1.0 ORGANIZATION OF CONFERENCE AND WORKSHOP

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VENUE AND DATE OF CONFERENCE AND WORKSHOP

The African Technology Policy Studies Network (ATPS) held its First Annual Conference and Workshop as an independent organization at the Nairobi Safari Club, Nairobi, from October 29 to November 1, year 2001.

SUPPORT FOR THE CONFERENCE AND WORKSHOP

The conference and workshop were organized and executed by the African Technology Policy Studies Network.

THEME OF CONFERENCE AND WORKSHOP

The theme of the conference and workshop was "Information and Communication Technologies for Development in Africa."

OBJECTIVES OF THE CONFERENCE AND WORKSHOP

The meeting set to achieve the following:

- Host a conference on ICTs for development in Africa
- Review new proposals for possible funding.
- Introduce ATPS Regional Project on Strengthening National ICT Policy in Africa
- Run a policy-methodology seminar for ATPS researchers
- Conduct the ATPS Annual General Meeting and appointment of the ATPS Board
- Conduct a National Coordinators' Meeting and discuss the administration of national chapters.

WORKSHOP STRUCTURE AND PROCESS

The meeting was structured as a conference and workshop, with the first day being devoted to a seminar on ICTs and the remaining days to presentations, discussions and review of research proposals, the ATPS Annual General Meeting and to a meeting of National Coordinators. Two field trips, one to a model banana plantation and another to a game reserve were also conducted.

During the conference, the official opening of the meeting was done, the keynote address delivered and plenary presentations on ICTs delivered. These laid the framework for the conference and workshop.

2.0 CONFERENCE AND WORKSHOP OPENING CEREMONY

PRELIMINARY REMARKS AT THE OPENING CEREMONY

The conference and workshop opening session was chaired by Dr. Andrew Mullei, the Executive Director, African Centre for Economic Growth. The session started with an introduction of participants. The Chairman of ATPS, Professor Norah Olembo, said the conference and workshop had come at a historic moment in the life of ATPS as the network had gained independence from the International Development Research Centre (IDRC). It was a moment for the culmination of a long dream, she said, pointing out that as an independent organization, the network now faced many challenges.

ATPS Executive Director, Dr. Osita Ogbu, welcomed participants and resource personnel to the meeting.

Dr. Mullei reminded the conference that Nigeria's Minister for Science and Technology, Hon. Prof. Turner Isoun, was a member of the ATPS Board and proposed that Kenya's Minister for Education, Science and Technology also sits on the Board.

REMARKS BY THE ATPS CHAIRMAN

The Chairman of ATPS, Professor Norah Olembo, made a short welcome and introductory statement at the opening of the conference and workshop.

She expressed gratification at the realization of a "dream" — the fact that ATPS was holding its first annual conference as an autonomous organization. She said the autonomy lent greater relevance to the mission and vision of ATPS, and expressed the hope that it would lead to greater donor confidence and, thus, to additional resources.

But Prof. Olembo was quick to point out that freedom goes with challenges, pointing out further that success would depend on effective ATPS leadership. The appointment of Dr. Osita Ogbu to the post of the Executive Director, she said, was of great importance to the Network. She said Dr. Ogbu was familiar with the Network, and that the board expected national chapters to ensure that the network had an impact on science and technology policy issues in Africa.

Prof. Olembo noted that National Chapters had completed their strategic planning process and were expected to implement their respective plans. She said the network's ambition is to put ATPS on the map of Africa as a center of excellence and reference on issues of science and technology policy in sub-Saharan Africa. "We should now move beyond talk and begin to reposition ourselves at seven levels of impact as articulated by the Executive Director: policy-makers, legislators, the mass media, the organized private sector, polytechnics and schools of engineering, farmers and small-scale producers, and donors."

She challenged national chapters to be more creative in their intervention on local technology policy issues. The chapters, in collaboration with ATPS, should organize and target research results, policy briefs and other materials to these constituents in a timely manner.

She called for resilience and hard work on the part of all involved in the network, saying it would take a collective effort to realize the mandate of ATPS. With the pressing issues of globalization, biotechnologies, and information and communication technologies, ATPS, she said, was best placed to articulate and disseminate policy advice to member countries.

She appealed to the government of Kenya to provide ATPS with a conducive working environment and called for the strengthening of the rapport between the two.

REMARKS BY THE ATPS EXECUTIVE DIRECTOR

The Executive Director of ATPS, Dr. Osita Ogbu, welcomed all to the conference and workshop, terming the meeting a historical moment as the Network was now autonomous. Since its establishment in 1994, he said, ATPS had built research capacity in several African countries, expanded space for technology policy debate in the continent, published research papers, broken the isolation of members through networking, and improved the working environment of members.

However, the Executive Director pointed out, these achievements were not enough. The new ATPS must make a difference in policy advice through targeted intervention using the Network's research and dissemination programs. The yardstick for measuring the new ATPS, he said, would be different. ATPS was now an African organization championing innovative technology policy in Africa. The Board, the Secretariat and ATPS National Chapters were repositioning themselves to achieve the required results. Part of the repositioning included enlarging target audience and sharpening the instruments for reaching them. He said the network is expanding and strengthening the National Chapters to be viable and visible in all the sub-regions of sub-Saharan Africa, to create an institution that is truly African. Working with like-minded actors in the region and with scholars outside the region, ATPS would act as a knowledge broker to maximize gains from the current technological revolution.

Dr. Ogbu said ATPS was lucky that its birth coincided with the call by the United Nations Development Programme (UNDP), in its *UNDP Human Development Report 2001,* and by African political leaders, through the objectives of the African Union and New Africa's Initiative, to innovate and develop technology policies that are effective. Such policies are required for Africa to be part of the biotechnology, and information and communication technology revolution for poverty reduction and for internalizing gains from globalization. The call for action, from several relevant quarters gives impetus to the Network's work and legitimizes its mandate.

He called for the co-operation of African governments and partners, including the international donor community, to help articulate the network's vision. Dr. Ogbu also thanked supporters of the Network and the government and the people of Kenya for providing a conducive environment for the management of ATPS .

THE CONFERENCE AND WORKSHOP OFFICIAL OPENING CEREMONY

The official opening of the conference and workshop was conducted by Mr. Adams Karauri, an Assistant Minister for Education, Science and Technology on behalf of Mr. Gideon Ndambuki, the Minister for Science and Technology. The Minister termed ICT as the engine of development and economic growth and raised the challenges facing ICT development. He outlined Kenya's strategy for ICT development and called on other African countries to develop their own.

He expressed recognition of the fact that ICT is the key to progress and noted that in 1993, only three countries in Africa had access to the Internet. However, by 1996, the number had

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sho up to 11, but at the end of 2001 every country on the continent was hooked to the Internet. Kenya had only one Internet service provider by 1995 but the number has since shot up to more than 60. The figures, he said, illustrate that ICT is a high growth sector.

ICT has the potential of unlocking opportunities in business, education, agriculture, industry, science, security and international relations, he said, adding it could lead to such economic rewards as distance education in "virtual" classrooms, less need to maintain expensive libraries at every institution of higher learning, the provision of medicare from a distance, the opportunity to leapfrog older technologies requiring heavy capital investments thus propelling developing countries directly into the information age and facilitating governance by making available large pools of timely information to policy makers and medium enterprises through e-commerce.

He urged governments to play a major role in stimulating ICT-led economic growth in order to raise productivity, create jobs, reduce wastage and increase incomes. The global trends, he added, would assist ICT governments to improve their economies. The declining costs of ICT goods and services and the recent liberalization of data services have created a new dynamism in the ICT sector with a proliferation of e-activities including e-learning and e-business, the minister pointed out.

To move forward, African countries should critically evaluate factors that promote ICT. In Kenya, he said, the main challenges to promotion of ICTs are:

- Inadequate and inequitable information, infrastructure and facilities;
- Inadequate or inaccessible complements such as electricity, telephones and data services;
- Lack of a policy and regulatory framework; and
- Inadequate human resource capacity to meet the challenges.

To meet the challenges, he said, the Kenya government had embarked on the establishment of a framework for ICT policy. He said the government hoped to work with ATPS on the development of the framework and on other areas of technology policy. In this regard, the government will strive to achieve two principal policy objectives. The first would be provision of an enabling policy environment necessary for the sustainable growth of a dynamic ICT sector. Government policy would be pivotal to the digital economy. Import tariffs on information technology, which now stand at five percent, would be gradually reduced. Tax incentives for ICT investment in the rural areas and education institutions would be introduced. Government policy would also spell out the way forward with respect to such activities as e-business, e-government and e-learning.

The second is the need to define the mission for service and delivery to the public through strategic application of information and related technologies. In order to maximize the gains of information economy, information communication technologies will be incorporated into the fabric of the country's core activities. This would require that a range of skills be developed at all levels of the population, both at the technical and user ends. Kenya, he said, intends to achieve this through:

- Promotion of initiatives to integrate information communication technologies in educational and training programmes at all levels
- Development of information communication materials for all, including learning materials for people with disabilities
- Establishment of community information communication technology, learning and information centres to enhance access to essential basic developmental information relating to market information, agriculture, health, education, industry, weather and research
- Linking of information communication technology to poverty reduction.

The Minister stressed that a consumer-driven strategy in ICT development would be the

most successful and challenged ATPS researchers as well as policy-makers to raise key consumer concerns and priorities at the conference. He also advised them to make concrete proposals to governments on the necessary institutional and legislative framework that would democratize access to information technology and bridge the rural-urban divide and tackle the problem of unemployment.

The Minister paid tribute to ATPS for organizing the conference and workshop and spoke of his ministry's interest in co-operating with the Network.

THE KEYNOTE: ICT HUMAN RESOURCE DEVELOPMENT IN AFRICA: CHALLENGES AND STRATEGIES

The keynote address, titled "ICT Human Resource Development in Africa: Challenges and Strategies" was delivered by Dr. Timothy M. Waema, the Director of the Institute of Computer Science, University of Nairobi.

The need to develop ICT policies, he said, is particularly urgent given the challenges many African countries are facing, stemming from globalization and liberalization. Globalization had removed time differences and geographical boundaries between countries and many African governments had woken up to the important role of information and communication technologies in transforming their economies in an increasingly knowledge-based global economy. ICT, he said, can assist in addressing the challenges facing our economies, which include wealth creation and managing of the HIV/AIDS epidemic.

In the development of national ICT polices and strategies, he argued, human capacity development is the key.

The keynote gave an overview of ICT human resource development issues in selected countries before discussing the challenges most countries face with respect to ICT human resource development (HRD). He also made recommendations on the strategies African governments should take to enhance ICT human resource development.

India, he said, had one of the largest scientific manpower in the world with about 2,000 educational institutes providing training to over 60,000 students annually. In 1995, the country had 140,000 ICT professionals. The government provided free internet access to students. By 2000, India was earning over $4 billion per year through software exports. Cities like Bangalore and Hyderabad had been converted into a Silicon Valley of India.

Malaysia, he added, had given topmost priority to ICT education, with annual enrolment of IT students at university expected to increase by 15-20 percent. In 1998, the country produced 1,500 IT students. A multimedia university had been set up to educate more than 4,000 students per year by 2001. The country had developed a special ICT city named Cyberjaya and launched a multimedia corridor. Nearly 75 percent of the training comes from the private sector.

Singapore, in 1997, commissioned an IT Education Master Plan stressing the need to fully integrate IT into the education curricula. It has set ambitious targets such as requiring that all students must have hands-on use of computers for 30 percent of their curricular time, the maintenance of a 2:1 ratio of students to computers, and requiring that all schools adopt IT use to plan, teach and asses academic lessons. The estimated investment required for the six-year Master Plan implementation is US$2 billion. In addition, teachers are given grants to buy computers.

By 2000, Egypt had 5,000 skilled computer workers, such as programmers and systems engineers. According to the country's National Plan for Telecommunication and Information, which in part states: "Human resources are considered the most important component in the communication and information industry", Egypt plans to push software exports to US$500 million in five years. To achieve that goal, the nation will need 30,000 ICT specialists. The plan proposes to establish a National Institute of Information Technology capable of graduating 5,000 students a year. Over 70 percent of the schools are equipped with computers and about

20 percent are equipped with phone lines and Internet connectivity. The Ministry of Education funds the Internet in schools.

The presenter said one of the greatest challenges to ICT development in Africa is the wide disparity in infrastructure, especially power and telecommunications between rural and urban areas. Poverty is a major hindrance to development, he said.

Education and training on ICT in Africa had been marked with unplanned growth. Most of the programs are run in the private sector and are usually skill-oriented. Many non-formal education sectors are involved in human resource development but the quality of their programs is questionable.

There also are disparities in the entry requirements to ICT programs, he said. Many countries globally lack adequate human capacity in ICT. The situation is worse in Africa. In Kenya, for example, most of the high-end ICT training takes place in public institutions which cannot retain staff, compared to the private sector, due to disparities in pay packages. This has the consequence of over-reliance on part-time lecturers and on lower quality trainers (i.e. trainers who should be training lower levels), with its attendant quality implications.

The presenter said there was great demand of skilled software developers, system engineers, communication and network engineers, data managers, data supervisors, computer teachers and skilled computer operators. A burning issue was lack of skilled teachers in computer education.

