life situations in contemporary societies and of the number of non-information related internal and external factors associated with any endeavour. Furthermore, short-term benefits are more information intensive. When moving towards long-term benefits, information use gets mixed with too many external factors, the relative weight of which is difficult to identify.

20. One may thus find a sufficient justification in solid, hopefully quantified, evidence that better performances occur when information is effectively used and conversely lower performances occur when it is not. This relationship may be enough in support of the pledge that information is a necessary condition for, or ingredient in, development and evidence of causal links may not be required at this stage. The evaluation of its impact remains not less complex. Good information projects or processes may have no impact, or even a negative one, because of the absence of other required inputs, while bad information projects or processes may have a positive impact because of favourable external factors.

21. No specific factor, much less information, can be singled out as a main cause of development. The question may thus rather be to find out benefits which are primarily associated with information. But, can "primarily" be defined?

22. The factors which are more closely related to information and the relations between the two should in any case be considered in order to avoid prerequisites in other areas being mentioned endlessly against any suggested information benefit.

23. The quest for a causal relationship between information and development also implies, to some extent, that decision-making is rational and based upon some sort of cost-benefit analysis. But decisions may be formed on the basis of a rationality which is different from the one underlying cost-benefit analysis, or any theory of decision. They may even result of a combination of various kinds of "rationality", or of drives which would be perceived as "irrational" by external observers.

4. THE NEED TO LINK BENEFITS WITH COSTS

24. Benefits can not be assessed without paying from the inception equal attention to the cost of providing the services which may generate them. One needs also to balance the value of benefits with the cost of information provision, otherwise the potential benefits of information could be taken as an absolute justification, regardless of the relative cost. However, some benefits can not be related to any particular information resource and thus cost, e.g. increased autonomy or rationality.

25. To the extent the offer side and its costs are relatively better known, a possible approach could be to first seek to identify potential benefits, assuming a cost-effective provision and use of information services. Once potential benefits have been identified, turn to specifying the kind of infrastructures and services which are required in order for them to concretize. Then figure out their cost. Finally, estimate the value of the benefits and balance it with the cost of providing the information.

26. The cost of providing and using information is far from easy to compute, especially in non-formal systems or formal ones which are not thoroughly structured. This limits the extent to which cost-benefit analysis can be applied in this field. However, properly designed and conducted cost-benefit analysis was proved to be both feasible and promising.

5. DEVELOPMENT

27. There is a lack of consensus about "development". One basic dilemma seems to lie between growth of GNP versus distribution of wealth. The concepts of "development" and "information" from the viewpoint(s) of developing countries, need to be ascertained. One may wonder whether "economic development" is more or less difficult to pin down than "development". For a country with an high GNP per capita, development may relate to quantitative and possibly qualitative growth but does not imply much structural change while in a country with a low GNP per capita, structural changes are almost inevitably a requisite.

28. A shift can increasingly be witnessed in the qualitative and quantitative balance of material and non-material resources to sustain a process of autonomous development. A

capacity for development is enhanced through the simultaneous cultivation of material and non material resources. Development requires strengthening the infrastructure for cultivating physical resources (land, material, plants and energy) and intellectual/ creative resources (those which build human capital). By raising the value of human capital, a dynamic society is capable of sustainable economic development. "Development, even economic development, is a knowledge based process" in K.E. Boulding's words.

29. A number of indicators are currently considered in order to trace significant changes in the evolution of modern societies, such as urbanization, literacy, vocational training, newspaper circulation, political democracy, independent judiciary, free enterprise, rational behaviour, social mobility, occupational diversity, associations, less factions (ethnic or else), nuclear family, etc. Clusters of indicators such as the "human development indicators" or "quality of life indicators" have also been used. They may point to areas in which it might be worth searching for a particular impact of information.

30. Many of the so-called development indicators, and likewise judgements of value, are to a large extent North centric and seems to equate development with the replication of socio-economic structures found in the Northern hemisphere. Gross National Happiness may be opposed to GNP.

31. In this context, it may be appropriate to consider if there is a significant difference between "knowledge" and "information" in the development process, referring for instance to IDRC's concept of "Empowerment through knowledge", versus the classical distinctions between data, information and knowledge. One participant contended that there is definitely one, and, even more, that true development can only be manifested by wisdom, the final stage of data transformation. A highly advanced, with regard to its material wealth and technological capacity, and information rich community can be nothing more than the worst predatory and ultimately self-destructive body, as we have plenty of examples in history.

32. Criteria of wisdom are not necessarily universal and may not apply beyond the individual, but by all yardsticks, all societies have still a long way ahead before they come close to it. Nevertheless, the issue of a "knowledge society" versus an "information society" has recently emerged and is getting increased attention. It may be of particular relevance for the theme of the conference. If information is, following and adapting Porat's definition "organized data which are, or rather can be, communicated", knowledge is information which has been meaningfully aggregated into a reservoir of facts and concepts that can be applied. In other words, information which has been absorbed. As a result, it is the endogenous information and knowledge, rather than the "world's store of information" and the access to it, which should be regarded as the main source of potential benefits.

6. INFORMATION

33. Contrary to the hopes expressed in the communication literature of the 50s and 60s, information is no magic recipe for development. The assumed key role of information

in development is based upon 2 assumptions, which are not fully, if at all, verified, according to which:

a) potential information users are capable of rational choices based upon a cost benefit analysis, in other words there is perfect information;
b) access to information has no cost.

Information has indeed a direct cost for all users, even if it is not apparent. More importantly, incentives for the adoption of new techniques or behaviours matter more than the dissemination of information about them. Information can have a negative impact on development if it is not associated with structural changes.

34. According to Mackenzie Owen (1992), information has a value-in-use, or potential value, which can be assessed only when it has been used. Information systems and infrastructures have a value added which is expressed by the efficiency and effectiveness of their delivery of information (availability and usability) and the improvements in the attributes of information-as-contents, as well as in their delivery mechanisms. Many information producers and providers have barely an idea about the value-in-use of information for their clients and not much more about the value added of their services. The value of information lies perhaps more in its versatility (ability to be applied to a variety of problems, even unanticipated) than in its straight application in the activities for which it was originally meant.

35. Because of its characteristics information may not be managed as the other production factors. This may explain why the focus is currently on information technology rather than information itself. One may wonder if there are basic (consumption) needs for information like there are for food, shelter, health, etc.?

36. Attention tend to be focused on the positive role of information and its contribution to enlightenment. But it also could well be a factor of conservatism if it transfers "what has existed in the past" through traditional channels. Its conservatism effect may also result from the lack of a problem solving attitude in information use. Information may be sought as a justification ex-post of decisions rather than input for innovative solutions, or as a reinforcement of "irrational" decisions in some instances.

37. Considering the particular situation of developing countries, two categories of information should be taken into account: the endogenous information (produced and/or elaborated within the country) and the exogenous information (produced in and retrieved from other countries). Respect for, and expansion of, the local knowledge base are essential factors for promoting science, technology and their applications by a society in ways that are consistent with its needs, conditions, resources and aspirations. There is a need to blend traditional wisdom with external information and expertise. Because of the monopoly of the technostructure in place over the communication cycle,and the manipulation by Governments of the endogenous information, preference is often given by information users outside and even inside, the technostructure, to exogenous over endogenous information.

38. Contents, activity and commodity are three sets of aspects to be distinguished when considering the impact of information. The information itself, considered for its contents, is a resource, the processes and channels through which it is exchanged are an activity, its packaging is a commodity. Developing Countries should consider as well information as a commodity, especially in conjunction with international markets; they should find ways to package information into an exportable commodity.

39. There is also a "raw" unprocessed information (e.g. biological information like properties of plants) which represent a potential wealth for the developing countries. To some extent, raw information is similar to "latent information", that is loosely organized and not ready to be communicated information, but its potential value may be considerably higher. The recent debates on the Biodiversity Treaty or patentability of the biological properties found in natural resources show that this resource is a reality.

40. Information, under all its forms (contents, activity, packaging) could be found in both formal and informal structures. One may distinguish between a formal and an informal information sector. The latter is likely to play by far the more important role in developing countries. The highest caution should be exerted at avoiding to equate, consciously or not, information to what is available in the formal sector. Unstructured, informal, spontaneous and personal information is so deeply rooted in the cultural context that none of the assessment models created for formal/technical information applies. And yet, without including culturally determined information processes and products in the conceptualization of the "information society" to be analyzed for indicators, one would arrive at nothing but a defective picture. In developing countries where rural development and the strengthening of local enterprises, small organizations, farms, cooperatives and local government are among national goals, the impact of information dissemination can not be assessed without accepting the influence of local cultures.

7. SOCIO-CULTURAL INFLUENCES

41. The value-in-use of information depends on users' attitude and behaviour vis a vis information. Its availability does not change by itself one's information behaviour. The willingness to change, ability to interpret information and its credibility are key factors in this respect. The socio-cultural context in which many decision-makers currently operate may not be conducive to information use, e.g. when any production increase by farmers is likely to be outweighed by tax increases. Conversely the intensive use of parallel, non formal, information sources in crisis situations, even at one's life risk, shows that information is indeed regarded as a critical resource. It should be emphasized that the term "decision-maker" is used here in a broad sense and does not refer exclusively to the persons in charge of organizations but to any individual or group having to make a decision in order to solve a particular problem. Being informed but not in a position to take corrective action for lack of control over the other factors does not help. Some decision makers may thus prefer to have the lack of information as a ready excuse. In the meantime, the elite may have access to the other factors in order to make use of information, while the poor do not. It would be interesting in this respect to be able to check whether the "informal sector" is more information-rich than the formal one.

42. Decision-making and problem solving, especially on large scale issues, are further not purely logical but also emotional, irrational or simply inspired. The non-formal and non-conscious information influences the interpretation of the formal one. In addition, information fulfils irrational and symbolic functions whose value or contribution to individuals' performance is not known and requires research. It seems that the interference of emotions grow at pace with the availability of information. There is a perception and reality that, as more and more information is produced, many people have less and less of the information they need when they need it.

43. In order for information to be effectively used, it may need to be attuned to the traditional communication patterns. But tradition may also be a strong factor of resistance to any form of progress, as for instance when access to knowledge is considered as a sin to be punished with expulsion from heaven. For some people, the only way out is thus to completely break away from tradition. Others however feel the solution may be in a medium term where a synthesis between it and modern practices will occur.

44. In addition to the values of users, the positive and negative perceptions of benefits by information specialists, or intermediaries, and their values should also be considered among the factors which affect the provision and use of information. In those cultures where information is highly controlled (which by itself creates an underground information market), information professionals in many cases act as barriers to information use.

45. One distinctive feature is the importance placed on the internally generated information. The official discourse however is often in many countries, irrespective of their development level, as much an exercise of magic than logic. It lacks the structured ideology and systematism which made the official discourse in "socialist" countries, for instance, more usable, or dependable, at least in its own sphere of validity. Then real information is sought from informal channels or rumours, even by top officials.

46. All information, even scientific data, may be culturally biased depending on the assumptions on which data collection was based. (Maruyama: "There is not one logic but many logics. Aristotelian logic is not "the" scientific logic...").

47. Power games appear to exert a significant influence in both the national and international arena. In both arenas, self-determination and fair access to information should certainly be regarded as critical benefits.

48. If more educated and informed people are likely to be more effective, they are also likely to be less obedient. The desire of better overall achievements as a result of information is balanced by the fear of the power in place to loose the easy control which an information poor environment allows. Information, when it reaches the masses, may put the power in place at risk in many developing countries, and others as well. Information is under influence from Governments which use it as a tool for power, with the resulting distrust of the masses for public information and also for the specialists who are responsible for its delivery under such influences.

49. On the international arena, there is a widespread feeling in the South that the North wants to protect its domination over "the tree of knowledge" and maintain the South as

an exporter of raw information. There is an alleged pressure from the North to force its information technology and products into the South regardless of their appropriateness. The North also resist recognizing the rights of the South over the raw information (biological) contained in its natural resources and sharing the technology required to turn it into formal information, as evidenced during the Earth summit. Opinion in the South is undetermined between a move towards cutting itself from the North and seeking endogenous information development or on the contrary towards the fastest possible establishment of modern information facilities, closely connected to those in the North.

8. INFORMATION POLICIES

50. For most constituencies, whether formal or not, information is not yet isolated as a particular factor. It is hardly distinguished from the activities in which it is involved.

51. The perception of information and the appropriate policies which could apply to it, when information is isolated, vary between two extremes. At the one end, the concept of information sector is seen as too broad and vague and it is advocated that one should rather consider its specific components when attempting at the definition of objectives. At the other end, it is said that no segment of the information sector can compete alone with the other, better established sectors for the allocation of scarce resources.

52. A number of specialists feel that modern information infrastructures require inputs and maintenance which are too costly with regard to the financial resources of the developing countries. This type of information is probably not their more pressing problem. Its role in development is overemphasized by the North, which seeks to open markets for its products.

53. No positive and explicit mention of a possible contribution of information to development, beyond the established cliche, could be traced in the justification statements of most information related programs and policies. The expected benefits are expressed in such broad and general terms that it is very difficult to translate them into potential impacts which could be observed.

54. In some instances information projects do point to potential benefits such as time savings, more timely decisions, avoidance of unnecessary duplication of activities, etc. But they seldom offer relevant background data about the initial situation and make provision for actually monitoring the achievement of such benefits.

9. INFORMATION SYSTEMS, SERVICES AND INFRASTRUCTURES

55. One may wonder if, given the present inadequacy of formal information infrastructures, systems and services, benefits can actually be identified. Considering benefits implies considering at the same time the noteworthy changes which are required on the offer side. The word information includes both the contents and the process of transmission; the two aspects need to be distinguished. A more appropriate approach might be to consider, for the various categories of users, two distinct yet linked issues:

a) What information (contents) is likely to contribute to development;
b) How can its transfer be organized/improved ?

