Concept Note

Global University Network for Africa (GUNA)

THE GUNA INITIATIVE

The Global University Network for Africa (GUNA) is an open joint initiative guided by an advisory committee that includes the Group of 77 in the United Nations (G-77), the Consortium on Science, Technology and Innovation for the South (COSTIS), the Trieste International Foundation for the Progress and Freedom of Sciences (FIT) and the Trieste System of Scientific Organizations.

GUNA will be implemented with reference to the following frameworks:

- Memorandum of Understanding signed at Trieste, Italy, on 10 November 2005, between G-77, the Abdus Salam International Centre for Theoretical Physics (ICTP), the University of Trieste (UniTS),
and FIT, which proposed “to build and utilize networks, institutional capacity and expertise in science and technology for research and development”.¹

- Memorandum of Understanding signed in Alexandria, Egypt, on 1 December 2005, between ICTP, FIT and TWAS, the academy of sciences for the developing world (TWAS), which proposed that “starting from the Memorandum of the G77 for a prototype of Collaboration (including Digital Literacy) of the University of Jamaica with University of Trieste and ICTP as representing the Trieste System, build up a network of such collaborations with universities in Africa to be possibly named the G77 network”.²

- COSTIS work plan for 2007 and 2008, within the Network of Universities and Research Centres of the South programme.

---

¹ This partnership framework is the prototype for future partnership agreements for member of GUNA (ANNEX 1)
² ANNEX 2
OBJECTIVES

It is generally accepted that a wide access to knowledge is crucial to education, and thus to sustainable development of the society. This has been underlined in the Millennium Report of the UN Secretary General and in numerous statements of leading specialists, and politicians including Heads of states. Two mutually interconnected issues are involved here. The first is the access to information infrastructure via telecommunication networks, and the second, the access to international specialized literature.

This project will contribute concretely to facilitate access to up to date and relevant educational information, developing networks of expertise, transferring technology know-how, mentoring students and sharing knowledge through distance teaching, which can be augmented by short term missions to transfer specific skills.

Achieving educational development will depend strongly on the increased cooperation among professors and lecturers, including setting up networks of researchers and institutions. Such collaboration requires nowadays the use of the Internet. Unfortunately, network connection in developing countries is marginal at best. Not only is the international communication bandwidth for these regions low, but also the internal network infrastructure is poor. In turn this makes collaborative research difficult and essentially unfeasible.

The goal of this activity is thus to setup adequate communication network infrastructures in the participating African institutions and to develop local expertise in the use of ICT. Training is identified as an important variable for the sustainability of this development. Appropriate training is critical to warrant an efficient use of bandwidth and equipment that are expensive resources.

GUNA with respect to the regular activities of the Trieste System for Africa, aims at raising, substantially, the socio-economic level of the African continent, within the fundamental aim of eliminating in the region, excessive illiteracy, poverty and hunger which applies especially to a good part of the sub-Saharan countries. It is a long-term project within the following objectives:
• Increase universities level and provide African scientists with adequate conditions and resources to carry out research in their home countries.
• Improve training opportunities for technicians and other professionals.
• Foster partnerships among universities in Africa for the development of specific projects.
• Focus initial activities on promoting scientific communication in African universities.
• Provide digital information (digital libraries) for the universities in Africa.
• Act on relevant subjects for the continent, such as: digital literacy, water resources, alternative energy, the environment, AIDS and tropical diseases, and so on.
• Increase the level of the universities in Africa and assist the creation of new universities, especially in the sub-Saharan region.

The fundamental objective of the proposed program is to reduce the isolation of African Universities, by encouraging and stepping up the exchange, production and dissemination of educational information. The digital divide from which the African academic community suffers is an emblematic example of the knowledge divide affecting developing countries.

The goal of this project can be reached only if the following requirements are put in place:

• Adequate network infrastructure in academia
• Technical Human Resources program
• A system for educational Knowledge access and dissemination
• A way of measuring and evaluating of the effectiveness of these actions
PROGRAMMES

The focus of the initial activities is to develop infrastructure to facilitate the scientific communication among the African universities. Furthermore the activities of the Network will be extended to other scientific institutions, both in the South and North.

The following programmes will take place for the first 2 years of the Network:

1. **Promotion of partnership agreements among the universities in Africa and scientific institutions, both in developed and developing countries**

   The goal, for the first year of activities, is to start the network with 5 university members that will become the main point of the GUNA net charged to spread communications and extend Internet facilities at regional level.

   One of the initial members will be chosen to manage the activities of the network and to host the GUNA office.