He talked of inadequate ICT literacy, arguing that majority of the graduates in most tertiary levels of education and training were without ICT skills. Most institutions do not have ICT literacy programmes. At the University of Nairobi, for example, ICT literacy courses for all students had not started largely because of lack of adequate staff to deal with the large number of students (about 20,000) and lack of adequate computing infrastructure, especially computer laboratories. He called for a policy to make most workers in Africa 100 percent computer literate. A literacy program should be launched in the form of a national campaign once the infrastructure for such education is set up. Low cost of PCs, low cost internet connection and telephone lines, he said, are the basic requirements for such a program.

Duties and taxes levied on ICT products, including VAT on ICT services make such products and services expensive. Although many governments raise revenue through taxes on ICT, the investment on ICT human resource development is almost non-existent in such countries. The cost of ICT training is, therefore, high, particularly at technician and artisan craft levels in private institutions. At the same time, many public tertiary institutions charge market rates for all forms of training, including ICT. The affordability of these training programmes, he argued, to some extent hinders access to ICT training.

In Kenya, he said, the government is still one of the key funding agencies for ICT human resource development. At a national level, lack of adequate funding in ICT training can be associated with lack of knowledge of the potential of ICT in national development. Lack of funding for ICT training in most countries, he said, had led to over-reliance on external donor funding. Although this funding has considerably diminished, it however tends to have its own problems. These include the fact that it tends to be one-off, it may often not be in line with one's own priorities, and is often not sustainable. In addition, most organizations lack adequate funding for ICT in general and for ICT training in particular.

The presenter also said inappropriate curricula in most African countries had problems including teaching of technical aspects of technology and ignored the social and organizational aspects of ICT. Consequently, graduates lack organizational and management skills and are, therefore, not adequately prepared to deal with the realities of the complexity of analysis, design and implementation of ICT found in most organizations. In addition, most programmes for training of ICT professionals are copied from those in economically developed countries with little modification to reflect the realities of individual countries.

Dr. Waema further argued that the low salaries for the teaching profession means that

training institutions cannot attract good quality trainers. In Kenya, for example, teaching is normally the profession of last resort for most candidates. Even those who get attracted to teaching resort to other methods to raise additional income.

The keynote also addressed strategies for African governments to enhance ICT human capacity. As a start, he urged for the establishment of a national entity to champion the drafting and implementation of ICT policies and strategies. Such entity, he proposed, should reflect a public and private sector community partnership, political accountability, legal and fiscal status maintaining contact with the full range of stakeholders. It should be politically robust and well-embedded, strategically located close to the central policy-making arm of government.

The national entity would be responsible for preparing a vision statement to energise the people, creating faith in ICT, formulating ICT policy and master plans whose aim would be to enable African countries to emerge as ICT giants in the 21st century, developing appropriate management programmes, advising on the strategy's long-term sustainable implementation and resourcing, developing a national capacity-building approach covering legal, institutional development, human resource development and community awareness, incorporating a legal framework which is flexible and can easily adapt to change, and conducting negotiations with global partners.

The presentation proposed ways to improving ICT human capacity development, arguing that abundance of ICT professionals in Africa would, with the right policy instruments, create the opportunity of attracting foreign investment for ICT industry as it has done in several Asian countries. In particular, there are prospects of exporting software to other countries. Software development should be carried out with a view to creating self-employment and earning foreign currency for national development.

ICT human resource development would be achieved by expanding capacity in existing institutions and building capacity in new institutions through electronic distance education, private sector involvement and the training of teachers. He stressed, however, that such expansion would only be effective if undertaken in the framework of a national ICT policy and strategy.

ICT human capacity development, he posited, must not lose sight of the fact that appropriate basic education is the first building block in production of strong manpower.

He made suggestions on reduction of the cost of ICT products and services through instruments that encourage private sector participation, including bank loans with low interest rates and through lowering of telecommunication tariffs.

He said ICT programmes and content should be of quality and characterized by an appropriate mix of staff complement, dynamic curricula and programmes and adequate supporting resources and facilities. Further, the presenter called for the maintenance of standards in training in order to achieve quality.

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3.0 CONFERENCE PLENARY PRESENTATIONS

3.1 Andrew Dymond and Sonja Oestmann:

ICTs, Poverty Alleviation and Universal Access Policies: A Review of Current Status and Issues

The presentation was made by Sonja Oestmann of Intelecon Research and Consultancy Ltd, Vancouver, Canada. The presentation provided a conceptual and practical foundation for discussing the role of information and communication technologies in uplifting poor communities. It offered a structured way of addressing the issues related to an increasing 'digital divide', two gaps to be bridged by different kinds of policies, both of which make up a country's Universal Access strategy. It demonstrated what the minimal response of policy-makers should be to the challenges they face. It concretized the discussion with findings on rural telecommunications developments in Uganda, which, she said, promises an encouraging outcome and potential model for other countries in Africa.

In giving an overview of the situation, Oestmann said the poor must have access to information to develop and participate in the modern economy. Access to information is no longer a luxury for the few, and social systems and economic markets are intertwined like never before and both depend on communication and access to information.

Further, she stressed that ICTs play a dominant role today in delivery and dissemination of information and are thus increasingly important to poverty alleviation. ICTs are not easily delivered or assimilated in poor or remote areas for technical and operational reasons, and measures of ICT — access telephone, media and internet penetration — show most rich countries have been drawing away from poor ones at a worrying pace thus increasing the "digital divide".

The solution, she offered, is formulation of a Universal Access (UA) or Universal Service (US) policy. A UA policy usually includes measures focusing largely on defining minimum acceptable targets that would ensure that people, communities and organizations are not left out and financial measures designed to secure funds, either from telecom operators in the sector or from other sources, assist to subsidise the capital or operational requirements of companies who attempt to meet these UA targets. The issue to be addressed by policy-makers, she argued, is less one of affordability but of supply strategy and policy. Most people are willing to spend between one and three percent of their income to use a telephone and other information-related services. She also pointed out that there was thirst for communication and that there was willingness to pay for it, and the issue then was to find out what the problem in ICT development was. The solution, she posited, lies in addressing communication and information service disparities and addressing the two "gaps".

She said developing countries had two huge disparities basic to telecommunication and information. There are rich and poor, and urban and rural, disparities. The two dimensions,

she said, can be labelled poverty and isolation. The urban poor, despite being largely without private telephone or information services, are not geographically isolated and can be 'reached' more readily through normal business approaches or access strategies such as telephone kiosks, Internet cafes and telecenters. Rural areas, on the other hand, often suffer neglect with or without liberalized markets because they are perceived as carrying both higher risk and lower returns to investors.

There also are two other gaps: the market efficiency gap and the access gap. The market efficiency gap is the difference between the current level of service penetration *and the level we could expect from the economic and commercial perspective if market conditions were improved.* The second gap, the access gap, exists because the market has limitations. There may be areas or groups that cannot be reached commercially, even in the most efficient of markets, without some form of intervention and special finance.

The presenter also discussed the challenges and disappointments with regard to ICT development, noting that ICT initiatives aimed at under-privileged communities or rural areas, which are led by incumbent telecom operators, governments and institutions often don't work well, especially in developing countries. However, where resources are higher in supply, the chances of success are also high.

Further, she suggested it would be better to have a profit motive behind the delivery of telecom and information services because they tend to work better that way. Policies to bridge the *market efficiency gap* must recognize this, she said, and major on the principle of market liberalization and good regulation. She was quick to add that liberalization and competition the engines of economic reform, innovation and information sector growth, don't necessarily provide rapid improvement to disadvantaged areas and people. They tend to increase the gap at first, because entrepreneurs, investors and financiers chase the most lucrative and ready opportunities.

She proposed that incentives need to be devised and policies enacted that tip the scales in favour of disadvantaged areas, in order to focus attention, increase interest and accelerate investment by profit-motivated people. These incentives should be directed first at the *market efficiency gap,* but also include special measures to address the access gap.

Oestmann also broached policy solutions, contending that without broad competition in the telecommunications sector, whole countries can be hindered economically. The way to address the needs of poorer communities for ICT development, she posited, is to enact a complete package of complementary policies that can encourage the spread of competitive or innovative activities to less privileged areas.

The measures include *good regulation and favourable "interconnection rules"* that create a level playing field, and encourage or attract operators and entrepreneurs to establish small regional networks and services that can survive and thrive in a multi-operator environment. They also include *Universal Service* and *Universal Access* funds and fiscal schemes addressing the access gap designed to redistribute resources from privileged to less privileged customers of telecom and ICT services, and *special licences* for companies and entrepreneurs with a vocation to serve regional and rural areas and provide access systems.

Lastly, they include *incentives and rewards* for leading technology companies and service providers to contribute significant effort and resources to projects that benefit poorer areas and communities.

The presenter emphasized, however, that ICT development involves more than just financial flows. Education, sensitization and training are also important. Co-operation between commercial and non-commercial players is also beneficial, she said.

Discussing global experience in ICT development, Oestmann said universal access through a special rural or universal access fund, as a complement to market liberalization, had been tried in several countries. Latin America had led the way.

Pitfalls to avoid relate to the implementation of the universal access funds. Whereas Chile's Fund had been well managed and could be labelled as largely successful, leveraging well over US$100 million of investment in rural telecom networks from less than US$20 million in fund subsidies, others have not been so successful. For example, for Peru and Nepal, general economic problems combined with tactical limitations of the fund mechanism had limited disbursement and network developments.

She also discussed expansion of universal access to Internet and information services, saying that in the African context, universal access still needed to be defined at two levels emphasizing, first, extensive access to telephony. Furthermore, the poor need knowledge, power and resources to apply existing information already available.

She discussed the case of Uganda, and outlined the measures taken by the Ugandan Communication Commission (UCC) in ICT development.

DISCUSSION OF PRESENTATION

Oliver Saasa:
Comments on Sonja Oestmann's Presentation

The presentation's discussant was Prof. Oliver Saasa, the Director of the Institute of Economic and Social Research in Zambia. He pointed out that Oestmann's premise that liberalization was the cornerstone to ICT development was a major contradiction. He argued that in most rural areas subsidies and grants would be pivotal to ICT development. Liberalization would not be catalytic in ICT development in most African countries owing to the sheer level of poverty. He posited that while liberalization was important, a balance must be struck between it and the deficiencies that hinder ICT development in Africa.

Further, Prof. Saasa argued that, although the presenter had focused on information communication and poverty alleviation, the issue of "digital divide" had not been exhaustively dealt with despite its centrality. An examination of the policy environment is crucial to understanding the ICT issues.

The discussant further argued that information technology provides the tool for growth, enhancing reforms. Thus, if the "digital divide" is bridged, poverty reduction is also achieved. However, it is important, he stressed, to appreciate that the cost of access is material. He gave the example of Zambia, saying 70 percent of the people would not afford food, making the need for technology secondary.

He discussed access at two levels: gathering and dissemination. He said rural people used totally different kinds of information and that information was not always disseminated in a friendly manner. The question "Access to what?" should be asked, he said, because information is not value-neutral.

3.2 Clement Dzidonu:

A Framework for Guiding the Development of ICT-Led Socio-Economic Development Polices, Strategies and Plans

In his presentation, Prof. C. Dzidonu examined issues relating to the challenges of the digital divide and its implications on the socio-economic development of developing countries with reference to Africa. He argued that the failure of African countries to recognize and exploit the developmental potential and opportunities of the information and technological revolution could seriously undermine their capacities to develop in the emerging information age.

He began by looking at the challenges of globalization and the information age, saying Africa faced new challenges in their socio-economic development as a result of globalization and the impact of the emerging new information age. He proceeded to examine the digital divide and its socio-economic development implications and posited that the problem of the digital divide is not a technological one; it is not an issue of a divide between 'technological-haves' and the 'technological-have-nots'. The threat posed by the digital divide is more of an economic development problem than a technological one. For developing countries, including those in Africa, the digital divide and its implications has more to do with the inability to deploy, harness and exploit the developmental opportunities of the emerging digital information and technological revolution to advance the process of socio-economic development.

He, thus, proposed the need to go beyond looking at the implications of the digital divide purely in terms of access to technological resources and services and examine its wider implications in socio-economic development.

The presenter reviewed 'ICT for development' efforts on the world scene. Governments world-wide, he said, recognized the crucial role ICTs play in facilitating and accelerating socio-economic development. Such countries as USA, Canada and a number of European countries, Asian countries such as India, Singapore, Malaysia, Thailand, Sri Lanka, South Korea, Japan and Vietnam, and South American countries such as Brazil, Chile, and Mexico, and others such as Australia and Mauritius either already have in place comprehensive ICT policies and plans or are at an advanced stage of integrating the programs in their economies.

India views ICTs as an area where the country can quickly establish global dominance and reap tremendous benefits in creating wealth and generating quality employment. Finland regards the development and utilization of ICTs as key to the improvement of life, knowledge and international competitiveness.

Malaysia's Vision 2020 envisages the country as a fully developed nation by year 2020. Singapore's vision of transforming the country into an 'intelligent island' also views ICTs as the main engine for promoting accelerated development and growth as well as gaining global competitive advantage. Mauritius, learning from the Singaporean experience, has developed a strategic ICT Plan that forms an integral part of its overall vision of social and economic development. Mexico also views ICTs as being crucial to achieving progress in social development and economic development.

Discussing the development of the *African Information Society and Economy: the AISI Framework,* Dzidonu said African countries, most of which are currently under-developed are at risk of being further marginalized if they fail to embrace ICTs to transform their economies. The need for these countries to put in place policies to address the challenges of globalization and the information age and devise *ways and means* to support the process of developing the information economy and society of their respective countries, he stressed, cannot therefore be over-emphasized.