56. As they are mostly designed and organized, information infrastructures tend to restrict rather than enable information flows. Investments are concentrated in the central part of organizations and/or major cities. They primarily serve narrow groups or privileged people. Access to information is selective and often subjected to various forms of "censorship".

57. It would be appropriate to reflect upon the wealth of formal information which is being accumulated in the industrialized countries and is likewise underutilized, in spite of noteworthy investments and promotional efforts.

58. A key question is whether the information infrastructures should serve the poor or the elites. Access for all to all information resources may be seen as a basic principle, or long-term objective. One may wonder the extent to which there is a multiplier effect in the provision of information to the elites.

59. A balance needs to be found between the application of modern information technology on the one hand, local conditions for its proper operation, traditional communication patterns and the information needs of the masses on the other hand.

60. The lack of true national languages, multiplicity of local languages and illiteracy are grossly overlooked in the design of information and communication systems and much more in national planning of information and communication.

61. The personnel of the information services seems to be convinced that information is essential and do not pay much attention to short-term returns. They blame lack of support and users ignorance for the limited effectiveness of their services. Their low status and poor employment and career prospects result in high turn-over, lack of motivation and minimal quality of service.

62. In order to maximize value, it seems to be more appropriate to create an information rich environment than try to provide information on demand, because information needs can hardly be expressed clearly beforehand and the high cost and time required to generate and package the information in response to ad hoc requests.

10. INFORMATION DEVELOPMENT SUPPORT

63. Information development support is relatively small, compared to support for other development activities, and scattered. Assessing a national impact is thus problematic. There is a great duplication among donors. Communication in this area is poor and there is not enough cross fertilization of information, ideas, experiences.

64. Donors seem to have relied up to now upon rules of thumb for the selection of the objectives and priorities of information projects. Information development support seeks a balance between the development of infrastructures and the satisfaction of the information

needs of the poorest segments of the population. The latter, e.g. rural population, are mostly reached indirectly, mostly through extension services. When resources are scarce, choices have to be made between infrastructures and serving the poor, they are often in favour of the former.

65. The information professions may also be blamed for having not yet been able to offer a rationale for the cost-benefit of information provision and use compared to other forms of development support. Studying the comparative advantage of information versus health inspections or vaccination campaigns may for instance provide useful insights.

11. ASSESSMENTS IN OTHER FIELDS AND THEIR APPLICATION

66. It was generally felt that the project could considerably benefit from the methods and findings of similar endeavours which contemplated the impact on development of investments and activities in other areas, whether hard, such as transport or telecommunications, mixed such as tourism, or soft such as science and technology or, more particularly, education.

67. The criteria and ratios possibly used by large corporations for deciding upon their investments in continuing education and information support were also felt to be an useful example.

68. General development indicators and the actual measurements used were felt to potentially offer an useful source of inspiration, at least with regard to calculation methods.

69. A number of studies of the correlation between the level of socio-economic development and information use, size of the information sector or incidence of information activities have been carried out. But they relied upon information indicators which are tied to material goods, were not able to reach clear-cut conclusions and pointed more to the availability of information than to its specific impact.

70. Investigations that sought to establish irrefutable relations between investments in information technology, or information, and the effects of its use, especially on productivity have generally failed to do so. This is not necessarily because of the quality of research or the rigour of the models. This is due to the very nature of the socio-economic and cultural environment in which information is produced, distributed and used. Some argue that measurements tools are to blame, others that strategies of investment have aggravated organisational, economic and other problems. As a result policy-makers who are not inclined to be persuaded will tend to remain so. This does not mean that selected indicators and models do not have a value. They do have an incremental effect on the views of those who need to be persuaded in government and industry.

71. It was suggested that some of the findings from the "Trilateral group" (Canada, UK, USA), which is studying the role of information in the economy and produced the "Glenerin Declaration" could perhaps be useful. Most of its discussions were however reported to be quite general and did not consider indicators proper. At its last meeting the

Trilateral group commissioned the preparation of a draft set of measures, but the respective schedules did not allow for the conference to benefit from this possible input.

72. Economics and information science have been struggling to identify information impact assessment criteria and measurements for decades. Several promising models for decision-making information have been created and cast aside. Each offered a useful approach to consider certain types of information, but each was limited. The exclusive attention of decision-makers on Return on Investment may be a major constraint to comply with when considering benefits resulting from information. For example, the model of decision-making in the firm has cast a long shadow on the conceptualization of information and kept structured, formal and technical information in focus as the only kind of information to be concerned with. What the model ignored was another kind of information: unstructured, informal, spontaneous, personal.

73. Qualitative evaluation models may be identified in development science, rural sociology, communication science and education rather than in economics. The trend towards creating and evaluating models for the local impact and sustainability of development that began in the late 1960s produced numerous interesting paradigms that might be worth examining.

74. Research on information theory may also offer some useful concepts. The impact assessment measures already developed to a considerable extent in Bibliometrics/Scientometrics/Informetrics might have some relevance to the ongoing exercise, although it is questionable whether citation implies usage and usage means impact on development. Some aspects of the management sciences (Decision Support Systems, Management Information Systems, Executive Information Systems) could also be possibly relevant to the ongoing research initiative. Lessons for "information in development" might also be found in the judiciary and the legal process, which depends heavily on the use of information.

75. Indicators for the impact of education have been developed for more than 20 years, especially in Latin America, where 4 or 5 countries have now ample resources of this kind. From one report, it appears that they indicators were based upon a cost-benefit analysis in human capital building. These indicators appeared to be convincing enough for providing policy-makers with a justification of the investments in education. The education indicators had thus some visibility effect.

76. However, there is apparently a lack of skilled strategic analysts who can make proper use of such indicators. What has been learned from the effort at devising indicators in research and planning has not been absorbed by administrators. Their assimilation is gradual and slow, while there is a strong resistance to change. Doubts about the evidence provided by the indicators still prevail in many areas.

77. The Society of Competitive Intelligence Professionals (SCIP) is also addressing the return-on-investment (ROI) question and grappling with the similar problems with convincing management of the benefits of Corporate Intelligence departments by demonstrating and measuring returns. It has set up toward this end an ideas clearinghouse.

CHAPTER 3

BENEFITS

1. BENEFITS FOR WHOM

1. Although the basic question of how to prove that information is an essential resource has been around for a long time, it does not seem that anyone has been able to answer it, at least in general terms, perhaps because it cannot be answered in general terms. It seems almost impossible to identify general benefits and the related indicators, since the concept, nature and goals of development may change from a person to another, and for the same person, from one time, or situation, to another.

2. A major problem with beginning from a global, eg. national, level and working one's way down is that the lower level data is needed to interpret higher level trends. One of the more common mistakes made in evaluating projects is that data are collected at a too general level. Another problem when considering the global level is that information in different sectors varies enormously in its value; or to put it another way, not having the right information at the right time can have much more serious consequences in some fields, say, in relation to a nuclear reactor emergency or other disaster, than in others, say, in relation to the choice of hand pump for a water supply and sanitation scheme. In addition "local" goals and objectives may not be the same because of the necessity of addressing immediate needs.

3. However, often "local" (or immediate) problem solving or decision making might improve if considered in a broader context and effects on long-term objectives and goals. Also, even though "local" and immediate needs may not seem the same, the consequences of decisions or actions may have higher level consequences that are compatible with National "benefits". Since what is good for one is possibly bad for the other, "National" benefits" are not necessarily the sum of local/organizational ones. Thus the need for a cross check, without a priori, at the macro level. But definitely having some clearer picture of the micro level is a required first step.

4. An attempt at producing some kind of comprehensive, authoritative "encyclopedia of benefits and related indicators for information activities and projects in developing countries" was felt, if even doable, of limited value, since indicators are context dependent and thus their list is endless. Neither would it make sense to produce a list of benefits which would look like a pot pourri of benefits for all in any possible circumstance. Identifying as many potential benefits as possible and producing a systematic and open-ended list could nevertheless be considered a desirable long-term goal, particularly as a guide for local specialists, so that they could develop indicators for specific purposes.

5. Rather than consider the impact of the information on development, one should start with the impact of information on the goals and objectives, decisions and actions,

intellectual equipment and overall skills of precisely identified categories of population, or constituencies, in relation to their priority problems, which might themselves reflect broader development issues, or more specifically, development priorities.

6. One may for instance select a set of development goals such as: health care improvement, employment, average income, etc., and try to make a link between them and the intermediate objectives necessary to achieve them (eg. adequate health care labour force, facilities, investments in primary health care infrastructures, etc.). Since the many issues can hardly be comprehensively covered, it would be advisable to establish a priority list of the constituencies, environments and problems and to pick up a few of them, which seem either more promising in terms of demonstration effect, or more critical, in terms of information/ development challenges, so that responses, even preliminary, could be proposed with regard to these areas.

7. Taking a specific development goal, eg. in health care or food production, one may think of all intermediate objectives that contribute to such a goal -- hundreds, perhaps, thousands. Then one would think through who contributes to these objectives and how, and then try to find out how information contributes.

8. The current thinking on benefits and value is that they are determined by users and use rather than the processing of "raw materials"; quality is thus being defined in terms of the user's net comparative value of the good or service.

9. Benefits may be bound to the expansion of the endogenous knowledge base, including the integration into it of exogenous information. This depends from the absorbtion capacity, mainly among the human resources. Cases of problem-solving related to development priorities issues may both illustrate the making of benefits and provide a basis for developing learning material which would later help enhancing the absorbtion capacity.

10. The serious question was raised whether personal benefits for the people associated with the governance of institutions or management of organizations, to the extent they might be contrary to benefits for the community, and thus unethical, should be taken into account. The issue may even be broader. Shall one consider any kind of benefit which may look unethical on whatever ground?

2. BENEFITS FROM WHAT

11. In our information-intensive society the most important assistance information specialists can provide is information, itself, and the skills to use information more effectively to work smarter. Measuring what difference these two make is part of our challenge.

12. The oral tradition, which has been grossly overlooked by information scientists, continues as a vital part of many cultures. There is a need for more inclusive definitions of communication which accommodate the importance of non-written traditions and informal information, in addition to more structured technical information. The best formal

information systems can easily be "done in" or bypassed by an effective, informal network. Measures and policies should recognize this and be developed accordingly.

13. A "visual tradition" is replacing the written tradition in many cultures, or, at least heavily supplementing it. In industrialized countries an entire generation (now moving into a second one) was raised with T-V, videos, computer games, etc., which gets its information and entertainment from still and moving images and no longer from the printed word. The new media and information technologies, plus urbanization, or rather "megapolization" and other social changes, bring us toward the Brave New World not to a new form of oral tradition, because they lack the interpersonal trust which is at its roots. These conditions create what may be called a "global virtual reality" in which all kinds of manipulations become possible. Thus the need for a new type of literacy that can be dubbed, "mediacy" to denote the need for skills on using multimedia information sources effectively and to connote the immediacy of the delivery of information, eg. via satellite, and for new concepts and designs of information systems, in the broadest sense, which fully incorporate and adjust to these dimensions.

14. The following aspects in the provision of information were mentioned as being worth special consideration with regard to their effect on value and benefits: Trade-offs between timeliness and perfection of information; Changing information strategies within private and public organizations with new 'enterprise' orientations: Commoditization of information; Information-rich and -poor; Human, organizational and also technological capability to use information; Demands for information from intergovernmental organizations and aid donors.

15. The concept of Information Resources Management (IRM) may offer an enormous potential for developing countries. Interest on their side has already been noted but there is no authoritative research that would help them to understand and apply the ideas to their special and unique circumstances. The concept has apparently not yet been explored and exploited from that vantage point; it seems to have been "unleashed" in the Western World, and taken hold in various enclaves here and there.

16. Any evidence of substantial information brokerage activities in developing countries should alert us to the values of information in the communities covered by those activities. The development of information companies may result in employment opportunities and generating a specific income, that is direct and short-term benefits for the companies and their employees. Their services also correspond to direct benefits for their customers and possibly indirect and long-term ones to the extent they may contribute to a better understanding by the users of the value of information. Demand and sales may be used as surrogates for broader and more difficult to discern benefits. Fee-based services and progressive move toward self-supportive information services in the government sector, or privatization, may have the same effect. This represents an avenue which it is urgent to explore. However, it should be realized that for the time being information services in developing countries are mostly in the public sector and available at no cost, that users have no funds earmarked for the purchase of information and may not have the required resources. Alternative strategies and shift in subsidies between offer and demand may need to be considered. The current conditions may restrict the enquiry to the modern sector, and to formal information services.

17. A comparative analysis of investments in information transfer and technology transfer in selected developing countries could also be considered. A special focus on information as an integrative tool for development should prove particularly valuable in Africa and the Caribbean where small countries must "team up" to initiate and sustain meaningful development. In this respect one should examine the costs of transborder data/ information flows vis a vis data/information flows between each country and their former colonial masters and the value added properties of information in time and space.

18. The creation of an information rich environment is to be considered among the long term benefits. It would be evidenced by more diversity, flexibility and versatility in the information resources, more reliable information, a wider use by more categories of users, more integrated and more standardized services. These types of benefits cannot be assessed in terms of cost per library visit, information search or any type of use transaction.

19. Benefits derived from cultural or recreational use of information should not be neglected since first they are expected by the people, second they relate to a number of actual information projects, third particular roles or needs of the individual, eg. as producer, consumer, citizen, etc., cannot be separated from the others and the patterns of cross-fertilization among the roles and the information used in conjunction with them are not known.

20. To the extent Government sponsored and other types of "development studies" are primarily investments in the generation of knowledge/information one may consider in what circumstances are their outcomes used. Similarly, in-depth country studies of actual development plans from different types of developing countries could serve for analyzing the use of information at the various stages (Ideas Formation/Rejection, Planning, Implementation, Evaluation).

21. As mentioned in the previous chapter, biological, raw information, and latent information may be seen as an important source of potential benefits for developing countries.

