NATIONS UNIES
CONSEIL ÉCONOMIQUE ET SOCIAL

Distr.: LIMITEE

E/ECA/ARSTM/55
5 avril 1995

ORIGINAL: ANGLAIS & FRANCAIS

COMMISSION ECONOMIQUE POUR L'AFRIQUE

Colloque régional africain sur la
télématique au service du développement

Addis-Abeba, Ethiopie
3-7 avril 1995

PROJET UNESCO: RINAF

PARTIE A: RESEAUX D'ECHANGE D'INFORMATION SCIENTIFIQUE ET TECHNIQUE

PARTIE B: ETAT ET OBJECTIFS DU PROJET RINAF

Par

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Colloque Régional Africain

LA TELEMATIQUE AU SERVICE DU DEVELOPPEMENT

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Projet UNESCO : RINAF

Partie A : Réseaux d'échange d'information scientifique et technique

Partie B : Etat et objectifs du projet RINAF

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Partie A : Les réseaux d'échange d'information scientifique et technique

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1. Introduction

Parmi les actions de recherche et de développement technologique, celles qui s'orientent vers la construction d'une société d'information et de communication et celles qui visent à améliorer la coopération scientifique et technique sont considérées d'une importance majeure. Ces actions sont en effet, d'intérêt commun et impliquent, par conséquent, la participation des établissements universitaires, des industries, des éditeurs, des exploitants de réseaux et de circuits de diffusion ainsi que les institutions d'informations spécialisées.

La composante commune à ces actions est l'information. D'où la nécessité de maîtriser tout le processus de son traitement; de sa production jusqu'à sa consommation et de rentabiliser cette ressource par la mise en place de procédures, mécanismes et réseaux de communication qui favorisent l'accès à l'information et constituent un support de communication entre les communautés scientifiques.

2. L'information et les réseaux de communication

L'information, et plus particulièrement l'information spécialisée, est prise en charge par des mécanismes complètement automatisés à travers toute les chaînes de traitement de manière transparente, conviviale et interactive vis à vis de l'utilisateur final. Cette approche de l'information qui définit une nouvelle manière de rentabiliser cette ressource, introduit les nouvelles technologies de l'information et les méthodes de numérisation.

La chaîne de traitement de l'information passe par plusieurs acteurs. Producteurs, transporteurs, serveurs, utilisateurs forment la chaîne des acteurs de l'information qui doivent s'organiser et coordonner leurs fonctions. Les nouvelles technologies apportent des solutions aux nouveaux besoins qui se présentent avec l'accroissement des volumes d'informations et la généralisation du processus d'utilisation intensive de l'information dans tous les domaines d'activité.

L'introduction des nouvelles technologies associée au développement de nouveaux services électroniques engendre de nouvelles méthodes d'organisation des institutions d'information des différents secteurs.

2.1 Evolution vers l'information en ligne

L'évolution vers l'information en ligne s'appuie sur trois facteurs : la modernisation de l'édition, la mutation dans les modes de mise à disposition des produits vers des supports électroniques et l'avènement des services télématiques.

L'automatisation du processus de production de l'information chez les éditeurs montre une nouvelle manière de concevoir la fourniture d'information. Il s'agit d'utiliser les nouvelles technologies sur l'ensemble de la chaîne existante, depuis la rédaction électronique jusqu'à la constitution de banques de données, de services télématiques ou de produits d'information sur CD-ROM. On atteint ainsi des gains de productivité tout en améliorant la qualité et la diversité des produits.

L'avènement des supports optiques et particulièrement des CD-ROM engendre de nouveaux comportements. La distribution de produits d'information sur supports optiques constitue un nouveau moyen d'exploitation des informations sur des sites spécialisés et qui deviennent également intégrés dans des environnements appropriés à des fonctionnalités de serveurs.

Enfin, le développement de la télématique offre la possibilité de services d'information à faible coût où la rapidité de la communication apporte une valeur ajoutée. Une étroite symbiose doit s'opérer entre produit d'information et produit de communication au profit d'une efficacité indispensable.

2.2 Schémas d'évolution vers une industrie de l'information

Les schémas possibles sont guidés par trois préalables : le passage à une télématique sur une grande échelle, la généralisation des techniques d'édition électronique, une évolution vers la dimension image.

Le premier schéma propose de prolonger les tendances actuelles de répartition des services par spécialisation. L'information fournie sous forme électronique reste spécialisée. Elle est principalement destinée aux utilisateurs professionnels.

Le second schéma privilégie l'ouverture. Il est fondé sur la généralisation du développement de services d'informations au niveau grand public. Cela se traduit par l'effort des éditeurs en matière de diversification vers les produits optiques et par le développement de la télématique à grande échelle. Ces services destinés à des utilisateurs non spécialistes nécessitent plus de transparence dans leur utilisation. Ce développement permettrait l'apparition de nouveaux types de services électroniques à destination du grand public ainsi que d'une nouvelle génération de producteurs et de serveurs. Ce schéma devrait avoir des conséquences positives sur la croissance et la structure industrielle du marché de l'information en ligne.