   For this purpose COSTIS will contact those African universities that have already developed successful collaboration with organizations in Trieste, as ICTP and ICGEB affiliated centres. They will be asked to send case studies and propose the first activities for the network.

   An advisory committee will assist the initial members to establish the legal partnership framework for GUNA. The Memorandum of Understanding signed at Trieste, Italy, on 10 November 2005, between G-77, ICTP, FIT and UniTS, will be the collaboration prototype between GUNA and other European universities.
The structure of the Network will be established according to the diagram bellow:

2. Improvement of Internet connection for African universities

Achieving educational development will depend strongly on increased cooperation between scientists, including setting up networks of researchers and institutions. Such collaboration requires nowadays the use of the Internet. Unfortunately, network connection in Africa is marginal at best. Not only is the international communication bandwidth for this region low, but internal network infrastructure is often poor. In turn this makes collaborative research difficult and impractical.

The goal of this activity is thus to set up adequate network infrastructures in the participating African institutions and to develop local expertise in the use of Information and Communication Technology (ICT). Training is identified as an important variable for the sustainability of ICT
development. Appropriate training is critical to warrant an efficient use of bandwidth and equipment that are expensive resources.

3. Promotion of online scientific communication African universities

Scientific progress in developing and emerging countries is greatly hampered by their inability to pay for access to educational material. At the same time, educational material generated in these regions often does not reach the international community because of financial and other restrictions affecting its distribution. In order to reduce this knowledge divide, free access to publications is needed in scholarly subject areas that exercise editorial quality control. The proliferation of freely accessible journals provides valuable supplement to academic and scientific knowledge.

Scholarly educational titles will be provided to the partner African universities through a portal. The portal will also provide the tools the academic and scientific community use to search for information within thousands of scholarly publications.

The portal aims to contribute to the development of expert professional and academic communities, encourage creativity and productivity, and facilitate the development of progressive science-based national policies. It will help enable countries to develop their own higher education institutions, conduct their own research, publish their own research findings, and disseminate information to policy makers, scientists, and the public.
STRATEGIES

The project constitutes a package of sustainable initiatives. Issues like continuity, sustainability, necessary resources after the formal phase of the project is over will be addressed from the very beginning.

The program aim is to increase the ability of African Universities to exchange, produce and disseminate educational information in the continent. It is envisaged that this target should be achieved through the consolidation and expansion of the existing network between the Trieste System and the African Universities involved.

In the long-term perspective, the program is expected to be fully self-sustainable. It will focus, therefore, on:

- Supporting the local counterparts in African countries, to ensure their transformation into locally self-sustained actors upon building up sufficient capacity to operate without external assistance,
- Exploring possibilities for expansion of the programme to other countries by encouraging both their own Governments and international donors to provide resources for this purpose.

1. Network Infrastructure

Objective:

To develop a communication network of Universities in Africa with adequate access bandwidth.

Activities:

1) Assist a group of key Universities in setting up a reliable full scale network through Satellite links.

2) Assist remote institutions to be linked with appropriate technology to the Internet.

3) Assist remote branches, departments and medical centers in setting up terrestrial wireless links.

Justification:
Given the limited information delivery systems and poor terrestrial communications infrastructure in the region, satellite communication becomes one of the best available means to meet the communication and educational needs in the region. Most African countries have poor or lack of fixed communications infrastructure, hence services are limited to Academic Institutions in major cities, while the ones in rural areas have very little or no infrastructure. Satellite communication is most suitable in this situation because satellites have a vantage point. They can receive and transmit high-quality electronic signals almost anywhere on the earth. Also satellite communications does not demand extensive wire infrastructure in order to broadcast information. They can also be used for point-to-point relays in support of communication among individual users, or for point-to-multipoint broadcast of audio, video or data aimed at vast audiences. Such capabilities would enable academic communities to get connected to the world of World Wide Web.

Although in the short term it may appear that the use of satellite is short-circuiting the development of terrestrial telecommunication infrastructure, satellite is the only logical choice for immediate delivery in the region. Another powerful aspect of satellite communication network is the capability to deliver Internet content directly to the network’s endpoint bypassing congestion within the network’s core. This is important for East African countries because the available terrestrial infrastructure is analog and connectivity is extremely slow. Therefore satellite services offer direct, quick and efficient means of communication for scientific institutions by direct uplink/downlink to the satellite network itself. In the long run, satellite services in the region will create the need and the means necessary for building terrestrial infrastructure. Moreover satellites provide competition for the terrestrial telecommunication networks, thus improving services and lowering prices both for equipment and services. Very small aperture terminals (VSAT) technology provides instant infrastructure at low initial investment and low per-minute operating costs. Service providers are able to offer affordable rates.