22. One may consider that there are "normal" and "abnormal" scenarios for development. A "normal development" scenario can be seen as one in which the Legislative, the Executive and the Judicial each play their respective role. One may investigate what is the relative use of information in each component and if a "normal" scenario can take place when one of the three poles functions sub-optimally, or is subsumed under one of the other two, as in military dictatorships, which can be regarded as a case of an "abnormal" scenario.

23. Benefits resulting from the creation of an information rich environment may be observed, as far as the formal information sector is concerned, in enhancements in the infrastructure such as increased capabilities, better products and services, better data integrity and reliability, wider and more intensive use, better application of information in decision-making, more intensive exchanges, more cooperation among the units involved in all steps of the communication cycle, development of manpower.

3. TYPES OF BENEFITS

24. It is not so sure Saracevic was right claiming that there is no empirical evidence that information plays a fundamental role in development. Just consider what happens when one takes away information, or when one provides no or poor manpower development (training)? What he probably wanted to say is that there is no "quantitative" evidence.

25. Three broad classes of impact need to be distinguished. First, there are those that are both measurable and quantifiable, such as cost and time savings. A major difficulty however is to determine whether something is improved, greater, etc. Second, there are those that are measurable but not quantifiable such as increased quality. Third, there are those that are neither measurable nor quantifiable, such as new insights, learning, performing higher order tasks (up-scaling) and so on, which escape the grasp of the cost-benefit analysis approach.

26. Duplication of effort, wasted time and wasted money are often due to ignorance of information resources. Some well-documented case studies could illustrate benefits, or lack of benefits as the case might be.

27. Two main categories of benefits can be identified which relate to the nature, or area of application, of the changes resulting from the use of information:

1) Direct benefits, which are an immediate consequence of the use of information according to the purpose for which it was sought, on the particular problem for which it was sought;
2) Indirect benefits: those who may only occur in the medium or long term, are not specifically related to the problem at hand when information was used, eg. structuring the knowledge base, enlightenment, attitudinal changes, etc.

28. In each of these categories, one may further distinguish between two sub-categories which relate to the conditions of occurrence of the benefits:

1) Immediate benefits, which can occur in the short term and, so to speak, as a mechanical effect of the availability of information; they can be watched more closely and express the most evident impact or effect of information products and services (costs and benefits or counter-benefits) and of the use of resources required to generate the information products and services (costs and benefits of information provision).
2) Potential benefits, which require other conditions to be fulfilled; they may arise if certain conditions are met so that the information can be successfully used in a given context; they are likely to be more remote and longer term benefits.

29. The display of effects (benefits, counter-benefits, costs and savings) accruing for different actors as a consequence of the generation and use of information, either informal or formalized in products and services, can be called effects mapping.

30. Some of the benefits which were mentioned in the previous chapter, may be observed at the macro (eg. national) level and in the long term. They may be easier to identify in this context in relation to problem areas or critical development issues. It is doubtful that short-term benefits could be observed at the macro scale; they should rather be sought in the area of long-term socio-cultural changes, although an impact on global economic performance, internal and international competitiveness may be looked for. One interesting feature in this direction worth checking is whether a fertilization of the non-formal and non-conscious information by formal, solid information occurs so that the latter, and actions based upon it, become less erratic. In doing this, one should however be careful not to impose a particular cultural bias; coherence, logic, appropriateness, etc. can only be judged from within the particular community, or on the basis of a consensus among the various stakeholders groups.

31. Moving from the short term to the mid term to the long term is precisely an area that we are weakest in. Perhaps "an answer" lies in being able to articulate a kind of "nested hierarchy" of short-, mid- and long-term goals. It is much like the nested hierarchical relationship between very broad "mission statements," then very broad "goal statements," and then broad "objectives," and, finally, specific tasks that must be accomplished.

4. EQUALITY OF ACCESS

32. An interesting approach was offered by Srinavasan (1971) which is an example of models that have emerged from development science. Speaking of measuring income distribution, he suggested that "...what one should be concerned with is equality of "access", be it to educational facilities, medical facilities, job opportunities, and not necessarily with equality of "success"....(because the latter approach) would not call for institutional change. (One should) measure the degree to which equality of "access" and fairness of the operation of the system is observed...." When equality of access to opportunities is measured, it becomes almost unavoidable to also measure the information channels leading to educational facilities, medical facilities, job opportunities or the development of the enterprises.

33. The whole environment of the information field is changing as a result of global computer networking. It is no longer database search and document delivery; it is the whole gamut of formal and informal communications which is undergoing historic changes. The volume of traffic on the electronic networks (eg. Internet), classified into such categories as: personal messages, computer conferencing, news lists, electronic bulletin boards, access to commercial databases, free catalogues, databases, etc. -- relative to GNP, population, education levels, etc., although it is more an indicator of the density of information facilities, is quite close a surrogate of benefits, in the context of international comparisons. Timeliness, comprehensiveness and reuse of information depend largely on access to international data networks. The same may be said for intra-country comparisons, eg. between capital city, urban and rural areas, central and peripheral parts of the territory etc. If data networks could provide figures about the breakdown of subscribers or users by socio-professional category, and/or of traffic by type (E-mail, access to databases, files transfer among branches of an organization, etc.) this would be

another approximation of equality. In many Third World countries this has not happened as yet but soon they will be judged, and will judge themselves, in these terms.

34. Equality of access (or preferably equal opportunity of access) must also be considered in relation to the effectiveness of access and the alleviation of physical barriers, such as those to be overcome by handicapped people, as well as socio-cultural barriers such as language. Maybe one more possible facet of information benefits is their eventual contribution to alleviating those barriers.

35. Even if developing countries have less opportunity (or infrastructure) for access to networks and data bases, this nevertheless points to some measure of equality of access, in an international context, since the lack of these services is a way of having lower access to information and thus less opportunity to benefit from it.

5. APPROPRIATENESS

36. It is virtually impossible for information to have intrinsic value. Its value always depends on other factors such as context, timeliness, availability of other information, usefulness, applicability to specific needs, etc. Information is only useful or valuable if taken in a certain context. If, for instance, a user gets some piece of information which he/she already knows, the message has been useless, except if confirmation is needed. Also important is the background of the receiver; for instance, the information that a blood pressure is 150 - 200 is of no use to someone without previous medical background on this topic, even if the patient may have a stroke because of this condition. This topic is one deserving of more discussion.

37. Even though the absence of these validity factors may jeopardize the use of information, one may question whether it fully eliminates the value information has in itself, at least when considering a collective use in the medium- or long-term. The fact that most people will never go to the National Library, and the information it holds is not appropriate for most of them does not imply that it has no value.

38. One problem with a lot of the library/information science activities concerned with 'information for development' is that a great deal of the information, for example that contained in the documents recorded in many bibliographical databases, is not at all relevant to the need, even though it may be 'about development' in the sense, for example, of being a consultant's report or research study on a development-oriented topic.

39. In a 1981 paper, A. Neelameghan noted that "The use of information is also dependent upon the appropriateness of the information accessed. Therefore providing equal access to information to everyone does not ensure equal benefit to everyone". He continued by listing a number of dimensions along which the appropriateness of information might be assessed; they include appropriateness:

- to the purpose
- to user's characteristics
- to the application environment

- to the medium of information transfer
- with respect to quality
- with respect to time of availability
- with respect to the economics and cost of access and usability.

40. He further stressed that "Efficient and effective use of information in a system or country also depends on the level of development of the infrastructure; this may vary with the sectors within a country and among countries. Hence the differential benefit from information even if access is "equal" to everybody.

41. Therefore one aspect of benefits which should not be forgotten, is the improvement of appropriateness of information which the information systems may implement in transforming and transferring both indigenous and exogenous information.

6. BENEFITS AS SEEN BY POLITICIANS

42. The challenge of getting decision-makers to focus on the longer term benefit stream is a difficult one. When discussing with economists, who are key players in Government and business decision-making, they ask, uno voce, for quantitative data showing the returns on the proposed investment in information services.

43. However, returns on investment in infrastructures are not always evaluated in financial terms by politicians but quite often on their constituents perceptions of the value. In which roads and dams will certainly be seen to have great value because of the impact on the voting public.

44. For legislatures and politicians benefits may be seen rather in terms of political advantages, such as reelection, as a result of the decisions to which effective information has contributed, as for instance increasing employment opportunities. In developing countries as in others, the technical rationale in support of a decision is further likely to be revised, and possibly turned down, on the basis of a "political" rationale. The politicians are highly motivated by any factor which is likely to influence their re-election, or political success in general. They are therefore more likely to be supportive of projects which have demonstrable short term benefits. Some way must be found (eg. by using CBA) to demonstrate the incremental benefits over the short, the medium and the long term, particularly within the context of specific policy objectives associated with particular governments. In this respect considering information components as being an inseparable part of "clusters of investments" is worth pursuing.

45. While these aspects should be given due consideration throughout the selection of benefits and elaboration of indicators, the project is not exclusively nor primarily devoted to developing a catalogue of sales arguments for politicians in connection with information related projects. It also has to feed the academic and professional communities with workable ideas as well as high level decision-makers, wherever they are, who do pay attention to a wide range of factors.

7. COST-BENEFIT ANALYSIS (CBA)

46. The cost-benefit analysis (CBA), also called benefit-cost analysis (BCA), process is a systematic methodology for comparing alternative means of meeting specific objectives. The process can be broken down into eight steps:

1. Establish and define the goals and objectives
2. Formulate appropriate assumptions
3. Identify alternatives for accomplishing the objective
4. Determine the benefits/values and costs/burdens of each alternative
5. Evaluate alternatives by comparing their benefits/values and costs/burdens
6. Test the sensitivity of the analysis outcome to major uncertainties
7. Present the results
8. Recommend an alternative

47. All decisions which involve the spending of money, and most do, weigh, more or less consciously, the costs (and burdens) and the benefits (and values) of one or more alternatives. The "trick" is to identify all potentially practical ones. Even if one is able to defend only one "new" alternative, the status quo implicitly becomes the other ("old") alternative and one must defend and explain why the status quo is untenable. The choice of whether to undertake one information project in a developing country over another, or leave the status quo, is also a benefit-cost decision.

48. If an information project is undertaken with only benefits/values identified, weighted and made explicit, then costs/burdens are implicitly inferred by the decision-makers whether the project designers and defenders intend that to be the case or not. In an era of increasingly tough economic pressures and costs, leaving costs/burdens in the "implicit realm" is less and less satisfactory (some might even say more dangerous) since decision-makers are left in the dark as to what those costs may be. Consequently, they may grossly over-estimate or under-estimate the true costs over the project's lifetime, in relation to the projected benefits.

49. Two extreme outcomes are possible. One is that they may unwittingly approve a project where the long-term costs far outweigh the benefits, but since the costs were unknown, they were unable to make an informed judgment. The other is that they may unwittingly disapprove a project where the long-term benefits far outweigh the costs.

50. It should be remembered that CBA methodology provides for the differentiation of quantifiable versus non-quantifiable benefits and costs, and the distinction between efficiency and effectiveness factors. Too often critics unjustifiably assume that using CBA means that ALL benefits and costs must be quantified and made tangible. That simply is not true.

51. Finally, it should also be remembered that CBA is no panacea, and, in the end, it is the decision-makers who must make the final decision, not the CBA analysis itself. And final decisions must take into account not only economic factors, but the political benefits and costs, and the social and humanitarian benefits and costs as well. After all, information has values and benefits that transcend the purely economic dimension.

52. An "information project" contemplated in a developing country should/could propose a series of "value enhancements" to the five categories of tasks considered in the Knowledge worker productivity model (cf. 78 below), but, in all likelihood, using a finer-grained listing. For example, a new information resource might be expected to help decision-makers improve their drafting/revising capabilities (e.g. as when a new office automation network is introduced). Or streamline and simplify and mechanize formal and informal exchanges between offices that need to coordinate their work. Or improve the speed and effectiveness of local and central information storage and retrieval systems, including re-use. Or indexing. Or primary and secondary distribution of data, documents and literature, etc.

53. Under a "classic" CBA approach the information project proposal would then be required to make a stab at identifying benefits, distinguishing between quantitative and qualitative benefits, and distinguish between recurring and non-recurring benefits. Next, the proposal would be required to make a stab at identifying costs, distinguishing between one-time and recurring, and between fixed and variable, and between the traditional "object classes of cost" as cost accountants must do such as labour costs, material costs, equipment costs, etc. Based on the results of this analysis, the project proposal would be required to finally develop a list of illustrative benefits, which comes close to a list of indicators, and may cover the items which are listed below under Benefits for organizations.

54. The discussions about CBA raised that the issue is not whether it is appropriate or not, but rather how it can be done properly. A number of constraints resulting from the underlying assumptions and methods in CBA were highlighted:

1. benefits and costs should be measured in terms of willingness to pay.
2. various types of benefits or costs can be aggregated and quantitatively expressed through a common numerical value.
3. costs and benefits can then be commensurated and compared through this common numerical value.
4. the distribution effects of policy choices is put aside.
5. all "real" benefits an costs must be taken into account without regard to the reasons people have for viewing something as a cost or benefit
6. the same priorities and ranking of values should apply across different social contexts, without regard to the contexts, e.g. whether people's choices are voluntary or not, autonomous or not, or reflect particular distributions of power.
7. all relevant moral and political considerations must be fit into the pre-established benefit and cost formula.
8. people's values and understandings about what it is reasonable to do must be fit into a utility formula treating risks and uncertainties as statistically expressed.
9. whatever is a benefit or cost in one domain is equally a benefit and cost in some other domain.
10. all benefits are measured against all the costs;
11. the benefits and costs considered are those to the producer and the funder, but not necessarily to the user; the costs of using information and information systems are often NOT taken into account.

12. benefits are defined as favourable comparisons of the costs and benefits of two alternatives, while costs are unfavourable comparisons. Thus, a benefit at one level can in fact be considered a cost at another level, a benefit to one can be a cost to another, and a cost for one alternative can be a benefit relative to another.