He said the African Information Society Initiative (AISI) by the Economic Commission for Africa (ECA) is a bold attempt aimed at developing the Africa information society and economy. The initiative adopted by the 22nd Meeting of the ECA Conference of Ministers in 1996, serves as a framework for a radical socio-economic transformation through the deployment of ICTs in the context of the challenges of globalization and the information age. He cited the first Africa Development Forum — ADF'99 — based on the theme "the Challenges of Globalization and the Information Age" using AISI as a point of reference, saying it re-focused the attention of African governments on the socio-economic development implications of the digital divide.

The 'what-to-do' framework has been operationalized, field-tested and refined, and a number of African countries had embarked on developing their national information and communications policies and plans based on the AISI framework.

He said countries like Rwanda, Senegal, Mozambique, Tunisia and a number of others had operationalized, adapted and refined the AISI framework to develop workable national ICT-led socio-economic development policies and corresponding national information and communications infrastructural plans.

In making the case for developing national ICT policies, strategies and plans, the speaker argued that if African countries are to achieve rapid and radical social and economic transformation in the new information age dominated by information and knowledge-based economies, they will need to implement comprehensive ICT-led socio-economic development policies, strategies and plans. Thus, while the industrially advanced countries only need to put in place specific ICT deployment programmes and national information infrastructure (NII) development and expansion programmes to move their already advanced and globally competitive economies into Information Knowledge Economies, developing countries will need to do more to achieve the same goal. African countries, he argued, would have to put in place their ICT policies and plans within their wider national socio-economic development objectives and strategies.

On guidelines to facilitate the process of developing integrated national communication and information policies and plans, he said for any country, the national ICT policy and plan development should be aimed at four key outputs: the *Framework, Policy, Plan* and *Structures.* The *Framework* would set the agenda for guiding the development of other elements of the process. The *Policy* based on the Framework would aim at providing the details of key policy commitments and considerations of the government. The corresponding *Plan* would provide details of the programmes and initiatives aimed at implementing the policy commitments of government as contained in the Policy document. Finally, the *Structures* would serve as the relevant national co-ordinating structures.

The speaker further discussed the guidelines for developing the framework to guide the policy and plan development process. He argued that the details of the *framework* would be determined by the specific social and developmental parameters of each country and would, therefore, differ from one African country to another.

He emphasized that the process of developing the framework document should be consultative, in order to bring on board all key stakeholders: government, private sector and civil society.

The presenter discussed guidelines for developing the policy document. He contended that national ICT policies and strategies should, among other things, address creation of the necessary enabling environment to facilitate the deployment, use and exploitation of ICTs within the economy and society. They should also address the development of a local ICT industry to facilitate the production, manufacturing, development, delivery and distribution of ICT products and services, the development of the national human resource capacity to meet the changing demands of the economy, and the development of the national information and communications infrastructure. They should also address the development of the legal, institutional and regulatory framework and structures required for supporting the deployment, use and the development of ICTs in economy and society and development and promotion of the necessary standards, practices and guidelines that support the deployment and exploitation of ICTs within the society and economy.

The policy issues to be addressed, he posited, are:

- Policy on creating and facilitating an enabling environment for the development of the national information society and economy
- Policy on implementing special tax packages, instruments, and incentive programmes to promote the development of the information economy
- Policy on human resource development and deployment to support the development of the country's information society and economy
- Policy to facilitate the deployment and exploitation of ICTs in the educational system

- Policy on the deployment of ICTs to support the operations of the civil and public services
- Policy on facilitating an investment climate for the mobilization of financial and technological resources
- Policy to encourage and facilitate physical infrastructural development
- Policy on the development of standards, best practices and guidelines to guide the deployment, exploitation and development of ICTs
- Policy on creating the necessary enabling regulatory framework for facilitating the deployment, exploitation and development of ICT products, services and systems
- Policy on the enactment of the necessary cyber laws and legislative provisions
- Policy on setting up of national ICT structures and bodies
- Policy to facilitate and promote the implementation of national ICT applications
- Policy to take into account gender sensitivity issues in the context of national information and communication programmes
- Policy on promoting universal access to information and communication technologies and systems
- Policy on the development of a local ICT industry
- Policy initiatives to facilitate the role of the private sector in the development and participation in the information economy
- Policy on the promotion and support of research and development initiatives directed at the development and the exploitation of the opportunities of the information society and economy
- Policy on involving key national stakeholders and civil society in the process

On guidelines for developing the plan on *how* the broad policy guidelines suggested above could be implemented in a given country, he recommended that for each policy area, specific programmes, initiatives and projects be developed and incorporated into appropriate plans for implementation over a designated plan period in the context of a long-term socio-economic development framework (e.g. Vision 2020) of the country.

The development of a specific plan, he said, could be guided by a number of principles, among them:

- Contributing to the realization of the stated socio-economic development.
- Addressing, where appropriate, the cost, budgetary and resource requirements, allocation and mobilization implications of the programmes, and initiatives identified for implementation under the plan.
- Introducing structure into the plan by sub-dividing the Plan into sub-plans each addressing a broad area of policy e.g. human resource development; infrastructure development; developing and facilitating the private sector etc.
- Making various programmes, initiatives and packages identified for implementation under the sub-plans practical, realistic and implementable with clearly stated *time-bound measurable* (TBM) targets.
- Setting targets based on baseline study data on the status of relevant key socio-economic and ICT-related indicators.
- Taking into account the fact that the government will continue to formulate and implement its short-to-medium-term socio-economic development and budgetary plans during the lifespan of the plan.
- Incorporating elements of risk analysis into plan, taking into account the socio-economic development risks.
- Incorporating a programme monitoring and evaluation mechanism that allows for appropriate intervention procedures and actions with clear guidelines.

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- Allowing flexibility in plan to allow for modification, revision and adaptation as the need arises.
- Avoiding making plan too specific in addressing implementation details.

The presenter emphasized the need for sub-plans, targeting specific areas of policy. He gave the Rwandan example, citing it as an exemplary model.

He also discussed the need for a baseline study to guide the development of the plan, saying such a study would compile relevant data on key ICT and socio-economic indicators within the economy and society to serve as a basis for the plan projections and targets.

Further, Dzidonu pointed out that success of the national ICT-led socio-economic development policy and plan development and implementation would depend on a number of success factors. Some of the key factors are:

- Active high profile national ICT champion — the President or Vice President
- Top level political leadership, support and commitment to the process
- A clear national vision, missions and strategies to guide the development of the process outputs
- Government endorsement and commitment to the national vision, missions and the corresponding strategies designed to contribute to the realization of the vision and the corresponding missions
- The goodwill and support of the people and their endorsement of the need for the vision and stated missions and their realization
- Strategic government ministry or agency to facilitate and co-ordinate the process on behalf of the government
- Dedicated policy decision makers, and professionals, cutting across the public and private sector committed to the process
- Adoption of a well-scheduled step-by-step approach with specific milestones and deliverables during the policy and plan development process
- The identification and the setting of realistic objectives and targets that can be achieved within a given time frame
- A well-researched policy formulation and plan development process that makes effort to learn from the experience of other countries
- Access to key ministers and stakeholders in the public and private sector to facilitate consultation and across the board contribution to the process and its deliverables
- Rounds of dialogue sessions with key stakeholders government, private sector and civil society
- Logistical support and facilitation for the process and
- Continuous push from the top for action and results

3.3   G. Olarere Ajayi :

African Response to the Information Communication Technology Revolution: A Case Study of ICT Development in Nigeria

This presentation was made by Prof. G. Olalere Ajayi, the Director, National Information Technology Development Unit, Federal Ministry of Science and Technology of Nigeria.

He gave a summary of the ICT Infrastructure in Africa, pointing out that Africa has the lowest telephone densities in the world. Africa also has about two percent of world telephone lines, less than those in Tokyo. Africa, which has the lowest annual growth in teledensity, has 35 of the world's 49 telecommunication least developed countries of the world. In 1997, the

teledensity for Africa was 1.85, while those for Europe, America and Asia were respectively 34, 30 and 6. There are more cellular telephones in Thailand than in the whole of Africa.

The Internet connectivity index shows the same trend as for telephones. The total number of computer hosts permanently connected to the Internet in Africa (excluding South Africa) was estimated to be between 25,000 and 30,000 in 1999, about the same number as that in a small Eastern European country such as Latvia, with a population of 2.5 million (compared to the 780 million people in Africa, about 13 percent of the world population). In 1999, there were about 3 million Internet users in Africa with about 1 million outside of South Africa. This amounted to about 1 Internet user for every 250 people, compared to the world average of one user to every 35 people, and a North American and European average of about one for three people.

He discussed the African Information Society Initiative (AISI), recalling that in May 1995, the twenty-first meeting of ECA conference of Ministers, which consists of the 53 African Ministers of Social and Economic Development and Planning, adopted Resolution 795(XXX) entitled "Building Africa's Information Highway". In response to this resolution, he said, ECA appointed a High-level Working Group on Information and Communication Technologies in Africa to draft an action framework to use ICT to accelerate the social-economic development of Africa and its people. The outcome of the Group's work is the document entitled "Africa's Information Society Initiative" (AISI) which was adopted by all of Africa's planning ministers at the subsequent meeting in May 1996. The AISI action framework calls for the formation and development of a National Information and Communication Infrastructure (NICI) plan in every African country, driven by national development priorities, and proposes co-operation among African countries to share experiences of successes. The countries that have so far begun the process of developing in-depth national information and communications infrastructural plans are Benin, Burkina Faso, Cameroon, Comoros, Ethiopia, Lesotho, Namibia, Mozambique, Rwanda, South Africa, and Uganda.

However, over 40 African ministers are fully convinced that building Africa's information society will help Africa to accelerate its development plans, stimulate growth and provide new opportunities in education, trade, health care, job creation and food security, and thus help African countries to leapfrog stages of development and raise their standard of living. Therefore, these countries have provided high-level endorsement for ICT development policies. In the past few years, a large number of ICT development initiatives directed at African countries emerged. And many of these are based on the AISI Initiative, which is increasingly being regarded as the guiding framework on which to base ICT activities in Africa.

The presenter also discussed the National Information and Communication Infrastructure (NICI). He said the African Information Society Initiative adopted NICI policies and plans to emphasize the importance of communication in the ICT development plans of the African countries, and other ICT initiatives already going on in Africa.

NICI's plans and strategies are high on the agenda and, African countries, like the developed world, are confronted with the challenge of being responsive and flexible to the convergence of telecommunications, audio-visual and computing technologies. These plans and strategies are made to reflect the overall development priorities, redefine sectoral policies and support the introduction of new regulatory frameworks so as to improve efficiency, and to mobilize resources for building national information and communication infrastructure among member countries. NICI-led socio-economic development policies, strategies and plans are expected to transform economies into Information and Knowledge Economies (IKEs).

On NICI development process in Africa, he said, support was coming from African governments, ECA, the Carnegie Corporation of New York and the International Development Research Centre (IDRC) of Canada's Acacia-communities and Information Society in Africa

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Programme. Other partners like USAID, UNDP, UNESCO and the World Bank are also supplementing ECA's effort in developing NICI activities in member states. The countries involved in NICI activities are Benin, Burkina Faso, Burundi, Cape Verde, Cote d'Ivoire, Gabon, Ghana, Guinea, Ethiopia, Mali, Malawi, Mauritania, Morocco, Namibia, Nigeria, Rwanda, Senegal, Sudan, South Africa, Tanzania, Tunisia and Uganda. Development of NICI, he said, should be seen as a new phenomenon and as a culture for information sharing to reduce the information gaps between different parts of the population. Collaboration of decision makers and all stakeholders in the information society is essential for the success of the NICI plans to be developed in member states.

He described the status of NICI development activities in African countries and gave examples of what had been achieved at country level in the NICI process in Africa:

- Ghana's Vision 2020 recognizes the strategic role that ICTs will play in the realization of its objectives. Morocco is setting up the Morocco Wide Area Network (MARWAN) to link, via a fiber optic network, all research institutions and universities in the Kingdom and to develop a nationwide virtual library and research laboratory.
- Rwanda has put in place an ICT-led Development Vision that aims at modernizing the Rwandan economy and society using ICTs as an engine for accelerated development and economic growth, national prosperity, and global competitiveness.
- Senegal is implementing a study entitled "Senegal 2015" which examines a number of issues to which ICTs could provide responses such as adaptation of the education system, expansion of social communication, strengthening of self reliance, management of the effects of increased urbanization, and revitalization of rural areas.
- South Africa is developing a proposal to set up an ICT strategy, which will consolidate all of the existing government networks in one 'Intranet' based on a high-speed fibre optic backbone to be built by the telecommunication operator.
- Tunisia has developed a national strategy with emphasis on information and communication infrastructure by setting up a nationwide Internet backbone with cyber cafes co-funded by the government and the private sector.

Discussing ICT in Nigeria, the presenter said the government, in 1999, issued a document on Telecommunications Development and Investment Opportunities in Nigeria containing investment opportunities in the telecommunication sector. It is planned that the following target will be achieved: Capacity (1999) a total of 700,000 lines; 2001 a total of 1,500,000 lines; 2003 a total of 3,000,000 lines; and 2005 a total of 8,000,000 lines.

He said Nigeria's current infrastructure is poor. However, a National Policy on Telecommunications had been put in place with the hope of improving the efficiency and availability of the nations telecommunications facilities. One such step is the establishment of the Nigerian Telecommunications Plc (NITEL) from the merger of the telecommunication division of the defunct Posts and Telecommunications (P&T) with the former Nigerian External Telecommunications (NET).