Once a fiber-optic, or satellite connection is in place, we believe that the most promising solution to extend network coverage is often a mixture of point-to-point and point-to-multipoint wireless technologies. These technologies could form a backbone that provides connectivity down to the remote University level. Our technological focus is primarily adapting the IEEE 802.11 (Wi-Fi) and/or Wi-Max 802.16 family of technologies to provide the backbone network. The 802.11 standard enjoys widespread acceptance, has huge production volumes, with chipsets costing as low as
US$5, and can deliver bandwidth of up to 54 Mbps. Furthermore, point-to-point links using 802.11 high-gain directional antennas can span impressive distances up to tens of kilometers.

2. Training

**Objective:**

To enhance the know-how in the field on ICT.

**Activities:**

Implement training programmes on Wireless Networking, ICT for Academic Institutions, e-Learning.

**Justification:**

ICT training is identified as an important variable for the sustainability of ICT development. Appropriate training is critical, for it means that bandwidth and equipment, which is an expensive resource, can be used efficiently.

The recognition of ICT as a major factor for development in Africa has created many avenues for training ICT personnel, but more needs to be done. Sufficient and sustainable human-resource development to sustain the best use of ICT in the education and research sectors is essential. This includes technical training and also ICT management and policy training. If African universities are to have the capacity to make their voices heard in the policy and regulatory environment, they must have the tools with which to do so.

3. Educational Access and Dissemination

**Objective:**

To accelerate scientific advancement by making educational literature results readily accessible.

**Activities:**

Launch a web portal.
Justification:

Educational and cultural advancement in developing and emerging countries is greatly hampered by their inability to afford the access to educational material. At the same time, educational contents generated in these regions are missing to the international community because of financial restrictions affecting its distribution. In order to reduce this knowledge divide, free access to publications is needed in scholarly subject areas that exercise editorial quality control. The proliferation of freely accessible journals provides a very valuable supplement of academic and scientific knowledge.

Scholarly educational titles will be provided to the partner African Universities through a portal. This will also provide intellectual tools the academic community use to search for information within thousands of scholarly publications.

The portal aims to contribute to the development of expert professional and academic communities, encourage creativity and productivity, and facilitate the development of progressive science-based national policies. It will help enable countries to build their own higher education, conduct their own research, publish their own findings, and disseminate information to policy makers and the public.

TIMELINE AND BUDGET

The initial steps for the implementation of GUNA are the following:

- Meeting of expert group to elaborate the initial costs of GUNA.

- Fund raising for the first activities of the Network.

- Establishment of partnership agreements between the 5 initial members.

- Establishment of the GNUA office in Africa.

---

In 2006, FIT and G-77 estimated 2.5 million dollars for the first 3 years of activities of the network (ANNEX 3)
• Improvement of the Internet standards for the initial members of the network

• Development of the web-based structure of the network.

• Promotion and sharing of digital material (digital libraries).

• Development and implementation of specific projects.

Work plan for the first 2 years:

A feasibility study of the telecommunication network needed to warrant ICT access at the Universities. Tasks of this study should be:

• identify five key Universities that should represent, through a call for participation, a first step of the full shape system,

• analyze and define the most cost-effective technologies for the three levels of communications, through expert meetings,

• estimate detailed costs for the network infrastructure and operation evaluating on-site capabilities, conditions and local technology costs

The estimate cost of the feasibility study is of 100,000 euros, including: manpower (12 person months), two meetings, on-site visits and technical documentation.

Duration of the feasibility study: 6 months.

The cost estimate has to be scaled in such a way that the first phase of the overall (2 years) project should cost 1.2 million dollars\(^4\). At the end of the 2 years, at least the connection with the five key Universities should be fully operational and access should be available for remote branches, departments and medical centers around the Universities.

\(^4\) With reference to the preliminary estimated costs for the 3 first years (ANNEX 3)
The feasibility study could be carried out by the ICTP-Aeronomy and Radiopropagation Laboratory, taking into account the long time experience of this institution in dealing with ICT development in Africa.
SUMMARY OF THE INSTITUTIONS

G-77

The group of 77 is the largest member-state organization in the United Nations, within 130 member States. It seeks to provide a voice and a platform for the discussion of issues of common concern to the developing world throughout the United Nations system.

