National Policy Dialogue on Research and Technology for Development in Uganda

an assessment

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List of ACRONYMS

AAS	African Academy of Sciences
ACP-EU	African Caribbean and Pacific-European Union
ATPS	African Technology Policy Studies
COSTECH	Commission for Science and Technology
EAC	East African Co-operation
ECDPM	European Centre for Development Policy Management
ECEP	Environmental Capacity Enhancement Project
EU	European Union
FOSRI	Food Science and Technology Research Institute
GOU	Government of Uganda
HERST	Higher Education, Research, Science and Technology
ICIPE	International Centre of Insect Physiology and Ecology
ICTP	International Centre for Theoretical Physics
IICD	International Institute for Communication and Development
IMF	International Monetary Fund
IPR	Intellectual Property Rights
ISUGA	Internet Society of Uganda
ITEK	Institute of Teacher Education Kyambogo
KEDA	Kigezi Economic Development Association
LDC	Least Developed Country
MOES	Ministry of Education and Sports
MUK	Makerere University, Kampala
NARO	National Agricultural Research Organisation
NEAP	National Environment Action Plan
NEMA	National Environmental Management Authority
NCDC	National Curriculum Development Centre
NIRDO	National Industrial Research and Development Organisation
NGO	Non-Governmental Organisation
NRM	National Resistance Movement
NUFU	Norwegian Universities Committee for Research Cooperation
NURRU	Network of Ugandan Researchers and Research Users
OPA	Organisation Performance Assessment
PEP	Production and Environmental Protection
PMA	Plan for Modernisation of Agriculture
PSF	Private Sector Foundation
RTD	Research and Technology Development
SAP	Structural Adjustment Programme
SMART	Sustainable Modernisation of Agriculture and Rural Transformation
STEPU	Science and Technology Equipment Production Unit
STET	Science and Technology Education and Training
STS	Scientific and technological services
TWAS	Third World Academy of Sciences
UBPA	Uganda Beef Producers Association

UGT	Uganda Gatsby Trust
UIA	Uganda Investment Authority
UIPE	Uganda Institute of Professional Engineers
UIRI	Uganda Industrial Research Institute
UNAST	Uganda National Academy of Science and Technology
UNBS	Uganda National Bureau of Standards
UNCST	Uganda National Council of Science and Technology
UNESCO	United Nations Education, Scientific and Cultural Organisation
UNIDO	United Nations Industrial Development Organisation
UNIT	Uganda National Innovation Trust
UMA	Uganda Manufacturers Association
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

This assessment study is intended to support the process of reviewing and updating the ACP-EU RTD cooperation policy. As part of this review, the EU has already initiated its own RTD policy dialogue both within and between EU countries. For this reason, it was felt to be important to find out whether and how a similar dialogue is taking place in the ACP. Uganda is one of five countries that were probed with the aim of identifying whether such a dialogue was taking place and, if so, what the nature of this dialogue was.

The methodology used in compiling this report involved conducting key informant interviews, document reviews (included a heightened scanning of the local media) plus attendance of public lectures, meetings, seminars and focus group discussions relevant to the theme. Using the ToRs for the study and elements of my own unique 'Consolidated Methodology for the Assessment of S&T Capacity in African Countries,' I was able to characterise the RTD policy dialogue system of Uganda and its effectiveness in policy-making.

I found that, on the one hand, Uganda is a typical poor ACP country in which there is not much RTD, not much RTD policy, and not much dialogue about that policy. Yet at the same time, it is also a country in which the little RTD policy dialogue that is happening is channelled through highly unconventional mechanisms, with a few flashes of brilliance and exciting pointers towards a possibly innovative model of a dynamic RTD policy dialogue in an ACP context.

I found that the main strengths and driving forces for the dialogue were essentially political, in the sense that the Ugandan political system of the past 14 years has indeed evolved as an open learning, innovative process in all spheres of Ugandan life, including RTD policy-making. Many driving forces also come from outside Uganda, including from the EU. Conversely, the main weaknesses and threats have sprung from the techno-bureaucratic civil service RTD management institutions and individual actors, mostly survivors from the old regimes, who certainly do not subscribe to the openness that is inherent to dialogue.

The findings point to a fragmented, compartmentalised RTD system with some very weak basic technical building blocks and little meaningful RTD policy dialogue between them. The few breakthroughs and flashes of brilliance have arisen where entrepreneurial RTD practitioners and institutions have effectively linked up with the political and economic actors to form a structured and institutionalised RTD policy dialogue that can build the capacities that are required for sustaining the process.

This report examines a number of case studies that illustrate that, where RTD policy dialogue has been good, so has policy-making - and conversely, where dialogue has been weak or absent, policies have also been weak or absent, with some dire consequences (e.g. the economic collapse of the fishing industry following the EU ban for RTD-related reasons.)

My recommendations therefore hinge on overcoming the weaknesses in the RTD policy management system, and seizing the opportunities for broadening the dialogue beyond ministers and civil servants, especially towards parliament, industry, civil society and NGOs.

I hope my methodology, findings and recommendations will offer a viable platform for a future RTD observatory in the ACP region that could help improve EU-ACP RTD cooperation.

About the author

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1. Introduction

This study is the result of a new initiative taken by the EU-ACP to review its cooperation in research and technology development (RTD). The EU started this review by initiating a policy dialogue on RTD both within and between EU countries. The EU also sought, through a process managed by the European Centre for Development Policy Management (ECDPM), to find out if and how a similar policy dialogue on RTD is taking place in the ACP countries. For this purpose, the EU decided to probe five ACP countries, namely Uganda, Ghana, Senegal, the Dominican Republic and Vietnam. This study is on Uganda.

The results will hopefully benefit the overall EU-ACP RTD policy dialogue as part of the review and improvement of future cooperation.