The new National Policy on Telecommunication was approved in October 1999. It covered issues such as policy objectives, management structure, finance and funding, manpower development and training, research and development, local manufacture, safety and security, satellite telecommunications, international perspective as well as policy implementation and review.

Nigeria has a population of about 120 million people and the overall target is a teledensity of 10 per 100 people. With the envisaged effective participation of private investors, the achievement is expected to be higher.

The presenter said although the Internet penetration for Africa is less than one percent, despite 13 percent of the world population, the situation in Nigeria was even worse. However, the emerging technologies such as broadband satellite, VSAT, wireless, etc provide wonderful

opportunities for Nigeria to leapfrog into the information society age. These technologies have been exploited in order to accelerate IT development in Nigeria.

He said the Federal Executive Council approved a national IT policy in March 2001 and the implementation started in April with the establishment of the National Information Technology Development Agency, charged with the implementation responsibility. The policy recognizes the private sector as the driving engine of the IT sector. Further, he pointed out, emphasis would be laid on development of National Information Infrastructure Backbone (NIIB) as well as the Human Resources Development. In addition, Information Technology Parks are to be developed in Abuja and in each of the six geo-political zones.

He said implementation strategies of the IT policy were evidence by the approval of the National Information Technology Policy and the subsequent establishment of the National Information Technology Development Agency (NITDA) as the implementation agency. The National Information Technology Policy created an enabling environment for the development of IT in Nigeria. The major IT events in the country in the recent past, he observed, were as follows:

- Zinox Technologies Ltd had developed the first indigenous set of computer systems. The systems were designed to work with the unfriendly operating environment of the country which most of the foreign branded systems normally cannot cope with. Zinox is the first step towards the creation of made-in-Nigeria IT technologies.
- UNITEC, a conglomeration of ten companies, will soon launch their own brand of computers assembled in Nigeria.
- The United States-Nigeria Development Institute (USNGDI) is setting up community resource centres in the six geopolitical zones and the Federal Capital Territory (FCT), Abuja. The pilot project is nearing completion at the National Women Development Centre. This particular centre will house about 50 computer systems, printers and other IT accessories. The centre will also be connected to the Internet and will provide both local and international telephones and fax services, access to television and radio broadcasts, event hosting, computer-based training and business services.
- . Microsoft Corporation is building a digital village in Owerri.
- . Many states in the country are taking up the initiative to start major IT development projects.

In conclusion, Prof. Ajayi said it is the responsibility of all African governments and the private sector to transform the digital divideinto a digital opportunity. E-commerce, e-business, e-financing, e-banking and others hold the future for our economic transformation and growth. Africa must be truly part of the ICT revolution, he stressed.

DISCUSSION OF THE PRESENTATION

Catherine Nyaki Adeya:
Comments on Clement Dzidonu's and Gabriel Olarere Ajayi's Presentations

Discussing the two presentations, Dr. Adeya said, Prof. Dzidonu's paper dealt with the general ICT policy development guidelines while Prof. Ajayi had zeroed in on how ICTs can be applied in a country context, specifically in Nigeria. Although Dzidonu's paper was general and Ajayi's specific, she said, Prof. Dzidonu gave a case study of ICT policy development in Rwanda.

She said Dzidonu's paper drew on the global experience on the development of ICT policies before focusing on the Africa experience. She pointed out his concern from the outset with the "digital divide", contending that the key argument is whether this divide had

been created by the widening gap of access of ICTs or whether it always existed but had been enhanced by ICTs. She said in addressing the issue, Dzidonu saw the solution as lying in   a country's ability to grasp and exploit the developmental opportunities brought about or accelerated by new ICTs, pointing out that the phenomenal rate at which applications continued to grow had generally meant that attempts to collate empirical evidence had inevitably been out of step with the realities on the ground. Policy-makers in Africa are faced with the challenge of developing strategies of bringing the information revolution by creating truly national, integrated information infrastructures. ICT policy in general, lay in accelerating the use of high-tech and low-tech information services.

Further, she pointed out a contention brought up again by Dzidonu that access to development of new ICTs would allow African countries to leapfrog the industrialization stage and transform their economies to value-added information economies that can compete with the developed countries. She expressed qualms about the contention but agreed with the presenter that there is no need for African countries to attempt to draw up their ICT policy for scratch. She further agreed that there are lessons that can, and ideally should, be borrowed from the development of ICT policies in developed countries, and cited the example of Mauritius whose experience was drawn on the Singaporean one.

The discussant also had qualms about the presenter's position in information and knowledge based economies (IKEs).

She said the AISI framework (Africa Information Society Initiative) was used as a point of reference on the way ICT policies in Africa are being developed. Ajayi, she said, drew on this in more detail. The AISI framework calls for the foundation and development of a National Information and Communication Infrastructure (NICI) plans in every Africa country driven by national developmental strategies. She pointed out that there had been confusion between AISI and NICI initiatives and pointed out that 22 African countries were already involved in the NICI initiative. Clarification, she said, would be useful to policy-makers.

Dr. Adeya said the 18 guidelines given for developing a policy document are detailed but added they would be challenging for a country without sufficient resources. She recommended that each country identifies a few key priority areas as a starting point. However, she said, specific guidelines can be prioritised. She listed the following as the key policies requiring priority:

- Policy to encourage and facilitate physical infrastructure that promotes universal access to ICTs.
- Policy on human resource development that facilitates exploitation of ICTs in the educational sector.
- Policy on development of a local ICT industry.

She made reference to ICT development in Kenya, pointing out that the Kenya Education Network (KENET) had been launched with the aim of establishing sustainable communication and networking among education institutions in the country to facilitate wide use of the Internet in teaching and research, among others, at affordable cost. To demonstrate the difficulties involved, she gave the example of the US which, in 1996, launched a five-year US$ 15 million effort to extend Internet connectivity to 21 African countries. Implementation had been challenging but achievements had also been made, she said. Telkom Kenya had agreed to lower Jambonet tarrifs for education institutions by 50 percent, and the equipment to inter-connect had been purchased.

She said there were indications Kenya could grant licences to two local companies to operate Internet exchange points. This would enable local ISPs to exchange intra country e-mail traffic without having to resort to expensive overseas connections. The government, she

added, intended to release a revised ICT sector policy. The Communications Commission of Kenya had agreed to free VSAT markets (Very Small Aperture Terminals) ideal for sharing information between branches and giving real time information to key operations such as ATMs (Automated Teller Machines).

The discussant said Ajayi's paper complemented Dzidonu's quite well. The areas identified for IT policy formulation in Nigeria are those highlighted in general by Dzidonu: human resource development, infrastructure, governance, research and development, trade and commerce and agriculture.

Software development had tremendous potential for development in Africa, she said, in agreement with Dr. Ajayi.

3.4 John Muraguri Waibochi

Development of Knowledge Workers in Centres of Learning

The paper explored ways of developing "knowledge workers" in the key sectors of the economy through the incorporation of ICT in their areas of expertise. It targeted industry-specific centres of learning where stakeholders learn the tools of their trade, enabling graduates to be better equipped to serve as trainers of trainers (TOTs) on the application of technology in their fields.

Mr. Waibochi said ICT training provided to the TOTs would comprise primarily of utilization of technology for knowledge. The focus would lean more towards *how* to utilize ICTs for research, documentation, collaboration, and dissemination, as opposed to basic computer skills. Although a level of basic computer training is a requisite in the early stages, he said, the main emphasis would be on how to tap onto ICTs, Internet, libraries, etc. to enhance one's knowledge. Upon leaving the learning institutions, the knowledge workers should be in a position to utilize ICTs and the Internet effectively in their everyday duties and drive the demand for others through skills transfer.

The presentation targeted centres of learning in education, agriculture, health, industry, policy and regulation, key drivers of Kenya's economy.

On education, he said, Kenya had over 234,000 teachers countrywide with approximately 41,000 of them in secondary schools, and the majority in primary schools. Despite their role as providers of knowledge, skills and attitudes, teachers in Kenya remain unaware of the use of ICTs. Furthermore, hardly any initiatives are in place to train teachers on the use of ICTs. The Teachers Service Commission (TSC) is increasingly tasked to provide qualified teachers to schools. However, it has no infrastructure to develop some of the needed skills, such as ICT.

He said as instruments of change, teachers must be well acquainted with the subjects they teach and keep abreast of changes. They need access to relevant, timely information on the subjects of their expertise and must also continuously retrain themselves to remain abreast of the latest innovations, theories and practices in their areas of teaching.

He noted that empowering teachers with the required skills in information communication technology would give them an opportunity to access information that is otherwise not easily available. Using the Internet, teachers can do research, create databases on subjects of interest to enhance their skills and indeed keep abreast of changing approaches, needs and methodologies in their careers. The teachers once trained would in turn equip students with marketable skills that would prepare them for the competitive marketplace.

Such centres of learning as the Kenya Science Teachers College (KSTC) and the Kenya Technical Teachers College (KTTC) would benefit immensely from curricula that emphasize ICT application.

He said the agricultural sector also needs to keep abreast of changing technologies to grow. Stakeholders in the agricultural sector must be equipped with the tools with which to stay in step with global trends, developments and technologies. Professional training and extension services should incorporate methodologies and tools that empower the trainees to become knowledge workers in the field, continuously tapping into the latest information from all available sources, including the Internet. Agriculturalists can also seek membership, not only through their local resource centres, but also with global research organizations and libraries through ICTs.

Agricultural research institutes, extension service providers, and agricultural training institutions providing training and continuous education to stakeholders in the sector need to ensure that they are continuously updating their best practices. They should ideally also be empowered to disseminate knowledge and technologies in the field where they are needed and catalyze the process of outreach and adoption.

Health and medical training institutions, he said, need to continuously impart a culture of continuous learning through research, information exchange and on-site training. Medical practitioners are often exposed to new or different strains of ailments beyond those learnt during their professional training. They need a resource base on which to fall back to learn new procedures, practices or medicines. This, he said, is best served through ICTs.

Organizations such as the Kenya Medical Training College (KMTC) are tasked with ensuring skills transfer into the profession. They need to ensure that the knowledge they transfer to their trainees is relevant, current and accurate. In this regard, the information base of the college should be captured, structured and managed for the long-term benefit of those within the organization and other stakeholders already practising medicine. The students graduating from these institutions need to be well equipped, not only with the latest in the medical profession, but also the tools to remain experts in medicine thereafter.

Industrial development must also take into account global trends and the new economy. The human resource base should be developed bearing in mind market demands and skills requirements. Entrepreneurs, companies and employees must innovate in tandem with global trends and technologies to survive. In this regard, knowledge of market needs and latest technologies is essential in order to maintain one's competitive edge in the global marketplace. This is best achieved, the presenter said, through effective use of ICTs for knowledge.

On policy formulation and regulation, Mr. Waibochi said African countries should tap onto the best of breed policies developed across the world and blend them with local ideologies to develop a solid policy framework. Rather than develop in a vacuum, ICTs provide the platform to study, research, debate and incorporate policies developed around the globe. Professionals in the policy or regulatory sectors of the economy must be empowered to have access to local legislature and be able to make reference, study and evaluate it with ease.

Institutions such as the Kenya School of Law, Kenya School of Monetary Studies, KIA, etc. concerned with the training of policy makers and regulators explicitly recognize that the globalization of policy research, regional and international co-operation and the capacity to access and evaluate knowledge from elsewhere becomes as critical as the ability for local policy development. Practitioners in the field must also recognize the need to be well informed and connected with changing practices in law and all law enforcers need a forum through which they change ideas. Practitioners, once deployed in the market, should have the skills base to continuously research and apply current and relevant information through ICTS in order to be knowledge workers in their profession.

He said the informal sector of Kenya has earned recognition as a major contributor to the growth and development of the economy. The potential to narrow the income gap, generate employment, stimulate economic growth and alleviate poverty has been widely acknowledged by the policy-makers.

Due to the restructuring of programmes that are on going among large corporate employers such as manufacturers and government agencies, there is a decline in the intake of employees.

The high levels of retrenchment in these and government organizations are rendering many jobless. About half a million job-seekers, including 10,000 university graduates, are sent out into the tight labour market annually, but given the sluggish growth of the formal sector which employs a meagre 1.6 million people, it is becoming patently clear that the enhancement of the informal sector can alleviate the situation. Micro enterprise growth must, therefore, be seen as the major strategy for reducing poverty and thereby improving food security in the country. A wealth of knowledge, both written and in human resource, exists for small medium enterprises.

On knowledge development process in centres of learning, Mr. Waibochi said, the first step in the process of developing knowledge workers is to incorporate ICTs in the curricula of the centres of learning. ICT would initially be taught as a subject where the basics of information, communication and telecommunication are explained.

The next phase is to incorporate ICT in the subject matter in the field of the learning centre where its use becomes part and parcel of the learning experience.

The next phase would be to develop centres of excellence for each of the key sectors in the form of sector specific knowledge resource centres. The main objective of the knowledge resource centres is to enhance economic development through the proactive use of ICTs to impart the required skills, influence attitude and impart knowledge to stakeholders in key sectors of the economy.

The methodology, he proposed, would be based on achieving three main objectives: cognitive, affective and psychomotor.

Typical knowledge resource centres, he said, comprise the Internet (or Intranet) based websites that facilitate exchange of information to staff, researchers and partners, and serve as a platform for ideas, learning, research, queries, promotion and administration. The centre's aim is to consolidate the information base and experiences of a particular skill, profession, industry or organization into a central point of reference that is user friendly and reliable with the capability to disseminate seamlessly.