2.3 Les obstacles au développement de l'industrie de l'information

Les télécommunications apparaissent comme l'un des principaux obstacles au développement du marché de l'information. L'accès à l'information soit a lieu dans des milieux protégés où fonctionnent des réseaux privés, soit grâce à l'assistance des spécialistes de l'information, qu'ils soient documentalistes ou intermédiaires. Les facteurs principaux de ces difficultés sont les suivants :

- la politique des tarifs est conduite par les gestionnaires de réseaux, elle s'accompagne de structures tarifaires complexes et frustrantes.

- le monopole des PTT sur certaines activités, notamment sur les réseaux à valeur ajoutée,alors qu'une ouverture dans ce domaine favoriserait la multiplication des modes d'accès, le développement de la qualité des services et la baisse des coûts de communication.

- la connexion avec les réseaux publics de transmission de données n'est pas fiable. Lorsqu'il y a des difficultés, il n'y a aucune assistance.

- les réseaux internationaux ne sont pas faciles à utiliser. Les procédures d'accès varient d'un pays à l'autre.

2.4 Les recommandations

Les recommandations que l'ont peut en tirer sont les suivantes:

- encourager l'application des nouvelles technologies telles que la transmission à distance, le stockage optique ou les réseaux à valeur ajoutée: elles doivent être considérées prioritairement.

- harmoniser l'environnement dans lequel s'organisent les services d'information : une structure spécifique et des ressources appropriées doivent être disponibles pour mettre en oeuvre une véritable industrie de l'information.

- accroître l'utilisation des services électroniques professionnels existants ou nouveaux en tenant compte des normes.

- les besoins technologiques ne sont pas les seuls importants, les questions légales et fiscales doivent être étudiées avec attention.

3. Réseaux d'information spécialisée

Afin de favoriser la constitution de groupes de scientifiques, de mettre en valeur le potentiel scientifique et de faciliter les moyens de coopération, il est nécessaire d'encourager la coopération et les échanges entre les institutions de recherche, que ce soit en milieu universitaire ou en milieu industriel. La réalisation de ces objectifs est tributaire de l'établissement des réseaux de communication et d'échange d'information scientifique et technique.

Pour faciliter et accélérer la diffusion et l'utilisation des résultats de la recherche, il faut développer des réseaux de coopération à base de réseaux informatiques rapides et performants qui utilisent une infrastructure de communication sur laquelle sont mis en oeuvre des services spécialisés qui soient accessibles aux différentes institutions scientifiques et industrielles.

La diffusion de la masse volumineuse des informations scientifiques et techniques qui résultent des publications des travaux de recherche et de développement dans tous les domaines scientifiques, nécessite entre autres, de supports de stockage optique qui se caractérisent par leur grande capacité de stockage et leur coût accessible à l'utilisateur final. D'autre part, il faut utiliser de nouveaux canaux de communication qui facilitent et favorisent cette opération, à savoir, les réseaux informatiques.

Le réseau informatique d'interconnexion constitue l'ossature sur laquelle les institutions utilisatrices et/ou productrices de l'information scientifique et technique s'y greffent graduellement pour bénéficier et coopérer aux services d'information et aux services d'échange de données, de messages et de documents. De tels réseaux sont communément appelés réseaux de recherche ou réseaux académiques.

3.1 Ressources informationnelles

Le développement de tout réseau de services d'information spécialisée se base sur les ressources informationnelles disponibles, à acquérir ou à développer.

Les ressources informationnelles se répartissent selon trois grands domaines :

- l'information référentielle,

- l'information de signalement,

- l'information textuelle.

Information référentielle :

L'information référentielle à mettre à la disposition des scientifiques comme source d'information primordiale est soit acquise de l'étranger, soit produite localement. Cependant, le recours à l'acquisition de bases de données référentielles internationnales qui répondent au mieuxaux besoins de l'ensemble des secteurs scientifiques et techniques est indispensable.

Information de signalement :

Disposer de l'information référentielle seule ne suffit pas, car se pose le problème de l'obtention du document primaire identifié dans une recherche documentaire. Pour apporter des solutions à ce problème crucial, il faut disposer d'un réseau de signalement des documents primaires disponibles sur l'ensemble des institutions de documentation. Ce réseau de signalement permet de rentabiliser les ressources primaires et de rationaliser leur acquisition. C'est ainsi que se constituera des pôles de spécialisation par domaine scientifique qui par le biais du réseau pourront s'échanger les documents au profit des intérêts de leurs utilisateurs. Généralement, les catalogues de signalement sont identifiés selon le type des documents.

Information textuelle :

Les progrès technologiques enregistrés dans le domaine des supports de stockage permettent la constitution de bases de données textuelles où le contenu des documents primaires est entièrement numérisé et devient donc accessible.