The evolution of the RTD policy dialogue in Uganda has closely followed the evolution of the country's socio-economic and political fortunes over the past 40 years, since independence in 1962. The country's fortunes have behaved like a candle when first lit. Initially, it seems to burn brightly, but then flickers and almost goes out, before picking up again to burn sustainably. The country went through these three stages in 1962-71, when Uganda's GNP was comparable to that of South Korea. Then came 1971-86 and the total decline, civil strife and capacity destruction wrought by dictator Idi Amin and his successor regimes, when dialogue on any topic was impossible and Uganda fell to a ranking of fourth least developed country in the world. Finally, in 1986, the current regime of President Yoweri Museveni embarked on a positive path of sustainable development, and the country clawed its way out of the pit and up the hierarchy of nations. Uganda is now around 16th from the bottom.

The past 10 years have seen a revival in the country's socio-economic stability and growth, and the restoration of an enabling political environment that is conducive to dialogue in all fields of human endeavour. Many of the megatrends and driving forces for the development of RTD policy have been put in place during this period. These include home-grown initiatives like Vision 2025, the plan for modernising agriculture, the industrialisation and foreign investment pushes, universal primary education and the unique brand of participatory, non-party democracy that Uganda is pursuing. They also include external forces such as the World Bank/IMF/USA's structural adjustment programme with its themes of liberalisation, privatisation, decentralisation, civil-service reduction, globalisation, regional integration and the liberation of South Africa.

How RTD policy dialogue has behaved in this post-conflict, capacity-depleted and yet rapidly transforming situation forms the subject of this report. On the one hand, the situation in Uganda is typical of a Least Developed Country (LDC) in the ACP, in that there is not much RTD or RTD policy, or dialogue about RTD policy. At the same time, I have also found a few exciting indicators of a possibly unique dynamism that works in favour of an effective policy dialogue in the RTD sector. I have found that, where RTD policy dialogue has happened, it has had a positive influence and has acted as an effective mechanism for directing policy in Uganda, while instances of no policy dialogue have led to dire problems in the progress of RTD.

Apart from the possible benefit to EU-ACP stakeholders, I am sure the study will be of significant use in enhancing RTD policy dialogue in Uganda. Excitement is high among the stakeholders

interviewed, who would like to use the report's key recommendations so as to stimulate more effective policy dialogue in the RTD sector.

2. Methods and sources

The main methods and sources for this evaluation were:
1 *Key informant interviews.* Potential interviewees were selected to cover as many social groups and perspectives on RTD as possible, including people from government agencies, NGOs, private sector firms, universities and research institutions, unions and citizens' groups. This was in order to gain a stereoscopic picture of the country's RTD system and the activities and issues within it. Many of the key informants and institutions were already familiar to me from work I had previously carried out in this field. Others were either nominated or discovered during the course of the project.

2 *Document reviews.* Various documents were obtained from the institutions visited and my own library, and these yielded data to support field observations. A heightened scanning of the media (especially print) was also carried out during the study period, so as to identify any significant RTD policy dialogue issues.

3 *Public lectures, meetings and seminars*. Extra efforts were made to attend meetings, lectures and focus groups discussions relevant to RTD policy dialogue, in order to gain more insights and contacts.

The result is a snapshot of the RTD policy dialogue landscape in Uganda during one month of intense exposure. We look forward to continuing this RTD observatory work beyond the life of this assignment.

3. Evaluation of the Uganda country RTD map (Mugoya 1999)

The Uganda Country RTD Map (Mugoya, 1999) is a country report on science and technology policy-making and policy implementation in Uganda. It was prepared for the Secretariat of the Commission for East African Cooperation (EAC), with technical and financial support from Deutsche Gesellschaft fur technische Zusammenarbeit (GTZ), Germany.

The EAC is a regional integration initiative of the three East African countries (viz. Uganda, Kenya and Tanzania) that was launched in the mid-1990s. It is an attempt to re-create the East African Community of the same countries which existed from the early 1960s to 1977, when it broke up under irreconcilable political and economic tensions.

Science and technology are regarded as constituting key areas in which cooperation should be enhanced. So the three countries, through their S&T coordinating bodies, have sought to harmonise their positions and starting points through Country Papers. These are basically situation analyses, diagnostic studies and RTD maps on S&T policy-making and implementation produced with a view to charting a common way forward. During the course of this study, I was privileged

to see versions of the three country papers (i.e. on Uganda, Kenya and Tanzania), as well as the synthesis paper produced by Bennett et al. (1999).

The Uganda Country RTD Map is evaluated here briefly in order to establish the existing situation, circumstances and context within which RTD policy dialogue takes or should take place in Uganda.

The Uganda country paper successfully assembles most of the building blocks that make up the Ugandan S&T policy-making system (i.e. the institutional framework, legal instruments and stakeholders). There are some significant gaps, e.g. NGOs, local governments and local-level grass roots and civil society participation.

However, where the paper really falls short is not so much in making an adequate assessment of the S&T policy-making process as in describing it at all. It ends up by making the depressing and static impression that basically nothing much is going on in Uganda in S&T policy. Having assembled the building blocks, it fails to build the house of S&T policy-making in Uganda. This could be a question of misunderstanding the process, a problem already encountered by the author in relation to S&T indicators.

The country paper paints the Uganda National Council for Science and Technology (UNCST), the apex government body for the coordination of S&T policy-making in Uganda, in a very poor light. Its role, structures, working methods, results, achievements and impact in S&T policy-making are articulated only very fuzzily. If true, the fact that an S&T policy was drafted in 1991 but has not come out during the following decade is indeed depressing. This failure and other big gaps in output need to be examined more critically.

On RTD policy dialogue, the country paper not unexpectedly claims that there is basically none, as there are apparently 'weak horizontal linkages between S&T statutory organs, resulting in a fragmented and uncoordinated S&T system...with increasing duplication of functions' (p.28).

Uganda is a clear case in which the South is not conducting a dialogue with itself even if initiatives to this end are taken by the North, as the UNCST has a knack of acting as a focal point for initiatives which the rest of the country does not know about, apart from a few carefully selected collaborators (perhaps chosen not on merit, but through nepotism as Mugoya has hinted). Indeed, Mugoya's paper shows that an attempt was recently made to become the focal point for East African Cooperation without any national dialogue having been conducted about this.

