New Strategies for the Improvement of Civil Registration and Vital Statistics Systems

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Introduction

1. Civil registration may be defined as "the continuous, permanent, compulsory recording of the occurrence and characteristics of vital events, namely, live births, deaths, foetal deaths, marriages, divorces as well as annulments, judicial separations, adoptions, legitimation and recognitions" in accordance with legal requirements of a country. In short, these events are all related to an individual from birth to death and all other changes in civil status which may occur during the individual's span of life. Although civil registration is carried out mainly for its legal value as provided by the law governing the system, vital statistics is an important product of the system. Compiling and publishing vital statistics from the vital records on a regular basis provide users and planners data for population studies and development planning and assist in health and educational plans. A complete civil registration system, if combined with population registration which is updated continuously, will give a true picture of the population structure and distribution in a country or area at a specific moment of time.

2. This report will discuss the past experience and efforts of the United Nations to improve civil registration and vital statistics systems and the new strategies for future action for reaching the goals of the "International Programme for Accelerating the Improvement of Vital Statistics and Civil Registration Systems".[1] Although improvement of civil registration in developing countries received support from other United Nations agencies, UNFPA was and still is the main donor agency in this field. In the "Guidelines for UNFPA Support to Basic Data Collection Activities", the following statement is included: "It should be noted that there are a number of methods of obtaining data on levels and trends in vital rates, and changes therein. However, the registration method is a preferred method since it provides information on changes in the individual's vital and civil status as they occur. Recognizing this, the Fund (UNFPA) will continue its limited support to improve registration of vital events as well as to obtain vital rates from other sources such as Sample Registration Schemes, Model Registration Schemes, Vital Statistics Enumeration Surveys and Analytical Methods". UNFPA technical assistance was and is still limited to finance, limited activities in establishing a new system or strengthening an already existing system in the country. In order for UNFPA and other donor agencies to continue financing some activities of civil registration and vital statistics projects in the developing world, there should be some tangible results and successful efforts. Our main focus in this brief paper, therefore, will be to assess the contribution of UNFPA projects in this activity to the overall improvement of the national civil registration and vital statistics systems and to recommend appropriate courses of action with regard to future funding (from either UNFPA or from other donor agencies) in this field.

Past Experience

3. In order to review and evaluate UNFPA supported projects in developing countries, a group of countries has to be selected for the study based on set criteria. The criteria for selection of countries were:

(i) When the project was started - those started or completed quite some time ago - to assess whether they had the momentum to establish the civil registration all over the country;

(ii) The size of the country , both in terms of population and area - this would influence the scale of the project and its organizational aspects;

(iii) Implementation of the project and whether this was considered reasonably successful or not;

(iv) Regional variations - differing systems of administration would have influenced the structure and contents of the projects.

4. The review and evaluation for the civil registration and vital statistics systems of the selected countries were based on UNFPA supported projects for

[1] The report depends on the consultancy report "Review and Evaluation of UNFPA Supported Projects on Civil Registration and Vital Statistics" by Mr. P. Padmanabha as part of the activities of "International Programme for Accelerating the Improvement of Vital Statistics and Civil Registration Systems" (March, 1993).

the countries in the nineteen seventies, eighties and early nineties. The present paper does not go into details of the project implementation in the countries, but rather summarizes the conclusions arrived at after the thorough study carried out by the consultant as part of the International Programme for Accelerating the Improvement of Vital Statistics and Civil Registration Systems.

5. The evaluation focused on "some broader criteria which would be helpful in determining as objectively as possible their effectiveness and impact". These are: (i) Have at least the minimum objectives set been achieved (including the immediate objectives of the project)?; (ii) Have the national staff been trained so as to equip with sustaining the system?; (iii) Has there been a contribution to the overall improvement of the national civil registration system concerned?; (iv) Has an efficient system of civil registration been established as a result of the project(s)?; (v) If the system has not been established, at least has a momentum been generated which might sustain the activity?; and (vi) Has the utility of the system been adequately recognized by the national government so as to ensure its continued interest and support.

6. Based on the above-mentioned criteria, which are not necessarily independent, the study revealed the following:

(i) the immediate objectives have, in most cases, been largely attained. In cases where these objectives were not attained, there were reasons beyond the control of the implementing agency, such as constraints of government funding, new political developments or changes and similar extraneous causes. The successful attainment of the immediate objectives, by themselves, is an indication of the successful implementation of the project. An in-depth evaluation of the project is essential at, or soon after, the conclusion of the project;

(ii) the training component both locally and abroad has generally been carried out. While the full utilization of the expertise of the trained personnel is dependent on the sustained attention to the civil registration and vital statistics systems that the government devotes, the benefits from the training component of these projects can be considered as both positive and long-term;

(iii) the establishment of a civil registration system or improvement of the existing one on a national scale within a reasonable period, which is a long-term objective, has not been achieved in almost all cases;

(iv) the awareness in government and among policy makers of the utility of the civil registration and vital statistics system has not been created through the projects. There are some exceptions where committees which were established during the project implementation continued afterwards to create inter-ministerial and inter-agency linkage between the national agency responsible for civil registration and other related agencies.

(v) the projects have made useful contributions to overall improvements to the systems, but they cannot be said to have had the impact hoped for in terms of generating momentum for sustained action for ultimate establishment of reliable nation-wide systems. In cases where the results of the projects have not been followed up by the national governments, their contribution towards overall improvement of the system can only be said to have been partial.

7. From the above evaluation that the projects in most cases did not achieve their long-term objectives, a concern was expressed about the cost effectiveness of the investment so far in the demonstration projects. The validity of the investment was also questioned. As the previous analysis shows that the basic goals were not achieved in a specified period of time, "it would, therefore, be necessary to consider, in the light of the experience gained so far (i) whether the scope and content of these projects need reconsideration and if so, what would seem possible improvements, and (ii) in continuing to fund these projects, should the principles guiding such funding have to be different?".

8. As stated earlier in this paper, UNFPA is the principal donor in the field of civil registration. In addition to funding activities in other areas of basic data collection, UNFPA provides technical assistance for pilot projects which include international personnel, training components, publicity activities, equipment, evaluation and other related resources. Within the framework of its guidelines in the field of data collection, the civil registration projects, which were mainly demonstration projects in pilot areas, were formulated and funded. The pilot demonstration areas were designed either to introduce changes in the existing system or to introduce a new system of registration of records including processing and dissemination of vital statistics. The demonstration approach had been blamed that it competes with an existing system, resulting in confusion and disruption of the latter.

9. This situation, however, can be overcome at low cost. Through proper administrative arrangements, such as having the new forms notified in the experimental areas and withdrawing the old ones, as has been done in some cases, the likely disruption of the existing system need not occur. Also, it is relevant to note that the demonstration project is generally introduced only where the existing system is not functioning at all. It is designed to test the procedures and management practices, data processing and computerization or record maintenance, training procedures of local staff and other activities of civil registration and vital statistics at a minimum cost. It is similar to the pilot population census, or pre-testing, which is usually carried out before launching the full census operations. These civil registration activities (including training methods and documentation procedures), if tested in small areas (not necessarily geographically representative) would not be disruptive of the existing system. This would also solve the problem of the legal contradiction between the old and the experimental systems in the pilot areas if the laws of the country are difficult to amend. It is, therefore advisable "that the demonstration approach should be considered as a valid method but its adoption to be dependent on the specific components and objectives of a project".

10. Among the reasons for these pilot projects not attaining the goal of nationwide extension is the lack of government commitment to expand the system after the termination of the project. In many countries, no priority is assigned to the civil registration and vital statistics system because little recognition is given to the utility and importance of the system despite the fact that in most cases both the enabling legislation and the infrastructure exist. The most important reason would seem to be the lack of appreciation of the utility of the system and of the valuable information it provides for policy-makers both in administration and development planning, as well as the legal benefits it confers on the individual in society. Although the gap in information is felt, it is temporarily met through other more costly sources of data such as ad hoc surveys and censuses. The pressure from the public on the government is not strong because most civil registration laws contain, or are accompanied by, rules and regulations which bridge the gap by assessing the ages of individuals for schools and other official requirements of age proofs, and burial permits are not inspected nor observed. These rules and legal arrangements, which affected adversely the formal civil registration in the country, were (and still are) used as less efficient procedures to get an estimate of the age of the individual for official use.

11. In many cases no in-depth evaluation (diagnostic study) for the civil registration in the country was carried out after the project was completed. This is true even in projects where funds were provided in the project for the purpose of evaluation for future action and monitoring. In some cases projects have followed each other without an evaluation of the preceding one. It is, therefore, important that a project be evaluated before further funding of a new project is considered.

New Strategies for Civil Registration and Vital Statistics Systems

12. The goal of the International Programme for Accelerating the Improvement of Vital Statistics and Civil Registration Systems is to promote, support and encourage developing countries to undertake meaningful and sound reforms to accelerate the development and improvement of their vital statistics and civil registration systems. To achieve this long-term objective and based on the past experience, the following strategies are suggested:

A. Focus for Future Civil Registration Activities

13. Our focus in the future should be based on the experience of the past two decades where UNFPA, like other donors, provided funds for demonstration projects in some developing countries. The following strategies are based mainly on the earlier analysis in this paper and in light of the most recent workshops carried out in Asia and Africa.