55. That is why it is imperative to state the CBA assumptions and "terms of reference" from the outset so everyone concerned with examining the CBA data accuracy and completeness are in a position to know the full benefits and the full costs including "near term" and "far term," sunk costs (which can not be recovered), and including what the economists sometimes call displaced benefits and costs, or "externalities." The environmental situation is classically cited as an example. The distinction between fixed and variable costs is also useful, particularly if a charging scheme is needed. It is difficult to decide at what level to project costs. Also, allocation of certain types of costs (general, administrative, overheads, etc.) can be complex. Most critiques of CBA focus on points 1-4 above. The cultural criticisms are directed at 6-8 and secondarily at 2 and 4.

56. The CBA approach does take into account "social norms" since in order to "pass" the CBA preferred alternative, many factors should be taken into account, some of which may be overriding, and/or mitigate against a "straight economic solution". Every decision made by a government to go ahead with a project must be and is in fact essentially a political decision. Often, decision-makers that override the CBA recommendations on social and/or political grounds do not have the courage to state their assumptions and premises because they are fearful they will be criticized for being wasteful of taxpayers' monies.

57. Not only may the decision-makers infer the costs associated with each alternative, they will have to infer the relative costs (costs which are much harder to determine because they are the results of a comparison of both alternative costs and benefits). Rarely are before/after studies conducted, so their implicit decisions are never validated.

58. Decision-makers, in applying the CBA approach to projects of all kinds, do not adequately take into account the very substantial differences between information projects and non-information projects (e.g. building a dam or a bridge or a road). As a consequence, the discount rates they use to calculate the so-called "benefit stream" and the "cost stream" are too much weighted to the near term because the officials do not seem to understand that the benefits that are expected from many information projects (not necessarily all of them) will take much longer to accrue. Their short-term benefits tend to be in the awareness/consciousness raising category, and the mid- and long-term benefits (the "payout period" to use CBA jargon) do not come until comparatively much longer than those of a bridge or a dam. If the decision-makers can be persuaded to use a lower discount rate in the CBA calculations, then the chances of successfully defending the return on investment of information projects are much better. Thus, perhaps another factor to associate with any identified benefit: lead time for its concretization.

59. It was suggested that some sort of "generalized CBA framework" might be developed, eg. from the example proposed about the computerized information services in Government agencies, with a view to offer guidance in CBA exercises in other areas.

8. APPLICABILITY OF CBA TO INFORMATION PROJECTS IN DEVELOPING COUNTRIES

60. Making a parallel between Maslow's hierarchy of needs and a corresponding set of information needs, as Woody Horton did in a 1983 paper, may help identifying the kinds of projects or situations in which using cost-benefit analysis (CBA), (or "Organizational Resource Analysis) may be not fully appropriate. At the bottom of the pyramid is Coping Information needs, and at the top Edifying Information needs (the other categories from bottom to top being Helping, then Educating, then Enlightening), making a five-step pyramid. Maslow's original pyramid used roughly equivalent terms such as "Security needs, Social needs, etc.

61. In general, the closer one is to the bottom of the pyramid, in trying to establish and utilize information resources to support and sustain human coping needs (i.e., coping with the day-to-day life challenges such as enough food, enough shelter and enough health care), the more difficult it becomes to utilize a CBA framework to explain, defend and justify expenditures for information projects. That is obviously because it is so difficult to "put a price tag on human life", or, perhaps less dramatically stated, "put a price tag on the fundamental resources needed to sustain and nourish human beings such as adequate food, shelter and health care."

62. As one moves up the Maslowian hierarchy, and reaches the levels of education and enlightenment (which presume that the lower order health, safety and security needs have been minimally met), it becomes progressively easier to explain, defend and justify CBA approaches to make decisions on the level of expenditure to put into an information project (implicitly meaning that the benefits, which are more quantifiable and more tangible and less subjective and less moralistic) can be articulated with greater precision, and outweigh the costs).

63. The perplexing thing is that it is perhaps the coping information needs that are so urgently required to be met in developing countries and yet these are the most difficult to justify using the CBA approach. One might attempt a correlation of Maslow's hierarchy of needs with a set of information needs for a developing country rather than an individual, eg. information for production of food (agriculture), information for safety (health) etc. One may then check whether a CBA approach works in this case?

64. Eventually the decomposition process suggested earlier may bring them back to series of factors where more objective assessments could work.

65. Notwithstanding the very difficult and complex problems confronting funding sources, sponsors and project managers for information projects, the project at least should make an effort, however feeble it may turn out to be, to use CBA analysis, even with the "lower order Maslowian" types of projects. Because, in these days of recession and tight economic times, the policy-makers and decision-makers are scrutinizing competing project proposals with a much sharper "jeweller's eye," and those who are explaining, defending and justifying information projects must be doubly vigilant that they use every strategy and tactic at their disposal to ensure success.

66. A response to the apparent of the difficulties of using CBA in developing country contexts, might be found in referring to the Maslow's hierarchy in order to develop, as in the case below, some hypothetical policies that government could follow in trying to decide how much to charge users, depending on what kind of information resource was involved (i.e. coping, helping, enlightening, enriching or edifying), and contrasting what the corresponding policy would be in the private sector, based on "normal commercial practice."

Type of Information	Proposed Public Sector Price	Private Sector Price
Coping Information	Free	Less than fully competitive and possibly subsidized
Helping Information	Less than full cost	Competitive recovery
Enlightening Information	Full cost recovery	Fully competitive
Enriching Information	Less than fully competitive	Fully competitive market pricing
Edifying Information	Fully competitive	Fully competitive

67. Coping Information may be represented by hotline telephone services dealing with emergency matters of health, safety and security, (e.g. police, fire, first aid and ambulance, etc.). Helping Information Enquiry services of Government, agencies, community groups and corporations. Enlightening Information by Community and neighbourhood information centre services. Enriching Information by most professional information services. Edifying Information by information analysis centres.

68. Thinking about possible CBA policies that a government might adopt in helping it decide whether to approve an information project that was being proposed to it, one may suggest the following criteria, against the backdrop of the above Maslowian definitions, in the context of a free market economy. Arguments will come into play on whether a particular information project should be classified as primarily related to "coping", "helping" or any other type of information need. As a matter of fact, information available and used at any one level, may also have secondary effects at one or several other levels. This versatility of information is indeed a major difficulty for the assessment of benefits.

But that disagreement is fairly "normal" and governments can deal with it on a "peer review" basis (i.e., using a panel of experts).

69. The criteria upon which the acceptance of projects in the various categories could be justified, can tentatively be outlined as follows:

- Coping Information:

Expected benefits do not equal aggregate costs; non-quantifiable benefits substantially exceed quantifiable benefits; quantifiable benefits are impossible or extremely difficult to compute; no amortization or return on investment period is specified; no discount rate is specified.

- Helping Information:

Expected benefits approximate or equal aggregate costs, or are no less than n% of costs; non-quantifiable benefits are approximately equal quantifiable benefits; quantifiable benefits are difficult but not impossible to compute, or at least approximate; amortization/return on investment period is extended; discount rate is reduced.

- Enlightening Information:

Expected benefits at least equal, but may exceed aggregate costs; quantifiable benefits exceed non quantifiable benefits, and are computable in a relatively straightforward manner; amortization/ return on investment period is within conventional norms; discount rate is within conventional norms.

- Enriching Information:

Expected benefits clearly exceed aggregate costs; the return on investment approaches or equal the current estimated government rate for capital and other "non-information" projects it undertakes; quantifiable benefits significantly exceed non-quantifiable benefits, and are easily computable; amortization/return on investment period exceeds the current government period for capital and other "non-information" projects, or at least are within conventional norms; same for discount rate.

- Edifying Information:

Expected benefits substantially exceed aggregate costs; the return on investment exceeds the current established government norm for capital and other "non-information" projects by a significant amount; few, if any non-quantifiable benefits are present (most are quantifiable benefits); amortization/return on investment and discount rate significantly fit within generally accepted government norms.

9. THE COMMON POOL RESOURCES (CPR) MODEL

70. The possibility of using an alternative model of CBA, one that allows for an investigation of the creation and use of information systems for development as a form of collective behaviour rather than individual behaviour, was considered.

71. Elinor Ostrom's Common Pool Resources (CPR) model was felt to offer a potential advantage, when used in appropriate situations, due to the fact that it is a benefit-cost analysis model that accounts for the influence of group norms on an individual's decision to change the status quo, which are a critical success factor not accounted for in "classical CBA models.

72. In an information CPR, the resource system, also referred to as the 'stock', consists of the index language and grammar which effect the flow of resource units. The resource units, also referred to as 'flow', consist of citations, texts, formulae, etc., which are appropriated from the resource system. The stakeholders are Appropriators (recognized participants and users), Providers (who arrange for the provisions necessary for creating the CPR), Producers (who assess the need for, design, and construct the CPR). Some individuals may participate in the information CPR in one or more of the above roles.

73. The Benefit-Cost-Norms-Discount Analysis (BCNDA) considers as Benefits what appropriators expect to gain from the information system; Costs what appropriators expect to invest in the information system; Norms the behaviours shared by appropriators, which reflect the value that appropriators place on the rules of the governance of the information system; Discount rate: The value that an individual appropriator places on the stock (index language and grammar) through which resource units are retrieved from the information system. The discount rate is determined by the appropriator in terms of immediate and future benefits expected from the appropriation of resource units.

74. Ostrom bases her model on the decisions which need to be made by individuals (potential appropriators, providers, and producers of a CPR information system) when considering how they can organize themselves, based on their shared norms, by developing rules and strategies to govern their interaction within the information CPR so as to avoid overcrowding, overuse, and short-term discount rates and to enhance long-term sustainability of the CPR. Appropriators base their support of the CPR on their short-term experience and long-term expectations of benefits and on their willingness to pay the costs of the maintenance of the CPR, as long as their benefits meet their expectations, and as long they perceive their cost of participating in the CPR as being reasonable in comparison to the costs born by the other appropriators.

75. By adding consideration of norms and discount rates, general predictions about the appropriators' needs for and likely success in sustaining a CPR-type information resource system can be made. On this basis, an information CPR can be designed in cooperation with appropriators. This design should reflect their past meaning-making behaviour and enhance their future ability to map information from their native system to the information CPR. The mapping of a known system to a new system can combine the power of both systems while also assuring individual appropriators that old positions of influence in creating and controlling information will not be entirely lost, decrease the need for

appropriators to adopt entirely new ways of making meaning from information and allow for norms of social behaviour to be transferred from the native to the new system.

10. BENEFITS FOR ORGANIZATIONS

76. The assessment of benefits for organizations should be undertaken in the framework of an Organization Resource Management (ORM) model. The assumptions in an ORM model are that:

- the concept of information resources encompasses information services, systems, sources, human resources, facilities, etc. (i.e., is quite similar to the concept of information infrastructure);

- information should be regarded as a full fledged factor of production;

- all factors of production should be subjected to management with the following four objectives in mind:

a) maximize value received from using a factor
b) minimize cost in using a factor
c) assign accountability for the use of a factor
d) ensure continuous supply of a factor

Objective b), at least in the context of developing countries may be complemented by 2 further objectives:

e) minimize effort in using a factor
f) minimize risks of unwanted external influences (in particular abuse of power).

77. The ORM model should take into account the specificity of the sectors, the socio-cultural factors affecting corporate and individuals' culture, the various kinds of organizations (eg. foreign firms, public or private organizations, large organizations, medium and small enterprises, etc.). It is questionable whether the ORM model could also be applied in the case of individual entrepreneurs and semi formal groups.

78. Benefits can be traced on the basis of the Knowledge Worker Productivity model, of which several adaptations have been developed from the original version once produced by Booz, Allen & Hamilton. It considers five categories of information or knowledge work: Marginally productive activities, reading, analyzing, writing and communicating. This model is however turned more toward the role of information producer than information user. The first category of marginally productive activities includes information seeking and organization of information. One may object to this qualification since they are essential; it would be better to consider them as separate categories. The model would require an extensive revision in order first to better reflect key functions and second, more importantly, in order to apply to non-formal, or oral tradition based, communications. It should also be remembered that users' cost are a key factor in the assessment of costs and benefits.

79. Short term internal benefits for organizations may take the following forms:

- improved productivity (efficiency)
- improved quality of decision-making
- timely recognition of opportunities and threats
- improved performance of tasks (effectiveness)
- reduction of time for tasks implementation
- improved learning curve (faster, sharper incline)
- upgraded work function importance
- replacement of certain manual tasks by automated ones (in those cases where this corresponds to a true increase in effectiveness)
- discontinuation of certain manual tasks altogether (in those cases where this corresponds to a true increase in effectiveness)
- greater interchangeability of personnel
- elimination of intermediate processing steps
- greater task integration
- improved task synchronicity
- less need for clerical support
- less reliance on paper files
- greater reuse of information assets
- greater sharing of information assets
- faster response time
- reduced turn around time
- tighter security and reduced information confidentiality or privacy violations
- less lost or missing information

80. Avoiding duplication could also be seen as a benefit, although some duplication may be beneficial. So does the avoidance of the obsolescence of the work force, at least in competitive environments; a rate of decay in the workforce capability can perhaps be derived from the obsolescence of literature in the related fields. Similarly, one may try to assess the contribution of libraries to literacy and its down stream socio-economic benefits from an estimate of a decay rate in literacy rates in the absence of a proper provision of reading material. In the public sector, productivity gains may be regarded as a potential benefit of paramount importance.

81. Productivity gains seem to occur more when people are excluded from the processes of operational use of information e.g. in computer assisted manufacturing or use of robots in manufacturing. In the service sector, productivity seem to be slower and more related to the amount of transactions than their effectiveness.

82. A tentative list of Benefit Indicators for a computer-based information system in a government agency, regardless of program or subject field, was proposed, which may well apply to any other type of formal organization. It covers a number of specific areas:

1. Overall Accountability and Management
2. Security, Integrity and Reliability
3. Interconnectivity and Interoperability
4. Quality of the Data and Information in the System

5. Productivity in the organization
6. Improvements in organizational effectiveness (after Taylor)
7. Improvements in information management

11. EXAMPLES OF BENEFITS ASSESSMENTS

83. The computer conference discussed in some detail two cases. One was a Rural Community Resource Centre, which can be found in Annex A. The other one outlined the application of Cost-Benefit Analysis to an information project in the health sector, which can be found in Annex B.