3.2 Réseaux d'échange d'information

Les services d'information spécialisée à mettre en place s'appuient sur les avantages de la constitution en réseaux des ressources matérielles et informationnelles pour atteindre les principaux objectifs qui visent à :

- faciliter l'accès à l'information en la rendant accessible à distance grâce à la mise en place de serveurs de bases de données,

- faciliter les opérations de coopération en vue de constituer des bases de données globales en regroupant l'ensembles des bases de données qui se trouvent réparties à différentes échelles : nationale, régionale ou internationale, et ceci grâce au développement d'outils de gestion, de contrôle et de traitement dans un environnement réparti : ces outils sont ensuite utilisés pour développer des systèmes d'information complètement répartis.

Serveurs de bases de données :

Dans le domaine de l'information scientifique et technique, l'ensemble des ressources informationnelles que couvrent en grande partie les informations référentielles dans différents domaines d'activités scientifiques et techniques doivent être mis à la disposition de l'ensemble de la communauté des scientifiques. Pour cela, la mise en oeuvre de serveurs de banques de données est indispensable.

Ce moyen de mise à disposition de l'information doit être généralisé à l'ensemble des bases de données qui sont en rapport direct ou indirect avec l'information scientifique et technique et par conséquent vont servir les communautés des scientifiques. De plus, de telles informations constituent des outils indispensables pour rapprocher les milieux universitaires et industriels et contribuer à développer leurs intérêts communs. Parmi ces bases de données, les plus élémentaires consistent à répertorier l'ensemble des institutions dans chacun des secteurs avec les activités de chacune d'elles.

Réseaux d'information :

Dans le domaine de l'information scientifique et technique, le développement des reseaux documentaires permet la réalisation de différents types de services d'information. Les plus importants étant :

. Le réseau de signalement :

Ce réseau peut bénéficier des possibilités des réseaux de communication pour la constitution des catalogues nationaux de signalement des documents.

. Le réseau des fonds documentaires :

Ce réseau permet la consultation à distance des fonds documentaires existants sur le territoire national et permet ainsi de bénéficier directement des services du réseau de signalement pour la localisation des documents primaires à la suite de toute opération de consultation.

. Le réseau d'échanges de documents :

Ce réseau peut s'appuyer dans une première étape sur la mise en place de commandes à distance de prêts inter-bibliothèques sur le réseau ou de demandes de photocopies de documents primaires. Ultérieurement, grâce à des moyens appropriés, cette opération peut être entièrement automatisée par la numérisation des documents et leur transfert à travers le réseau.

4. Conclusion

Aujourd'hui, l'apparition de nouveaux produits d'information s'appuyant sur les moyens électroniques e les systèmes optiques confère à l'information des rôles nouveaux auprès d'utilisateurs de plus en plus diversifiés et de plus en plus concernés. L'effort technique à porter sur l'information engendrera des fonctions, des formations, des professions nouvelles ainsi que de sensibles modifications dans les esprits et les méthodes de travail. Le but est de permettre à tout un chacun de disposer de l'information dont il a besoin dans les meilleurs délais et sur le support qui lui convient, même si celui-ci reste finalement le papier.

Dans le domaine de l'information spécialisée, les nouvelles technologies permettent de pousser la recherche d,information beaucoup plus loin, d'offrir à l'utilisateur un produit finaliste, à jour et immédiatement utile. Ceci ne peut être rendu possible que par la création de réseaux d'information spécialisée accessibles à distance et par une meilleure coordination entre tous les acteurs de l'information.

Part B : Status and objectives of the RINAF project

March 1995

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Contents

1 Introduction

The RINAF (Regional Informatics Network for Africa) project was conceived by the Intergovernmental Informatics Program (IIP) of UNESCO and financed by a grant of the Italian Government and by a contribution from the Republic of Korea; the project implementation phase was started in the second half of 1992 and is planned to last till the end of 1995.

Decisions regarding grants currently made available from the Italian Government are taken by the Steering Committee, which will operate for a period of two years in order to carry out the project goals. An African Committee was set up for the approval of all actions to be taken in order to get the best advantage of the available funds; the African Committee, which is estined to survive to the RINAF project, will represent a forum whereby the African regions define the status of utilisation of information technology means in their countries along with the requirements within the RINAF project.

Stefano Trumpy, Director of the CNUCE Institute of the Italian National Council of Research (CNR), has been nominated Technical Coordinator of the RINAF Project. The task of the technical Coordinator is to propose a set of initiatives and investments to the African Committee, based on the knowledge of the situation concerning network infrastructure and computer usage in the African countries. A structure has been set up in Pisa which supports the Technical Coordinator in taking the initiatives, testing the technical solutions and starting the training activities.

The project is meant to bring basic Internet services (e-mail, bulletin boards, access to data bases, discussion lists, etc.) to several African countries. The plan is to establish five regional nodes and ten national nodes. RINAF relies on the cooperation with other initiatives operating in the African continent like the IDRC- Canada project, the RIO network of ORSTOM-France and other existing network initiatives; therefore, the protocols used and the technical solutions adopted have to be heterogeneous in order to get the maximum result from the project.