14. In the formulation of future civil registration projects, the objectives themselves may need concentrated consideration. The possible reasons for the long-term objectives of current projects not being attained have been suggested in the earlier part of this paper. The past experience indicates that it is desirable to reconsider the focus of future projects in the civil registration area.

15. Any civil registration system is known to mean full coverage of events. It would seem, therefore, that it is no longer necessary to support projects that seek to establish a total system, particularly since the establishment of an efficient system is essentially dependent on national interests and motivations. The external funding of a national system would, in any case, be unlikely. It is, therefore, useful to consider the possible future orientation of these projects.

16. At this point it is important to note that both the

guidelines and the projects, in keeping with the mandate and interests of UNFPA, emphasize the statistical utility of the civil registration system. This is a valid approach, but it has had, in operational terms, an unfortunate result. Within the government concerned, there has rarely been a recognition of the general wider utility of the system, as described earlier, for other development agencies, for administration and for the public. Even departments that should have been very concerned about the efficiency of the system such as those dealing with health, women's and child welfare, family planning, disability and rehabilitation, human rights, criminal justice and the like, have not been actively involved in measures for the improvement of the vital statistics and civil registration system.

17. Given these realities of civil registration systems, it would seem desirable to change the focus of future projects in this area. The components of a project needing emphasis would no doubt be determined in more specific terms by the above-mentioned diagnostic study and the focus should be:

i) to establish within government an appreciation of the utility of the civil registration system, with particular reference to those ministries, departments or agencies concerned with health, family planning, women's welfare, infant and child mortality, education, etc.;

ii) to develop methods and procedures for introduction of stipulations regarding the production of certificates of specified vital events, such as birth and death certificates, for various civil entitlements, in a progressive manner and with necessary safeguards;

iii) to identify specific and priority activities to which the project may be restricted at a given point of time. The priority activities should be based on a diagnostic study. They may include: (a) training (both local and international) of the national staff to augment skills; (b) data processing (or computerization of applications of the system); (c) record maintenance; and (d) introduction of stipulations regarding production of certificates relating to vital events for official purposes, etc.

18. Such a focus would result in building up institutional strength as a priority in substitution of current attempts to improve systems which do not have such strength. This would also make the investment on the projects more cost effective.

B. Diagnostic Study

19. The diagnostic study of the existing system and the project(s) implemented would help in identifying specific components, such as those mentioned in para d above, that a project could concentrate on, and which are relevant for the attainment of the aimed-at focus. Such specific projects would need rather brief consultancies and not long-term experts, thus reducing costs. It is recognized that in a particular case a comprehensive project in the traditional format that seeks to include all operations may be necessary but, with the experience gained so far, such projects should be the exception rather than the rule. It is therefore advisable that, depending on the findings of the diagnostic study, the scope of a project should preferably be restricted to essential priority activities with built-in mechanisms for keeping the focus in view.

20. The diagnostic study and analysis would also help in identifying components that should be considered as a priority. For example, if there is little appreciation of the utility of the system in official agencies and within government, the promotion of recognition through demonstration of the value of the system could, in itself, be a worthy project.

C. Linkage to Existing Administrative Records

21. In this context it would be relevant to consider the linking, as in some countries, of the civil registration system to the systems of population registers and identity cards. Such administrative linkages can strengthen the civil registration system. The importance of inclusion in the population registers and the need to possess an identity card are clearly perceived by the public. If the mandate of the donor agency (UNFPA) does not allow financing other activities beyond population registration, funding can be limited to those inputs that are solely within the civil registration objectives of the project.

D. Demonstration Approach

22. That the demonstration approach continue to be viewed as a valid method, but its adoption should be within a general plan for establishment of the whole civil registration and should be dependent on the situation of the system. However, its adoption could be subject to certain conditions. The demonstration approach is also considered increasingly as a useful mechanism for testing out new changes to the system. It would be useful in situations where there is no civil registration

system at all, or where the performance of the existing system is weak or unsatisfactory. It would be useful for trying out procedural innovations for improvement of management of the system or for new technologies of records preservation, retrieval and data processing. In this case, the demonstration approach is very similar to the pilot population census, or pre-testing, which is usually carried out to test the census procedures before launching the full census operations, i.e., as part of a comprehensive programme. (See para. 8 and 9 for past experience).

E. Long-term Experts Versus Short-term Consultancies

23. The need for assignment of long-term international experts to civil registration projects would depend on the findings of the diagnostic study. International experts are expensive - increasingly so - and, more to the point, the project almost invariably becomes "expert dependent". Nevertheless, there may be projects which may require a long-term international expert because it is complex or because it seeks to establish a totally new system. Such situations would be rare. Therefore, depending on the circumstances that prevail, short-term consultancies for specific activities or components of a project would seem a desirable alternative. Such missions, if of reasonable duration, would enable the expert to intervene and suggest improvements without diminishing the responsibility of the national implementing agency. It is recommended that the assignment of international long-term experts be made only in exceptional cases, with the possibility of designation of direct execution responsibility to the national implementing agency, assisted by short-term international experts, being the preferred alternative.

F. Need for Evaluation and Monitoring

24. In many cases projects have followed each other without an evaluation of the preceding one. As mentioned earlier, the process of project formulation does not normally envisage a rigorous evaluation. It is encouraged that on its conclusion a project be evaluated before further funding of a new one is considered. In particular, the evaluation should assist in assessing whether the preconditions for a project exist and what should be the priority areas for further funding, keeping in view the broad focus suggested earlier.

25. Lack of follow-up of the activities of civil registration in the countries after project activities leads to uncertainty whether the project has been able to establish the desired momentum and whether the government has taken steps which would help in this direction. It would seem desirable to establish a mechanism for post-project monitoring of the system which provides a status report of the system in a country and helps in determining whether any further encouragement would be desirable to achieve the ultimate objective of establishment of an efficient national civil registration system. This may be established within the new system of UNFPA TSS/CST arrangements, in co-ordination with UNFPA country directors. Such monitoring and reporting should not be interpreted as pre-project activities which need actions to be taken immediately.

G. The Need for Government Commitment

26. That government commitment be assessed and made a precondition for establishment of a civil registration system or improvement of the existing system. Among the factors that influence the growth and strength of a civil registration system, the most important is the priority assigned to it by the government. National commitment is conditioned by official recognition of the utility of the system by numerous government agencies and by the pressure from the public for an efficient system because of requirements of certificates of vital events for various purposes. It is, therefore, essential that the appreciation of the system by the whole government system (and particularly those ministries and departments that are concerned with health, women's welfare, education, etc.) and the pressure from the general public should be securable to lead to the national commitment for the system.

H. International Cooperation

27. Since it is recommended that UNFPA continue to support projects in civil registration and vital statistics, but with stricter conditions for their objectives and focus, it would be necessary to ensure that there is some uniformity in (i) the conduct of the diagnostic study, (ii) identification of the appropriate preconditions for project formulation and implementation, (iii) determination of the particular focus of a project, and (iv) identification of the specific components and activities proposed to be included in a project based on the diagnostic study. It would also be necessary to maintain reasonable parity among projects with regard to inputs such as international or national expertise and equipment and their assets. Similar approaches would be called for with regard to evaluation and monitoring. This would

imply that the conduct of diagnostic studies and all other aspects referred to here, including monitoring and evaluation, should be subject to technical examination from the beginning. For this purpose, it is desirable that the United Nations Statistical Division be fully involved since it would have the advantage of having a global approach, especially since it is also the repository of long experience in this field. Coordination would be essential between the Country Support Teams and the United Nations Statistical Division and other concerned agencies.

28. It has been repeatedly emphasized that the civil registration system in a country should not be considered in isolation and that its utility as a tool of management of development programmes of numerous other agencies must be recognized. Therefore, elements of the system should be built into the appropriate projects of these other agencies so that there is full support of the civil registration and vital statistics system. These elements would be largely informative and educational. Their inclusion would entail almost no costs. Projects relating to women's welfare, immunization, family planning, social welfare benefits, disability and rehabilitation and the like can build in elements of information on the benefits of the civil registration system. Training programmes for medical personal can expose them to the utility of vital statistics and, therefore, the need to educate the public to register vital events while carrying out their functions. School programmes can also include elementary messages of a similar nature to inculcate in the young the utility of registration. There would be innumerable such programmes and projects which, at little cost, could lend support to the civil registration system. Although in the past, reference was made for coordination of similar projects, no clear-cut steps were mentioned for coordination of the efforts. It is desirable that more detailed and concrete steps of coordination be stated in the formulation of UNFPA projects and other donor agencies in the areas referred to.

29. In this context, it would be beneficial if such information and educative elements that support and strengthen the civil registration system be built into the appropriate projects and activities funded by other international agencies such as WHO, UNICEF and UNIFEM. These organizations presumably have a direct interest in the establishment of reliable civil registration systems and share the anxiety of UNFPA (and other concerned donor agencies) in developing such systems universally. The inclusion of the supportive components would not entail costs. In other words, this would result in a programme approach to civil registration instead of the purely project approach as at present.