G-77 has been one of the pioneers in introducing the importance of science and technology in the United Nations development agenda at the General Assembly. Two decades ago, developing countries have initiated the establishment of the UN Commission on Science and Technology for development to build greater awareness of scientific and technological development for economic and social development.

FIT

The Trieste International Foundation for the Progress and Freedom of Sciences (FIT) has promoted the creation of most international institutions composed the Trieste System and works towards the dissemination of scientific and technological knowledge for peaceful applications. It facilitates cooperation between university and research institutions in Trieste and international scientific organizations both in the developed and developing world.

COSTIS

The Consortium on Science Technology and Innovation for the South (COSTIS), promoted by FIT and G-77, was launched by the Meeting of the Ministers of Science and Technology of the Group of 77 Member States held in Angra dos Reis, Brazil, in 2006, and was formally endorsed by the G-77 Foreign Ministers, at the United Nations, in New York.
A High-level Scientific Advisory Board, comprising the heads of various institutions based in Trieste, has been established to guide COSTIS' scientific programmes.

Objectives of COSTIS:

- Promote the integration of science and technology into the national development plans of developing countries with a view to facilitating the solution of national problems;
- Develop networks of universities, including those in the poorest regions in Africa;
- Support the establishment of new international centres of excellence for sustainable development in the South and enhance cooperation among existing ones;
- Promote the development of collaborative programmes between members of the Consortium and scientific institutions and organizations of the South in areas of science, technology and the environment that are of critical importance to national development;
- Advance relations between scientific institutions and organizations in the South and their counterparts in the North through the development of bilateral links and cooperative programmes;
- Promote the sharing of experiences and best practices in harnessing science and technology for sustainable development in the South.

TRIESTE SYSTEM

The Trieste System is a network of international scientific institutes and organizations located in Trieste, Italy, that seek to promote scientific capacity building in the developing world. The System, which is funded largely by the Italian government, began with the creation of the Abdus Salam International Centre for Theoretical Physics (ICTP), in 1964, and the Trieste International Foundation for the Freedom and Progress of Sciences (FIT), in 1980. In addition to the ICTP and FIT, it now includes TWAS, the academy of sciences for the developing world, the International Centre for Genetic Engineering and Biotechnology (ICGEB), the International School for Advanced Studies (SISSA), the International Centre for Science and High Technology (ICS) and the University of Trieste (UniTS), and other institutions.
MEMORANDUM OF UNDERSTANDING

BETWEEN THE ABDUS SALAM INTERNATIONAL CENTRE FOR
THEORETICAL PHYSICS (ICTP), THE UNIVERSITY OF TRIESTE AND THE
GROUP OF 77 OF THE UNITED NATIONS

i) Recognizing the contribution of the international and Italian institutions in Trieste (Trieste Science and Education System) in promoting science and technology in developing countries,

ii) Recognizing the importance of exchange of students and researchers between universities and research institutions to promote effective training programmes and advanced research and to facilitate transfer of science and technology that could benefit developing countries,

iii) Reaffirming the Joint Statement signed at Trieste on the 5th of October 2004, by the Minister for Education, University and Research, and the Under Secretary for the Ministry of Foreign Affairs of the Government of Italy, with the representatives of the local scientific institutions of the Trieste Science and Education System and by the Chairman of the Group of 77,

iv) Reaffirming the Memorandum of Agreement signed on the 20th of December 2004 by the Chairman of the Group of 77 and the President of the Trieste International Foundation for the Progress and Freedom of Science (FIT),

The Chairman of the Group of 77, the Vice-Chancellor (Rector) of the University of Trieste and the Director of the Abdus Salam International Centre for Theoretical Physics (ICTP) agreed to:

1. Establish a framework of partnership and cooperation between the University of Trieste, ICTP and other universities and research institutions in the South.

2. Exchange scientific experiences in various fields, identify opportunities for technical and scientific advances, develop new interactive learning projects, provide grants to students for studying or to scientists for research and innovative interactive projects, share expertise in learning or research development, and any other activities of mutual interest.

3. Facilitate the exchange of students, academia, researchers, and provision of scholarships and grants, and make use of state of art research facilities offered by the Trieste Science and Education System.

4. Promote education and enhance access and use of Information Communication Technology in developing countries.
5. Build and utilize networks, institutional capacity and expertise in science and technology for research and development including programmes of science literacy both for school and society in developing countries.

6. Cooperate closely for effective implementation of sustainable development activities through collaborative capacity-building efforts in management, exchanges in technological and scientific know-how and the development of state-of-the-art environmentally-sound technologies.