2 RINAF project objectives

As agreed between the RINAF Technical Coordinator and the African Committee, the following points represent the main project objectives:

1. to bring basic data communication services to a number of African countries in order to:
    - improve the communication capabilities among African research institutions
    - improve the communications with the world-wide research community
2. to create a group of technicians specialised in the African network services management;
3. to increase the awareness on the importance of data network services in Africa;

4. to contribute to the cultural growth of the institutions hosting the RINAF nodes;

5. to leave, at the end of the project, a structure that may be completely handed over to one or more regional centres able to manage the data network services for Africa.

3 RINAF specific goals

RINAF is planned to be concluded by 1996. If more funds will be allocated, the organisation of the project, and probably its definition, will have to be changed. RINAF is planning to activate five regional nodes and ten national nodes before the end of the project. The hierarchy of the RINAF achievements is linked to the level of the services offered, to the personnel dedicated to them, and to the presence of a co-ordinating activity towards other African countries.

Since the RINAF project is achieving its objectives in a time where several other activities promoting networks in Africa have become effective, RINAF has chosen an approach of cooperation instead of trying to constitute a stand alone separated network. At present, if we exclude the Mediterranean states and South Africa, there are few hundreds network users in Africa which were activated mainly under grants of the IDRC of Canada; RINAF, with the participation of other funding projects, may significantly contribute to increase this number up to several thousands. RINAF may also contribute to the formation of the technicians needed to support this increasing user base; we can certainly say that RINAF will assure the formation of several tens of skilled technicians. This formation will be accomplished, not only through training courses, but mainly through the practical experience that the technicians will gain in the field, with the continuous help of the RINAF technical staff.

RINAF will also increase the awareness of governments and concerned Ministries on the importance of data communication networks. It will also give its contribution to the growth of the structures where the RINAF nodes will be installed and, in particular, of those hosting the regional nodes. At the end of the project, these structures should be able to handle all the matters concerning network management in Africa and should participate to the international boards or committees which are managing Internet and are planning future developments.

4 The target services

In the Internet (the network of networks to which all major research networks in the world are connected in a way to form an integrated global communications environment) there are a lot of services available which are suitable for the various networks and transmission means available; RINAF will privilege those services which are suitable for the telecommunication infrastructures in Africa and may reach the more isolated Personal Computer user, i.e.:

- the person to person communication;

electronic mail; with this service, the isolated user or the research groups will be able to address all his colleagues in Africa and in the world, independently from the network to which they are connected; the user simply has to address his correspondent and the mail will reach him with no need for the message originator to take care of the actual data path or of the address translations while passing from a network environment to another;

- the person to groups communication;

electronic conferencing; this service will allow all the RINAF users to subscribe to electronic conferences and to receive the information they need from the several thousand conferences active in the Internet; the RINAF community will be encouraged to establish computer conferences in order to increase the exchange of information between African countries and to give the users from other parts of the world the possibility of accessing the information created in Africa. Some African discussion lists have been created and managed by the RINAF staff (Camnet, NGR-mail, SENEGA-l, GUINEQ-l) with the aim of linking African citizens living all around the world. Through these lists, African researchers, professors and students can interact efficiently and at a very low cost with their African colleagues living and working in the more developped countries; to the opinion of the Technical Coordinator, this achievement is as valuable as the one of allowing users to interact efficiently within the African continent.

During the 1st phase, some RINAF discussion lists have also been activated such as: RINAF-R as a tool of information exchange between the Regional Coordinators and the RINAF staff, RINAF-L as a general information list on the project and RINAF-T as a strictly technical discussion list.

- the access to data bases;

while computer conferences constitute a mean to flow unstructured information which is originated by individuals wishing to contribute to a topic discussion, the data bases constitutes the libraries of the future to which researchers, teachers, students and citizens can find several useful information for their cultural and commercial needs.

One of the recent and more relevant achievements of RINAF is the constitution and spreading, in the Internet, of the RINAF Information Service known in the network as the "RINAF gopher" from the name of one of the most popular distributed information services (i.e. the gopher). The RINAF information service contains information on the project itself, on the status of networking in various African countries, a set of networking articles and publications, information concerning other networking project implemented in the African continent, African discussion lists and links to other information services concerning telematics in Africa.

The RINAF nodes will be encouraged to become the centre of access to locally produced data bases; the regional nodes are called to play a major role and to establish data bases servers which will allow external users from other regions of Africa or from elsewhere to search the information contained in the locally produced data bases; at the same time the RINAF users will have the access to the enormous catalogues of data bases available worldwide in the Internet.