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Accessing and Using the Internet

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I. WHAT IS INTERNET?

What is now known as *the Internet* started on 2 January 1969 when the United States Government, through the Advanced Research Project Agency, a Department of Defense Organization, launched an experimental project to explore networking technologies. A network --called ARPANET-- connecting supercomputers and other radio and satellite networks, was established to support mainly military research. The system was designed is such a way that each computer could communicate with any other computer, even if sections of the network were, for one reason or the other, out of order.

The network has evolved considerably since then, by incorporating other networks such as NSFNET, commissioned by the United States National Science Foundation (NSF), an agency which in the late 1980's was operating five supercomputer centers for scholarly research. The supercomputers composing the NSFNET backbone were communicating via fast (56,000 bit per second) telephone lines. The NSF network, based on ARPANET's technology, was joined by regional academic university networks, each with a supercomputer center operating as a hub.

The incorporation of NSFNET to the Internet was, in many respects, the starting point of its "democratization" in the sense that the NSF promoted universal educational access by funding campus connections only if the campus was willing to provide access to any enrolled student.

As a consequence of the increase of the number of nodes, the traffic on the network reached saturation. It was decided to upgrade the network with faster telephone lines and faster computers controlling the traffic. The contract was awarded to Merit Network, in parternership with IBM and MCI.

How do computers with different operating systems communicate with each other?

Communication among computers operating under different systems is ensured by running programs that use the same communication standard called protocol. A set of protocols, known as Transmission Control Protocol/Internet Protocol (TCP/IP)[1], was developed under contract from the U.S. Department of Defense as a means to internetwork dissimilar systems. TCP/IP is a de facto UNIX standard, but is supported on almost all systems.

Internet can therefore be defined as an electronic network composed of all the networks using IP protocol. This include, in the United States of America: government networks, campus networks, regional networks and large organizations; and a few networks outside the U.S.A., mainly located in Canada and western Europe. It has been recently joined, through gateways, by non-IP based networks (also called the outernet) such as Bitnet, Decnet, UUCP and FidoNet. The Internet (or simply "the net") , like the galaxy on which we are a tiny part, is in perpetual expansion. As of 30 April 1995, the number of nodes on the Internet and on other affiliated networks reached a number of 4,652,000. There were only 4 on ARPANET in 1970.

Who owns the Internet?

No one does. The Internet is not only the set of supercomputers and computers and the telecommunication infrastructure that links them together, but also the huge information resources and services available to users connected to the network. There is no supreme authority for the Internet as a whole. There is however a voluntary membership organization, called the Internet Society (ISOC), whose goal is to promote global information exchange through Internet technology. ISOC appoints a technical body, the Internet Activities Board (IA), whose members are selected among volunteers. The IA is responsible for the technical management and direction of the Internet and reports to ISOC. The IA decides when standards are necessary, actually sets them and announces them via the network. It also keeps tracks of Internet addresses, ensuring that two different computers do not have the same 32- bit address (though it does not assign addresses itself). ISOC relies also on another technical

[1]The TCP part of TCP/IP ensures that all of bytes sent are received correctly at the other end The routing mechanism is provided by the IP part. Messages transmitted contain the address of the receiver, as well as the destination station. A file transfer capability, called FTP or File Transfer Protocol is included in TCP/IP. Files can therefore be uploaded and downloaded between sites using the TCP/IP protocol.

body called the Internet Engineering Task Force. The IETF is the main working group in charge of the development of new TCP/IP standards for the Internet.

Who pays for it?

Part of the Internet is subsidized by the United States Government through agencies such as the National Science Foundation. With the Internet opened to other networks, the general rule is that every constituent network pays for its own part.

II. WHAT CAN BE DONE ON THE INTERNET?

There are five main services:

- Electronic mail (also known as E-mail or messaging);
- Discussion lists (ListServs) and newsgroups (Usenet) for communications among users;
- Remote connections to other systems with FTP for file transfer, or remote computing using Telnet;
- Query, access and download of text, data files and software using Archie, Veronica and WAIS;
- Interactive navigation across the network using Gopher and World Wide Web.

The electronic mail is the most basic level of the Internet that enables anyone to exchange E-mail with users on the Internet and other networks.

The next highest level combines discussion lists, newsgroups and electronic mail. The best collection of Internet access includes newsgroups and E mail, as well as the Internet's interactivetools — Telnet, FTP, Gopher, and so on. (These tools are called interactive because they enableanyone to connect with other people and computers in real time. E mail and Usenet groups do not work in real time. For instance, when someone sends an E mail message to a friend, it is not read at the same time the user types it in. It may sit in a mailbox for minutes or days before it is read by the recipient.).

ELECTRONIC MAIL

Like any tool, the electronic mail has its strengths and weaknesses. On the surface, it appears to be just a faster way of delivering letters. To know when an electronic mail is appropriate, think about how it differs from other

Table 1. Comparison of communication techniques[2]

	Telephone	E-mail	Postal Mail
Speed	High	Moderate	Moderate
Cost	High	Low	Low
Synchronization	Necessary	Not necessary	Not necessary
Formality	Varies	Moderate	Varies
Accountability	Low	Moderate	High
Conferencing	Small group only	Unlimited	One-way only
Security	Moderate	Low	High

mmunications media. In some ways, E-mail is very similar tothe telephone; in other ways, it is similar to traditional postal mail. Table 1 gives a quick comparison.

Table 2. Time and cost comparisons between fax message and electronic mail between Addis Ababa (Ethiopia) and London (United Kingdom)[3]

Media	10K file (4 pages) Time	60K file (24 pages) Time	10K file (4 pages) Cost in US$	60K file (24 pages) Cost in US$
Fax	8 minutes	48 mn	14.00	84.00
E-mail no compression 2400bps	2 minutes	5.6 mn	3.20	9.00
E-mail compression 2400bps	1 minute	3.7 mn	1.60	6.00
E-mail no compression 9600bps	30 sec.	1.2mn	1.60	3.20
E-mail compression 9600bps	20 sec.	40 sec.	1.60	1.60

The use of low-cost electronic networking allows information and expertise to be shared with wider

[2] Excerpt from *The Whole Internet:User's Guide and Catalog.* Ed Krol. O'Reiley & Associates, Inc. April 1994. Pages 101-103.

[3] Lishan, Adam. *Modern Communications Through Electronic Networking.* PADIS, UNECA. Workshop on Statistical Computing, Addis Ababa, Ethiopia 7-11 Nov. 1994. ECA/STAT/SDB.5a(ii)/94/10. Page 8.

coverage, unlike the conventional telephone and even fax communications. The relative cost-effectiveness of electronic networking is well documented . In Africa, for example, a one page E-mail costs about $1 to transmit, a one page fax about $10, and a five minute phone call up to $25.

Electronic Mail, ListServs, and Discussion Groups

Sending an E mail message is the most used function on the Internet, with the exception of sending and receiving files. The Internet software, through a computer network, delivers the E-mail messages right to the computer. Delivery time and costs are far less than other traditional means. The only main drawback is that the system is not secure. This means mail sent and received are open for others to read. Therefore, to maintain mail privacy and confidentiality, do not send it by E mail unless you want to invest in a scrambling device for encoding communications. E mail is used for the same reasons people send postal mail:

· Exchange of correspondence among business associates
· Exchange of private letters among friends and family

In addition, the E mail is useful for these purposes:

· Transfer and receive copies of files and documents
· Subscribe to electronic discussion groups, electronic journals, electronic newsgroups, and so on
· Obtain free copies of computer software
· Obtain copies of sounds, graphics, and multimedia through the Internet

Sending and receiving E-mail

To write and receive E mail messages, an E mail software program "resident" is required. This software allows the user to see incoming E mail messages and provides an editor for outgoing messages.

According to statistics regularly compiled on network usage, the electronic mail is the most widely used facility (see Figure 3). Provided someone has a direct PPP connection or has access to a networked computer with E-mail facility, the person may send messages, documents and data files to one or several countrepart users.

There are many commercial E-mail programs operating under all platforms (CCmail for DOS and Windows, Microsoft Mail, PINE, ALL-IN-1, DEC MAIL, etc..), and most offer these functions: send and receive mail, forward mail to one or several addresses, reply directly to the sender by proposing a template with the address and subject already filled, attach documents in several formats, store mail in folders, use aliases in lieu of addresses

Internet addresses are built up from left to right beginning with the most specific piece of information (a user's personal and individual identification) and proceeding to the most general (the highest level domain within which the user can be found). A name consists of several elements or labels, each separated by a delimiter (a @ or . character). The format for addressing a message to an Internet user is:

username@location.domain

For example, the address of one of the authors of this document is benzine@un.org, pronounced "benzine at u.n. dot org". The "at" sign (@) separates the name from the network address. In another address such as: pgerland@nywork2.undp.org, the address also carries the computer name (nywork2) in addition to the domain name (undp) and the top-level domain name (org). Usernames are commonly a first initial followed by the last name (pgerland for patrick gerland) or the reverse (nuttalli@who.ch for Isabelle Nuttall). Sometimes the first and last names are separated by an underscore (riza_padolina@smtplink.unicef.org) or a dot (christophe.nuttall@itu.ch).