7. Discuss practical modalities of scientific cooperation with interested universities and other scientific institutions of Jamaica. Such a model will be extended to other interested universities of the South.

8. Decide to hold regular consultations on the practical modalities for the implementation of this Memorandum with the objective to expand this initiative to other universities and institutions in developing countries.

Ambassador Stafford O. Neil  
Permanent Representative of Jamaica to the United Nations  
Chairman of the Group of 77

Professor Domenico Romeo  
Vice-Chancellor of the University of Trieste

Professor Katepalli R. Sreenivasan  
Director of the Abdus Salam International Centre for Theoretical Physics

Witnessed by;  
Professor Paolo Budinich  
President of the International Foundation for the Progress and Freedom of Science (FIT)
MEMORANDUM

After the meeting of 1 December 2005, in Alexandria, Egypt considering that:
I. The Second G77 Summit of June 2005 and subsequent Doha Plan of Action, Point 35 (Ann1);
II. The letter of the G77 Chairman O'Neil (Ann 2);
III. The 4 November 2005 visit of K.R. Sreenivasan and of P. Budinich to the Vice President F. Frattini of the European Commission in Bruxelles (Ann. 3)
IV. The following visit of K.R. Sreenivasan to D.A. King and Royal Society in London (Ann 4);
V. The letter to M. Ahmia proposing the creation of the Committee (Ann.5). That letter has been de facto dictated by M. Hassan and has been approved by M. Ahmia;
VI. C.N.R. Rao supported the creation of the Committee and agreed to be one of the founding members of the committee,

after discussions, the following actions were agreed upon:

A. To convene in Trieste, as soon as possible, a meeting with the new Chairman of G77 accompanied by M. Ahmia (Hassan and Rao).
B. Collect the proposed signatures (and possibly meet the concerned members). Add to the members Bruce Alberts, Co-chairman of IAC, and possibly A. Falaschi (Chairman of SDT) and S. Fantoni (Director of SISSA [P. Budinich]).
C. Formulate for the committee the structure of the organ to operate in the transitional phase (2-3 years) for the benefit of Africa.
D. The creation of the committee, as soon as finalized, should be communicated, as promised, to the European Commission in Bruxelles, for further actions (financing).
E. About the objectives and programmes of the Committee (and subsequently of the Consortium) the following were tentatively suggested:
a-Doubling the existing and effectively working affiliated centers of ICTP and ICGEB;
b-Relaunching the old TWAS project to provide one good library to each developing country (starting from seven Mediterranean African countries to be correlated with Alexandria Library (Ann 6);
c-Starting from the Memorandum of the G77 for a prototype of collaboration (including science literacy) of the University of Jamaica with University of Trieste and ICTP as representing the Trieste System (Ann 7) build up a network of such collaborations with universities in Africa to be possibly named the G77 Network;
d-The creation in an appropriate country in Africa of the first centre for Science and Technology as proposed to D.A. King by K.R. Sreenivasan and C.N.R. Rao;
e-Besides enforcing the present activities like Associates Federated Institutes, South-South Collaboration (laser and mathematics) further projects should be studied and proposed;
f-It would be desirable if such proposals would be requested and promoted also from those in Africa, who benefited from the activities of the Trieste System (action already started).
Signatories:

C.N.R. Rao
K.R. Sreenivasan
M.H.A. Hassan
P. Budinich
ANNEX 3

PRELIMINARY ESTIMATED COSTS

Considering that to each affiliated Centre the A.S. ICTP was (10 years ago) allocated an annual contribution of 25 000 U.S. dollars for regional collaborations contributions should be raised to at least 30,000 U.S. dollars to each element of G77 UN. The estimated annual cost for the PhD should be further 30,000 U.S. dollars. The annual cost of network LAM IS: (experimental devices plus publications of bulletin) 200 000 to 400 000 U.S. D.

ESTIMATED ANNUAL COST OF THE G77 UN AFTER 3 YEARS

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>COST/ELEM.</th>
<th>NUMBER</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>G77 UN</td>
<td>30</td>
<td>30</td>
<td>900</td>
</tr>
<tr>
<td>PhD courses</td>
<td>30</td>
<td>15</td>
<td>450</td>
</tr>
<tr>
<td>NETWORKS</td>
<td>150</td>
<td>6</td>
<td>900</td>
</tr>
<tr>
<td>ICTS</td>
<td>10</td>
<td>30</td>
<td>300</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>2,550</td>
</tr>
</tbody>
</table>

In thousands dollars.