CHAPTER 4

INDICATORS AND ASSESSMENT METHODS

1. CHARACTERISTICS OF INDICATORS

1. The indicators should be selected with due consideration to the following constraints: Data collection and analysis should be as easy and simple as possible. The interpretation of the indicators should be straightforward. They should point to benefits which are usually given consideration by policy- and decision-makers. The resulting conclusions should be intelligible, if not attractive, for those who are going to act upon them.

2. It would be helpful to label each proposed benefit and indicator according to its intended target user. At least two categories can be considered: policy-makers (global/general level) and technical decision-makers (operational level). Whether scholars are to be included in the latter group or form a third one is to be further considered.

3. A majority of decision-makers in developing countries, and the people at large, contrary to a widely held view, do possess a sound idea about the importance for individuals and organizations, of accessing and managing information and knowledge. However, each community and individual has its own special representations, values, and immediate interests, whether or not conscious, about information. Any potential indicator should be checked against them.

4. Indicators may need to be defined and grouped according to the three main types of purpose for which indicators could be used:

- Evaluation of the performance in relation to a set of objectives which depends on the peculiarities of the specific area of endeavour or project;

- Planning the development of services or activities where indicators are needed as a reference point to guide the planning process;

- Argue on behalf of a proposal where one has to take into account the situation and needs of the decision-maker that has to be convinced (of course, it may be a group of decision-makers with different interests).

5. Any potential indicator seems likely to fit in one of these categories; should one be identified which does not, an additional category could be considered.

6. Four types of indicators, based on four types of measures (input cost, output, effectiveness, domain), identified in the previous work on the Value of Information and

Information Services by Griffiths, could be considered in relation to information impact on development. They include:

- Operational performance indicators which relate to output, e.g., productivity, efficiency, cost per output, cost by attributes level, productivity by attribute level, etc.

- Effectiveness indicators which relate output to use, e.g., user satisfaction, turnover rate, amount of use by attribute level, satisfaction by attribute level, amount of use by satisfaction level, etc.

- Cost-effectiveness indicators which relate input to use ratios, e.g., cost per use, cost per user, cost per capita, cost by satisfaction level, etc.

- Impact indicators which relate actual to potential use, eg., market penetration, uses per capita, needs fill rate, etc.

7. Some of the above mentioned indicators seem to be more on the information systems evaluation side, but could perhaps be adapted to the impact of information use. Eg. timeliness of service points to a potential benefit which is avoidance of delays in reacting to a given challenge or problem. Cost effectiveness and impact indicators seem right on the subject but may need to be made more explicit.

8. Assessments have to pay attention to all significant issues and should not restrict themselves to what is easy to measure. In particular, indicators should not miss the informal information processes and resources nor qualitative aspects of users satisfaction.

9. In order to structure a consistent series of indicators for long-, medium-, and short-term potential benefits, one should produce a nested hierarchy of broad mission statements, broad goals, broad objectives, and specific tasks.

10. Focusing on short term and narrow specific constituencies for sake of greater visibility may close up cost-benefits analysis on the assessment of information systems themselves rather than their impact on development.

11. Two methods for analyzing the links between information and development goals and intermediate objectives can be contemplated. First, correlation or regression analysis, as shown for instance by the work of Hayes, where the dependent variables are indicators of goal achievement (e.g. statistics on health status) and independent variables are level of health care labour force, etc., and level of information capabilities. Second, surveys of intermediate level contributors to health care, etc., to determine the extent of their use of information and then the consequences of the use of information in terms that relate to health care, etc. The latter is more practical because of the feasibility of getting good data on dependent and independent variables for regression analysis. Statistical analysis based upon readily available data is often not paying off. Thus the need to specifically collect meaningful data (which the former are not). But, one should be careful that the data stick as closely as possible to information and its role (limit interferences from non information factors).

12. "General indicators" may be a synthesis of a series of sector related ones. But the latter are context dependant and thus a large number of cases would need to be reviewed before one is in a position to consolidate them and arrive at a suitable picture.

13. Indicators should in principle have several formal properties, such as additivity, generality, etc., which should be satisfied, even if this makes things more difficult. The indicators should be compatible among themselves, and be relative measurements, preferably using ratios or indexes, such as number of potential users/number of actual users. This would simplify comparisons with other measurements, comparisons among various types of information provision as well as comparisons among different situations in relation to a particular mode of access or service.

14. There is a conceptual definition of an indicator (that implies intellectual operations in the conceptual, abstract domain) and an empirical definition (that implies measurement operations in the physical domain).

For instance, in relation to the immediate benefit for an extension worker using a RCRC identified as "Increased knowledge (or reduced uncertainty) about the community demand for information" (expressed information needs), one would have the following definitions of the indicators.

Conceptual Definition: Demand for information expressed by the community.
Empirical Definition: Average number of records in the reference section of RCRC during the first semester and/or Percentage of records classified by information content categories (an ad-hoc classification scheme should be attached) detected in the reference section of RCRC during the first semester.

Note that there can be more than one conceptual definition per benefit, and more than one empirical definition per conceptual definition. Of course, both conceptual and empirical definitions have to be stated clearly so that a third party can assess the quality and pertinence of them.

15. When considering information projects, a distinction ought to be made between those indicators related to the status or capabilities of information activities, such as number of professionals, articles published, information unit services, etc., and those specific indicators related to the convenience or feasibility of developing a project, and the results of such a project, which can involve cost reduction, improved services, wider coverage and other aspects. In both cases, the aim of the indicator is different, and if this is taken into account, it may be easier to define the most appropriate.

2. DESCRIBING CONSTITUENCIES

16. Most monographic studies of the provision and use of information in developing countries offer only a limited overview of the environment. They tend to forget about the roles and functions in the communication cycle which are not directly associated with the considered activity or service. Attention is seldom paid to the other mechanisms by which

the main users groups may have access to information, in particular the informal information channels. They often use methods and rely upon a reference framework which are peculiar to each study. Their results can thus hardly be consolidated.

17. Once a constituency or segment thereof has been selected for an investigation of the impact of information, basic data are needed about the population in order to be able to adequately interpret the observations, whatever and however collected. These data elements, or descriptive parameters, were tentatively identified and organized in R.S. Taylor's model of Information Use Environments (IUEs). The model was somewhat revised and expanded as a result of the computer conference. Seven sets of data might need to be covered:

a) the people including demographic data (e.g. age, sex, marital status, race, educational level, etc.), occupational data (e.g. profession(s), positions, etc.), sociological data (e.g. income level, personal networks, status in and interaction with the community, media use, etc.);

b) the settings (e.g. location, size of the organization, domain(s) of interest, culture of the organization, history, etc.);

c) culture (e.g. attitudes toward education, new technology, risk taking, innovation, information, knowledge, source of authority, etc.);

d) the problems (e.g. sets of perceived priority problems, dynamics of those problems, nature of the problems like well structured/ill structured, simple/complex, familiar/new, agreed upon/not agreed upon, etc.);

e) the expected solutions to the problems (e.g. what constitutes, for a given set of people, resolution of a typical problem, what does information do for the resolution of the problem, what types of data could contribute to which aspect of the solution, etc.)

f) the process of decision (e.g. where does the impetus comes from, what are the recognized formal steps and factors, what are the non-formal or "non-rational" factors involved, etc.)

g) the available information sources (e.g. mapping of all formal and informal sources and access channels known by the population and available to it).

18. This need not be a profound anthropological study of the particular audience but should nevertheless offer a sufficiently precise description of the social machinery in order to provide guidance in the interpretation of the data which will further be gathered on the use of and benefits from information. A suitable presentation of IUEs would go far beyond the rather superficial descriptions of users group one usually finds.

19. The model of Information Use Environments (IUEs) summarized above still needs to be tested and consolidated. The sets of data and their contents have to be validated. A series of IUEs for the principal constituencies in developing countries would need to be devised. Then the corresponding data could be collected with a view to document the

parameters and outline suitable data gathering methods. On this basis, the model could be revised if required. The model could then be applied in a decentralized and co-operative effort aiming at assembling as comprehensive a possible a series of IUEs covering all types of constituencies in all categories of developing countries. It should be noted that the various sets of parameters could be the focus of particular studies. If their implementation is guided by commonly agreed concepts and methods, this may facilitate the progressive building of IUEs.

20. The descriptive parameters contemplated in the IUEs should be distinguished from the indicators of the impact of information, which are supposed to focus on information benefits and nothing else.

21. The total communication cycle, from generation to assimilation, in specific institutions or communities of the developing countries has not been studied. Comprehensive descriptions of its structure and operation, taking due account of the logistics aspects (e.g. maintenance of equipment, provision of supplies, effectiveness of mail, etc.), encompassing formal and informal channels, may be seen as a requisite for understanding information flows and later explaining the perception of benefits resulting from information.

22. Unconscious values, emotions, and "non-rational" perceptions of information seem to affect the effectiveness of information use behaviours, especially from formal sources. Social psychology studies might prove most helpful in trying to provide some insights into these phenomena.

23. It would also be worth trying to assess the eventual difference in the richness and composition of the information environment of comparable groups operating respectively in the formal and informal economy. One may assume that a stronger struggle for survival and more autonomy have resulted for those involved in the informal economy in the constitution of an original and possibly richer information base. Should this hypothesis be verified, it might help identify meaningful parameters for the description of IUEs as well as design alternative strategies. The investigation could be attempted through the mapping of memorized sources which was mentioned in the previous chapter.

3. BUILDING IMPACT ASSESSMENTS INTO INFORMATION PROJECTS

24. Information projects, e.g. those related to the provision of information in rural communities, information in higher education as a tool for planning, information for health services, information for politicians and information in building planning, and many other projects, have to be analyzed in order to see what makes them valuable more generally. The first factor is certainly that they are specialized, all related to a specific need.

25. The difficulty about "information" is that information, in the abstract, means very little to the engineer, the agriculturist, the farmer, the craftsman, the doctor. Information must be subject oriented, or otherwise delimited, to have relevance to specific groups. Information QUO information is a non-starter. The way forward in this area thus seems to

be in specific, and well conceived, projects undertaken in association with specialist groups, or groups with a broad common interest.

26. Seminars or workshops should be organized with two target groups: a) specialized workers in one subject/activity; b) top management in the same subject/activity. They would take place in the course of the implementation of projects for the development of information services, possibly at regular intervals from the design to the ex-post evaluation stages, in order to identify and possibly measure the benefits. It is only when a series of such projects have been completed that adequate assessment indicators can be formulated more comprehensively.

27. One of the features of information research is that funding bodies in many instances want quick and dirty results, and the consequence has been that no measured consideration has been given to the question now being raised, which involves considering information as the various professions conceive it, i.e., breaking away from the perception of the information professions.

28. Simple information support projects, whose variables can be easily controlled, could be designed with the specific objective of measuring benefits and costs at the same time information is actually delivered. Such projects should propose a precisely identified series of value enhancements to the various categories of Knowledge Workers Productivity model or to the roles and functions in the communication cycle. In using a cost-benefit analysis framework, the projects' design should identify benefits distinguishing between qualitative and quantitative ones, recurring and non recurring ones, distinguishing as well between on time and recurring costs, fixed and variable costs and the object of costs.

29. A sufficient time span should be granted for information services to make their way through. Therefore, information use and its impact should be evaluated at regular intervals during the project implementation and several years after the completion of the information projects.

30. The formulation of information related projects is more often than not carried out within a very short time, possibly on the basis of pre-established models. This does not allow for the gathering of the data required in order to gain an adequate understanding of the Information Use Environment and the initial information situation. It would thus be advisable to introduce pre-project or initial phases in order to map the related information use environments and gather data about the actual information flows and uses and their associated costs.

31. The benefit indicators used by the U.S. General Accounting Office (GAO) when assessing information activities were mentioned as a possible example of a framework for investigating benefits from information projects. They may also apply in the case of information in organizations which is discussed below. They include:

1. REQUIREMENTS DEFINITION

a. What is the operational need being satisfied ?

(1) Are the quantitative and qualitative deficiencies of the current information service or system real?

(2) Is the current system/service tied to a function for which there is a clear authority for the organization to perform?

(3) Are the deficiencies more organizational or operational than service/system related?

(4) Is the need tied to a specific decision that must be made or a specific report that must be developed?

(5) Does the service/system produce the information in a timely and useful fashion (i.e., does it have practical utility)?

b. What impact does the system/service have?

(1) Does the system/service assure the quality of the data?

(2) Does the system/service achieve maximum throughput?

(3) Does the system/service contribute to better decisions by supplying necessary decision linked data previously unavailable?

(4) Does the system/service streamline or consolidate what would otherwise be disjointed functions or processes?

(5) Is the system/service preventing an impending program failure or is it just alleviating or postponing one?

(6) Are the impacts being realized now, or are they expected sometime in the distant future?

c. What are the objectives and the operational concept for the system/service?

(1) Do the objectives of the system/service relate to the programmatic objectives of the organization? Is it tied to any higher level objectives?

(2) Does the service/system blend into the programmatic functioning?

(3) Does the service/system blend with other staff or user functions and activities?

(4) To what extent would major or minor changes require modifications to the overall organization or operations?

(5) If there are system/service changes, what specific program or system say result?

(6) How many and what types of subsystems are there? Are they completely installed? If not, what is the schedule? Is it reasonable?

d. What are the performance levels of the system/service?

(1) Do they meet or exceed the defined need?

(2) What are the bounds of acceptability on these performance levels?

(3) What's the chance of falling short of these levels? Impact of falling short?

(4) Does the system/service perform at a consistent level, or is it in danger of degrading (e.g. saturation)?

e. For new development efforts, what is the required date for the system/service to become operational?