In all fairness, though, the country paper was not intended to focus on RTD policy dialogue in Uganda. That is the focus of this study. The country paper is therefore a primary source that has helped me to build up my case without reconstructing the situational background. Hopefully, my own study has revealed a more dynamic and more hopeful situation, and discovered a steady platform for moving in the future towards a more fruitful dialogue on RTD policy-making in Uganda.

I agree with the Country Report about the general map of the RTD landscape in Uganda, which may be depicted as follows:

Table 1: Five important building blocks (clusters) of the Ugandan government RTD system

Cluster	Level/function	Ministry
1 UNCST	Policy/Regulatory/Coordination	Finance/Planning/Office of President (Res. clearance function)
2 NEMA	Policy/Regulatory/Coordination	Cabinet/Ministry of Natural Resources
3 NARO	Agricultural Research/Extension (8 institutes)	Agriculture Animal Industry and Fisheries
4a UNBS	Standards and Quality Assurance	Tourism, Trade, Industry
4b UIRI	Industrial RTD	Tourism, Trade, Industry
5 MUK	Academic RTD and Training	Education and Sports

On the face of it, the UNCST and NEMA are ranked highest in the hierarchy. There appears to be a great deal of consultation and dialogue at a superficial level because of the degree of cross-representation on each other's boards and committees. I found, for example, that the Vice Chairman of the MUK, a professor of chemistry, chairs the boards of both the UNCST and the NEMA; and that the UNCST is represented on the NARO board by its Chairman (who is the Vice Chairman of the NARO). In practice, however, the respondents claimed that each of the five clusters carried a lot of influence in its own separate cluster, depending on how 'politically well-connected' it was and how 'rich' it was – i.e. in terms of the power, numbers and resources commanded. In fact I was told of the old generation of the 'Big Five' leaders of the clusters, who live in mutual familiarity (and contempt), do not bow to each other, and cannot be convened by each other. Each does his own thing. Instead, they engage in a superficial pseudo-dialogue by delegating lower-level representatives, who reach non-binding decisions.

It also emerged that some of the clusters do not even subscribe to the consultative system, and many of the statutory committees, especially those of the UNCST, are moribund. The reason given was 'no resources' (which my methodology does not accept). In terms of RTD capacity, the biggest weaknesses and gaps were detected in clusters 1 and 4. These need addressing urgently.

I suspect that it is because of this apparent impasse that many respondents felt there was a need for a better (higher?) organising principle that could open up the RTD dialogue in Uganda, and hence make the sector more dynamic and vibrant. At least one respondent called for the total replacement of the Big Five in one fell swoop, so as to open up the way for a new generation of leaders. This is not likely to happen in the near future.

4. CHARACTERISATION OF THE POLICY DIALOGUE ON RTD

4.1 Introduction

This chapter seeks to understand the character of the RTD policy dialogue in Uganda by trying to discover the forces that drive and govern the dialogue. What are these driving forces? Where do they come from? How do they impact on the RTD policy dialogue? And how does the RTD policy dialogue respond to these forces and to what effect on RTD policy-making?

In addition to being based on the Terms of Reference, this is a partial application of my own unique 'Consolidated Methodology for Assessment of Scientific and Technological Capacity in African Countries' (Tindimubona, 1996). In this publication, I developed a conceptual 'Cascade Model' enabling one to trace and measure significant impulses and interactions impinging on the S&T system from different levels of the system and its environment.

I have applied only a few elements of my full methodology in this particular study. This has helped me to discover that the Ugandan RTD policy dialogue, if it happens at all, proceeds through quite unconventional mechanisms. These mechanisms, once understood, also yield new insights into the effectiveness of RTD policy dialogue in Uganda.

4.2 Driving Forces for an RTD Dialogue

Period up to 1986

Before 1990, policy dialogue on RTD was very limited. Although the current political regime came to power in 1986, it struggled at first to pacify the country and make it safe not only for RTD institutions to replan and rebuild, but also for many RTD exiles to even think of returning to live in Uganda. Some of those who had remained had participated in RTD policy initiatives that were driven mainly by UNESCO (i.e. the CASTAFRICA process), the World Bank (e.g. the NARO + UNBS reorganisation) and also in attempts to form the Uganda National Academy of Science and Technology (UNAST).

Period after 1986

The new regime came to power with a unique new approach that was quite revolutionary in many ways. Led mostly by young angry intellectuals-turned-soldiers, it was the only regime to come up with a clear programme – the famous ten-point programme (Museveni, 1986) – which its leaders said they would like to implement, be seen to implement, and be held publicly accountable for. The ten-point programme had very specific pointers to RTD (which it referred to as science and technology in general), describing how the regime intended to use it to transform Uganda from a peasant agrarian economy to a medium-sized industrial power within a single generation. The ideas was to create an independent, integrated and self-sustaining national economy resting on the key pillars of science, technology and managerial capacity. These were very bold and inspiring policy statements.

Another significant early component of this dialogue system has been the reorganisation of the private sector through the Uganda Manufacturers' Association (UMA), the Private Sector Foundation (PSF, a USAID project) and the Uganda Investment Authority (UIA), the main government push for re-attracting investors to Uganda, including the Asians who were expelled

by Idi Amin. This private-sector reorganisation has enjoyed a favoured position, as it is nurtured and championed directly and politically by President Museveni himself, to whom the private sector has direct access for dialogue on its problems.

Other driving forces for RTD policy dialogue have emanated from external pressures, especially the World Bank/IMF/USA Structural Adjustment Programme (SAP) which Uganda adopted early on and in relation to which the country's apparent success has caused it to become something of the darling of the West. These include a reduction in the size of the civil service, the privatisation of formerly public (nationalised) enterprises, the liberalisation of markets (including financial), and the decentralisation of government functions and services, in the first instance to the districts and now right down to sub-counties.

New forces after 1996

Along with these external pressures, Uganda has pioneered several home-grown innovations with an impact on RTD dialogue, especially during the period after 1996, when President Museveni and his government were given a strong electoral mandate by the result of democratic elections. In essence, these elections enabled Museveni and his colleagues in the leadership to return to their original state of civilian intellectuals determined to transform the country.