The presenter stressed the importance of setting up centres of learning where the country's key resources are trained for the world tomorrow. The graduates leaving these institutions must be equipped with the tools and supported by the resources to allow them to compete in the global economy. These graduates, he said, must be empowered to face the world that awaits them.

3.5 Melvin Ayogu:

Strengthening National Information and Communication Technology (ICT) Policies in Africa: Governance, Equity and Institutional Issues

The paper provided a framework for a research agenda on the governance issues around information and communication technologies (ICTs) in Africa. It gave a background to the issues, showing why they are important, and looked at what had happened to the ICTs in general, and to the governance of ICTs in particular. The presenter also reviewed events in Africa and elsewhere, highlighting the importance of governance of ICTs for their growth and development. In addition, he discussed the conceptual as well as the policy and research issues. He also dealt with research objectives and the methodological framework for analysis.

He said advances in information and communication technology, particularly the advent of the Internet, had brought about new challenges in the regulatory and legislative regimes, and had begun to blur the traditional definitions and jurisdictional boundaries. Since the

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beginning of the 1990s, for example, more than 150 countries had modified their existing regulatory regime on ICT. Unique among those changes is Malaysia's 1998 Communications and Multimedia Act. Pressures for convergence in regulation, he suggested, appear to be coming from the increasing overlap of communication regulation with content or broadcasting regulation. The expectation is that these pressures can only increase as both telephone and cable operator cross-enter product lines previously delimited, and as the Internet's video delivery capability improves. The rate at which Internet's video delivery capability improves depends also on the quality of governance and on the prospects for broadband deployment, an issue which depends on the articulation between competition and incentive regulation.

On ownership and market structure, he said between 1989 and 1997, approximately 25 percent of African countries had partially altered the ownership structure of the ICT sector, although this drive to restructure gathered momentum only in the second half of the 1990s. During this period, 62 percent of the 42 ITU member states in Africa unbundled post from telecommunications, while close to 75 percent corporatized their telecommunications operations. Little or no, privatization had occurred in broadcasting. The trend in liberalizing this segment of the market had been to allow *de novo* entry.

However, in spite of the overall growth in competition that has come with changes in the regulatory climate and ownership structure, much still remained to be achieved: approximately 60 percent of all countries still prohibit competition in any basic service, be that local, trunk, or international. Similarly for leased lines markets. However, this lack of contestability had not spelled easy life for network carriers and other incumbent operators. Potential and actual threats from the new technologies and services, many of which can be used to bypass existing local network and even regulatory restrictions, mean no end to competition, and an uneasy life for government that attempts to lean against the forces of competition.

On cellular communication and Internet-based services, he said, the relative high degree of competition, diverse ownership, and innovation in mobile markets were being dampened by concerns about the high cost of spectrum auctions to the industry. This new generation of spectrum-hungry mobile services is expected to broaden end users' access to mobile data application. As with mobile services, provision of Internet access grew principally outside the core business of incumbent carriers and their subsidiaries from entering the Internet services, the market has tended to be dominated by ISPs (Internet Service Providers) that are controlled by incumbent operators. Ranked next to mobile services in competitiveness are leased line markets. Unfortunately, he said, prices in this segment remained stubbornly high despite the declining cost of supplying transmission capacity. Leased lines are the building blocks of e-commerce and other IP-related services.

Other notable trends in ICTs are occurring in mobile technology, the mobile computing equipment, and in the wireless transmission medium, all with implications for mobile commerce (m-commerce). These advances in mobile technology are turning cell phones from devices for simple voice communication into powerful mobile computers, permanently connected to the Internet. He said numbering and addressing were now important aspects of communications technology. Names and addresses are not only markers that guide the movement of information from source to destination. In a networked economy and an information-saturated environment ('informatics jungle'), they become public identifiers with important implications for marketing, visibility (branding), and ease of use. The evolution of numbering and addressing are driven by three major trends: (1) the rise in demand for numbering and addressing deriving from the proliferation of new communication devices such as facsimile, pagers, satellite phones and mobile phones, and (2) the increase in new services such as free telephone calls (toll-free '800' numbers), international premium rate, and shared cost services, all of which require separate numbering domains, and some even international or global co-ordination of numbering.

Discussing key issues for decision makers, Prof. Ayogu first raised the issue of IP

Telephony. The highly popular trend of making and receiving telephone calls using the Internet and other networks that are based on the Internet Protocol, he said, had become a pressing policy issue. IP Telephony can generally be offered to customers at prices that are far below those from conventional circuit-switched networks, particularly on long-distance and international calls. This is partially because traffic pricing on IP-based networks is largely independent of distance. All over the world, a large number of operators has already announced intentions to eventually migrate all their global traffic onto IP-based networks.

For developing countries, IP Telephony presents an additional dilemma in that, while it promises to reduce the price of international telephone calls, it may also reduce the revenues from these calls that currently help funding the extension of the domestic network to help meet universal service obligations.

He also discussed equity and access as a policy issue.

On legislative and regulatory measures, Prof. Ayogu said inappropriate interconnection requirements could act as a barrier to competitive entry, undermine investment in new infrastructures, and deprive the public of innovation and attractive (affordable) service options. Various regulatory fora around the world confirm that regulators consider interconnection to be the single most important issue in development of a competitive marketplace for IT related services. Efficient interconnectivity to the fullest extent — voice, data, video and multimedia services — requires that a variety of arrangements be in place. These arrangements, he said, generally include the interconnection of signalling networks, as well as access to operations support systems and call-related databases, including number portability databases.

Overall, the regulatory and legislative issues arising from the policy concerns, he said, include how far, and at what point a regulator should intervene in industry negotiations over interconnection and whether to establish binding roles or regulatory guidelines, and under what framework. An *ex ante* framework involves setting, in advance, clear and perhaps detailed sector-specific rules for all market players to follow. An *ex post* model, by contrast, gives market players substantial freedom and flexibility, with intervention occurring only after a regulatory infringement has occurred.

Once a government decides the basic parameters of a regulatory framework, it must then decide how it wants to govern the institutional structure.

Questions to be answered include:

- What would be the optimal regulatory structure?
- What should be done to the existing (inherited) framework, if any?
- A single integrated agency, or a multiple agency to govern each of the components of digital technology?
- Will the agency be organized around functional lines or along some other organizational model?
- Will the regulatory authority or agencies once created be independent of the dominant players (i.e., question of regulatory capture)?
- Will the agency or agencies be "independent" from political power?
- To whom is the agency or agencies accountable?
- From what source will the financing of the authority or agencies come?
- How independent is "independence"?
- What would be the governing structure of the agency or agencies, and will it vary according to the model of organization chosen for each agency? That is, would the body be collegial, governed by a directo-general, a board, or other governance structure?
- What would be the optimal decision-making (management) style — active involvement, participatory or consultative, transparent, flexible, extensive, and accessible?

The presenter argued that given the almost universal appreciation and acceptance of the benefits of efficient ICTs in contemporary society, it is puzzling that the pace of ICT

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dissemination in Africa has not reflected this ostensibly huge expected social benefit. He said among the questions to be answered are the following:

- How should the process be managed to compress the time frame required to achieve a reasonable convergence?
- How should the governance proceed; should the convergence of services require adaptation in the regulatory framework?
- Should broadcasting and CATV, telecom, distribution and sales, and software-content issues be handled by a composite regulator?
- On the other hand, are the legal principles and issues deserving of separate regulators in view of the differences in telecom law, in broadcasting law, in intellectual property law, and in commercial law?
- Are some of the current initiatives, often pursued without government support, sustainable in the long-term?
- How can we use ICTs to improve political participation and equitable access to justice?
- African legislative regimes lag behind the developments of ICTs in trade (e-commerce) and in new financial instruments that are ICT based.

He said if Africa must compete globally, we have to review and update laws and create or reform institutions to take account of the growth in ICTs.

DISCUSSION OF THE PRESENTATION

John Mugabe:
Comments on Melvin Ayogu's Presentation

Dr. John Mugabe was the discussant for Professor Melvin Ayogu's presentation. He commended the presenter for detail and thoroughness, saying the paper covered wide ground of policy issues requiring attention. However, Dr. Mugabe said Prof. Ayogu's paper required examination through "conceptual lenses" in order to show clearly how the following would be addressed:

A 1. The issue of governance *of* ICTs, taking into consideration the values, norms and rules required to promote or regulate development and application.
   2. The issue of governance *and* ICTs taking the socio-political conditions in which the technologies would have to be set up.

B 1. Intra-state access and equity.
   2. Inter-state access and equity.
   3. Global access and equity.

C Institutional issues also needed to be addressed, taking into consideration their typology — NGOs, public or corporate. One could also consider their scale, he said, taking into consideration their breadth — local, national, regional and international.

He further emphasized the need to understand clearly the technological system, including its parts, features and trends.

4.0   METHODOLOGICAL   WORKSHOP

4.1   M. H. Khalil-Timamy:

Pursuing Technology Policy Research in Sub-Saharan Africa: Reflections on Dimensions, Applications and Implications of a Methodological Framework

The paper explored methodological issues in the context of technology policy research for interested parties in sub-Saharan Africa. It provided background information on the nature of technology policy and situated the discussion within the purview of methodological sensibilities, epistemological demands, and scientific objectivity. It also discussed the evolution of technology policy research by examining, first, the profound links between conceptual categories and the configurations of methodological devices and, second, by describing how changes in research focus have, over time, led to non-trivial methodological shifts. It further described the elements and dimensions of a methodological framework and identified priorities and the potential directions of future technology policy research, placing a special premium on the imperative of relevance. The presenter concluded by noting that the imperative of sustainable development posed profound research and technology policy challenges to African researchers; challenges that are bound to influence the internal aspects of methodological devices.

He said the evolution of technology policy research and the methodological devices that accompanied the investigative endeavors have been heavily conditioned by particular conceptual categories that informed the description, interpretation, and prediction of technological phenomena. Apart from the studies of economic historians, most early investigations on technology policy were conceived within the neo-classical worldview. This conceptual orientation not only imposed severe methodological limitations on research efforts, but also circumscribed the potential for appreciating the wider meaning and processes of technological change.

Some of the most illuminating studies on technological policy emerged in the wake of significant strides made in the conceptual field. The leaps in conceptualization posed fresh methodological challenges as demands for new sets of data grew in both scope and depth. At a broad level, technology policy research shifted emphasis from countrywide, to sectoral, to industrial, and finally, to firm-level units of analysis. This evolutionary experience was marked by new methodological paths driven, as it were, by new conceptual apparatus.

But these cosmological shifts, while deeply enriching our understanding of technological change, precipitated new epistemological concerns, namely, the challenges of validating in the scientific sense, the results of firm-level research. Which sampling designs would conform to the rules of scientific methodology has since emerged as a critical concern of technology policy research.

The imperative of sustainable development, he said, has raised new policy and methodological challenges to technology policy research as a whole. Explorations that seek to fathom

growth-promoting technical changes in the context of sustainable principles may offer policy insights on the instrumentality of institutional and organizational innovations. The area of cleaner productions technologies is particularly relevant in this regard. Tackling such fields, including the search for technological solutions in the food, energy, health, and recycling domains would go a long way towards making sub-Saharan technology policy research relevant to concerned parties, he said. The generation of reliable and credible knowledge invariably results from designing and using robust methodological procedures rooted in sound epistemological foundations.

4.2   Magayu K. Magayu:

Writing Skills: What Not to Do When Writing Your Research Paper

The presenter took participants through some of the most common mistakes in writing research reports. Drawing from his experience as editor of ATPS publications, he made demonstrations of strengths as well weaknesses in reports submitted to the network. Majority of the mistakes related to grammar, spelling, punctuation, tautology and redundancy, sentence adherence and concord as well as numbering. There also were problems of facts and accuracy. Weighting of issues in a report and the creation of subject rankings and hierarchy also raised problems.

The presenter said a lot of the problems could be alleviated if individual researchers took greater responsibility over their work. It appeared, he suggested, that some researchers left it to ATPS and the network's editors to correct even the most blatant mistakes. He pointed out that certain mistakes, particularly those relating to facts and figures would be difficult, if not impossible, for an editor to detect. Researchers, therefore, must take extra care in ensuring their reports were as "clean" as possible before submission to ATPS or to any other publisher.

The presenter took participants through a practical session in editing as a demonstration of the concerns and the rigors of the process.

Participants requested that a book be prepared showing various mistakes that are commonly made in writing. The researchers said such a book would make their work, and that of ATPS easier.

5.0 PRE-STUDY WORKSHOP ON THE ATPS REGIONAL PROJECT ON ICT POLICY

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Strengthening National Information and Communication Technology (ICTs) Policies in Africa: Governance, Equity and Institutional Issues

A working dinner was held on the second day of the conference and workshop for a pre-study discussion and review of ATPS' proposed project on ICT policy development in sub-Saharan Africa.

During discussions, many questions were raised on issues broached by Professor Ayogu in the presentation. He said the purpose of the paper was to examine how ICTs — as opposed to ITs — would be governed. The issue revolved around regulations, and two main problems were conflicting — liberalization and costing. The problems were compounded by scepticism on governments' sincerity in the governance of ICTs. The challenge for ATPS, Prof. Ayogu said, was how to help change rules, how to influence governments to change as they appeared unwilling to relent on regulations. It is important to identify structures that would help influence governments to change their position.