5 The RINAF data conveyance infrastructure

In order to reach the maximum results with the funds available, the RINAF project, during its planned lifetime, intend to use different network protocols/services (basically Fidonet, UUCP and TCP/IP) and will use different data transmission channels (dial-up lines, X25 packet switched services, leased lines shared with other projects or networks, radio links, etc.) to reach the worldwide Internet. These technical solutions appear to be today the most effective in a field where the technology is evolving very rapidly. The choice of network protocols/services and transmission means will be determined by the following factors:

- presence of expertise in managing network protocols/services;
- tariffs for data transmission in each country;
- presence of other projects or networks which may contribute to the purpose of RINAF; and will be agreed with the RINAF Country Coordinators in order to maximise the results with the available funds.

The above shows that RINAF is a network in a broad sense since it allows its users to communicate among them but, from a technical point of view, the definition of computer network does not apply strictly since the communication will be assured by a variety of communication channels and network protocols/services. Different considerations must be done on the following points:

5.1 addressing, routing and gateway issues

The present goal of the project is to assure a good Internet connectivity to all the countries involved in RINAF. This will allow both a good communication means among African countries and the best way to be integrated in the worldwide research community;
this goal will be realised basically following three types of solutions as far as the international connections of the RINAF nodes are concerned:

- Fidonet connections;
- Unix--UUCP connections;
- TCP/IP connections (direct Internet connectivity).

Other types of protocols will be used in a few cases where computer networks have already been activated (EARN, DECnet, etc.); RINAF will not invest in these solutions but will rather provide a good integration of these services in the Internet environment. In order to equalise all the technical solutions at least for the e-mail service, which is by far the most used, RINAF will make use of the Internet addressing scheme. Fidonet and UUCP users might use the addresses of their network but they will be encouraged to use the Internet addresses; in this way they will be recognised by the whole Internet community in the world.

Fidonet nodes will constitute perhaps the majority of the technical solutions, at least at the beginning, if we include the new national nodes to be selected by the African Committee. In order to enter into the Internet environment, the Fidonet users of RINAF will have to reach a gateway to Internet, possibly located in a place connected to the international networks

through leased lines (the reason for this is that the gateway traffic to Internet will not imply an overcharge, if the leased line has enough bandwidth to support some more load); a gateway will be operated initially by CNUCE. We plan to install at least another gateway in one of the regional RINAF nodes as soon as this will be feasible (the nodes will have to operate the three protocols and possibly to rely on a leased intercontinental line). Specific plans to manage the traffic among the RINAF international nodes will have to be defined and monitored in order to secure a reliable service; furthermore, it will also be taken into account the didactic purpose of the project aiming at providing the African institutions involved with the capability of running the network services on their own.

UUCP nodes will enter in the UNIX network which has its own addressing and routing schemes; the problems encountered are similar to those of the Fidonet users; moreover the UNIX nodes will manage the UUCP/Fidonet gateway locally, in order to collect all the Fidonet national users; the UNIX nodes will have then to reach an Internet gateway located in a place well connected to the international networks, through a leased line. A UUCP gateway is presently operated by CNUCE; we plan to install at least another gateway in a regional node as soon as this will be feasible.

TCP-IP nodes equipped with dial up routers will have the possibility of handling multiprotocol network applications; this solution is substantially more expensive of the previous two and, furthermore, it allows only limited Internet services if used on dial up lines with dial up routers The optimal solution is to acquire a leased line on which all Internet services might be exploited.

5.2 physical data path

The data conveyance is a consistent part of the project which absorbs a relevant part of the costs. Although the amount of data transmitted at the beginning would not be relevant, as soon as the utilisation of the network takes momentum, this part of the costs will be the most relevant of all the recurring costs. Therefore, in order to secure the sustainability of the network services in the future, it is RINAF responsibility to explore solutions that minimise the recurring costs.

Since the RINAF project cannot certainly afford a structure based on leased lines which require more consistent financements than those actually available, it is necessary to rely on switched lines in most of the cases; these can be either X25 international services or normal telephone lines. X25 is normally more reliable but also more expensive; the trade off between the two types of connections may vary depending on the tariff structure of each country, on the cooperation, if existing, with the national PTTs, etc.

In order to better exploit the utilisation of the switched lines and to obtain reliable services taking into account the considerations made in the previous paragraph concerning the routing and gateway functions, the best solution seems to be that of having, for the nodes connected through international dial up lines, is making calls, at regular intervals, the nodes for operating the mail loading and unloading possibly from a places connected to the Internet network through leased lines.

6 Organization

In order to define, at the best, the interfaces with the selected countries, the following items and representatives have been constituted:

- RINAF questionnaire;

The RINAF questionnaire contains the data for evaluating the updated situation of each country as regards the TLC structure in the research environment and the suggestions for an institution proposed as the RINAF focal point.

- RINAF Country Coordinator;

He is in charge with the project planning and managing and he interacts with the Technical Coordinator for the project implementation.

- Supporting personnel to the Technical Coordinator;

A key role for the support of the Technical Coordinator in Pisa is played by the CNUCE Institute along with the group set up, under contract with UNESCO, by the Consorzio Pisa Ricerche which is represented by a full time post graduate in telecommunications engineering and by a part time graduate in charge with the organizing secretariat.