They have now swiftly embarked on Vision 2025, a long-term visioning process; invested in universal primary education; a plan for the modernisation of agriculture; and a fresh push for industrialisation and infrastructure building, perhaps best exemplified by the completion of the first hydroelectric power dam ever built by a post-independence government since the British colonial government built Owen Falls Dam in 1954.

On the political front, a unique model of no-party democracy that encourages dialogue has been put in place. It is a combination of participatory and representative democracy. The participatory mode is practised at the grass roots, in urban and rural areas, where all residents of a village or suburb participate directly in everyday issues affecting them. They elect their neighbours as officials to handle matters on their behalf, regardless of class, race or sectarian parameters, simply on the basis of their ability to serve in any neighbourhood. A Ugandan houseboy and the foreign wife of a Ugandan have served on the local security committee. This system continues in five steps up to district level (Local Council 5).

The representative model is based on 300 candidates who go to parliament by seeking votes from individual voters at county (i.e. constituency) level, on personal merit only, as independent candidates not waving any party flag at all. Presidential candidates are elected similarly from one national super-constituency where they have to canvass for votes. The interactions among and between these different levels and forces has made for a very robust, dynamic and apparently quite stable system.

Of significance to RTD policy dialogue, it is of note that this system of personal merit has resulted in a very large number of highly educated scientists, technologists and intellectuals ending up in parliament, cabinet, or as powerful political heads of districts. They have easily dislodged the traditional 'professional' politicians of the multiparty era. They are very much at ease with, and very receptive to, RTD policy dialogue and can easily help implement the results of this dialogue.

As far as the media are concerned, it is true to say that the liberalisation of the media has taken Uganda by storm. Private FM radio stations, TV stations and newspapers abound. The FM craze has spread to over 30 stations, not only in Kampala but in rural towns as well. A recent statement by President Museveni claimed that there are 12 million radio sets in a population of about 22 million (which, he revealed to his opponents after the fact, he had used to win the latest election in June 2000). Media freedom is almost total, and it provides a platform for a great deal of RTD policy dialogue.

Other significant technological changes which have been direct drivers of RTD policy dialogue are the mobile phone craze (where there has been a rise from 50,000 to 200,000 subscribers in just two years) and the internet explosion, which has been reflected especially strongly in the mushrooming of 'cyber cafés', from two just a year ago to at least 30 at present. The main breakthrough here has been the wireless VSAT link technology which has come to Uganda apparently from South Africa.

Regional integration as a driving force

There is no doubt that regional integration is becoming a reality very fast in Eastern and Southern Africa, with the Uganda government and its leaders very much in the activist vanguard. Meld in the unleashing of the economic might of South Africa into the region after its political shackles were thrown off in 1994, and the result is a major driving force for RTD policy dialogue in Uganda. Uganda is participating in the revival of the East African Community, COMESA, IGAD, the Greater Horn of Africa Initiative, the Nile River Conference, etc. Even its role in the conflict in the DRC has RTD policy implications.

Sharing in the development and management of natural resources, industrial products and RTD results is becoming an everyday occurrence. The joint Lake Victoria Environment Programme, and the selling of hydroelectric power to Kenya, Tanzania and Rwanda (and possibly even to Djibouti, as the President of that country tantalisingly announced on a recent visit) are cases in point. So is the recent launch of an iron and steel company in Uganda that will use Tanzanian coal and sell its products in the whole region. The InterUniversity Council for East Africa was also recently re-launched with a strong RTD cooperation component.

RTD policy-making: response to the driving forces

It was this heady atmosphere that the scientists joined when they initiated the first serious, open dialogue on RTD policy with the help of UNESCO (UNESCO, 1991; Tindimubona, 1991a (Uganda Wakes up)). This dialogue attracted Ugandan RTD promoters and experts who were still based outside the country, including myself, coming in as a resource person from the African Academy of Sciences in Nairobi to help re-build the science and technology system (Tindimubona 1991b, TOKTEN Report). The upshot was the reorganisation and upgrading of the Uganda National Council for Science and Technology (UNCST) as the apex statutory coordinating body for RTD in the country (Tindimubona 1991c, Model Secretariat)

In the next ten years, the consolidation of the UNCST, NARO, UNBS, and NEMA, the resuscitation of RTD activities within the main university (Makerere University) and the start of activities at the Uganda Industrial Research Institute (UIRI) meant that Uganda had the building

blocks ready for an almost complete S&T system, from which an RTD policy dialogue could begin to emerge.

The science activists targeted the political leadership, whom they saw as being highly receptive to RTD ideas. I, too, lobbied for the participation of Uganda in the Presidential Forum for Science and Technology in Africa, an initiative taken by the African Academy of Sciences (AAS) with the help of General Olusegun Obasanjo of Nigeria that made a significant contribution to RTD policy dialogue in Uganda. Presidents with large entourages from the Eastern and Southern Africa Region held three summit meetings (in Gaborone in 1993, in Maputo in 1994, and in Kampala in 1995). They held face-to-face discussions on science (based on working papers presented by the AAS) as scientists, business people and ministers watched. Diffusion of the ideas and actions emanating from the summits has continued and enriched RTD policy dialogue both nationally (e.g. PSF, 2000) and even at a district level (Tindimubona et al., 1996 - KEDA).

4.3 The characteristics of the RTD Policy Dialogue

As can be seen from the above, many of the driving forces for an RTD policy dialogue have been external, and have involved very little national dialogue in terms of agenda-setting, national ownership of the programmes and hence accountability for achievements and failures.

Typically, an RTD initiative is brought into Uganda inside an expatriate's briefcase. He or she acquires a local contact or focal point in the country, usually an individual or a department in a government ministry. Together, they secretly establish a pipeline or conduit between that department and the expatriate's organisation through which resources and people flow without anybody else (even board members) knowing. Both accountability and results are hard to ascertain. In many instances, the results emerge only if the project is hit by a disaster of some sort.

One of the most interesting examples of this type of problem is the National Council for Science and Technology (UNCST) itself, according to many respondents. Although it is the public body that has been mandated to formulate and coordinate RTD policy for the country, it appears to have put very little effort into this vital part of its mandate, with the result that Uganda still does not have such a policy ten years after the first draft was produced. I encountered minimal staff familiarity with RTD policy formulation as a concept, and with the structure of an S&T system, and a despondent attitude to RTD policy dialogue, the basic tenor of their comments being that such a dialogue did not exist in Uganda.