Members expressed strong support for the project, with some even proposing ways of raising funding in countries for it.

The following are highlights of issues raised by members during the discussion and review.

- It is important to clearly establish who should be held responsible in ICT governance: is it the person who generates the content or the one who transmits it?
- There is need to clearly explain how the ICT project discussed by Prof. Ayogu would work for purposes of selling it.
- For the project to be properly rooted, there is need to profile what was happening in all countries covered by the ATPS project.
- It is important to take into consideration the specific needs of the countries in the context of the program.
- It was observed that, in general, ICT regulators are not sufficiently trained and may not, therefore, always make the right decisions.
- It was further observed that the fact that governments are the main regulators of ICT industry makes independence of the industry impossible. Even in the case of Rwanda, viewed as a model, it was pointed out that a multi-sectoral regulatory agency had been set up to oversee ICT regulation issues but the members sitting on the agency were appointed by the government.
- On the ownership of telecommunications infrastructure, it was suggested government regulation was always useful. Use of roads was cited as a good example requiring government regulation.
- Research should be carried out on ICT regulations.

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- It was observed that there is need to clearly set the terms of reference for regulatory agencies. Governments should be enlightened on the need for this.
- It was noted that telephone service costs in Africa were the highest in the world. This was attributed to government mistrust and insecurity and multinational craze for higher profits.
- It was suggested constitutional guarantees should be built in to ensure governments are trusted. However, it also was pointed out that most countries had good constitutions but the upholding of the constitutions was lacking. It was proposed that strong civil societies and media be nurtured to remedy the situation.
- It was observed that "independent" regulators often behaved like appendages of government or state corporations.
- It was observed that there is need to draft cyber laws and laws related to cyber activities.
- It was mentioned that property rights and data protection laws were top on the agenda for governments.
- It was suggested that technological solutions to cyber crimes may often be better than legal redress.
- It was agreed that the fact that blueprints crafted in the past on technology had gone on collecting dust in shelves should not deter members from forging ahead.

6.0   ATPS   RESEARCH   OUTPUT

Margaret Gathoni Karembu:

Small-scale Farmers' Adoptive Response to Banana Biotechnology in Kenya: Implications for Policy

This ATPS- funded research project won First Research Medal in the Global Development Network awards for Science and Technology for Development in December 2000. The presenter delivered a comprehensive report on research carried out in Central Kenya on small-scale farmers' adoptive response to banana biotechnology in the country. She reported that the project had successfully brought on board a variety of partners that played different, but key roles. The initial field research, she said, had helped generate knowledge on conditions under which the technology would diffuse within the existing farm realities of inter-cropping, cultural values and orientations.

She said the model used for tissue culture banana technology transfer in Kenya is worth replicating in a similar socio-economic environment. It is a unique model which had not been applied before in this region, and the success that had been attained was incredible. In a span of less than three years, small-scale farmers were already reaping the benefits of biotechnology application. The most interesting aspect of this model, she said, was the powerful synergy generated through the comparative advantages of the different collaborators, drawn from both the public and private sectors.

The project brought about new experiences of growing healthy bananas under tropical conditions as a commercial initiative, which was overall lacking from the public sector. It provided a rare opportunity for KARI, a public funded research institution, to work with industry and others to promote the delivery of biotechnology applications to resource-poor smallholder farmers. The farmers also had an opportunity to test a new innovation and learn with the scientists in their own fields. The emphasis placed on collaboration between scientists, extension and social scientists created mechanisms and channels for partnerships throughout the research, development and distribution. This is in accordance with government policies put in place following the World Bank and International Monetary Fund initiated Strategic Adjustment Programmes that have seen a decline in resources to government extension services. The business environment created by the project is conducive to the development of an indigenous biotechnology sector, which holds promise as one of the most powerful tools available, but which has not been fully exploited as an intervention method, to help reduce poverty and hunger, especially in the Third World.

From more than 500 applicants in 94 countries, five finalists were chosen to present their submissions. The GDN Medals and Award are sponsored by the Government of Japan and the World Bank and build upon other GDN activities such as the Regional Research Competition and the Global Research Project. These activities seek to promote advancement in knowledge creation and capacity building in developing countries.

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7.0 PRESENTATION OF RESEARCH PROPOSALS

The following proposals were presented for funding consideration by ATPS.

ON FOOD AND AGRICULTURAL TECHNOLOGY POLICY

"Technology Attributes, Farmer Perceptions and Adoption Decisions: the Case of Improved Cereal Varieties in Uganda" *by Henry Manyire and Wilberforce A. Sakira*

"Technology Intervention Strategies in the Informal Milk Marketing Sector in Kenya" *by D. M Kabiru, C. W. Kariuki, C. K. Njoroge and S. N. Ndirangu*

"Female-Male Differentials in the Adoption of Agricultural Technologies in Ethiopia" *by Tiruwork Tizazu*

"Indigenous Knowledge Systems and Sustainable Agriculture in Lesotho, the Case of Sorghum Production" *by V. Mashinini and M. Mokhothu*

"Poverty, Gender and Environmental Degradation: Technology Adoption and Use in the Production of Staple Food in Nigeria" *by David Nwoye Ezeh*

"Legume-Based Cropping Systems for Improving Cereal Production in Lesotho" *by M. V. Marake*

"Fruit-Processing and Packaging in Eastern Province, Kenya: Identification of Multi-Stakeholder Technology Issues and Constraints for Policy Action" *by Paul N. Mbuthi, Philip K. Rono and Julius M. Ogola*

An Assessment of the Impact of Agricultural Extension in Kilombero District, Tanzania" *By Anthony A. Chamwali*

"Improving Smallholder Agriculture in Ghana: The Case of Women Farmers' Knowledge and Practice of Soil Fertility Improvement Technologies" *by Agyenim Boateng, S. Boadi and Joyce Hallegoah*

"Technology Adoption Challenges and Obstacles Facing Small and Medium Enterprises in Agro-Processing of Oilseeds in Western Kenya" *by Paul K. Ndalut and Philip K. Rono*

"Adult Literacy and Agriculture Technology Transfer: A Case Study in Two Agro-Ecological Zones in Uganda" by *Kaliisa Wilfred Monte*

"Validation of the Machobane Farming System in Lesotho" *by M.V. Marake*

ON ICTS AND INDUSTRIAL TECHNOLOGY POLICY

"The Impact, Opportunities and Challenges of Electronic Commerce in the Marketing and Promotion of Nigeria's Non-Oil Exports" *by A. S. Bankole*

"Information Technology Diffusion, Adoption and Implementation in Public Organizations in Zambia: Organizational, Economic and Legal Implications?" *by Daniel Apton Phiri*

"Adjustment to the Emerging Role of Information Technology: A Case Study of other Financial Institutions in Sierra Leone" *by Philip Sulaiman Koroma and Sarah F. Bendu*

"Information Technology: Access, Capabilities and Use among Administrators of Agro-technology Transfer Programmes in South-Eastern Nigeria" *by Fidelis N.O. Uguru and Patrick O. Ogbuinya*

"Institutions Supporting SMEs: A Case Study of the Industrial Development Centres (IDCs) in Nigeria" *by O.A. Bamiro*

"Research and Development of Traditional Tanzanian Foods: Processing Technologies, Preservation, Quality Control and Safety" *by Andrew B. Gidamis*

"Linkages Between R&D Institutions, the Private Sector and Policy Makers in Zimbabwe" *by Stephen Chipika*

"Technological Development in the Maintenance Operations of Imported Used Automobiles and their Policy Implications for the Automobile Industry in Nigeria" *by B. A. Ogwo*

"Comparison of Alternative Technologies for Spinning Sisal Fibres by Women at Grassroots Level in Swaziland" *by Pinkie E. Zwane, Dan J. Mwaisengela, Moses M. Sithole*

"Sector Policy Influences on Mining Technology Acquisition and Use in the Small Scale and Artisanal Mining Sub-sector in Zambia" *by Chozi V. Lungu, Brenda Bowa, Inonge Imasiku*

"Technology and National Development Planning: Implications for Effective Industrialization in Nigeria" *by A. T. Simbine and Prof. G. O. A. Laditan*

"Innovations and Capacity Utilisation in the Kenya Textile Sector" *by Charles O. Abuodha and Mary J. Randiki*

ON PUBLIC POLICY FRAMEWORKS APPROPRIATE TECHNOLOGY AND INNOVATION AND EDUCATION AND TECHNOLOGY

"Strategic Integration of S&T into National Reconstruction and Development Planning Processes for Sustainable Development in Sierra Leone" *by Chris Squire*

"Linking Appropriate Technology Utilization by Rural Women and Household Food Security in Swaziland" *by M.M. Keregero and F.M. Badejo*

"Market Liberalisation, Institutional Reforms and Choice of Appropriate Technology: The Case of Aqua-Culture Sub-Sector in Uganda" *by F. Bunugire*

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8.0 THE ATPS ANNUAL GENERAL MEETING

The ATPS First Annual General Meeting was chaired by Professor Norah Olembo.

REMARKS FROM ATPS LEADERSHIP

At the start of the Annual General Meeting, Professor Norah Olembo, ATPS Chair, reviewed the Network's activities during the past year. She noted the frequency and output of the network's publications had gone up dramatically, arguing that the development was an indication of growing ATPS strength. The organization had also made strides to improve its financial base, she said, and commended Dr. Ogbu for leaving a high profile job with IDRC to take up the leadership of ATPS. She said the network would focus on ICTs and biotech policy issues. She urged researchers working with ATPS to "think policy" as this was the mandate of the organization. She also noted that the quality of proposals had gone up, saying that that too was a mark of achievement.

The Executive Director of ATPS, Dr. Osita Ogbu, said fund-raising would be a major challenge now that the Network had become autonomous. He stressed that little would be achieved without requisite resources and spoke of the need to reach out to new donors apart from the ATPS' traditional supporters, IDRC, the Carnegie Corporation of New York, and the Rockefeller Foundation.

He encouraged national chapters to help in the fund-raising effort. He appraised the meeting of UNDP's report for the previous year that had raised issues that squarely fall under the mandate of ATPS. This, he said, gave greater credence and legitimacy to ATPS work. The Network, he said, had approached a number of organizations for financial support including OPEC Fund (which had given US$ 50,000), the Ford Foundation (which is expected to give US$ 150,000), the Rockefeller Foundation (which had given US$ 300,000), the Dutch government, African Development Bank and Danida. He appealed for patience from the national coordinators and researchers as the fund-raising efforts continued.

The Executive Director stressed that technology policy was the thrust of ATPS work. He said the Network would be shifting responsibility from the secretariat to the national chapters.

He said the ATPS Board needed continued stability. Experienced people should be elected to the Board, he said, adding private sector input was also required.

REMARKS FROM THE MEMBERS

Members expressed the need to have more donors put on board. The Commonwealth Secretariat, Japan, the United Nations Economic Commission for Africa, ITU and ECOSOC were viewed as potential ATPS donors. Members also proposed that governments also be approached for support.

For efficient networking, it was agreed that each member makes sure they have an e-mail address.

A question arose on how strategic plans would be balanced against policy issues. It was noted that there had been a shift to proactive rather than post-mortem proposals. It was suggested the trend be maintained, and the Karembu project was cited as a demonstration of the trend.

It also was suggested that additional institutions be sought to fund other research issues while ATPS continued to fund those on policy.

It was clarified that it was in order to describe the workshop as the *First* as it followed the dissolution of the older ATPS. A new ATPS had been established under new Articles of Association.

DISSOLUTION OF THE ATPS BOARD AND ELECTION OF NEW ATPS BOARD

The ATPS Board was dissolved in accordance with the new Articles of Association. The election of a New Board followed and the following were elected:

Professor Norah K. Olembo   -   Chair
Professor Oliver Saasa   -   Member
Professor Sam M. Wangwe   -   Member
Professor Joseph G. Massaquoi   -   Member
Professor Turner T. Isoun   -   Member

Professor Lynn K. Mytelka   -   Member (Appointed by the Board)
Ms Yolonda Richardson   -   Member (Appointed by the Board)

It was agreed that the next Annual General Meeting would be held in year 2002 in Abuja, Nigeria.

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9.0 NATIONAL CO-ORDINATORS MEETING

A National Coordinators Meeting of ATPS was held under the chairmanship of Dr. Osita Ogbu, the Executive Director of ATPS. At the meeting, various administrative issues were discussed and suggestions made on how to improve the governance of national chapters.

Dr. Ogbu appraised national coordinators of the Network's decentralization policy that would see national chapters take greater responsibility in the running of their affairs. It was agreed that national coordinators should step up efforts in promoting their chapters and in making their presence felt in their respective countries. Ways and means should be found to work closely with policy-makers in respective countries, and particularly with those involved in technology policy development. It was also agreed that national chapters should, as much as possible, look for alternative sources of funding to supplement support from headquarters.

It was also agreed that the logo for theNational Chapters be harmonized to avoid the development of different logos. The logo for the Kenya Chapter was reviewed as a model that should be emulated by other chapters.

10.0 CONFERENCE AND WORKSHOP FIELD VISITS

P articipants had an opportunity to visit either a biotechnology laboratory, the Genetics Technologies Limited and a banana plantation at Maragua, Central Province, Kenya, or the Nairobi National Park.

Those who visited the Nairobi National Park on the outskirts of the city had an opportunity to see wildlife as well as part of the country's flora. Those who visited the laboratory were taken through the process of banana culture production. Later, they visited Maragua and saw how disease-resistant tissue culture bananas are grown. Participants later visited the offices of ATPS on Valley Road where they were appraised on the Network's operations.