The top-level domain name is a three letter abbreviation of the recipient's affiliation: .com (commercial . and business organizations), .edu (education and research institutions), .gov (government agencies), .mil (military sites), .net (gateways or hosts), and .org (international and other organizations). All Internet addresses are internally converted into a unique, 32 bit identifier (always four numbers - each less than 256 - separated by periods) for a specific TCP/IP host on a network. The Internet Protocol address corresponding to the one given above for illustration is: 157.150.192.10

Outside the United States, each nation has an assigned domain that corresponds to its two-letter code, as listed in table 5 (page 86). These country codes are based on the International Standards Organization (ISO), number 3166, which defines two-letter, three-letter, and numeric
designations for each nation.

Information moves across the Internet very much like mail moves through the post offices. A message may be carried in a mail truck or (in the case of the Internet) on a packet switching network. In either case, it may travel

along with thousands of other unrelated messages. When it arrives at its destination (say Brazil), our electronic message is reassembled, sorted, and sent out again to its final destination within Brazil. Message delivery to a recipient's mailbox is not instantaneous as the case is, for example, with a faxed or telexed message. It takes from a few minutes to a few days, depending on how it is routed: two messages from a single source to the same destination may take different routes,depending on the traffic in the network. It is the responsibility of the receiver to open and check the mailbox. Mail not delivered is returned with a message indicating the reason for non-delivery.

To send the message, use the command in the menu. There are some E-mail systems whereyou type a period on a separate line and hit the Return key. The system will send the message, or prompt with cc. This gives the opportunity to copy the message to a third party. If we simply press Enter, the message will immediately be sent.

When E-mail gets returned

When electronic mail cannot be delivered, the user normally gets a message. At this point, you only know the mail did not go through. To know the cause, it is necessary to wade through the returned cryptic message.
There are three common reasons for electronic mail to fail: · Unknown hosts: the mail system can't find the recipient's machine· Unknown Recipients: the recipient is unknown at that machine· Mail Can't Be Delivered: the mail can find the machine but still can't deliver the message.

Using E mail to Subscribe to ListServs and Discussion Groups

Since the BBS concept was transferred to the Internet and the software was modified, hundreds of USENET and ListServ discussion groups have operated on the same principles: a topic is stated, and people interested in the topic send and receive messages, and conduct discussions
from all around the world. Many programs now archive the discussions so that newcomers can retrieve threads of conversations that have taken place before they join a discussion. Any listing that has a URL beginning with mail:// can be subscribed to via E mail. Someone simply "writes" to the contact person of the resource, and they "write back" in return. It is all accomplished electronically, just as if the person were sending a letter through the post office

Mailing Lists and ListServs

This is an E mail feature that allows a single message to be "served" or delivered to many addresses simultaneously. The recipients' E mail addresses must appear on a distribution "list" to receive these reflected messages. There are currently over 5,600 publicly accessible ListServ-based mailing lists in the world (May 1995). They cover a wide variety of subjects, and thenumber grows daily.

The Listserv system is a mailing list of E-mail addresses which allows members to send messages to a particular mailing list. The mailing list consists of a large number of people interested in the specific topic(s) who receive subject related articles using their normal E-mail software. Mailing lists are generally maintained by the Listserv software but some of them are managed by a human moderator.

Listservs have been traditionally maintained at universities as part of an intercampus network called Bitnet. The Listserv program forwards messages directed to it to all subscribers The host computer receives and sends out E-mail, keeps files, handles subscriptions and unsubscriptions,and collects monthly logs of all messages sent to the list. It can also provide files of other information. The listserver will send "back issue" logs and other files on request. ListServs are free and provide a very useful and efficient way of coordinating the activities of a large group of people (especially if they are geographically dispersed). Everyone can comment or inform everyone else about their work, questions to be answered, or some organizational matters to be resolved. Since the comments can be read by everyone, it provides a quick and easy way to keep list subscribers involved and informed. The following describes how to use the listserv programs.

To subscribe to a ListServ group, send an E mail message to the URL address. The transaction takes place between software, and there is no human intermediary. Knowing the difference between a list that has a human moderator and one that is controlled by software is useful. We can usually tell this by the URL. If the address contains the information "listserv@", the resource is handled by a computer; if it contains the information " requests@", there is a human editor who handles the subscription and information requests, and maintains the distribution list manually.

To send or receive an E mail message, both the sender and the receiver must have electronic mail addresses. (Some services have emerged on the Internet that accept an E mail messageintended for another party who does not have an electronic account. These services will —for a fee— have the message printed and delivered by a fax or by the post office.). Typically, to subscribe to a ListServ list, we send an E mail message to the software (called, simply, ListServ) that governs the subscription requests and maintains the distribution records for the discussion list in which we are interested. Invariably, the software governing a list will belocated on the same computer host on which a particular discussion group is located. The subscription request is sent as a message containing the single line:

<SUB List Name YourFirstName YourLastName>

(Substitute your real first name and your real last name for the phrases "YourFirstName" and "YourLastName" in the preceding syntax.)To unsubscribe is even easier. We send a message containing the single line:

<UNSUB ListName>

In this case, the computer software will be able to determine your first name and your last namefrom the subscribers'records it maintains. It is, however, important to send these messages from the same account used when the subscription was made; otherwise, the records will not match. To send a message to all subscribers on the list, simply address an E mail message to the listitself, instead of to the ListServ software. Thus, if we wanted to join a list called "Economy" about Economic Problems in Less Developed Countries located at "acadvm1.uottawa.ca", we would send a subscription request to the following address:

listserv@acadvm1.uottawa.ca

If we intended to send a message to all the subscribers of the list, we would address our message to the following:

economy@acadvm1.uottawa.ca

Note that the computer host, domain, and type (everything following the "@" sign) are identical in both instances as we are merely addressing the software manager (ListServ) in the first case, and the distribution list ("Economy") in the second.

ListServs are free; there is no subscription fee. But a price can be associated with subscribing to too many ListServs (or ones that are very active). Subscribers should be aware that some ListServs generate a lot of interests and heavy mail. If someone subscribes to several ListServs, (s)he should be prepared for a substantial increase in mail. It could be difficult to review, and might also take up disk space on the computer until the person is decided what to do with the individual messages. It is better to keep a record of the lists you have subscribed so as to to easily unsubscribe from a list that inundates you with more messages than you can handle.

Finding a Mailing List

To find out about mailing lists that are relevant to your interests, send the following command to the same address given above:

LIST GLOBAL /keyword

(Of course, we must replace "keyword" with an appropriate search word such as Marketing, Education, etc.). Another helpful document with the commands used to subscribe, unsubscribe and search mailing list archives can be obtained by sending this to:

LISTSERV@ubvm.cc.buffalo.edu

Include only this command in the body of the note:

get mailser cmd nettrain f=mail

Search and view the enormous selection of Listserv and Internet mailing lists through this easy-to-use gopher interface which includes a list of recent additions, deletions, and updates: Gopher: Name: Nova Scotia technology Network Internet Resources | Mail Lists

Internet Mailing Lists

There are several compilations of mailing lists to which one can subscribe and these are indicated below. The same mailing lists may appear in several compilations, as there are overlaps among the sources.

Mail:
Address: arielle@taronga.com or mail-server@sri.com
Body: end netinfo/interest-groups

Usenet:
Newsgroup: news.answers

Anonymous FTP:
Address: dartcms1.dartmouth.edu
Path: /siglists/internet.lists

Address: class.org
Path: /class/ kovacs_library_listservers

Address: ftp.concert.net
Path: /netinfo/interest-groups.txt

Address: ftp.sura.net
Path: /pub/nic/interest-groups.txt

World Wide Web:
URL: http://www.ii.uib.no/~magnus/palm.html
http://www.clark.net/pub/listserv/listserv.html

Bulletin Boards (BBSs)

BBSs are software tools for providing bulletin board services. BBSs differ only slightly from E-mail ListServs. Any given BBS can provide E mail, but it also provides access to collections of data and/or documents that can be downloaded. BBSs offer an alternative to ListServs in the sense that we can choose whether we wish to obtain information from a BBS, whereas by subscribing to a ListServ we automatically receive all messages from the ListServ. Users may retrieve "threads" of discussions along topical lines from BBSs by requesting a search of archives of postings and E mail messages that deal with a particular topic. Non Internet BBSs frequently involve an access fee, while most Internet based BBSs are free.

USENET (USERS NETWORK) GROUPS

USENET refers to a worldwide collection of thousands of computers (not all on the Internet) that host and receive USENET newsgroup information and exchanges. As of May 1995 over 58,000 computers around the world make up this network, exchanging news articles daily. We will find many of these in the references listed in this paper. The main differences between the Newsgroup and the mailing lists (ListServ) are the following:

· USENET is a special interest news distribution scheme that allows individuals with access to Usenet to read and post articles. The system is somewhat like E-mail but involves a network of news 'feeds' that pass the news along, and makes up a worldwide collection of automatically updated electronic bulletin boards or forums.