The project activation in each selected country has been based on:

- RINAF Technical Responsible;

He is in charge with the services given by the RINAF nodes and will have to interact with the RINAF staff in Pisa; the Technical Responsible of the node should be a person with a technical background, if possible specific in the field of computers and data networks, so as to interact efficiently with the staff in Pisa.

- RINAF system operators;

A nucleus of qualified technicians which will be in charge with the RINAF nodes management.

- National committees for data network services development;

RINAF encourages the setting up of a local committee for data network services development, formed by the most interested user groups of each country, by experts in data networks and by representatives of possible funding Institutions; this will be a key factor for the success of the project and for future expansions.

7 Interaction with the RINAF focal points

One of the most important RINAF actions and a fundamental key for success is the establishment of competencies and structures capable of running the services Moreover the sensitisation of user groups, financing bodies and politicians will be prove to be of great relevance to assure the sustainability of the services that RINAF will contribute to start. For this reason the Country Coordinators are playing a key role for the success of RINAF in their countries. The RINAF initiatives have been concentrated so far on the 5 regional nodes. The relevant steps for the implementation of the project in a country have been the following:

a) appointment of the RINAF Country Coordinator

b) the Technical Coordinator has started his interaction with the appointed Country Coordinator in order to help him:

- appointing a national Technical Responsible;
- selecting at least two technicians to be trained as system operators;
- preparing a RINAF plan;
- setting up a national committee/s to promote and increase the user base.

c) The Technical Coordinator and the Country Coordinator have agreed on a feasible implementation plan which makes the most appropriate use of the RINAF funds taking into account the following aspects:

- available equipment;
- presence of cooperating initiatives/projects in the country;
- situation of the telephone system in the country;
- existence of a first nucleus of users;
- existing know-how.

d) The RINAF staff has carried out with the acquisition and shipment of the equipment after having examined various offers.

e) The training activities and the on-site training have partially taken place

8 Status of the nodes implementation

The division of the African countries into five main regions has been agreed by the African Committee as follows:

NORTH ALGERIA	WEST SENEGAL	CENTER NIGERIA	EAST KENYA	SOUTH ZAMBIA
Morocco	Gambia	Cameroun	Djibouti	Zimbabwe
Tunisia	Guinea Bissau	Central Africa	Ethiopia	Namibia
Mauritania	Guinea	Guinea Eq.	Somalia	Malawi
Egypt	Liberia	Sao Tome	Uganda	Angola
Libya	Ivory Coast	Gabon	Ruanda	Swaziland
Sudan	Burkina-Faso	Congo	Burundi	Lesotho
	Mali	Zaire	Tanzania	Botswana
	Cap Vert	Benin	Madagascar	Mozambique
	Niger	Togo	Comoros	
	Ghana	Seychelles		
	Sierra Leone	Mauritius		
	Chad			

The RINAF Steering Committee decided in Paris, on the 1st July 1992, to start eight nodes in the following countries: Algeria, Egypt, Guinea, Kenya, Nigeria, Senegal, Swaziland and Zambia. Since the beginning, the nodes of Algeria, Kenya, Senegal, Nigeria and Zambia were intended to have regional functions; the nodes of Guinea, Swaziland and Egypt were intended to be national nodes.

8.1 Regional nodes status

The planning and implementation of the regional nodes is the following:

- Algeria (CERIST - Centre de Recherche sur l'Information Scientifique et Technique);

The RINAF Country Coordinator is Mr. M. Benhamadi, Director of CERIST and member of the African Committee. A 9600 bps leased line between CERIST and CNUCE has been activated in January 1994 giving all Internet services using the TCP-IP protocol. The connection has not been very stable lately. This was principally caused by the distance between CERIST and the nearest telephone exchange (about 20 Km) compared to the 8 Km maximum distance recommended for data transmission. The Algerian PTT has therefore installed a better line and the connection has been reliable since August 1994.

CERIST has informed all Algerian scientific and academic institutions about the Internet connection suggesting the use of dialup access to have e-mail services. About 500 requests have been submitted from universities, research centres and other institutions but only the 10% of these potential users can make use of this service at present. All users and institutions with

an e-mail account at CERIST are registered in a directory service which is available on the ist.cerist.dz machine connected to the INTERNET.

- Senegal (CNDST - Centre National de Documentation Scientifique et Technique);

The RINAF Country Coordinator is Mr. M. Ali Ndiaye, "Delegue a l'Informatique du Ministere de la Modernisation de l'Etat et de la Technologie". The Technical Responsible function is carried out by Mr. Fadel Diagne, Director of the CNDST. In order to start the node in Senegal, a cooperation has been activated with the RIO node of ORSTOM in Dakar. This cooperation envisages a training activity for the RINAF system operators and the installation of 11 points of access to the RIO network. A plan for the activation of the RINAF nodes has been agreed and the equipment sent have already been delivered to 7 different Senegalese institutions. Installation and testing have been carried out during the second half 94. The main node of CNDST in Dakar is already functioning and it regularly communicates with the CNUCE, PADIS (Addis Ababa), Infoterra (Nairobi), RIO Orstom etc. The training activity, foreseen by the contract signed with the RIO-ORSTOM, is being carried out along with the equipment installation in each institution bound to be connected.