11.0 CLOSURE OF CONFERENCE AND WORKSHOP

A cocktail party and dinner were held at the Nairobi Safari Club and the conference and workshop officially closed.

APPENDIX I: THE WORKSHOP PROGRAM

MONDAY, 29 OCTOBER 2001

Plenary Session
Information and Communication Technologies for Development in Africa
Venue: Mawingo Room

Opening Session
Chair: Andrew Mullei, *Executive Director, African Centre for Economic Growth*

9:00a - 10:00a
Brief remarks from the ATPS Executive Director: Dr. Osita Ogbu
Brief remarks from the ATPS Chairperson: Prof. Norah Olembo
Opening: Hon. Gideon M. Ndambuki, E.G.H., M.P *Honourable Minister for Science & Technology (Kenya)*

Session I
Chair: Andrew Mullei, *Executive Director, African Centre for Economic Growth*

10:00a - 11:00a **"ICTs and Rural Development and Poverty Alleviation"** by Andrew Dymond and Sonja Oestmann, *Intelecon Research & Consultancy Ltd. (Canada)*
Discussant: Prof. Oliver Saasa, *Director, Institute of Economic and Social Research (Zambia)*

11:00a - 11:30a   TEA/COFFEE BREAK

11:30a - 12:30p   Open discussion

12:30p - 2:00p LUNCH
Venue: Safari Terrace
Keynote address: **"Experiences in Capacity Building for ICTs: The Way Forward for Africa"** by Dr. Timothy Waema, *Director, Institute of Computers Sciences, University of Nairobi*

Session II
Chair: Dr. James Kulubi, *Secretary, National Communications Secretariat*

2:00p - 3:00p **"Essentials of an African Country ICT Policy Strategy"** by Prof. Clement Dzidonu, *President, & CEO, International Institute for Information Technology (Ghana)*

"ICT Policy Formulation and Implementation: *Examples from Nigeria*" by Prof. Gabriel O. Ajayi, *Director, National Information Technology Development Unit, Federal Ministry of Science & Technology (Nigeria)*
Discussant: Dr. Catherine Nyaki Adeya, *Research Fellow, United Nations University, Institute of New Technologies, The Netherlands*

3:00p - 4:00p Open discussion

4:00p - 4:30p TEA/COFFEE BREAK

Session III
Chair: Prof. Lynn Mytelka *Director, United Nations University, Institute of New Technologies (The Netherlands)*

4:30p - 5:00p **"Development of Knowledge Workers in Centres of Learning"** by John Muragori Waibochi, *Managing Director, Virtual City Ltd. (Kenya)*
Discussant: Alex Maina, *Managing Director, Insight Technologies (Kenya)*

5:00p - 5:30p Open discussion

5:30p - 6:15p Introduction of the ATPS Regional Project on ICTs
"Strengthening National Information and Communication Technology (ICT) Policies in Africa: *Governance, Equity and Institutional Issues*" *by Prof. Melvin Ayogu*
Discussant: Dr. John Mugabe, *Executive Director, African Centre for Technology Studies*

6:15p - 7:00p Open discussion

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GROUP A: FOOD AND AGRICULTURAL TECHNOLOGY POLICY
Resource persons: Prof. Melvin Ayogu, Dr. Osita Ogbu, Ms. Yolonda Richardson, Prof. Oliver Saasa
Venue: Mawingo Room

Morning Session:
Chair: Ms. Yolonda Richardson

8:30a - 9:30a **A1:** "Technology Attributes, Farmer Perceptions and Adoption Decisions: The Case of Improved Cereal Varieties in Uganda" *by Henry Manyire and Wilberforce A. Sakira*

9:30a - 10:30a **A2:** "Technology Intervention Strategies in the Informal Milk Marketing Sector in Kenya" *by D. M Kabiru, C. W. Kariuki, C. K. Njoroge and S. N. Ndirangu*

10:30a - 10:45a   TEA/COFFEE BREAK

10:45a - 11:45a   **A3:** "Female-Male Differentials in the Adoption of Agricultural Technologies in Ethiopia" *by Tiruwork Tizazu*

11:45a - 12:45p   **A4:** "Indigenous Knowledge Systems and Sustainable Agriculture in Lesotho, The Case of Sorghum Production" *by V. Mashinini and M. Mokhothu*

12:45p - 1:45pLUNCH BREAK

Afternoon Session:
Chair: Prof. Oliver Saasa

1:45p - 2:45p **A5:** "Poverty, Gender and Environmental Degradation: Technology Adoption and Use in the Production of Staple Food in Nigeria" *by David Nwoye Ezeh*

2:45p - 3:45p **A6:** "Legume-Based Cropping Systems for Improving Cereal Production in Lesotho" *by M. V. Marake*

3:45p - 4:00p TEA/COFFEE BREAK

4:00p - 5:00p **A7:** "Fruit-Processing and Packaging in Eastern Province, Kenya: Identification of Multi-Stakeholder Ttechnology Issues and Constraints for Policy Action" *by Paul N. Mbuthi, Philip K. Rono and Julius M. Ogola*

5:00p - 6:00p **A8:** "An Assessment of the Impact of Agricultural Extension in Kilombero District, Tanzania" *By Anthony A. Chamwali*

*Evening Session: **Venue: Room 402***
Chair: Prof. Melvin Ayogu

6:00p - 9:00p **Working dinner** *(by invitation)***:** ATPS Regional Project on Strengthening National Information and Communication Technology (ICT) Policy in Africa.

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GROUP B: ICTS AND INDUSTRIAL TECHNOLOGY POLICY
Resource persons: Prof. Gabriel Ajayi, Prof. Melvin Ayogu, Prof. Clement Dzidonu, Prof. Lynn Mytelka, Prof. Sam Wangwe
Venue: Room 401

Morning Session:
Chair: Prof. Samuel Wangwe

8:30a - 9:30a **B1:** "The Impact, Opportunities and Challenges of Electronic Commerce in the Marketing and Promotion of Nigeria's Non-oil Exports" *by A. S. Bankole*

9:30a - 10:30a **B2:** "Information Technology Diffusion, Adoption and Implementation in Public Organizations in Zambia: Organizational, Economic and Legal Implications?" *by Daniel Apton Phiri*

10:30a - 10:45a   TEA/COFFEE BREAK

10:45a - 11:45a   **B3:** "Adustment to the Emerging Role of Information Technology: A Case Study of Other Financial Institutions in Sierra Leone" *by Philip Sulaiman Koroma & Sarah F. Bendu*

11:45a - 12:45p   **B4:** "Information Technology: Access, Capabilities and Use among Administrators of Agro-Technology Transfer Programmes in South-Eastern Nigeria" *by Fidelis N.O. Uguru and Patrick O. Ogbuinya*

12:45p - 1:45p LUNCH BREAK

Afternoon Session: Chair: Prof. Lynn Mytelka

1:45p - 2:45p   **B5:** "Institutions Supporting SMEs: A Case Study of the Industrial Development Centres (IDCs) in Nigeria" *by O.A. Bamiro*

2:45p - 3:45p   **B6:** "Research and Development of Traditional Tanzanian Foods: Processing Technologies, Preservation, Quality Control and Safety" *by Andrew B. Gidamis*

3:45p - 4:00p   TEA/COFFEE BREAK

4:00p - 5:00p   **B7:** "Linkages between R&D Institutions, the Private Sector and Policy Makers in Zimbabwe" *by Stephen Chipika*

5:00p - 6:00p   **B8:** "Technological Development in the Maintenance Operations of Imported Used Automobiles and Their Policy Implications for the Automobile Industry in Nigeria" *by B. A. Ogwo*

Evening Session: Venue: Room 402
Chair: Prof. Melvin Ayogu

6:00p - 9:00p   **Working dinner** *(by invitation)***:** ATPS Regional Project on Strengthening National Information and Communication Technology (ICT) Policy in Africa.

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GROUP C: PUBLIC POLICY FRAMEWORKS, APPROPRIATE TECHNOLOGY & INNOVATION AND EDUCATION & TECHNOLOGY

RESOURCE PERSONS: DR. MOHAMED KHALIL, PROF. JOSEPH MASSAQUOI, DR. JOHN MUGABE, PROF. NORAH OLEMBO
Venue: Room 402

Morning Session: Chair: Prof. Joseph Massoquoi

8.30a-9.30a   **C1:** "Strategic Integration of S&T into National Reconstruction and Development Planning Processes for Sustainable Development in Sierra Leone" by Chris Squire

9:30a - 10:30a **C2:** "Linking Appropriate Technology Utilization by Rural Women and Household Food Security in Swaziland" by M.M. Keregero and F.M. Badejo

10:30a - 10:45a   TEA/COFFEE BREAK

10:45a - 11:45a   **C3:** "Market Liberalisation, Institutional Reforms and Choice of Appropriate Technology: The Case of Aqua-Culture Sub-Sector in Uganda" by F. Bunugire

11:45a - 12:45p   **C4**: "A Review of the Policy Framework Towards Strengthening of the Fish Industry in Kenya" *by Gabriel G. K. Masha*

12:45p - 1:45p LUNCH BREAK

Afternoon Session: Chair: Prof. Norah Olembo

1:45p - 2:45p   **C5:** "An Evaluation of Fish Processing in Sierra Leone - Technology Development Modification and Innovation" *by Raymond A. B. Johnson*

2:45p - 3:45p   **C6:** "Technological Capacity Building for Biotechnology Development: Stakeholders Linkages and

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Public Dialogue in Ghana" *by George Owusu Essegbey*

3:45p - 4:00p TEA/COFFEE BREAK

4:00p - 5:00p **C7:** "Survey on User-Perception and Technological Input on Growth Monitoring and Promotion Tools for Under Five Children in Lusaka, Zambia" *by Selestine Nzala and Charles Michelo*

5:00p - 6:00p **C8:** "The Impact of World Trade Organization's Intellectual Property Rights on the Nigeria's Domestic Technological Capability (The Case of Nwewi Industrial Cluster)" *by Adeboye John Adeyemo*

*Evening Session: **Venue: Room 402***
Chair: Prof. Melvin Ayogu

6:00p - 9:00p **Working dinner** *(by invitation)***:** ATPS Regional Project on Strengthening National Information and Communication Technology (ICT) Policy in Africa.

WEDNESDAY 3 OCTOBER 2001

GROUP A: FOOD AND AGRICULTURAL TECHNOLOGY POLICY

Resource persons: Prof. Melvin Ayogu, Dr. Osita Ogbu, Ms. Yolonda Richardson, Prof. Oliver Saasa
Venue: Mawingo Room

Morning Session: Chair:

8:30a - 9:30a **A9:** "Improving Smallholder Agriculture in Ghana: The Case of Women Farmers' Knowledge and Practice of Soil Fertility Improvement Technologies" *by Agyenim Boateng, S. Boadi and Joyce Hallegoah*

9:30a - 10:30a **A10:** "Technology Adoption Challenges and Obstacles Facing Small and Medium Enterprises in Agro-Processing of Oilseeds in Western Kenya" *by Paul K. Ndalut and Philip K. Rono*

10:30a - 10:45a TEA/COFFEE BREAK

10:45a - 11:45a **A11:** "Adult Literacy and Agriculture Technology Transfer: A Case Study in Two Agro - Ecological Zones in Uganda" *by Kaliisa Wilfred Monte*

11:45p - 12:45p **A12:** "Validation of the Machobane Farming System in Lesotho" *by M.V. Marake*

12:45p - 2:00p LUNCH BREAK

Afternoon Session: ***Venue: Mawingo Room***

2:00p - 4:00p Policy/Methodology Workshop *by Dr. Mohamed Khalil. Dr. Khalil lectures a course in Science and Technology Policy at the University of Nairobi.*

4:00p - 4:30p Writing Skills: What Not to do When Writing your Research Paper *by Magayu K. Magayu, Lecturer, School of Journalism, University of Nairobi and an ATPS Publications Editor.*

4:30p - 5:00p TEA/COFFEE BREAK

5:00p - 6:00p Presentation of the paper titled, "Small-scale Farmers, Adoptive Response to Banana Biotechnology in Kenya: Implications for Policy " by Margaret Karembu and Florence Wambugu. This ATPS funded paper won a global award.