· Each message within an individual newsgroup is called a post or an article. Articles within each newsgroup are arranged by topics. Initial queries or informational articles will likely generate several responses. This patchwork of queries and responses form a message thread with a specific topic. The software used to read network news automatically piece together the various queries and responses in logical order. The original article appears first, followed by any available followup (response) articles in the message thread.

· USENET is divided into newsgroups. Each newsgroup is devoted to a single topic. Each newsgroup article is received and stored on each participating USENET computer. Unlike E-mail (and mailing list based on ListServ), where the messages are actually sent to every computer subscribers and stored on their individual mail account, newsgroup articles are stored on a news server, at the site that services the accounts.

Check with the systems administrator(s) at your site or your service provider to see if you receive USENET news or if a site mail alias has already been set up for the mailing list before subscribing. This can help cutdown on network traffic, and reduce the cost by sharing the same amount of information among all the locally interested subscribers.

As of May 1995 there are over 2,500 active newsgroups that function as forums for exchange of questions and answers on a specific topic. Each newsgroup has a distinct identifier that describes the topics discussed in the group. Newsgroups distributed worldwide are divided into seven traditional classifications:

comp Groups that discuss topics of interest to computer professionals and hobbyists. Hardware and software systems are also discussed.

misc Groups that address themes not easily classified under any other headings, or that incorporate themes from multiple headings.

news Groups concerned with the news about network and administration topics.

rec Groups oriented toward the arts, hobbies, and recreational activities.

sci Groups concerned with discussing practical knowledge, usually related to research in or the application of established sciences.

soc Groups that primarily address social issues and socializing.

talk Groups largely debate oriented and tend to feature long exploratory discussions on individual topics with little resolution.

In addition, there is a rapidly growing category of newsgroups with "alternative" grouped names. These involve subjects or communities that are less formal and less traditional, such as the following:

alt	Groups that deal with ephemeral, frivolous, or highly controversial topics.
bionet	Groups related to biology.
bit	Redistributions of BitNet LISTSERV mailing lists. All sorts of subjects.
biz	Groups for business and commercial topics.
clar	ClariNet newsgroups, from commercial and official sources.
gnu	Groups about the GNU Project of the Free Software Foundation.
hep	HEPnet newsgroups, about high-energy and nuclear physics research sites.
ieee	Groups for discussions related to engineering and electronics.
info	A collection of mailing lists gatewayed into news at the University of Illinois.
k12	Groups for discussions of primary school educational topics (K thru 12th grade education).
relcom	Russian-language newsgroups, mainly distributed in the countries of the former Soviet Union.
u3b	Groups of interest to AT&T 3B{2,5,15,20,4000} computer users.
vmsnet	Groups of interest to VAX/VMS computer users.

Each newsgroup is geared to a specific subject. Some newsgroups may literally have thousands of subscribers whereas others may exist with only a dozen or so subscribers.

INTERNET ACCESS TOOLS[4]

TELNET

Telnet is among the earliest Internet command structures. Telnet is a software tool used to log in to a remote computer and to use its applications. Most computers are protected by passwords (or their important files are protected by some measure of security). Some allow temporary or restricted access when a user submits his/her computer account as a password. Given the appropriate password, or if a computer is available to the public, Telnet lets us work on the remote computer as if we actually owned it. This means that if the computer to which we are connected is more powerful than the one than we own, we receive the benefits of its increased performance even though we are distant from it (perhaps even in a different country).

Most communications software packages support Telnet communications protocols, because the command protocols are by now quite ubiquitous on the Internet. The Internet Telnet software is a tool of enormous benefit to scientific and engineering research and development. It makes it possible for people to work together and share resources as, for example, to avail themselves of powerful and expensive supercomputers. Telnet is a useful command structure, letting us interact with computers on the Internet. Telnet is useful because it has existed for a long time, and many commercial programs now incorporate basic Telnet programming structures, making it possible to use this facility from a variety of telecommunications software programs.

FTP (FILE TRANSFER PROTOCOL)

FTP is another specialized Internet tool. Its special function is limited to retrieving files from remote computers or placing them there. Text files, application programs, binary code, software updates, various utilities, and many helpful computing aids can be retrieved using FTP. Numerous Anonymous FTP sites permit anyone on the Internet to retrieve files that have been placed on a computer as a public service.In a recent transaction, files of substantial size were posted onto a computer by one user and picked up by another for correction. When the corrections were finished, they again were posted to a computer and retrieved by another individual. In the case of this example, one of the persons was in New York, U.S.A, and the other in Algiers, Algeria! It would have been time consuming to have transferred these files by postal service. It might also have been impractical to send large files via E mail. FTP permits the exchange of files in this manner very easily.

ARCHIE

Archie is a searching tool that has a specific function on the Internet. It queries Anonymous FTP sites on the Internet in a standardized manner and creates an index of the files located on these sites. Because there are thousands of Anonymous FTP sites, it could be difficult to find a specific file. Archie solves the problem by its single comprehensive index. We can easily search for a file name, and then log in to the appropriate FTP site listed in the index. Archie is a software tool that — on an ongoing basis — scans Anonymous FTP sites and builds an index of Table of Contents of those sites,

[4] Excerpt from *New Rider's Official Internet Yellow Pages* by Christine Maxwell and Czeslaw Jan Gryez. New Riders Publishing. 1994. Pages 10-13.

making it easier to find specific items.

GOPHER

Gopher is an extremely popular Internet tool, developed at the University of Minnesota. Gopher permits us to access data without requiring that we know beforehand its location or even details of what it is we are looking for. Gophers are popular because they permit the user to browse and discover things on the Internet with little difficulty. Most people also find Gophers very friendly and easy to use. Gophers provide a simple, menu driven, tree structured interface to the data/files available on the various Internet servers. Even though they are easy, some people have improved on Gopher even further, and have made that improved software available to the Internet community. Most of the Internet tools can be retrieved from FTP sites. These kinds of tools are often also carried on local sites, so we might check with our local administrator to find out if a copy is already available to us through our home or office account provider.

Veronica

Veronica (VEry Rodent Oriented Net-wide Index to Computerized Archives) is a gopher service dedicated to locating resources existing within "gopher space." Veronica is an augmentation of gopher. It provides keyword searches of the titles of gopher items. This is a major help to finding out where a given file or program can be found and retrieved from among the various gopher Internet sites. The Veronica service maintains an index of titles of gopher items, and the result of a Veronica search is a gopher like menu of files or directories. We can often get to Veronica by going through a normal gopher client, either our own or one supplied by our Internet service provider if we do not have our own.

WORLD WIDE WEB (WWW)

Another characteristic of the Internet is the ability to link documents at one location with files at another. This kind of network linking is known as hypertext, and a special tool has been developed to pursue hypertextual links among disparate files. World Wide Web (WWW) is an Internet software tool for network navigation similar to gopher. It is also menu driven. Unlike gopher, WWW follows hypertext links between related sources rather than files related to one another by server identification. WWW allows us to pursue the "strands" of a web of information distributed across the networks. Using WWW we might locate an interesting document, notice a citation in it, and use WWW to look up the source document. This popular Internet navigation software can be obtained from a site in Europe. Though a relative newcomer, WWW holds great promise for navigating the Internet electronically, and is contributing to making Internet even more accessible to novice users.

Mosaic

Mosaic was developed by the National Center for Supercomputing Applications at the University of Chicago at Urbana Champaign, Illinois. Mosaic is among the most popular of the recently available Internet searching tools. It comes in many flavors for various computing platforms. Be sure to download the version of Mosaic that matches your computer. Mosaic understands the protocols of many of the most used graphical user interfaces. It unifies the searching capacities of many Internet retrieval tools and adds the ability to display images in a variety of graphical formats. This means that Mosaic can retrieve a variety of image files and show them on the computer even if we do not own the original graphics program from which the images have been generated. Of course, the computer must be able to display graphics (that is, it must have a windowing capability of some sort).

Mosaic is popular for its flexibility and comprehensiveness as an Internet navigator and retriever
of a wide variety of file formats. A text-based version called *Lynx* is able to run on most computer platforms and can also provide most of the basic navigation features offered by Mosaic using the hypertext links available in the World Wide Web.

As with many such specialized tools, finding out what is available for retrieval by Mosaic was a problem. A recent tool called the World Wide Web Worm WWW(W) is accomplishing a function similar to that of Veronica. It scoured the Internet locating WWW sites and indexing their contents so that people could more easily find information they were seeking.

Wide Area Information Servers (WAISs)

WAIS is an Internet tool that lets us access specially designed server databases in a useful manner. Rather than using a conventional searching strategy, WAIS incorporates the capability of using natural language

queries. The system interprets a query in a useful form for its server databases, and looks through the database(s) for documents containing specific terms or phrases. When it finds them, it ranks the results and delivers a list of likely information in the order of relevance. The document that best matches a search is scored 1,000, and the rest are given a lower figure according to the rank of relevance. An even greater enhancement is that we can use the results of the search to modify our original search even further. Thus, if the fourth ranked file is closer to what we want than the first ranked file, we can add it to our query parameters, saying, in effect, "get me more like this" but including this topic.

WAIS is an example of a tool that provides an enhanced retrieval mechanism through ranking of items according to their relevance to a constructed query. It is a powerful Internet tool, and many servers exist on the Internet with WAIS compliant databases. We can find some of these listed in the pages of this directory.