(1) Is this date achievable based upon project schedules?
(2) Is there sufficient control over tasks to ensure meeting this date?
(3) Are the budgets and resources in place to ensure the operational date is met?
(4) Will the system/service be tested before it is declared operational?
(5) Is there a backup capability if the operational date cannot be met?

2. INFORMATION SYSTEMS/SERVICES PLANNING AND MANAGEMENT

a. Have goals and objectives been identified and clearly stated?

(1) Are the goals and objectives achievable?
(2) Are the system goals and objectives limited to the programmatic goals and objectives?
(3) Are they product-oriented? Measurable?

b. Is accountability for costs and progress of the system/service development and operation assigned to specific individuals within the sponsoring organization?

(1) Are these accountable individuals organizationally placed where they can control activities? Are they close enough to the activity to be aware of progress?
(2) Is accountability established through formal certification of achievement of intermediate milestones?
(3) Are there secondary and tertiary levels of accountability for integrating the efforts of suborganization activities toward achieving system/service development milestones?
(4) Will a clear audit traixist (?????) that identifies and traces the sources of service/system development problems?

c. Are clear lines of authority established for making decisions affecting the system/service development?

(1) Do these decision-making lines of authority correspond to the accountability network?
(2) Are these decision-making lines of authority consistent with the organizational structure?
(3) Can the decision-making process keep pace with established schedules?

d. Are tasks specific. Are they properly sequenced? Are assigned priorities adequately staffed?

e. Are schedules clearly defined with intermediate and accountable milestones to measure progress?

f. Are there contingency plans in place to handle budget funding interruptions programmatic shifts, schedule slippages?

g. Are tasks specific? Are they properly sequenced? Are assigned priorities adequately staffed?

h. Are schedules clearly defined with intermediate and accountable milestones to measure progress?

i. Are resource requirements clearly specified and have steps to secure them been taken?

j. Do service/system development efforts conform to acceptable life cycle management standards and guidelines?

3. SYSTEM/SERVICE DESIGN

a. Does the system/service design recognize the fact that there may be an existing system/service in place which could be incorporated into the new design?

b. Does the designer allow for intermediate stages of sophistication or capability and plan modular growth to the final performance level?

c. Does the design rely on proven technology?

d. Does the design explicitly consider, and accommodate, the user as part of the system/service?

e. Does the system/service designer recognize necessary interfaces with other systems/services?

f. Will the design incorporate internal checks and balances?

g. Are alternatives being considered?

h. Are security considerations and the use of standards explicit?

i. Does the system/service provide for failure and "fail safe" contingencies?

j. Does the design give proper consideration to the data?

(1) Are the data requirements clear and directly related to the use of the information?

(2) What controls are used to ensure the quality of the input data?

(3) What simplification, mechanization or streamlining options can be introduced to reduce the labour intensity or increase the quality of data acquisition?

32. The assessment of benefits requires a thorough knowledge of the current needs and provision of information. A series of surveys or market studies has been proposed in order to get a more comprehensive picture of information needs, response provided by new/enhanced information services and users satisfaction; they include:

- users attitudes vis à vis the information services before and after the introduction of services;
- systematic surveys of information resources (Infomapping) in selected group of institutions or sectors;
- information needs analysis for selected sectors or groups of institutions;
- response by newly established centres/services to the identified needs;
- increase in information delivery and use;
- requirements for databases in selected sectors;
- coverage, match with the identified needs and use of databases;
- information packaging needs;
- rate of incorrect responses;
- databases and information services users;
- computerized and traditional management systems;
- data transmission facilities and traffic;
- use of telecommunication facilities;
- information manpower resources;
- information training facilities with evaluation;
- information standards requirements;
- cooperation protocols among information producers and providers.

33. There is no consolidated list of the information related projects which have been so far carried out in the various developing countries. One can only hope that some research could be undertaken in order to fill this gap. Nevertheless, it seems that more attention has been paid to the building of information infrastructures, especially at the national level, than to the immediate distribution of information services. It would be interesting to investigate the rationale, cost-benefit and outcome of the respective approaches with a view to possibly suggesting an appropriate balance between them.

4. ASSESSING INFORMATION BENEFITS FOR ORGANIZATIONS

34. Analytical and quantitative methods for assessing values in organizations, even though they are increasingly used and have significantly contributed to the understanding of information activities, may be time consuming and costly and not always accurate enough. The present deficiencies in the theoretical foundations and empirical verification in information further difficult the design and implementation of cost-benefit analyses. Regular procedures for the overall assessment of organizations and auditing may also be unnatural in the considered environment.

35. Assuming that information is recognized as a production factor of its own, one may attempt at producing input-output matrices among the production factors in order to identify potential benefits in a systematic fashion.

36. Indicators could be developed in order to trace the long-term benefits resulting from a richer information environment made possible by information-related investments and short- or medium-term benefits resulting from the empowerment of the organization, staff and management.

37. Information impacts and indicators could be developed that can be easily related with the basic managerial survival needs such as coping with turbulence, rapid change and uncertainties, more effective management as a result of a better knowledge of information resources. The critical incident method may offer a suitable framework for such investigations.

38. One may attempt at deriving a decay rate of the workforce skills from the decay rate of literature in related areas. On this basis, the amount which should be devoted to the information support of the professional staff in order to keep its knowledge base up-to-date can be estimated. It might be in the order of to 2% to 3% of the payroll for professional staff, considering that a larger proportion of the decay rate should be compensated for by continuing education. The effect of such an effort can be assessed from the comprehensiveness, relevance and timeliness of the information referred to in the production of the considered staff.

40. Time saving could be assessed through the response time for getting access to correct information from the information resources at various points in time over the process of strengthening the available information support.

41. The assessment of the reduction of duplication could be undertaken through a review the annual reports and interview executives of a representative set of organizations in a given sector/branch in order to find out duplicate activities which were not known, were known but undertaken and the reason why, were proposed and rejected on the basis of the available information.

42. Studies of the correlation between investments and recurrent spendings in information and research productivity could also be considered, even though research outputs in developing countries may often be non-formal ones, eg. contribution to extension programs, advisory services, etc.

43. Programmes geared at the computerization of information- and communication-intensive processes, which are receiving increasing attention, may offer an appropriate ground for impact assessments. These are hybrid applications of information technology with clear strategic implications concerning for instance the modernization of the financial sector, customs and tax computerization, management of public expenditure and public debt, etc.

5. ASSESSING THE IMPACT OF INFORMATION FOR SPECIFIC CONSTITUENCIES IN RELATION TO PRIORITY DEVELOPMENT ISSUES

44. The mapping of IUEs should serve as the starting point in the identification of critical issues, which might then be linked, if appropriate, with broader development priorities (eg. sanitation, participation of intermediate groups, etc.).

45. Taking an example such as the polio vaccine, there are many different facets. Was it the discovery of the vaccine, the infrastructure to distribute and administer the vaccine, the information about the benefits of the vaccine and the safety of getting the vaccine, or a combination of all of these that virtually eradicated polio in many countries? The problem lies in trying to separate the components from one another and measuring what benefits were derived from what component.

46. A possible way out might be:

a) To use a nested hierarchy, in which the ultimate end product and its benefits, eg. eradication of a disease the example, will be so to speak decomposed into successive series of required inputs.

b) To consider among those lower level inputs those which are "information dependant" and those which are not, or not up to a point the information input into them could be assessed, or could be regarded as critical.

Eg. in the example, information dependant: health care plan, public awareness, personnel, vaccine, etc. Other: all logistics, like transportation, supplies.

Each of the factors, or critical resources, can further be broken down in the same way, if required, up to the point information inputs can be specified and assessed.

c) Then the problem will be to measure the value of the benefits directly related to information. A possible way is to consider the percent distribution of the cost of the various factors and apply it to the value of the ultimate result, when it has one more or less defined. Sticking to health problem, even though their calculations might raise some questioning, public health officials often quote a "cost" of a particular disease.

47. An objective measurement at whatever level is all but easy. It is difficult to obtain indicators of utility on a consistent scale and leading to objective interpretations. Subjective estimates by experts in specific fields may offer a suitable alternative.

48. Assuming that the sources of information which are known and remembered are likely to be those which are beneficial, a preliminary overview may be gained by measuring, at successive intervals, in a sample of the population the breadth and depth of the formal and non-formal information which has been memorized and used, or of the "memorized directory" of information sources, in conjunction with specific decision-making or problem-solving situations for the considered constituency.

6. ASSESSING THE INFORMATION RICHNESS OF THE ENVIRONMENT

49. The qualitative and quantitative improvements of the formal information resources could be assessed through the following criteria:

a) The enhancement of the infrastructure could be measured from the ratio of coverage of the needs identified through market studies and the rate of utilization of computer and telecommunications facilities.

b) The availability of information could be measured from the coverage of the various sectors by databases and an index of the diversification of information products.

c) The reliability of information could be measured by the rate of correct responses, e.g. from a regular panel survey.

d) The use of information could be assessed by both the numbers of users of centres and services and the diversification of the users groups.

e) The impact on management could be assessed from the number of organizations with well defined general and information management structures and procedures.

f) Information sharing could be seen from the number of on-line links, the number of networks, their scope and coverage of the various sectors.

g) Manpower development could be assessed from the number of staff with information responsibilities and number of information related courses.

h) Cooperation could be reflected by the number of joint projects activities, joint committees, active cooperation protocols.

i) Standardization could be reflected by the number of information standards introduced over time.

50. One more possible facet of information benefits may be their eventual contribution to alleviating the barriers to information such as language, literacy, distance from the sources, disabilities, lack of financial resources to access information, etc.

51. The ingredients of a formula to measure equality of access to information were listed. They include time, cost, and distance in relation to income group or any other socio-professional characterization.

52. Indicators to consider in order to assess Equality of access to data networks and telecommunications facilities at large, both within and among countries, are number of facilities available, total traffic, traffic per type of service, cost, in relation with basic country indicators or basic parameters specifying the considered socio-professional groups.

53. In relation to the cost of access some direct measure can be made, on the assumption that, in the absence of the information systems, each user would have to bear

costs individually (that is to say that the actual unit cost of acquisition and processing would have to be multiplied by the number of users; eg. if the unit cost for 1 item is $50 plus $50 overheads = 100 and it is used by 100 users the saving is somewhere between $9 900 and $4 900).

54. One would probably have to rely upon market surveys, e.g. through standing panels, in order to assess the appropriateness of both formal and informal channels, once the mapping of IUEs will have provided enough background for their design.

7. USING ANECDOTES

55. Collecting a large body of cases, or anecdotes, in a systematic fashion, about the use of information and its effect on problem-solving within specific and well defined Information Use Environments (IUEs; cf. 17 above), is to be regarded as a most important and promising approach.

56. Social studies of information suffer from a lack of continuity and systematism. Should a large enough series of well structured cases be available, the co-occurrence of an appropriate provision of information and effective resolution of problems could be established. In addition, the nature and conditions of the role of information may possibly be elucidated. This may be sufficient as a starting point for establishing a possible causality.

57. Due attention ought to be paid to the fact that information uses and practical value are related to many non information related factors. The field of information further lacks at the moment a set of common principles similar to the one available in other disciplines such as law or history in order to derive knowledge from anecdotes. In order for the anecdotes to be intelligible, not only should the Information Use Environments be well defined but the parameters shown in the anecdotes should to also be categorized according to the characteristics of the respective constituencies (cultural, socio-economic, group size, scale of operation, etc.).

58. Considering the example of health care improvement, there should be a considerable body of historical evidence based on the work of PAHO and WHO to indicate the impact of information on development, specifically in relation to the control, reduction or elimination of certain diseases in developing countries. This historical approach may also be able to identify further evidence which has been documented by aid agencies working in other areas in developing countries, even though it is unlikely they undertook any assessment of the role of information itself outside the extension services.

59. It is probably possible, though by no means easy, to find examples of the value and usefulness of information, that is situations in which having the right information has made a difference, in relation to specific kinds of information in specific situations. Sector professionals may prove a better source of examples than information professionals who don't often see the end result of the information supply. The "post-mortem approach" could also be tried, that is, identifying the information/knowledge use components of

actual development activities considered by developing countries as "successful" or disastrous (perhaps even more these ones).

60. It would be essential that the definition of the nature, topic and scope of the anecdotes be determined on the basis of the perceptions of the concerned constituencies themselves and not those of "information specialists". Several method could be used for the collection of the data, including the Grounded Theory, Priority and Performance Evaluation (PAPE) and Critical Success Factors.

61. In order to evaluate a body of anecdotes one would need in first place to categorize them according to their formal characteristics, e.g. who collected what, when and where, and to which IUEs and problem areas are the anecdotes related. Second, one would need to have some elements to determine the reliability and credibility of the reporter. Third, one would need to examine whether the anecdotes make sense in the considered contexts and in relation to the problem being examined. Fourth, one would need to establish links between the anecdotes and the existing body of evidence, e.g. are they new, confirming, expanding or contradicting it. Standard scales could be use in this validation process.

62. The validation could be undertaken by individual judges or panels of specialists, who should be familiar with the considered contexts and shall not impose an external "common sense" interpretation.

63. Assuming the anecdotes are properly calibrated, some statistical analysis can further be attempted in order to extract a common set of variables, so that those that are relevant could be discriminated and their relationship analyzed. In particular, such anecdotes can be statistically measured through the critical incident method. This method could provide some support to previous hypothesis on the impact of each of the variables. Of course, this can be a limited approach, to the extent it does not offer evidence of causality and the variables would be limited by what is reported; however, it can give hints on the effect of the various factors and a better basis for designing further studies.

8. ASSESSING INFORMATION IMPACT THROUGH THE MARKET

64. Forcing users to pay for information may offer the most straightforward solution toward the assessment of utility. One may accept as a starting point that demand could be an acceptable surrogate of utility.

65. Given the prevailing conditions, market studies may offer a suitable alternative, at least in the formal sector, in order to find out which types of information are regarded as the most useful and how much people would be prepared to pay for them.