NB: The ATPS Board will meet from 1:00pm in Room 401

WEDNESDAY 3 OCTOBER 2001

GROUP B: ICTS AND INDUSTRIAL TECHNOLOGY POLICY

Resource persons: Prof. Gabriel Ajayi, Prof. Melvin Ayogu, Prof. Clement Dzidonu, Prof. Lynn Mytelka, Prof. Sam Wangwe
Venue: Room 401

Morning Session: Chair: Prof. Lynn Mytelka

8:30a - 9:30a   **B9:** "Comparison of Alternative Technologies for Spinning Sisal Fibres by Women at Grassroot Level in Swaziland" *by Pinkie E. Zwane, Dan J. Mwaisengela, Moses M. Sithole*

9:30a - 10:30a **B10:** "Sector Policy Influences on Mining Technology Acquisition and Use in the Small Scale and Artisanal Mining Sub-Sector in Zambia" *by Chozi V. Lungu, Brenda Bowa, Inonge Imasiku*

10:30a - 10:45a   TEA/COFFEE BREAK

10:45a - 11:45a   **B11:** "Technology and National Development Planning: Implications for Effective Industrialization in Nigeria" *by A. T. Simbine and Prof. G. O. A. Laditan*

11:45p - 12:45p   **B12:** "Innovations and Capacity Utilisation in the Kenya Textile Sector" *by Charles O. Abuodha and Mary J. Randiki*

12:45p - 2:00pLUNCH BREAK

Afternoon Session: **Venue: Mawingo Room**

2:00p - 4:00p Policy/Methodology Workshop *by Dr. Mohamed Khalil. Dr. Khalil lectures a course in Science and Technology Policy at the University of Nairobi.*

4:00p - 4:30p Writing Skills: What Not to do When Writing your Research Paper *by Magayu K. Magayu, Lecturer, School of Journalism, University of Nairobi and an ATPS Publications Editor.*

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NB: The ATPS Board will meet from 1:00pm in Room 401

WEDNESDAY 3 OCTOBER 2001

GROUP C: PUBLIC POLICY FRAMEWORKS, APPROPRIATE TECHNOLOGY & INNOVATION AND EDUCATION & TECHNOLOGY
RESOURCE PERSONS:DR. MOHAMED KHALIL, PROF. JOSEPH MASSAQUOI, DR. JOHN MUGABE, PROF. NORAH OLEMBO
Venue: Room 402

Morning Session: Chair: Prof. Joseph Massaquoi

8:30a - 9:30a   **C9:** "Managing Manufacturing Firms in a Competitive Environment: Systems Approach to the Assessment of the Role of Technological Acquisition Process in Tanzania" *by Josephat Stephen Itika*

9:30a - 10:30a **C10:** "The Influence of School Polices and Practices on Students' Participation and Achievement in Science and Technology Education in Swaziland High Schools" *by Kamanja Gathu*

10:30a - 10:45a   TEA/COFFEE BREAK

10:45a - 11:45a   **C11:** "Identification and Recording of Indigenous Knowledge in the Area of Traditional Medicine in Ethiopia" *by Amare Dejene*

11:45p - 12:45p   **C12:** "Computer and Scientific Literacy at the Senior Secondary School Level in Ghana: The Role of Science and Resource Centre" *by Kenneth S. Aikins*

12:45p - 2:00pLUNCH BREAK

Afternoon Session: **enue: Mawingo Room**

2:00p - 4:00p Policy/Methodology Workshop *by Dr. Mohamed Khalil. Dr. Khalil lectures a course in Science and Technology Policy at the University of Nairobi.*

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4:00p - 4:30p Writing Skills: What Not to do When Writing your Research Paper *by Magayu K. Magayu, Lecturer, School of Journalism, University of Nairobi and an ATPS Publications Editor.*

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NB: The ATPS Board will meet from 1:00pm in Room 401

Nairobi Kenya

THURSDAY, NOVEMBER 2001

ATPS Annual General meeting

Venue: Mawingo Room

Morning: Chair: Prof. Norah Olembo

9:00a - 10:30a ATPS Annual General Meeting

10:30a - 11.00a   TEA/COFFEE BREAK

11:00a - 1:00p ATPS AGM *continued*

1:00p - 2:30p LUNCH

Afternoon:
2:30p - 5:30p Visit a biotechnology laboratory, Genetic Technologies Limited, followed by a field trip to a banana plantation in Maragua
        or
Visit to the Nairobi National Park.

6:00p Pickup for Cocktail

7:30p Closing dinner

FRIDAY, NOVEMBER 2001

National Coordinators' Meeting
Venue: Kirinyaga Lounge

Chair: Dr. Osita Ogbu

9:00a - 10:30a Administrative Issues

10:30a - 11.00a   TEA/COFFEE BREAK

11:00a - 2:30p Working lunch

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APPENDIX 3: MINISTER'S OFFICIAL WORKSHOP OPENING SPEECH

Speech by Hon. Gideon M. Ndambuki EGH, M.P., Minister for Science and Technology, at the Official Opening of 1st Annual Review Workshop of the African Technology Policy Studies Network (ATPS) at Nairobi Safari Club on 29th October 2001

Nairobi Kenya

M r Chairman, distinguished guests, ladies and gentlemen: It gives me great pleasure to have beeinvited to preside over the official opening ceremony of the workshop of the African Technology Policy Studies Network, (ATPS). It is a great honour and privilege for us from Kenya to welcome our colleagues from various parts of the African continent who have come to our country to participate in this workshop. On behalf of the government and people of the Republic of Kenya, and on my own behalf, I wish to extend a very warm welcome to our guests. I wish them a pleasant and memorable stay in our country.

It is gratifying to note the presence of such a distinguished mix of scientists who have gathered here with the sole purpose of joining hands in a cooperative effort to link science and technology policy to the development of our continent.

Ladies and gentlemen, I understand that the theme of your workshop is "Information and Communication Technologies (ICTs) for African Development". I also understand that the workshop will review incoming research proposals as well as the progress of ongoing projects that were funded earlier on.

Mr. Chairman, it is widely recognized that information and communication technology sector is a dynamic one. In this connection, I have been informed that in 1993, only three countries in Africa had access to the Internet. By 1996, the number had shot to 11, but at the end of last year every country in the continent was hooked to the Internet. Here in Kenya, there was only one Internet service provider in 1995 but the number has since jumped to more than 60. The figures illustrate one point: that information and communication technology (ICT) is a high growth sector.

It is also recognized that the information communication technology sector is an engine of development and economic growth. The sector has the potential of unlocking many opportunities in business, education, agriculture, industry, science, security and international relations.

In this regard, developing countries which are able to capitalize on the tremendous growth and the economic potential of ICTs are likely to reap significant social and economic rewards including the following:

- Distance education in "virtual" classrooms;
- Less need to maintain expensive libraries at every institution of higher learning;
- The provision of medicare from a distance;
- The opportunity to leapfrog older technologies requiring heavy capital investments thus propelling developing countries directly into information age;
- Facilitating governance by making available large pools of timely information to policy makers and medium enterprises through e-commerce.

Mr. Chairman, in view of what I have just said, the infrastructural development of ICTs for economic development cannot be overemphasized.

Our governments will, therefore, be expected to play a major role in stimulating ICT-led economic growth in order to raise productivity, create jobs, reduce wastage and increase income.

The global trend with respect to the ICT industry will assist our governments to play this role. The declining costs of ICT goods and services and the recent liberalization of data services have created a new dynamism in the ICT sector with a proliferation of e-activities including e-learning and e-business.

In order to map out the way forward, each of our countries will be required to critically evaluate all the factors that can assist in the promotion of Information Communication Technology. Here in Kenya, the main challenges to the promotion of ICTs have been identified as:

- Inadequate and inequitable information infrastructure and facilities;
- Inadequate or inaccessible complements such as electricity, telephones and data services;

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- Lack of a policy and regulatory framework; and
- Inadequate human resource capacity to meet these challenges.

Accordingly, the government of Kenya is embarking on establishing a framework for its ICT policy. We are hoping to work with institutions such as the African Technology Policy Studies Network (ATPS) in this and other areas of technology policy.

In this regard, the government will strive to achieve two principal policy objectives in the development of its ICTs sector.

The first one will be to provide an enabling policy environment necessary for the sustainable growth of a dynamic ICT sector. The government policy will be necessary in playing a pivotal role in the digital economy. Import tariffs on information technology, which now stand at 5 percent, will be gradually reduced. Tax incentives for ICT investment in the rural areas and education institutions will be introduced. The government policy will also spell out the way forward with respect to the growth of activities such as e-business, e-government and e-learning.

Secondly, there will be a need to define the mission for service and delivery to the public through strategic application of information and related technologies. In order to maximize the gains of information economy, information communication technologies will be incorporated into the fabric of the country's core activities. This will require that a range of skills be developed at all levels of the population both at the technical and user ends. Kenya intends to achieve this through the following measures:

- Promoting initiatives to integrate information communication technologies in educational and training programmes at all levels.
- Developing of information communication materials for all including learning materials for people with disability.
- Establishing community information communication technology learning and information centres to enhance access to essential basic developmental information relating to market information, agriculture, health, education, industry, weather and research.
- Linking information communication technology to poverty reduction.

Mr. Chairman, I have outlined the Kenya strategy and it is my hope that every country represented here will have a strategy for the development of its ICT sector.

I would, however, like to point out that the only strategy that stands a chance of being successful is a consumer-driven strategy.

The challenge to African Technology Policy Studies Network researchers and policy-makers gathered here today is, therefore, to bring key consumer concerns and priorities to this forum and also to champion the views of the consumer. We would expect you to propose concrete advice to the government on the necessary institutional and legislative framework for democratizing access to information technology for bridging the rural-urban divide and for tackling unemployment.

Whatever answers your research and discussions lead to, they have to be the answers that benefit the majority of our people. That is why it is crucial to have stakeholder representation in decision-making about an information communication technology policy.

Mr. Chairman, at this juncture, I would like to pay tribute to the African Technology Policy Studies Network (ATPS) for organizing this annual review workshop.

A few weeks ago, I met with a delegation from the African Technology Policy Studies Network and we had fruitful discussions on areas of possible cooperation. My ministry is interested in cooperating with the African Technology Policy Studies Network in order to achieve some of the goals of our government. This partnership is expected to be effective in the near future.

In conclusion, ladies and gentlemen, I wish you well in your discussions today and my ministry is ready to consider the outcome of your deliberations.

With these remarks, it is my pleasant duty to declare this 1st Annual Workshop of the African Technology Policy Studies Network officially open.

Thank you.

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A report of the 1st Annual Workshop of the African Technology Policy Studies
Network held at Nairobi Safari Club, Nairobi, Kenya, on 29th October - 1st November
2001

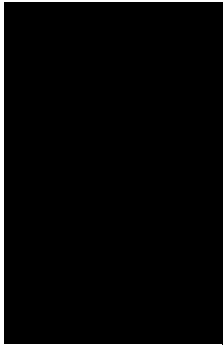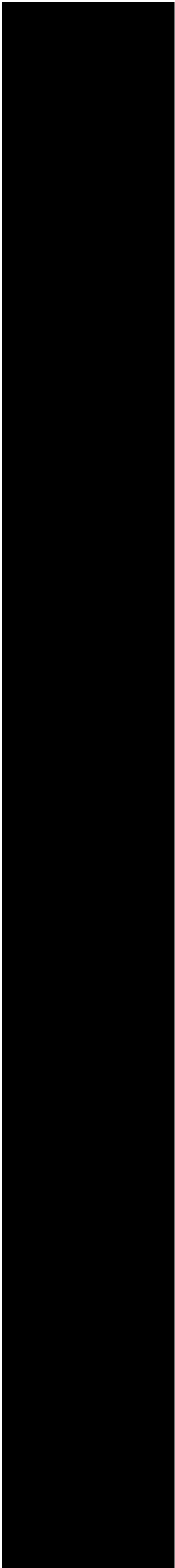Rapporteur: Magayu K.Magayu

ICTS FOR DEVELOPMENT IN AFRICA

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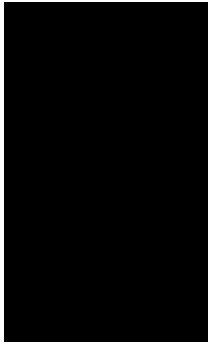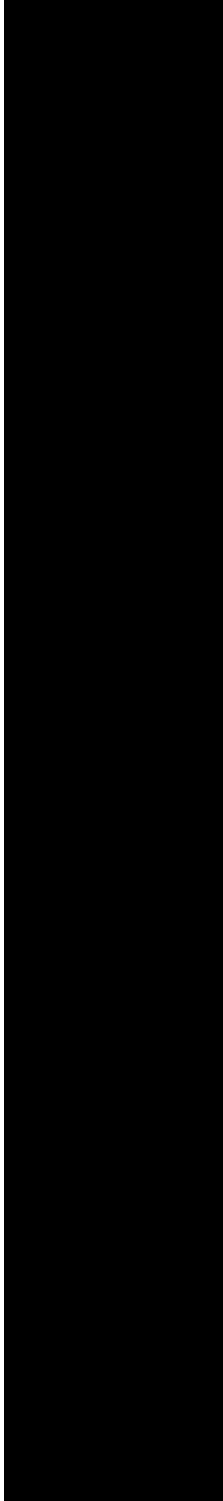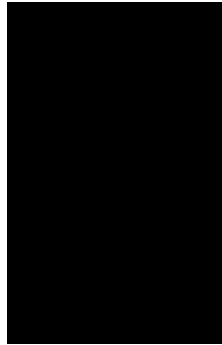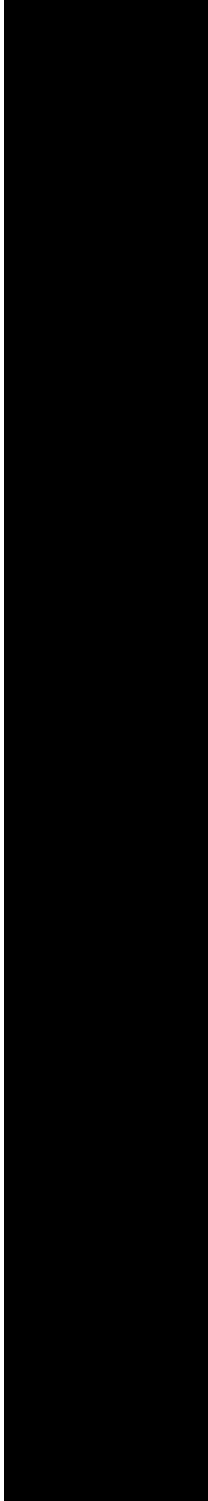
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