III. GETTING CONNECTED: WHAT IS NEEDED TO PLUG IN TO THE INTERNET

There are two types of connections to the Internet: a shell account connection and a true Internet connection. Most of the users get connected through their companies or university computers with full time access to the Internet. This category of users has its PC or MAC linked to a UNIX server connected to the closest Internet access point, called the host. The connections from users to the server is made via a modem or through a local area network (LAN) and a communication software. A growing number of on-line service providers also offers
subscribers, who want to be members of the club but do not have access to a company or university computer, a shell account on a computer connected to the Internet.

A terminal emulation software is used to dial from the computer to the service provider's computer. Once connected, users get access to some of the Internet's resources depending on the specific agreement with the provider. The shell account type connections and those obtained through employers' and universities' computers are not "true" Internet connections: they provide access to only a limited number of services. To benefit from the complete set of services (to be reviewed later), a TCP/IP connection is required with a Point to Point Protocol (PPP) link. PPP is a serial communications protocol for Wide Area Networks (WANs) defined by the Internet
Engineering Task Force (IETF) in 1991. It can run on any full duplex link from dial up to high speed communication lines. It can establish and terminate a session as well as hang up and redial on a low quality call.

With a remote log-in (Shell account), one cannot use applications that need a graphical display (like AIR Mosaic, discussed later). For that, a PPP connection is necessary. Similarly, electronic mail can be sent and received directly only with a PPP connection.

Depending on the user's needs and the provider, the connection may be free, or it can vary from a nominal fee to thousands of dollars per month.

What is needed?

The equipment needed depends on the selected level of service. Here are the essential components to connect to the Internet:

· *A personal computer* (IBM PC, Macintosh, or other) is sufficient for individual level services. Unlike other recently popularized areas of computing such as multimedia, the hardware requirements are quite reasonable. The computer can be any size or kind. It should be capable of running a conventional communications program and must have some space to store files. Obviously, more powerful machines that can run Windows, or System 7 for a Macintosh, may provide a more up to date user interface and other features, but the baseline capabilities of the net will not be enhanced.

· *A hard drive*. A hard drive is essential to store the information files taken off the Internet. Hard drive space is always at a premium. It is likely that the more interesting files on the Internet will be larger and more complex ones. Files containing images or sound can be quite large, so it is wise not to skimp on disk space.

· *A modem*. This device converts what is typed on a personal computer into signals that are transmitted across standard telephone wires or data lines. (Modems are usually distinguished by the speed of transmission, known as baud rates. The higher the baud, the faster the transmission) E mail activities can be readily handled by modems with low baud rates (2,400). If advanced Internet functions are anticipated, a modem supporting higher transmission speeds is highly recommended (14,400 is common now, and 28,800 or higher are already on the market). The rule of thumb is to purchase a modem with the highest available baud rate.

· A standard, voice grade telephone line is perfectly

acceptable for connecting to the service provider's host computer. The most advanced levels of service require special hardware, and perhaps special telecommunications lines.

· *A telecommunications program.* Communications programs are software programs that permit the computer to send data across a modem. In an increasing number of business and office environments, local area networks are being established through which Internet access is available. If we work from home or from remote field locations, we will need a software program for our home or portable computer to permit it to make a phone connection across telephone lines to another computer connected directly to the Internet. (Frequently, the people who specialize in modems will be able to recommend an appropriate communications software program. They will also be able to answer questions about setup and provide initial troubleshooting.)

· *An electronic account.* All Internet users must establish an Internet address. To do this you must obtain an electronic account with one of the services providing Internet access. Electronic accounts can be obtained from universities or research institutions (if the reader
happens to be affiliated with one), from some businesses (many companies are already installing or investigating electronic networking), or from the commercial Internet service providers that sells access accounts.

· An appropriate level of Internet access . Universities and large corporations have dedicated lines to the Internet. All individual users need a software program to use the Internet Protocols (IP) for communications. IP protocols are enabled by SLIP (Serial Line Internet Protocol), compressed SLIP, or PPP, (Point to Point Connections) software applications. Increasingly, these tools come with the major telecommunications programs, or are available as shareware from other users.

Many Internet users subscribe to commercial providers who have already installed the necessary connections. Users need only to sign up with one of them and they are ready to follow on-line instructions to gain access to the Internet. It is useful to realize that almost all Internet providers can supply subscribers with a variety of access levels, from simple E mail to a more comprehensive TCP/IP access. The rates vary based on the level of access.

Similarly, it is important to know that some electronic network providers give subscribers access to a set of services that can easily be confused with Internet services. Companies like CompuServe, America Online, and Prodigy in the US, Minitel in France, and other producers in other countries provide some useful electronic services, but they are not the Internet. In many
cases they can provide access to Internet E mail addresses through gateways, but many Internet resources requiring FTP, gopher, MOSAIC, or other advanced Internet services are either unavailable, or accessible with additional conditions.

How much will it cost?

The cost for an Internet connection comes from three sources: service provider charges, line connection charges, and set up costs.

Set up costs

Assuming that a user has a personal computer, the needed hardware is a modem. A 2400 bit per second (bps) modem can be easily found and purchased for under $50[5]. A communications software is also needed. For the most basic services, it possible to use terminal emulation software that can cost from $50 to over $100. For the more sophisticated service that will support the needs of a small business, it is reasonable to pay about $500 to $2,000 for hardware, plus another $500 or so for software.

The software cost of an Internet connection is being alleviated by a move of operating system developers to include Internet capable software within the OS itself. For some time, UNIX operating systems have been Internet capable, and Microsoft Windows NT also includes thesoftware support necessary to communicate with the network. Many of these same features are also expected in the next release of Windows 95.

Monthly costs

The service provider calculates the monthly charges based on the level of service and theprovider's price structure. As mentioned earlier, there are conditions for a free connection. If someone uses a fee based provider, it is common to pay $10-$30 per month for basic service,

[5] The costs quoted in this section are applicable to the United States of America.

and $20-$50 for a full featured individual access. A small business can get sufficient service for $100-$500 per month. Expensive connections are designed generally for larger organizations that often have dedicated staff for arranging and managing the connection.

The telephone company charges for the connection time. A popular trend among service providers is to offer local phone numbers, or toll-free numbers for a flat fee. The advantages must be weighed, but it does give an option.

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Rapid Assessment Procedures (RAP): Is there a role for the modified cluster survey?

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I. Rapid Assessment Procedures - Origins and Overview [1]

Rapid Assessment Procedures (RAP) are an eclectic set of methods, tools and measurement techniques used originally in programmes for child survival and development and in water and sanitation projects. At its inception, RAP was applied predominantly in rural settings [see also Rapid Rural Appraisal (RRA) references]. The methods of RAP include group interviews or focus group discussions, interviews with key informants, ethnographic or direct observation, case control studies, community surveys, epidemiological and demographic surveillance, sentinel site surveillance techniques, unstructured interviews with programme beneficiaries and community participants [Scrimshaw 1992] plus a whole host of other techniques (see Glossary in Annex). The uses to which RAP has been put include both planning and evaluation. For child survival programmes and other applications, the main initial goal was to find out what intervention strategies work best in the field.

Emphasis was originally placed more upon qualitative and explanatory information than upon quantitative data, the latter of which was and is often condemned and avoided as being too expensive and time-consuming to collect, especially with respect to large-scale national surveys. The rationale for introducing the anthropologically-based RAP was the desire for in-depth information that could be collected rapidly and used credibly and purposefully. More recently, RAP methodology has included increasing use of quantitatively-based data collection protocols including cluster surveys, lot quality assurance sampling and rapid surveys [USAID 1993].

In the continually evolving methodology of RAP its proponents use the kind of terminology usually found in statistical experimental design and in biostatistical applications such as epidemiological research. Terms with a clear statistical connotation such as "rigorous," "unbiased," "reliable," "valid," "accurate" and even "representative" abound in RAP literature. Of more importance, however, is the increasing use of RAP findings or results to claim inferences about larger populations.

Paradoxically, and strangely, few if any statisticians have had a strong hand in developing or refining RAP methodology. Not surprisingly, there are some statistical problems with using RAP-derived data as statistics. This article briefly describes some of those problems and suggests how one newly emerging rapid technique, the "modified cluster survey," can be designed in a statistically sound manner and used in some RAP applications. Our objective thus is not only to remind users of deficiences in techniques when RAP is used for statistical purposes, but more importantly to suggest a way in which a valid statistical technique can be invoked efficiently with little risk of having to change the acronym to SAP (substitute "slow).

II. The Procedures

A glance at the Annex reveals the veritable cornucopia of tools and methods that are invoked under the name of RAP or RRA. It would seem that almost anything goes. Indeed a definition of rapid rural appraisal that was put forth in 1985 (Grandstaff, 1985) is "any systematic activity designed to draw inferences, conclusions, hypotheses or assessments, including acquisition of new information in a limited period of time." This definition is unfortunately not very informative; it is another way of saying "use of any conceivable research tool, but not in perpetuity." For that reason it seems to exclude no technique nor does it even include rapidity, since any finite time frame, (25 years!), can be said to be "limited."