I was given the impression that the Council survives in other ways that the staff were not prepared to talk about. In the event, I happened to stumble on the key to the mystery: the Council is the focal point for no less than eight international projects about which the scientific community knows hardly anything, apart from a few individuals who have been discretely let into the 'secret.' These projects are not at the level of policy management, i.e. the type of activity in which the Council claims to be involved, but rather at research implementation level, such as running tele-centres and peri-urban tree planting projects in competition with research organisations and NGOs. One of the international projects the Council had run since 1993 had just blown up in its face (ATPS), with the donors insisting on more openness by reconstituting the project as an independent NGO through a process of open RTD dialogue. The process was aired on national TV on 11 July 2000.

There have been other major public scandals and embarrassments related to a lack of openness on RTD policy dialogue. These have included the Valley Dam saga, the EU fish ban, the Water Hyacinth, and even the recent admission, under pressure, that most of the lecturers at Makerere University were unqualified for the posts they hold. The university recently announced 400 vacancies for PhD holders (The Monitor, 2000).

Inside each sector, the degree of open policy dialogue has varied. Probably the most open example has been the National Environment Management Authority (NEMA) process. Initiated around 1993 by an enterprising Ugandan scientist returning from the USA with World Bank backing, it used a highly consultative NEAP (National Environment Action Plan) process involving almost all the RTD players then in the country. Scientists, lawyers and policy-makers all interacted in drawing up the action plan and eventually the Environment Statute, and in setting up the NEMA. The NEMA has moved swiftly to reach the districts, instituting DEAPs, DEOs and Environmental Inspectors. The NEMA is poised to reach the sub-county level in the near future.

I found that a very promising start had been made with RTD policy dialogue in the health sector, in the area of traditional medicine. A small number of people, including doctors, missionaries, natural product chemists, pharmacologists and development workers, are working to integrate the modern and traditional medicine approaches. The National Council for Science and Technology has created a forum for interaction in this area of indigenous knowledge systems. Issues of intellectual property rights (IPR) have arisen from this and other sectors of RTD, and exposed serious weaknesses in the country's IPR regime, which is practically non-existent. It is still the old system that is based on ARIPO verification outside the country. This is a serious fetter on national innovation as prospective inventors and innovators are reluctant to expose their inventions to a system whose integrity they are not sure of.

Case study 1: RTD and the economy: the EU bans Ugandan fish

The crisis in the fishing industry which has hit Uganda over the past year and a half has been a wake-up call for Ugandan RTD policy dialogue. The Ugandan fishing industry had grown rapidly in the 1990s to command a significant portion of Ugandan exports, encompassing 18 factories and thousands of fishermen working in an industry that is concentrated on Lake Victoria. The main market for fish is the European Union.

Suddenly, in around March 1999, the EU banned imports of fish not only from Uganda, but from all three countries of East Africa, namely Uganda, Kenya and Tanzania. The cause was the use of unorthodox fishing methods, i.e. poisoning. The poison was identified as an agricultural pesticide, and the real motivation for conversion to this method was identified as stemming from fierce competition in the lucrative industry. The fish ban suddenly halted the flow of cash into the industry, and caused widespread soul-searching on a wide range of issues, including what to do from an RTD policy perspective.

The law quickly came into the picture, with stoppages, sensitisation, policing and fines. For the RTD policy sector, the main challenge has been to prove to the EU that Ugandan fish is free of

pesticide, and hence win back EU custom. The ban exposed fundamental weaknesses in Uganda's RTD system, mainly low analytical capacity in the government and university laboratories. The strategy adopted across the board was for government to invest in better lab equipment and training of analytical scientists, and involved a key policy shift towards encouraging the private sector to enter the market and set up similar laboratories. The strategy seems to be working, and the country is now reported to be moving closer and closer to re-entry into the EU market.

The most positive 'silver lining' on this cloud for Ugandan RTD policy-making has been the attempt to build up local analytical laboratory capacity, instead of still relying on sending samples to remote European laboratories, as was the custom in the past. The country is now moving towards full EU accreditation of its laboratories. However, I also gathered that it would be very useful if equivalent labs were also located in academic RTD institutions, where independent checks and verifications could be handled. The problem was felt to be whether it is possible to guarantee that no pressure will be brought to bear on a private or government lab to come up with 'the right results'. Why not ask a graduate researcher to tackle the same problem, i.e. someone working under strict supervision, whose sole aim is to obtain an academic degree, and who is interested simply in getting results, and not in getting a particular set of results? If a researcher working in these conditions comes up with the same findings, this at least would be some sort of guarantee of their reliability. Interesting RTD policy dialogue would accrue from this strategy.

Apart from the problems with the UNCST as an RTD policy coordinating body, the most serious gap in the S&T system is to be found at the Uganda Industrial Research Institute (UIRI). Started over 20 years ago as part of the East African Industrial Research Organisation, it has grown very slowly and could indeed be called stunted. Operating under the auspices of the Ministry of Trade and Industry and with the help of the Chinese government, its initial mandate was to cover two specific sectors: food technology and ceramics. Now renamed as a full Industrial Research Institute, the reality on the ground shows that it has not yet undergone the requisite visionary and strategic transformation, and that it is not acting as a spur for a full RTD policy dialogue such as would fit its new name. I found it pottering along with a few projects in food technology. Its leadership is weak and dominated by foreign experts from China, the UNIDO, the FAO, etc. whom the Acting Director did not even mention in my interview with him.

Because of its lack of growth, the UIRI's territory has been encroached upon by the international projects described above and the now dynamic and vibrant Uganda National Bureau of Standards (UNBS). This is another body whose statute has taken ages to pass through parliament. Its nebulous mandate means it cannot grow to its full potential with proper staffing and full activity. A similar institution started in Zimbabwe 10 years ago: the Scientific and Industrial Research and Development Centre (SIRDC) has already built six vibrant institutes out of the projected 10 institutes, all headed by PhDs, while the UIRI languishes in mediocrity. Of course, in the old Uganda, such a nebulous state of affairs served to preserve certain interests and practices which would clearly not survive and thrive under the new regime. For this reason, the onset of the new regime has been resisted for as long as possible.