- Kenya (NCST and Moi University);

Dr. J.B. Ojambo, from the Faculty of Information Sciences of the Moi University, has been appointed as Country Coordinator. A plan for the activation of the RINAF activities in Kenya has been agreed with the Technical Coordinator and has been put in place. The equipment requested has been sent to Kenya and it is still waiting to be installed. The delay has been caused by the long clearance procedures followed to clear the 14 modems sent from Italy. The Technical Responsible role is carried out by Shem Ochuodho of the University of Nairobi and by Thomas Afullo of the Moi University. A National Committee for networking, chaired by Prof. Ogallo (Secretary of the National Council for Science and Technology), and of which Dr. Ojiambo is a member, has been set up.

- Zambia (University of Zambia);

The RINAF Country Coordinator is Mr. Mark Bennett, Director of the Computer Centre at the University of Zambia, who is also the Technical Responsible. A plan to improve the present status of network services for the research area in Zambia, has been agreed and executed. The equipment requested has already been supplied and installed and the node is functioning. The University of Zambia has been given a grant by the World Bank to activate a full Internet connectivity in the country. On that basis a 9.600 Kbps leased line has been installed between the University of Zambia and TICSA, a commercial Internet provider in Cape Town, South Africa and it is now operational. The CISCO router provided by RINAF, has already been configured and connected to a local UNIX network.

- Nigeria (NACETEM - Obafemi Awolowo University);

Prof. A. Sanni, Executive Director of the National Centre for Technology Management located at the Obafemi Awolowo University in Ile-Ife, has been appointed as RINAF Country Coordinator for Nigeria. A plan for the activation of the regional node has been submitted and the equipment requested has been sent to NACETEM. The critical political situation in Nigeria has caused a remarkable delay in the project implementation in this country. At present, the

main node at the Yaba College of Technology is operational through a UUCP protocol using the equipment supplied by RINAF; regular dial- up connections are made by CNUCE for uploading and downloading e- mail messages. The connection has suffered long interruptions due to sever damages occurred to the modems caused by the very high variations of the voltage supply. In May '94 the Yaba Tech / CNUCE connection went down; the RINAF technical responsible in Lagos, fixed the damaged Worldblazer modem and the connection has been restored since the end of September. At present, several Nigerian organisations are asking to link up with the Yaba College on the Internet, requesting an on-line system.

8.2 Role of the national and regional nodes

The RINAF project is encouraging the communications within the single regions; the regional nodes have a promoting role for this purpose, by supplying information and data bases, training and support to the users; RINAF encourages the interregional communications and to this objective the regional nodes should play a major role. RINAF provides not only efficient connections to Europe and America but also supply frequent and efficient means of communication and of exchanging data between African countries. Provided that the data path is transparent to the users, the goal of RINAF is to assure a good intercommunication between African countries despite the often bad quality of the international telecommunication means in Africa.

We can certainly say that the aim of inserting the African countries in the community of Internet, which is opening to a fast growing number of developing countries, has been prevailing; the Internet environment is infact providing technical tools which allow the users to interact in the best cost-effective way with any other user in the network, regardless of the physical path followed by the data.

The key factor for reaching the goal of RINAF, as well as any other networking initiative aimed to reach a global connectivity, has been to create a group of good African technicians who should be able to promote the network and the user services but also to manage the network complexity, working with the Internet technicians spread out in the world. This group of African technicians has been trained to take advantage of the existing links to Internet in order to guarantee a good level of the service, to select alternative paths when the main links are failing and to deal with queuing problems. They have also been trained to maintain a structure which, due to the african economic situation, is based on standard and consolidated technological solutions but which still encounters difficulties related to the minor redundancy of equipment, to the lack of specialised personnel, to the difficulties in getting support from the hardware and software manufacturers, etc. Therefore we confirm the primary objective of creating a first class group of technicians; the RINAF Country Coordinators are aware of the importance of carefully selecting the network technicians possibly providing them with an adequate position, in order to avoid their following departing.

9 Training activities

The formation of a group of technicians in charge with the management of the RINAF nodes and with the training of the potential users, has been considered a key factor for the success of RINAF. The training courses carried out within the project have been the following:

9.1 RINAF course for system operators:

RINAF course for system operators, Pisa, 26th October - 6th November 1992. The course has been attended by two delegates for each of the 8 RINAF nodes along with a delegate from Tunisia, one from Uganda and another from Kenya. The total number of attendees was 19. The teachers guaranteed a very high level of expertise and supplied some good written material for further consultation. The course attendees after one week of intensive course, took part to the international conference on network services, NSC '92 held in Pisa, which represented an ideal situation for the integration of the African representatives in the international arena, stimulating them to interact with their European and American colleagues. The participants worked very hard in the time left after the lessons and prepared a valuable set of documents which onstitute the base for the implementation of RINAF.