It is interesting to note that definitions, in general, in rapid assessment procedures are hard to come by. While the particular techniques used in a given application are described, usually carefully and with great detail, they are rarely actually defined. One reason could be that many of the techniques are simply well-known in social research and their definitions are taken to be self-evident by users. But it also suggests that RAP itself is a sort of unrestrained approach to research that shuns exactitude. The "definitions" offered in the Annex come largely from the author's own experience and imagination; they are no doubt fraught with misconceptions, which is one reason we hasten to say that this is a work-in-progress.

[1] This paper is a work-in-progess. Other topics will likely be included as the research progresses. Moreover, as can be seen in the Annex, the glossary is incomplete and evolving.

Yet we are not insisting on tight, circumscribed definitions, because RAP generically, as opposed to the particular methods or techniques of RAP, subscribes to a set of desirable principles or properties which characterize it, if not narrowly defining it. These include emphasis on the explanatory dimension of research and emphasis on the participatory nexus between researcher and subject; flexibility and creativity of design; triangulation (utilizing three sources of information for validation); the concept of optimal ignorance, or limiting investigations only to "what is worth knowing" (Kashyap, 1992); focus on inductive rather than deductive results; attention to cost effectiveness, timeliness and local resource limitations; and attempts to overcome the limitations of conventional surveys (Kachondham, 1992). More about the latter point is discussed in sections IV and V.

III. Justification for Adapting RAP to Population Data Collection Activities - the Connection to ICPD

As mentioned, two important features of RAP are rapid compilation and in-depth explanatory information. These are highly desirable in any context. For follow-on research relating to the International Conference on Population and Development there is a clearcut advantage to using RAP wherever it is warranted. It goes without saying that there is an urgent need to implement workable intervention strategies to deal with the myriad issues of reproductive health, the general situation of women and children and other topics as soon as practicable.

Where RAP applications can inform policy and intervention plans and strategies, there is an obvious dividend that might otherwise be seriously delayed if planners must await a more demanding and time-consuming reproductive health survey to be staged. Yet, even in the latter, there is potential for advantageous use of the modified cluster design, alluded above and discussed in section VC. But first it is necessary to deal with some of the statistical problems of RAP.

IV. Statistical Barriers

To illustrate one of the statistical problems with RAP that pervades the literature, a 1993 report prepared by USAID (Reinke etal, 1993) is briefly discussed, though the author is quick to acknowledge the overall usefulness of that document in providing a comparative analysis of nine,[2] mostly quantitative methods used in RAP. The report provides guidelines to programme managers on the conditions under which various rapid assessment techniques should be used, listing the advantages and disadvantages of each. The individual chapters on each method provide a good description of these techniques.

Commonly cited advantages among the 9 methods elaborated in the USAID report include rapidity, low cost, simplicity, small samples and ease of reporting. It is interesting to observe that statistical quality, or any equivalent concept, is never mentioned as an advantage, nor lack of it a disadvantage. This omission may be due to the authors' recognition that statistical quality is not readily attainable with RAP, but perhaps it is because they believe the intended audience may not care. Yet, many of the techniques compared use "samples" in the data collection.

It is the use of samples in so many applications of RAP, not only in the guidelines presented in the report discussed above, but throughout RAP research, that cries out for the hand of a statistician. Objective and unbiased sample selection, through the use of probability-based designs, is the primary way to ensure that a research study is free of any underlying agenda which the researcher, often unwittingly, may be setting out to prove. That is why statisticians are brought into research design - because they usually do not come to the task with an *a priori* point of view about what the desired outcome should be. Statistical methods, especially sound sampling practices, cannot be perfect but when they are applied with honesty and competence they have been shown to be a great boon to understanding. When they are applied wrongly or ineptly, it is the practitioner who is at fault and not the methods themselves.

RAP research proponents do not, it seems, denigrate the use of probability sampling on principle. But rather there is a tendency to forego its use on practical grounds. It may be too costly to prepare a complete, accurate sampling frame from which to select the sample. "Random" sampling may underrepresent important (vulnerable) subgroups of particular interest to the research study. Preparing a current list of households, from which to select a sample, in a village

[2] The nine methods compared are cluster sampling, double sampling, lot quality assurance sampling, reduced and tightened inspection, epidemiological surveillance, demographic surveillance, industrial process control methods, case control analysis and sociocultural group assessment methods.

or urban community may be too time-consuming and costly to consider. These problems tend to lead RAP practitioners into the direction of substituting shortcut methods, which are then "validated" by expert anointment or by comparative analysis with other studies or with known population distributions.

The objections to using legitimate (i.e., probability) sampling methods, which are real and important, can however be overcome without great expense or time. Then and only then, can inferences, generalizable to the parent populations, be drawn from the RAP study without having to rationalize or apologize for the underlying methods used. We shall see how in the next section. But first we should note that, owing to the eclectic nature of Rapid Assessment Procedures, the use of probability sampling is not relevant, on a practical level, for most of the techniques that go under the name of RAP (refer again to the Annex). As examples, tapping key informant opinion and gathering data in participant-observation studies, are RAP techniques where probability sampling would not likely have a useful role, though in theory one can be imagined.

Another major statistical problem with some methods of RAP research is the potential for test group bias or the Hawthorne effect. This can occur when the same subjects are repeatedly studied over time. It comes about whenever the study group changes its behavior because it participated in the study. It becomes a problem for research when the study results are used for statistical purposes, such as to estimate change **and** to infer those results to a larger population which the study group reputedly represents. An example would be a sentinel site study in which the participating villagers are told that boiling the local water may prevent episodes of diarrhea. If these same subjects are interviewed later and found to have much reduced incidence of diarrhea, the achievement is laudable but the comcomitant change estimate is not a statistical, or inferential, finding and should not be presented as such. The point here is simply that such methods are undeniably valuable for finding out what works, but data generated from them should not be used for statistical purposes.

V. The Modified Cluster Survey as a RAP Proposition

A. Development

The modified cluster survey (MCS) methodology was developed in response to the need to carry out rapid, low cost surveys that are grounded in probability sampling - an attempt to wed together the concerns of programme managers and policy makers who want quick, economical results and the concerns of statisticians who want survey applications to stand up under statistical scrutiny (so the results can be trusted). The origin of the method derives from the EPI Cluster Survey which WHO and the Centers for Disease Control have used for over 20 years in various settings. Various criticisms of that method, mainly the lack of probability sampling techniques in the second stage of selection, which have been registered by Bennett (1993), Kalton (1987), Scott (1993) and others led to the development of the MCS design, which the author (Turner, 1994), underwritten by UNFPA support, helped develop. Its use was first promulgated in Bangladesh, where an annual survey is being carried out to monitor various goals and targets relating to the situation of children and women.

The technique is now receiving widespread use around the globe in Multiple Indicator Surveys (MIS) sponsored by UNICEF to monitor the Child Summit goals (UNICEF, 1995). Some of the key features of the MCS design include its utility for national level baseline data and subnational level programme evaluation data, simplicity, rapidity, comparatively low cost, statistical validity, the latter being the feature which distinguishes it from its parent EPI Cluster Survey and from most RAP research methodology.

B. Sampling and Survey Methods

The MCS design is a minimalist sampling strategy that is not necessarily dependent on a sampling frame which is absolutely current. It uses a simple two-stage design, employs careful stratification methods, quick canvass and area segmentation, and avoids the expense of listing households prior to subsampling. Its main property is that probability sampling is used at all stages of selection. For the aforementioned applications in Bangladesh and UNICEF's MIS, the other distinguishing feature is the use of pre-coded, simplified questionnaires that can be quickly administered - an obvious advantage for any RAP application. But it should be noted that the MCS sampling strategy is germane for household surveys, no matter how complex or lengthy the questionnaires may turn out to be.

The basic MCS sample design comprises five steps:

(1) Stratification, usually geographic (urban-rural and provincial-district), of the most recent census frame, with the type and number of strata depending upon the population subgroups of

interest.

(2) Selection of a first stage sample, that is, primary sampling units (PSUs), of villages and urban sectors from the stratified frame, using probability proportionate to size, *pps*, or equal probability depending upon how variable the PSUs are with respect to their measures of size. Old measures of size can be used, even if the census frame is a few years old, though the frame must fully cover the population of interest - whether national or localized.

(3) Visits to each sample PSU for quick canvassing plus area segmentation using existing maps or sketch maps, with the number of segments being predetermined and equal to the census measure of size divided by the desired (expected) cluster size. The segments which are created are approximately equal in size - in their expected value - but not exactly.

(4) Selection of one area segment with equal probability from each sample PSU.

(5) Conduct of interviews with all the households in each selected segment.

The simplicity of this design is apparent and its utility for RAP applications may also be self-evident. The segmentation operation partially compensates for using a frame which may be out of date. Of course the method is not problem-free, but its most salient disadvantage is that the old measures of size at the PSU level will give a sample which is variable in size at the cluster (segment) stage, thus making the overall sample size variable and causing a modest increase in variance and creating a situation where interviewer workloads may not be easily predicted in advance. These are thought to be minor problems, however, given the enormous advantages of having a simplified, unbiased probability sample which is low-cost and does not require the expensive operation of listing households in sample PSUs, which is often done in more traditional surveys in order to bring the sampling frame up to date at the second stage of selection.