It was at the UIRI that I found the most obvious case of duplication and conflict based on a lack of RTD policy dialogue. I found essentially two separate institutes of food science and technology operating under two different ministries. One is basically the UIRI itself, which falls under the amorphous Ministry of Tourism, Trade, Industry and Technology. The second is the Food Science and Technology Research Institute (FOSRI), operating under the National Agricultural Research Organisation (NARO). Headed by a PhD scientist and with a core strength in fish processing quality, it was apparently set up by the NARO to spearhead its entry into post-harvest and agro-processing research. Following the numerous reorganisations conducted at the NARO, it is no longer one of the NARO's eight core statutory institutes, and has been surviving on internal administrative handouts from NARO headquarters. With its accommodation not assured, it wandered around and found a temporary home at the UIRI. But I found that the FOSRI was in the process of being thrown out of the UIRI, and its equipment was being put in storage as staff looked for a new home within the NARO. The heads of the two institutes have both put the blame on poor RTD policy dialogue and departmental turf fights within government. They have both welcomed the idea of a more open dialogue that would harmonise such conflicts.

A similar lack of coordination appears to be the reason for the existence of a section within the same Ministry of Tourism, Trade, Industry and Technology that deals with 'building indigenous capacity in science and technology,' according to a recent job advertisement (New Vision, 2 August 2000, p.16). Such a mandate would appear to clash directly with the stated role of the National Council for Science and Technology. Indeed, some respondents stated that neither this section nor the NARO nor the NEMA report to the UNCST, although the latter is supposed to be the apex government body on S&T matters. More RTD policy dialogue is clearly needed.

On a positive note, the plan for the modernisation of agriculture now being developed is also taking a highly dialogue-driven approach and therefore has a chance of promoting good RTD policies. It was one of the PMA resource persons who stated categorically that 'the days when a few officials could sit in Kampala and decide where a dam should be built, which forest should be gazetted as a protected area, etc. are gone forever.' He was of course referring to the colonial era and subsequent regimes. Now almost everything in Uganda has been politicised and made negotiable. Central government must negotiate with the districts, and ultimately with the farmers who are responsible for actually implementing the PMA, making the daily decisions that will make it fail or succeed. It is also the same PMA that has come to realise that modernising agriculture is not simply about farmers, but involves many stakeholders whose views must also be obtained. Dialogue will produce better policies all round.

The low tech-high tech debate: RTD policy dialogue in the Internet age

The low tech-high tech debate is very active in Uganda. I probed it and found it a good indicator of RTD policy dialogue. This debate is characterised by the presence of two extreme schools of thought. The 'catch-up/leapfrog' school, mostly conceptualised and pushed by UNESCO and Western media, says the Third World, having missed out on the Industrial Revolution, must not be left behind this time in the new technologies in the fields of ICT, biotechnology and new materials which are shaping the future of the world. This school believes that the third world should use these technologies to catch up.

The 'basic needs' school has been conceptualised and pushed in Africa initially by Mwalimu Julius Nyerere, the former president of Tanzania, and subsequently by the Non-Aligned Movement and The South Centre. There it was expressed in sophisticated RTD terms by the famous Pakistani Nobel Prize laureate, Abdus Salam, the founder of the International Centre for Theoretical Physics (ICTP) and the Third World Academy of Sciences (TWAS) in Trieste, Italy. Essentially, the 'basic needs' school tells the South not to be duped into jumping onto high-tech bandwagons and blind alleys into which the West can lure it. It says that the South must analyse and solve its problems of backwardness by mastering and building to full capacity the classical 'low' technologies that work to solve the basic needs of the masses, namely food, clothing, shelter and energy. It should then use this mastery and experience as a stepping stone to reach the higher 'quantum levels' of emerging sophisticated high technology. For example, there is no point in attempting to study biotechnology without a thorough knowledge of microbiology and biochemistry. At the same time, it is also important to keep an eye on advances in high technology, because these can sometimes offer the most 'appropriate' solution, even for a Third World country.

I found a great deal of familiarity with and sympathy for the issues involved in the high tech-low tech debate in Uganda. Most people agreed with Nyerere and Abdus Salaam and were in favour of taking a multi-optional approach, with no closed doors and open systems, and judging each system on its own merits. One engineer informed me that even the ostensibly low-tech Nalubaale Power Station, which has just been completed at the source of the Nile, is not simply a duplicate of the old Owen Falls Dam, which the British completed there in 1954. It was built on a high-tech platform, starting with the ICT-led CAD/CAM design of its structure, and makes use of highly sophisticated new materials in its power generation machinery that are helping it to quadruple the efficiency and power output of the Owen Falls Dam.

Even the traditional healer I interviewed carried a mobile phone and said his next acquisitions will include a computer to develop a comprehensive database of his herbal holdings, as well as information about them. We discussed the possibility of working together to develop an artificial intelligence application for natural products that I myself worked on in the 1980s (Tindimubona, 1987). He was quite fascinated. This is an RTD area in which high-tech and low-tech merge, and in which the EU and the ACP could cooperate in mutually beneficial ways in the new age of natural products. Opportunity knocks for e-commerce with New-Age products.

Case study 2 (low-tech success): The Uganda Gatsby Trust

The Uganda Gatsby Trust is an appropriate-technology development and transfer organisation for small-scale industrialists, mostly in the informal engineering sector. It is an NGO which grew out of a project that started at the Makerere University Faculty of Technology, in part to link university and industry in order to train engineers for job creation purposes. It is sponsored by a UK charity, the Gatsby Trust, founded by the Sainsbury supermarket chain. Together with students and small-scale industrialists, several engineering faculty staff have teamed up to set up a small foundry for manufacturing various spare parts and appliances, as well as a motor repair garage and a showroom in Katwe's informal-sector industrial area for promoting small-scale manufacturers and their products. They also train small-scale industrialists in business skills and

help them to obtain credit through a micro-financing scheme. The project has spread from Kampala to several rural towns through a Gatsby Club programme. The project has already produced a few Uganda shilling millionaires.