66. Such market studies could in particular be undertaken with regard to the usefulness of information in the mass media for professional/practical use, the scope and size of additional information possibly required and the price users would be ready to pay for this additional information.

67. In order to seek a market validation of benefits, and also check the likelihood of deriving benefits from the establishment of information industries, there is a need to break away from the quasi exclusivity given to information projects in the government sector with no significant attempt at building into them cost-recovery mechanisms which could possibly evolve in at least a partial self-sustainment.

68. More projects should be tried in the private sector with the aim of trading information as a commodity. Such projects should be long term and proceed form the building up of the basic facilities, then shift progressively support from offer to demand and then reduce progressively the support to demand reaching a stage of self-support over about 10 years. They might take the form of low-risk, non capital intensive joint ventures for establishing information enterprises, or even companies, from where the viability of economic demand could be monitored, and through it, socio-economic benefits assessed.

CHAPTER 5

DIRECTIONS FOR THE FUTURE

1. OUTCOME OF THE COMPUTER CONFERENCE

1. Keeping in mind that the computer conference, even though it considered at its inception all possible facets of the relationship between information and development, was intended to be a brainstorming and a preliminary investigation, its outcome might be regarded as quite satisfactory.

2. The sponsor, the participants and many members of the community might have hoped that more progress could be made toward the production of a comprehensive and articulated framework and possibly the identification of a number of hypotheses, if not initial answers.

3. The discussions quickly showed that the subject was indeed very complex, difficult to tackle and unusual. It requires that one breaks away from the established concepts, concerns and methods. Of particular significance is the need to question the built-in equality between information and the formal information sector, which has so far dominated the analysis of the move toward an information society in industrialized countries. The change brought by the information society, even more by the knowledge society, is no longer about the mode of production of material goods. It is about the mode of thinking. And, if one allows a reference to Descartes, it is about the essence of individuals and societies.

4. The computer conference could thus probably not achieve much more than what it did. The avenues it has open for future investigations are nevertheless clear and promising.

5. If all those concerned agree with one of the starting points of the computer conference which emphasized that one can no longer be satisfied by the endless repetition of the axiom that information is an essential resource for development and that some solid evidence need to be gathered and shaped, the question is of the ways and means by which a long-term research effort in this area will develop.

2. FURTHER STUDIES

6. The first step to consider next is probably to test a few methodologies for the appraisal of the impact of information on development in selected Information Use Environments and in relation to specific problems identified by those communities. The choice of the IUEs will be bound to existing projects and/or institutional support. It may however be worth trying to outline a tentative list of those IUEs which should be

investigated in priority. The choice of methodologies, from among those which were mentioned earlier and possibly others, will depend on the IUEs and problems.

7. From this first round of field tests, basic guidelines for the description of IUEs and various approaches to the assessment of the impact of information could hopefully be developed.

8. While other field test would be undertaken, it would be advisable to widely disseminate the methodological framework among agencies supporting information projects, the information community and especially academic programs with a view to maximize the chances of related investigations, even of a limited scope to be undertaken.

9. These current and future efforts, as well as past ones, should be monitored, at least by means of systematic literature reviews, and possibly through site visits and seminars, in order to facilitate the process of consolidating the relevant experience and the interaction among the various studies. This would be particularly critical for the design of research protocols, ensuring compatibility among the various assessments, comparison and discussion of results, selection of the constituencies to be investigated. If concerned teams could be granted access to an electronic network their standing interaction as well as the effectiveness of their work would obviously be greatly enhanced.

10. At this stage, agencies embarking into information related projects might be in a position to include in their formulation phase a thorough audit of the initial information situation, the description of the related IUEs and cost-benefit analysis of their projects, when applicable. Adequate provisions will need to be introduced in order to ensure that a fair proportion of the projects do include such investigations. It might also be appropriate to design a simple handbook with a view to assist organizations in developing countries to assemble the background data needed for eventual assessments as well as for their own strategic management.

11. A systematic effort toward the mapping of all significant IUEs would seem to be worth trying as a next step. This is going to be a long-term and open-ended commitment whose effectiveness will be dependant on appropriate communications among those involved.

12. In the mean time, field work on the assessment of information impacts would hopefully continue and hopefully expand.

13. Even if the above suggested monitoring takes place, it would be advisable that after a period of about 5 years, the findings of these various studies be consolidated through a report and a workshop.

14. Assuming that a sufficient number of assessments would have been successfully implemented during the previous period, the methodologies could be revised at this point and the further assessments could encompass a validation of the consolidated results from earlier studies.

15. Upon completion of a new cycle of field work, a second step of consolidation would be appropriate.

16. Although there seems to be a consensus about the need to begin with "micro-level" studies before considering such macro-level issues as benefits at the national level on a sector or major development priority basis, it may worth trying without delay some kind of prospective study in order to offer an outline of possible macro-level benefits. This would form a series of hypotheses which could both help in the design of and later be checked against the cumulation of results from the micro-level studies. To the extent a number of decisions regarding investments in information are taken at the macro-level, e.g. programs to assist countries moving toward an information-based economy, the outline, even if it would need to be considered with great caution, could prove useful for practical and methodological purposes.

3. THE NEED FOR A COOPERATIVE PROGRAM

17. Given the size and complexity of the problem, on the one hand, and the required bottom up approach, on the other hand, if the effort at assessing the impact of information on development is undertaken by only one, or a small number of organizations, a long delay will be incurred before any significant results are available.

18. At this time it may well be that the information gap between the North and the South has widened so much that actions taken by the developing countries would not drastically correct the imbalance.

19. It seems therefore essential that this subject could become the theme of an international program in which a large number of institutions would participate.

20. Except for appropriate communications among those involved and an adequate monitoring of the related projects at all their phases, plus possibly a focal point, this does not imply noteworthy expenses. The programme could operate as a decentralized network.

21. The industrialized countries currently invest considerable amounts of money in information research of which very little, if anything, is actually applied to the investigation of information problems in developing countries. One may wonder if some incremental steps toward the sophistication of information storage and retrieval are so important that they could not be delayed in favour of studies which could help bring a better global balance in the provision and use of information. The more so to the extent a better understanding of the role of information in developing countries could be of direct value for the industrialized countries.

22. A growing number of students from the developing countries are taking doctoral programmes in the industrialized countries. This represent an enormous potential of research which is currently misused in research which, except the sophistication of the students, has no direct relevance for the developing countries, and yet contributes to

reinforce the advantage of the industrialized countries. Should the programme be properly publicized, some of this potential may be directed toward its implementation.

23. A number of baseline studies and data gathering exercises could also be implemented as part of the assignments of students in the developing countries, under appropriate supervision. This would probably contribute better to their intellectual equipment and to the advance of the field than the usual inconsistent descriptions of particular information services.

24. As previously mentioned, the formulation of information projects could also offer an unique opportunity for carrying out some of the required studies. The participation of the agencies which currently support such projects would thus be highly desirable.

25. The key question is whether there will be a large and standing enough mobilization of the concerned community in order to undertake the effort.

ANNEX A

THE CASE OF A RURAL COMMUNITY RESOURCE CENTRE (RCRC)

1. The Rural Community Resource Centre, or Rural Information Resource Centre as it is sometimes called, concept is a "bottoms up" community based approach which relies on the mobilization of resources at the rural level to meet the information needs identified by members of the community. These resources would include information materials, personnel, facilities, and funding as well as existing organizations.

2. Using this approach in an LDC environment where the main economic activity is of a primary nature, say agriculture or fishing and where the population is in the range of 5 to 10,000 and exhibits marked cultural differences from the urban population based on tribal or other characteristics, one could identify or perhaps demonstrate benefits, direct or indirect, immediate or potential from providing access to information. It should be possible for each group to identify direct and indirect benefits with indicators expressed conceptually or empirically. However, this looks like a major task.

3. The community envisaged, for the time being, is not at all relying upon sophisticated information technology; computers and CD ROMS are not available and the telecommunications links are at best unreliable. The information resources will consist of print and non print material. In this type of environment where the level of literacy is likely to be low, audio visual material will be of great importance. There will be a great deal of reliance upon "change agents", e.g. extension workers in agriculture, health, community development, sports, etc.

4. It was considered that benefits could accrue for three main constituencies: Government agencies, communities (eg. villages) and individuals. A tentative and preliminary list of benefits, noted "B", and the related expected results, noted "R", was proposed for a RCRC.

5. GOVERNMENT AGENCIES

"B" Opportunity to more effectively identify and meet information needs as defined by the community.
"R": Improved supply of more appropriate information directed at rural communities.

"B" More effective dissemination of information about Government programmes.
"R": Increased willingness to participate in Government programmes.

"B" Facilitating the dissemination of rural development information by Extension Workers.
"R": Increased support for and participation in Rural Development Projects.

"B" Provide Feedback on community concerns and reaction to plans and programmes.

"R": Improvements in two-way communication flow between government agencies and local communities.

"B" Contribute to the preparation of well informed citizens.

"R": Better informed decision making at community level.

6. COMMUNITY

"B" Provision of information and activities which will enable community members to acquire skills.

"R": Increase in variety of skills and jobs in community.

"B" Assist the community to acquire new knowledge.

"R": Increase in the understanding of and participation in community affairs and in the effectiveness of their handling.

"B" Access to information about health, agricultural techniques, child care, nutrition, small business enterprise, etc.

"R": Improvements in social and economic conditions.

"B" Strengthen communities involvement and appreciation of local and national culture.

"R": Heightened awareness of national issues and greater national cohesiveness.

"B" Provides focal point for community activities.

"R": Increased cooperation and greater cohesiveness at community level.

"B" Encourages and facilitates the capture and storage of the information of the indigenous knowledge base.

"R": Greater share of the local information in the total knowledge base.

7. INDIVIDUAL

"B" Locate and obtain information on subjects of interest.

"R": Wider knowledge base.

"B" Participation in learning activities.

"R": Acquisition of new skills and knowledge.

"B": Availability of and access to print and non print information resources.

"R": Retention of literacy and numeracy skills

"R": Greater access to information for non-literates, e.g. by means of oral or audio-visual resources.

"B" Continuing educational opportunities.
"R": Self improvement and increased perception of self worth.

"B" Recognition and use of indigenous information based on the oral tradition.
"R": Increase in number of persons willing to participate and contribute to programmes designed to record the information which exists in the indigenous knowledge base.

8. The groups receiving the benefits might be defined in accordance to more fine tuned different interests, motivations, and roles in development. For example, an alternative classification would be: Government Bureaucrats, Local Politicians, Local Leaders (non-partisan), Government extension workers, N.G.O. extension workers, Members of Community Groups, Citizens in general, Students. The groups can perhaps be defined more precisely on the basis of the background information mentioned below.

9. Background information would need to be collected on the constituencies served by the RCRC (e.g. geographical location, size and structure of the population, main economic activities, history of the location), the resources available at the RCRC (e.g. information products and services expected to be offered on a regular basis or on demand, size, and quality of the RCRC staff, information technology such as computer, telecommunications, if any, CD-ROM, etc.).

10. The change agent, i.e., the extension worker, will also benefit from the RCRC. The latter will in principle provide an identifiable central store of information which the community can access. Precise information would then be available to the extension worker as to whether the information supplied is being consulted. The effect of the use made of such information could be more readily witnessed from the behaviour of the members of the community.

11. Considering for example the hypothetical case of a health extension worker who supplies information on the benefits of child immunization, the indicators for RCRC staff could be the size and variety of information resources available in the RCRC and the number of times information is requested or consulted, while the indicator for the health extension worker could be the response by the community in terms of number of children immunized compared to previous patterns.

12. Indicators by which the information impact on the expected results could be assessed would need to be identified and tested. For example, if one considers such an expected result as "Increased participation in Government programs", it could be measured by the ratio between percentage of participating people before and after the information program among those who were exposed to the considered information facilities. One should be careful in formulating the indicators that they could, as far as possible, stick as close as possible to the information factor. A special survey would need to be carried out in order to ascertain the respective role of information and other inputs or incentives in the observed changes in participation. Otherwise, they may be erroneously attributed to information while they are the result of more incentives of any kind or other specific circumstances.

13. In order to accurately assess the impact of such information provision, feedback should be obtained from persons outside of the information sector and therein lies the rub. The information provider can only supply empiric evidence of number of times consulted, not of the number of times the information was used, if we accept the fact that information can only be said to have been used if related actions or perceptions can be observed.

14. To the extent human intermediaries, whether professional or not, are playing a key role in the operation of such services, one possible way of assessing benefits would be to map, at successive points in time, their "information resources directory", both formal and informal. That is the memorized "addresses" of institutions, places, people or documents, from which the relevant information can be gathered. One can look at both breadth and depth of this map, e.g. how many sources are known for a given subject, how many characteristics of these sources are known (e.g. accuracy, comprehensiveness, reliability, etc.), how often they were used.

15. The end-users and their actual use and possible benefits from the information provided should also come in the picture. One can select a number of critical issues for the considered community, for which information was provided and check, through observation and interviews, at various points in time, their "information resources directory" on the one hand, and which information was actually obtained, used and what was its effect on a number of parameters describing the population, its information literacy and its well being.

16. One important indirect benefit for the general public using a RCRC (i.e., excluding politicians and government officers), is the appropriation of the facility by the community, that is the opportunity it may have to control the flow of information, in other words to win self-determination in the provision of information. This may be observed in first place through the existence of an advisory or governance board and its composition. The funding of the RCRC could give another indication e.g. ratio of public subsidies versus community contributions and direct income in the funding of the facility. One may further observe the nature and rationale of its decisions. The local advisory board may for instance not only determine the level of staffing but will identify suitable personnel from within the community. It may also identify the nature of the information required and specify the nature of the information products and services to be provided. The latter aspect may be cross-checked by observing for instance the ratio of information material received without solicitation to material specifically requested.