A variation of the basic MCS design for RAP would no doubt have to take account of subgroup populations of interest, to counter the complaint (Epstein, 1992) that "random" sampling underrepresents targeted groups. This can be accommodated in two ways - first, through appropriate stratification (step 1 above), and second, through application of differential sampling rates within strata, determined through optimum allocation methods. In some applications, where it is known that there are drastic changes in population settlements, such as squatter areas or refugee camps, a pre-survey updating of the frame in affected areas would likely be necessary, especially if those areas were "empty" when the original frame was established.

C. Applicability of MCS - Reproductive Health Surveys

It is worth repeating that the MCS was designed to replace "quick and dirty" methods with "quick and clean" ones. Yet its features relate only to the sampling methods. And though these sampling methods can be applied even in omnibus surveys with lengthy, modular or complex questionnaires, such surveys are not likely to retain the "quick" feature and would therefore fall outside the realm of RAP.

Some ideas have been put forth nevertheless on how the MCS can be put to use in reproductive health surveys of the type which may emerge as a consequence of the International Conference on Population and Development. These were presented at UNFPA's "Consultative Meeting on Global Framework for Assessment and Monitoring of Reproductive Health," 3-5 April 1995 in New York (Turner, 1995).

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ANNEX

Glossary of Rapid Assessment Procedures

These are minimal definitions, and as such, this annex is a work-in-progress. A more elaborate glossary, carefully annotated and codified into certain typologies (rapid, not rapid; quantitative, qualitative; etc.) would be a useful contribution to RAP research. The author notes that not all of the terms on the list are necessarily rapid nor even feasible for social research, yet each of them has appeared in literature describing RAP methodology. The list is no doubt incomplete, as RAP is constantly evolving. Readers are invited to suggest additions and to correct missconceptions.

anthropological methods - a generic all-encompassing term that embraces all of the qualitative procedures in the glossary

aerial photographs, surveys - a means of studying special topics such as population density, agricultural production, number of animals, and natural resources

case control analysis - a comparative study of "cases" and convenient non-case individuals that are in the same target population

case study - in-depth study of a particular community or group

cluster sampling - the use of clusters of individuals in sampling, as opposed to simple random sampling

controlled field experiment - use of rigorous statistical procedures to study a problem by dividing the target population into two groups - control group (not subject to the "treatment") and experimental group (subject to the treatment)

demographic surveillance - monitoring of births and deaths through various techniques including vital registration and compilation of pregnancy histories

demonstration (pilot) survey - a tool in survey research in which a methodology is tested comprehensively on a small sample or a single area before launching a full-scale survey (cf pretest)

diagramming - a variety of participant techniques to study village topics, such as diagrams and pictograms showing seasonality, spatial and social relations, ecological history, trends, and institutions

direct observation - anthropological technique whereby the researcher compiles information through direct, often live-in, contact with a community

double sampling - a technique involving screening devices to post-stratify large samples for subsequent follow-up on a subsample basis (also known as two-phase sampling)

ethnohistories - use of villager-produced time lines and chronologies of events

epidemiological surveillance - systematic compilation of records data on health conditions, usually from clinics, to monitor diseases or health trends

expert panel - group session of experts convened to learn about a sociocultural problem

focus group discussion - discussion group of small number of participants to elicit information about social customs and behavior (cf expert panel)

group interview - participatory technique intended to study a sociocultural topic by interviewing, usually with unstructured interviews, community representatives in a group setting

in-depth interview - interviewing technique intended to get at explanatory variables and usually involving a semi-structured questionnaire or questionnaire guide

industrial process control methods - the use of visual control charts in which a health condition or disease is plotted and tracked

key informant interview - interview intended to learn about community conditions or concerns through contact with knowledgeable persons

lot quality assurance sampling - a sampling technique, borrowed from industrial quality control, relying upon small samples to ascertain dichotomous (yes-no) variables for the purpose of identifying where follow-up studies are called for

mapping - use of participant-drawn maps to depict village situations and conditions by household

participatory learning methods (PALM) - exercises

involving a mix of organizations plus 'real villagers' conducted within the village itself and designed to involve village people with their own development

pretest - a tool usually applied to questionnaire design in which a version of the questionnaire is tested on a small group of subjects, variously selected

purposive survey - a quick survey based on a quota or judgmental sample

quasi-experiment - a partial controlled experiment which may involve a test group and a control group but without rigorous procedures that ensure complete separation of the two (cf controlled field experiment)

ranking and scoring - use of relative criteria for measurement of sensitive items such as income or wealth rather than direct questions

rapid rural appraisal (RRA) - a generic term referring essentially to RAP in rural settings and applications, (but compare PALM above)

reduced, tightened inspection - an intensive form of double sampling in which sample lots are scrutinized more stringently for "defectives" by tightening the tolerance threshold

role playing - a participatory method, often used in the design stage of a project, intended to refine methodology by acquainting researchers with problems and issues by having them assume roles, for example, as respondents or subjects

sociocultural group assessment methods - a generic term referring to various qualitative techniques such as focus groups taken as a whole, with emphasis not on collection of objective information but on the study of attitudes and beliefs

two-phase sampling - a technique involving screening devices to post-stratify large samples for subsequent follow-up on a subsample basis (also known as double sampling)

unstructured (semi-structured) interview - interview that is focused on a special subject but nevertheless follows a general outline or guide with respect to the direction and types of questions posed rather than relying upon verbatim questionnaires

PopMap - ARC/INFO Data Conversion

At a recent meeting between Mr. Vu Duy Man, Coordinator for the intercountry project on Computer Software for Population Activities, Statistical Division and Mr. J. Dangermond, founder and president of ESRI (Environmental System Research Institute, Inc.), it was indicated that ESRI supports the data conversion between PopMap and ARC/INFO, the world most popular GIS software produced by ESRI. This conversion will be developed through ungenerate and shape file formats. The conversion capability will allow data exchange and ensure reusability of geographic data produced with PopMap and commercial packages for both low-end desktop mapping and high-end GIS applications.

The meeting took place following the ESRI 1995 User Conference which was held from 22 to 26 May 1995 in Palm Springs, California, USA. The conference was attended by more than 4,500 participants from more than 60 countries. ESRI has pioneered the development and use of geographical information system (GIS) technology over the last twenty-five years. Acknowledged as the world leader in GIS technology, ESRI is noted for providing highly functional software products, with a high level of dedicated support services to its users. ESRI software products includes ARC/INFO (GIS tools for advanced applications), ArcStorm (spatial data management), ArcView (desktop GIS and mapping), PC ARC/INFO (GIS tools for PC users) and ArcCAD (GIS tools for AutoCAD users).

ESRI is working toward providing users with easy-to-use and powerful GIS tools. The high-end ARC/INFO is powerful but mostly commands driven and difficult to use. ESRI is working toward: making ARC/INFO easier to use, implementing graphical user interface and migrating it into Windows NT and at the same time improving the performance and adding new features such as 3-D data manipulation. On the other side, the low-end and very successful ArcView is user-friendly but limited in features. ESRI will make it run faster, improve the performance and adding features such as editing/digitizing, better annotation and more compatibility with ARC/INFO. ESRI will also make ArcView easier to use by providing customization capabilities with Avenue programs.

Mr. J. Dangermond, appreciated the simplicity of the United Nations software PopMap and its useful applications in population field, especially for some of the implemented PopMap population atlases. Mr. Dangermond supports the use of PopMap together with PC-ARC/INFO, ArcView and Avenue for different types and levels of applications and is willing to help and sponsor developing countries in using effectively ESRI's GIS solutions for appropriate projects. Further information on this cooperation, readers should contact Mr. Vu Duy Man, Statistical Division United Nations New York. *(Vu Duy Man)*

2,000 World Population and Housing Census Programme

Since the last four decades the United Nations through a resolution of the Economic and Social Commission has declared, every decade, a World Population and Housing Census Programme. The last one being the 1990 World Population and Housing Census Programme, which covers the period from 1985 to 1994. The World Programme was aimed to encourage states, members of the United Nations, to carry out population and housing censuses during the period of the programme. The Programme urges member states to conduct their censuses to take into account international and regional recommendations regarding standards, concepts, definitions, classifications and methodologies.

The United Nations during the past several decades have convened various meetings, globally and regionally, with the aim to arrive at a consensus on what is considered to be internationally and regionally agreed recommendations and standards. The United Nations published various documents related to guidelines and principles of conducting population and housing censuses.

For the above reason, the United Nations Statistical Commission at its twenty-eighth session in March 1995 considered a draft resolution of the ECOSOC regarding the 2000 World Population and Housing Census Programme. The Commission also endorsed the convening of an Experts Group Meeting to discuss the revision of the existing recommendations. This meeting is tentatively planned to be held from 13 to 17 November 1995 in New York. Census experts from both developed and developing countries will be invited to contribute to the meeting. In addition, concerned international agencies including UNFPA Country Support Teams will also be invited to send their experts. Further information on this meeting readers should contact Mr. S. Suharto, Statistical Division, United Nations, New York. *(Sam Suharto)*