9.2 Regional courses in Africa

Five regional courses will be organized within the project. The RINAF Technical Coordinator is prepared to make agreements with the Regional Coordinators in order to shape the course agreeing on the following points:

a) dates and duration of the courses (from 3 to 5 days);

b) program of the course (to be agreed in accordance with the technological solutions adopted by RINAF in the region);

c) teachers (if possible one coming from the region hosting the course);

d) selection of the trainees (the optimal number should be 20);

e) budgetary issues;

f) organizative aspects.

The first regional course for system operators has taken place in conjunction with the Helina '93 conference held in Ile-Ife, Nigeria, on 19-23 April 1993. The three days course, which has seen the participation of 20 delegates coming from the central and western part of the African continent, concentrated on Fidonet and UUCP technologies along with some hands on practice sessions. The RINAF Technical Coordinator, Mr. Stefano Trumpy, attended the course as a teacher and coordinating person. The course was also the occasion to train the system operators to start the nodes activity in Nigeria. The remaining courses will take place in locations and at a time to be determined.

9.3 On site training and assistance to the RINAF nodes

Each node will require a specific training for the installation and for site assistance in order to start the operations and activate the services; this activity has already been carried out in Algeria, Egypt and Nigeria.

10 Future perspectives

In the present days Internet has gained great populatity in the public opinion as the basic instrument which will bring to reality the global information infrastructure in the world. The Internet services, based on the TCP/IP protocols, have become a standard de facto and will constitute the platform which will be used to develop the new services for the broad community of the network users. The concept of information highways, recently exploded in the developed countries, is that of bringing together the information bases and the services in order to realize the global information society. For the above considerations the RINAF choice of making any effort to insert some selected countries in the Internet environment has been most appropriate also allowing, from now on, the future expansion of the companies initiatives by using the same technology. It might be argued that the lack of telecommunication infrastructures in the African continent could in perspective enlarge the gap existing today with the western countries and that alternative approaches to the communications should be found in order to reduce the isolation of the academic and research institutions in Africa. The former assumption is certainly false for the following reasons:

- it is certainly true that the gap concerning the performances and the reliability of the telecommunications infrastructures in the African continent, if compared with the same infrastructures in Europe, North America and Japan, is increasing because the deployment of such infrastructures requires large investments in hard currencies and it is feasible in a social environment which is already a high consumer of communication services. However, it has been proved that the TCP/IP protocol may reliably work using the existing TLC infrastructure of some African countries;

- it is also true that the present rush in developing the new services for the information highways will bring large investments in the field, justified by the large user community. As a consequence the low end services, suitable for the vaste mass of users who cannot afford the development of the new services or a wider bandwidth access, will be provided at marginal costs and will have the advantage to rely on consolidated standards. Furthermore the realization of the information highways will pose a problem of democracy in the more developed countries; the governments will have to implement very low cost solutions to let those who cannot afford fancy services access the Internet community. These solutions will also be the most suitable for the countries which cannot rely in efficient and developed telecommunications infrastructures.

The more developed countries need to communicate with everywere in the world and are willing to put investments for extending the information technology to developing countries based today on the Internet.

It is opinion of the authors that, in this case, this form of technological dependance is, at the end, of advantage for the developing countries since what it is obtained is a set of efficient communication services which may constitute a precious knowledge basis for the development process.

What does the RINAF community should expect or encourage to happen?

The process initiated by the project and by other initiatives in Africa like IDRC, VITA, ORSTOM-RIO, PADIS/UNECA, WORLDBANK, WHO, COMMONWELTH, etc. should be continued and possibly reconducted to a global panafrican project which shouldbe conceived as follows:

- as far as the technology is concerned, the Internet is the common unifying domain; inside the Internet galassia there are many different technical options which are all valid since they assure a global connectivity;

- as far as the transmission means and the network topology are concerned, the solutions to be adopted are the most cost effective without concentrating on the actual data path; an active cooperation between the various network initiatives shoud be pursued;

- a strong effort should be devoted to develop servers and information services for the african community since this is the real network;

- each separate initiative supported by a funding organization should provide resources for the connectivity of the end users mainly for developping the information and other services for the class of users which constitute the target of these initiatives; this latter aspect will save the identity of the project and of the funding organization.

To conclude, the basic concept is that in the information society the physical network is unique; the real networks are the knowledge networks serving various class of users that may be selected with different criteria (geographic, disciplinary, commercial interest, etc).

One of the most interesting challanges for the African continent is to use the telematic services now available to build up an information base, distributed and available to all.

RINAF volonteers to activate the debate to define a global project having the above described characteristics. A conference to reach this aim, will be organised at the end of the RINAF 2nd implementation phase.

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