One of the challenges to RTD policy is the fact that the project apparently outgrew the ability of a university to manage such innovative interactions, and had eventually to be cast in the mould of an NGO, albeit with strong links with the university. The sustainability of these links would form a good subject for further study. For example, the work of university engineering professors with outside groups such as the Gatsby Trust is not highly rated in the academic environment (e.g. in helping them to secure promotion), and the faculty has lost many staff members to private practice.

Case study 3 (high-tech success): MedBiotech Laboratories

Tucked away in a quiet residential suburb of Kampala is a world-class centre of excellence in medical research, MedBiotech Laboratories. I was alerted to its existence by a newspaper report on a Ugandan scientist who had just won an international award in medicine worth USD 250,000. It was set up five years ago by a Ugandan scientist, Dr Tom Egwang, when he returned to the country after a distinguished career in education and research in Canada, the USA and Gabon spanning a period of two decades.

MedBiotech Laboratories is a molecular parasitology laboratory that focuses on the malaria parasite at the molecular, post-genomic level of DNA, cloning and genetic engineering. With over eight other Ugandan scientists, technicians and interns, Dr Egwang is making a significant contribution to the development of diagnostics, vaccines and medicines against malaria, mostly in collaboration with international colleagues with whom he is in constant touch over the Internet. The laboratory is equipped with the latest genetic engineering instruments obtained through international grants.

What is the secret of his success? One factor is his unique experience in having obtained a tenured professorship in the USA with a lot of resources, and having acquired the experience to build and manage such a laboratory both in the USA and in Gabon, an oil-rich country where resources were also no object. Another is a strategy he has adopted of combining research and training. The latter is the key to research capacity-building and hence self-replication, not to mention the attraction of grants in the training sector. A third factor is his passionate desire to use science to ease the suffering among the Ugandan poor. He expresses this by doing his field research in a very remote rural area of Uganda, and in trying to inculcate science in Ugandan high schools.

Not since the towering success of Prof. Thomas Odhiambo of Kenya's International Centre of Insect Physiology and Ecology (ICIPE) and the African Academy of Sciences (AAS) have I seen such an inspiring and promising initiative in RTD in Africa. Its implications for the RTD policy dialogue in Uganda are immense, and I shall continue to observe its progress as a model of what is possible, even in an LDC such as Uganda.

Formal RTD Policy Dialogue by the UNCST and the IICD

Most respondents agreed that RTD policy-making is extremely fragmented, with very little inter-institutional and inter-sectoral dialogue. Each sector seems to go it alone, proceeding in a top-down, authoritative fashion on the initiative of central government. Indeed, much RTD policy-making is confined to the central echelons of government and the general public are hardly involved.

I found at least two very good examples of formal RTD policy dialogue exercises carried out by the UNCST. One involved the commissioning of the Ssemwanga Centre Ltd, a local consultancy group, to organise 'Pre-test workshops on the integration of science and technology in the socio-economic development of Uganda'. Two workshops in Masaka and Hoima Districts brought together various district-level stakeholders from government, the private sector and civil society to brainstorm on their needs and aspirations for using science and technology in their lives. The proceedings give an insight into the real RTD needs and perceptions of the rural masses, and if followed up could really illuminate the RTD policy dialogue in a significant, realistic way. This project is supposed to cover 10 pilot districts, but I was unable to ascertain exactly how far it had gone. A similar dialogue was also attempted for the industrial sector, but proceedings are not available yet.

A very promising RTD policy dialogue is also currently proceeding under the auspices of the Ministry of Education and Sport (MOES) on information and communication technologies (ICTs) in education. Facilitated by an Anglo-Dutch NGO known as the International Institute for Communication and Development (IICD), it is moving fast towards developing a comprehensive programme for introducing ICT in Ugandan schools.

The most significant aspect of this initiative is the personal, hands-on championship and involvement of the Minister of State for Higher Education, who is himself a PhD scientist. He has been able to encourage senior civil servants in his ministry (both at headquarters and in the districts) to dialogue with the schoolteachers who are developing the actual school-based ICT labs, so that they can support the programme fully, for example by putting policies in place that promote the growth of ICT. This strategy appears to have a high potential for take-off as it gathers a ministry-wide, indeed sector-wide, momentum in which all forces are sensitised and aligned to achieve a common goal.

This is in stark contrast to the UNCST methodology, which is simply too narrow, and in relation to which no visible political involvement and support has been mobilised. The chances of success and take-off are slim at best. In view of this initial hypothesis, it would be interesting to undertake a direct comparative study between this MOES/IICD initiative and Acacia, an IDRC-supported ICT initiative, from an RTD dialogue perspective. I did not have an opportunity to visit Acacia during this assignment, although I did examine some literature on an early dialogue process during its initiation.

Poor science and technology education and training (STET)

Many respondents were adamant that the poor standard of the RTD culture in Uganda has its roots in the country's educational system, which offers inadequate education and training in

science and technology. Students in primary and secondary schools are taught theoretically with very little hands-on practical work. Yet good RTD is practical. S&T concepts are not illustrated with locally relevant examples, so students find them difficult to comprehend. The curricula have not changed since the 1960s and have hence failed to keep up with the times and with new developments in science. Laboratory facilities are inadequate at all levels of education, including university level. One professor said the lab where he studied during the 1960s, when it served 10 students, was now used by 40 students - with the same working area and the same number of instruments. Professors are underpaid.

Many undergraduate courses in S&T were said to be understaffed, and some science students apparently hardly ever interacted with PhD-qualified lecturers, who were too busy either with industrial consultancies (which they undertook to make ends meet) or with administration. The science students interacted only with technicians, who knew no more than they did, or – in the later stages of their studies – with graduate students. The result is that many science graduates are unemployable, for example those who take 'flat' BSc courses in botany and zoology. Those who combine with chemistry or education, or specialise, are better off.