17. The distinctions among various the various types of benefits may be illustrated by the following example. Let us assume that a RCRC maintains a register of the demand of information coming from the community. The immediate benefit for the Government officers in charge of satisfying the community information needs would be: "Increased knowledge (or reduced uncertainty) about the community demand for information" (expressed information needs). A potential benefit would be: "Opportunity to more effectively identify and meet information needs as defined by the community". This will take place provided the officers do access and know how to exploit the information of the register and take decisions accordingly. But this benefit to be fully reaped would require further investigation of the unexpressed information needs. A second, more remote,

potential benefit would be "Improved supply of more appropriate information to rural communities". This benefit will now accrue to the community and concretizes the officers ability to exploit the information of the register. In order for this to take place, many other favourable conditions should be met, like the officers drive to serving the community, willingness to take decisions, availability of material facilities, supportive management, etc.

ANNEX B

ILLUSTRATIVE EXAMPLE OF THE APPLICATION OF CBA TO AN INFORMATION PROJECT

I. Step 1. Define Objectives

1.1 Overall Objective: To create a national database, information system and clearinghouse for AIDS, to be used as a national information asset, available to and accessible by:

(1) accredited national, regional and international public health (PH) institutions and organizations,
(2) authorized practising PH and other health professionals,
(3) qualified academic PH and other health research facilities,
(4) PH and health-related mission government departments, and
(5) other users and beneficiaries on an "as entitled and as needed" basis.

1.2 Long Term Goal (substantial achievement 10 years out [or longer]) (Level III - Education and Enlightenment)

To decrease the incidence of endemic AIDS in the population from X% to Y% by the end of the out-year period (e.g. 0Y + 10) by creating positive conditions allowing high-risk populations to become fully aware of the political, economic, social and human consequences of dysfunctional attitudes and behaviours, including life-styles, value systems and belief systems.

1.3 Mid-Term Goal (substantial achievement in 5-10 year time frame) (Level II - Helping Training)

To increase the level of awareness of high-risk AIDS populations to dysfunctional attitudes and behaviours from A% to B% per annum during the out-year period (e.g. 0Y + 5 to 0Y + 10).

1.4 Short-Term Goal (substantial achievement by the end of the fourth year out) (Level I - Coping With the Present)

To sensitize the target PH user and beneficiary groups to the existence of the new information resources (the database, the information system and the clearinghouse), availability and accessibility conditions or pre-conditions, their responsibilities for both data input and data output use, and other awareness factors, so that 95% of all target groups are fully aware of the resource and are using the information assets (knowledge, expertise and facilities) in an effective, fully-functioning manner.

II. Step 2. Formulate Assumptions

2.1 Workload growth

The new items added to the database shall increase from a range of from A to B in the first year it becomes fully operational (Stage I, Database Creation and Bringing Up Online), C to D for the next (#) years (Stage II, Rapid Growth), E to F for the next (#) years (Stage III, Levelling Off), and is extrapolated to grow from G to H for years following year (0Y + 10) when the database is mature.

2.2 Volume of user demand

The demands from users for access and retrieval of items from the database shall increase from a range of from A to B in the first year, etc. (following 2.1 format above).

2.3 Length of the life cycle of the resource

The database, information system and clearinghouse are expected to remain in a fully-functioning status without requiring any major modifications until (0Y + 10), whereafter a new CBA will be required to take advantage of new technologies, new approaches and changes in user demand patterns.

2.4 Period of time covered by the analysis

A ten-year information resource life cycle period was selected on the grounds that the resource's capabilities and technological infrastructure would remain relatively stable for that period of time.

2.5 Inflation rate adjustment

An inflation rate of X% per annum was used as the basis to project the streams of quantified benefits and costs during the system life/payback period.

2.6 Salary cost projection

Salary base rates used to calculate cost streams were considered to rise by A% during the first three years of the project; B% for the next three years; and C% for the remaining four years.

III. Step 3. Identify Alternatives

3.1 Status Quo (Alternative One)

Do not create a new information resource. This alternative may be considered the "baseline."

3.2 Modify Existing System (Alternative Two)

Essentially keep the present approach, but make modest changes to upgrade its efficiency and effectiveness.

3.3 Create New Database, Information System and Clearinghouse (Alternative 3)

Create a brand new capability and gradually phase out the old approach and replace it with the new one. Running the old and new in parallel for one or two years may be required.

IV. Step 4. Estimate Benefits/Values and Cost/Burdens

4.1 Divide benefits into quantifiable and non-quantifiable.

4.2 Distinguish between recurring and non-recurring (one time).

4.3 Project benefits year-by-year from 0Y through each of the outyears. Some benefits may be the same for each year, but other benefits may be different as the project matures.

4.4 Distinguish between "efficiency benefits" and "effectiveness benefits". The former help do the same jobs better at the same or reduced cost by using a different technique, approach or method; the latter help do new and different jobs that were not done before ("upscaling"). It should be noted that the above are benefits to the producer and/or funder but not necessarily to the user.

4.5 Measure the benefits/values using assessment indicators. Here one could sub-divide the assessment indicators based on the three-tiered time period scheme used above (i.e., long-term, mid-term, and short-term). For example:

Short-Term (note that almost all of the short-term indicators, all but the last one, have to do with the mechanics of set-up and start up and how-to-use the new information resource, rather than the more substantive goals and objectives of why the information resource was created in the first place):

o Increased awareness ("information literacy") by users and beneficiaries to existence of, applications for, and methodology- for-using the new information resource (33% awareness level achieved on existence of, applications for, and methodology-for- using the new information resource for target user populations by end of first year)

o Operation of a single, central, authoritative resource to replace a multiplicity of fragmented, dispersed and ineffective resources

o Increased availability of the information resource to wider users and clienteles

o Wider, faster, and more effective access to the information resource

o Improved retrievability and document delivery of hard copy outputs from the information resource

o Improved searchability of the information resource

o Improved retrievability of data, documents and literature from the information resource

o Improved usability of the output from the information resource because of formatting and packaging features

o Decreased AIDS endemic incidence from X% to Y% (very modest, incremental decrease)

Mid-Term (note that a more equal balance of the mechanics of the resource's use versus more substantive benefits is reflected in the indicators)

o Faster and more effective application of knowledge to AIDS research

o Faster and more effective application of knowledge in AIDS public awareness programs

o Faster and more effective application of knowledge in AIDS education and training programs, both formal and informal

o Reduced turnaround time from X (hours/days) to Y (hours/days) in searching for information

o Reduced turnaround time from X (hours/days) to Y (hours/days) between retrieving and applying information

o Greater sharing of information between PH institutions and professionals

o Greater re-use of information assets

o Decreased instances of lost or missing information

o 66% awareness level achieved on existence of, applications for, and methodology-for-using the new information resource for target user populations

o More effective public policy decision-making

Long-Term (note a greater emphasis on substantive, ultimate goals and objectives achievement)

o Reduced AIDS incidence from A% to B% in the primary target population as a whole

o Reduced AIDS incidence from C% to D% in the highest high-risk target population

o Reduced AIDS incidence from E% to F% in the secondary high-risk target populations

o 95% awareness level achieved on existence of applications for, and methodology-for-using the new information resource for target user populations

o Very effective public policy decision-making

4.6 Measure the costs/burdens (distinguish between recurring and non-recurring (one-time)).

4.7 Sub-divide costs by category (e.g. labour, contract, materials, equipment (distinguish hardware, software and telecommunications) etc. It is also useful to distinguish between fixed and variable costs, particularly if a charging scheme is needed. Even if their allocation is far from straightforward, overhead costs have to come in the picture.

4.8 Identify sunk costs, if any (these costs cannot be recovered and should not be included in the cost streams), even though this may prove quite difficult.

4.9 Project costs year-by-year from OY through each of the outyears. Some costs may be the same for each year, but other costs may be different as the project matures. Sometimes referred to as the "cost streams."

V. Step 5. Compare and Evaluate Alternatives

5.1 General Comparison Method

Under this approach no attempt is made to express benefits and costs in terms of the "present value" (PV), nor compute net present value (NPV), nor compute a benefit:cost ratio (BCR). Evaluators simply scrutinize the supporting text and make their decision based on a simply intuitive weighting (best, next best, etc.).

5.2 Present Value Method

Under this approach an attempt is made to express benefits and costs in terms of the PV, and an NPV is computed. The higher an alternative's NPV, the more its benefits/values exceed its costs/burdens.

5.3 Benefit:Cost Ratio (BCR) Method

Under this approach a BCR is computed by dividing the PV benefits by the PV costs. The BCR provides a measure of the benefits obtained per dollar spent. It is particularly useful when comparing alternatives with unequal costs, benefits and life-cycles. BCR is a measure of the return relative to the size of the investment cost. BCR does not allow comparison of the magnitude of the returns from several alternatives.

VI. Step 6. Sensitivity Analysis

Sensitivity analysis involves examining the assumptions of a CBA to determine their effects and influence on the final recommendations. The essence of the procedure is to take an important assumption and vary it to observe the total effect on project costs or benefits. Take, for example, suppose in our illustrative information project cost estimate that an assumption is made that the project will require five computer room personnel. Personnel costs are recurring. Over the life cycle of the project, they continue to add up. One could use sensitivity analysis here to determine the effect on the total costs of the system assuming 2, 3 or 4 personnel. One possible trade-off might be between more personnel (a recurring cost) and more expensive equipment (a non-recurring or one-time cost).

VII. Step 7. Present Results

Once completed, the CBA should be presented, insofar as possible, in a standardized manner. This approach organizes the findings in a familiar way and ensures that all important issues have been addressed. Oftentimes, it is useful to supplement the written report with oral briefings to afford the decision-makers an opportunity to question the CBA analysts first hand, asking for clarification, amplification, etc.

VIII. Step 8. Select a Preferred Alternative

It must be emphasized that the CBA study does not "select" the preferred alternative. The policy-maker or manager responsible for the project selects the preferred alternative based on the information provided by the CBA, and supplementary information provided by independent research and counsel, oral briefings, and other "third party" data. The final decision must always rest on the judgment of the responsible official.

APPENDIX 1

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Note: Quotes from some of the documents listed below have been made in the course of the discussions, but the mention of the source may have been omitted or deleted in the process of editing, especially when the original text had to be split over several items. The documents from which quotes are included in the report are marked with an asterisk " * ".

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APPENDIX 3

STRUCTURE OF THE CONFERENCE

1. GENERAL

Messages related to subjects bearing on the conference theme as a whole (theme, scope, objectives, overall approaches, etc.) or to several topics which cannot be dealt with separately.

2. POLICIES

Messages discussing the accountability of information policies vis à vis the identified benefits. This was not recommended until enough progress had been made on Benefits .

Examples of questions which were to be considered: How do policy objectives of information programs and institutions or other constituencies, and those mentioned in conjunction with activities related to the provision and use of information, relate to identified overall benefits for society? Are the latter broad justifications of a rather theoretical nature or do they point to measurable results? Which policy objectives would be geared to measurable benefits? Which conceptual framework, eg. information infrastructure, information sector, information society, etc., seems more amenable to the identification of appropriate policy objectives? Etc.

3. BENEFITS

Messages related to the discussion of benefits, for whom. This was the core of the conference and the priority topic for discussion.

Examples of questions which were to be considered: What is the scope and nature of the benefits (economic, social, cultural, commercial, competitive, political, environmental, etc.) which may be expected to result from information activities? To what extent are the benefits associated with the building up of the information infrastructure compatible with those resulting from the immediate provision of information services? Are some benefits more important than others? Do the negative side effects associated with the development of an information intensive society offset the benefits? To what extent can the benefits resulting from information activities be compared to and assessed in the same way as those resulting from other kinds of non-material production, such as education? Is it possible to identify benefits which are primarily a result of information activities, and are not dependant from other conditions? Etc.

4. INDICATORS

Parameters or indicators by which the identified benefits could be assessed. Their discussion was not recommended until enough progress had been made on Benefits.

Examples of questions which were to be considered: Which facts could point to the achievement of the identified benefits? What is the time frame for those facts to be observed? What combination of facts is required in order to arrive at reliable assessments? Is it possible to assess short-term and long-term benefits with the same set of parameters or indicators? Etc.

5. CALCULATION

To discuss suitable procedures for data gathering and calculation in relation to the parameters or indicators selected. Their discussion was not recommended until enough progress had been made on Benefits and Indicators.

Examples of questions which were to be considered: What data are required in order to recognize that a particular benefit has been obtained? How can these data be gathered? Can the data-gathering be incorporated into the routine operation of information services? How could indicators be calculated? To which extent should and could the proposed parameters or indicators allow for inter-country or international comparisons? Etc.

6. FIELD PROJECTS

To discuss suggestions regarding future field testing or design of field projects which could incorporate the assessment of benefits. Their discussion was not recommended until enough progress had been made on Benefits and Indicators.

Examples of questions which were to be considered: How could the data gathering and monitoring of benefits be included among the components of the types of projects currently implemented in support of information activities? What alternative projects would need to be considered in order to facilitate such assessments? Are projects specifically geared toward the assessment of benefits required? If yes, what kind of projects? Etc.

7. RESEARCH AGENDA

To discuss suggestions for future research which cannot be taken care of by field testing in conjunction with information projects. Their discussion was not recommended until enough progress had been made on Benefits and Indicators.

Examples of questions which were to be considered: Which topics within the theme of the conference or in related areas would require a specific investigation? How

could this investigation be carried out? Are there priorities among the proposed research topics? Can these activities be further specified at this stage? Etc.

8. LITERATURE

Messages giving references and, if possible, short reviews, especially for hard-to-access non-conventional material, of relevant documents which it is felt all participants should be aware of.

9. OTHERS

This topic was available for messages related to such subjects as:

- News from the participants (absence, travel, meetings, etc.);
- Reporting about the interaction within personal networks;
- Comments on the proceedings and methods, suggestions for alteration of the conference structure and schedule;
- Cosy and telecommunications procedures and problems;
- Other subjects which do not fit within the scope of the other conference topics.

10. DIGESTS

Periodic summaries of the proceedings and comments on them. The summaries themselves were "read only"; comments or request for editing had to be presented in separate messages.