5. Assessment of the influence exerted by dialogue on the direction of RTD policy

The evidence gathered for the purpose of this study clearly shows that dialogue, when it has happened, has had a beneficial influence and is an effective mechanism for directing RTD policy in Uganda. The dire consequences of its absence are also clear. This is borne out by the success of the NEMA and the failure of the UNCST and the UIRI/NARO.

The success of the NEMA may be attributed to the intimate involvement of the political leadership, engineered by the scientists. It was a clever move to position the NEMA very high in the political structure, i.e. at cabinet level. Its senior governing body is a multi-sectoral cabinet subcommittee of ministers! This gives it both a high profile and the powers it needs to achieve its objectives quickly and effectively.

The President of the country has also taken a keen political interest in matters of environmental protection. His key contribution has been to institutionalise environmental protection in the grass roots of the participatory democratic system, by creating the office of Secretary for Production and Environmental Protection (PEP) on local councils. Thus, in every village, parish and sub-county up to district level, there is a political leader who has been mandated to plan, oversee, monitor and evaluate environmental protection on an everyday basis. In addition, as part of his initiative to modernise agriculture, the President recently pushed a proposal to recruit university graduates in agriculture, environmental studies, and human and veterinary medicine to posts at sub-county level. They are gradually being hired. A lot of RTD policy dialogue has started to happen as the political PEP meets the technical DEO and other RTD cadre.

The AIDS reduction story is another famous case of RTD policy dialogue. This success is attributable solely to the open encouragement of behavioural change by the political leadership. This was particularly brave because sex is in the main a taboo in Uganda that people are not

supposed to talk about in public. Breaking this taboo has been the source of success, in a region where the traditional silence is resulting in an unmitigated spread of the AIDS scourge.

However, some respondents claim that this is not a particularly good example of RTD policy dialogue and is more like a powerful policy monologue. Ugandan scientists have hardly been involved in studying AIDS from all the various perspectives suggested by science. Only a few are involved in clinical and epidemiological studies in collaboration with foreign colleagues, at least one of which has raised an international controversy on RTD ethics. The prevalent feeling is that, for such an issue of national security, national scientists should have worked with policy-makers towards producing an integrated response. Policy-makers did not listen to local scientists - and I learnt of some very interesting scientific proposals which have gone unheard. Since AIDS has become a major issue of concern to Africa following the controversial statements recently made by President Thabo Mbeki of South Africa, it is a key area for RTD policy dialogue.

The same applies to malaria and other diseases. Instead of contacting local scientists over the issue, policy-makers are rushing to expensive international conferences and returning home with curious solutions that are untested in the local context. Or they hire an expensive foreign consultant to produce a manual that could have been written by a local expert. The health RTD sector needs a more open policy dialogue.

Of course, since policy-making is a process, it takes time. But the desire to dialogue must be there, and in some cases it definitely has not been there. Instead, the opposite, extractive and concentrative tendency has been at work, particularly at the National Council for Science and Technology. Several stakeholders told of how they were asked in a pseudo dialogue 'to give their views on S&T policy' and other related RTD issues, but never got any feedback for years. The problem was that the ideas were continued in a closed fashion as a 'one-man effort', as Mugoya hints, and almost invariably faded away as a result.

These non-open methods of working are cited as being more responsible for the slow pace of progress than the clinched response of 'not enough resources allocated to RTD.' Other reasons are 'system blockage', in which alternative efforts are discouraged because 'the Council is already doing it, so why duplicate efforts?' This has been the case in the badly needed area of creating a unifying body for Ugandan scientists so as to allow them to do what they do best: promote excellence in science and integrate science and technology into the economy.

Many respondents complained that polytechnics are trying to become universities and fall into same theoretical and academic trap, with lower-ability students who will find it difficult to become real scientists. At the same time, the downstream institutions that utilise RTD graduates would like to see better trained technicians who can do good bench and instrumentation work, and specialised graduates in electronics and microbiology who can keep up with modern demands.

There seems to be no mechanism in the country for these signals to be passed on to the education and training system, so as to develop better RTD human resources for the new millennium. A lot of RTD policy dialogue is called for in this area.

Case study 4: Scientific and technological services: The rise and fall of STEPU

Scientific and technological services are a key component of any S&T system. The science and technology equipment production unit (STEPU) is the vanguard of STS in the country. It is a unit within the National Curriculum Development Centre (NCDC), which was built and equipped with human resources by British aid to produce educational materials for Uganda. Unfortunately, it seems that the donor never equipped the unit with a capacity to engage in an RTD policy dialogue that would have assured its sustainability, because it practically died off as soon as the British left. The main reason, according to some respondents, was the fact that no orders were received from Ministry of Education and Sports, as the Ministry's officials apparently preferred to import educational materials even though they could be produced at home using the facilities and human resources put in place by the British.

The centre is now in a sorry state, occupying an unfinished building which could have been completed with the proceeds of the orders. Major RTD policy dialogue is needed in this whole area of STS, with a view to developing and utilising the available local capacity.

Case study 5: A science-business partnership: the Uganda Beef Producers Association (UBPA).

The Uganda Beef Producers Association has existed since the mid-1990s, and coasted along until one of the members, backed by strategic planning advice supplied by myself, hit upon an innovative idea: to challenge a couple of returning scientists he knew to become job creators instead of job seekers. It turned out that the two veterinary doctors in question had been at the centre of Botswana's much-vaunted beef industry, where they had been employed during their exile. The beef farmer in question invited them to join the UBPA as technical partners, with their work supported by contributions from members. In a very short time, the scientists have put together master plans and proposals that have attracted large investors and partners to the industry from abroad. It is now poised for take-off so long as the group and the country can solve the RTD problems of quality assurance in processing the beef products for the global market, as in the fish case.

Cows hold a very special place in the Ugandan economy, and particularly in the heart of the President, who comes from a pastoralist heritage and is himself a large cattle farmer. It is he who has been singing the praises of the famous Ankole cattle, using some interesting RTD facts he has gathered from scientists. One is that their meat is very low in cholesterol, which would make them very highly prized on the health-conscious Western market. Another is that the micro-organisms used in milk fermentation do their work at ambient temperatures, unlike those in temperate regions, which work at either extremely low or extremely high temperatures. This means that Uganda could produce fermented milk products for the world at a relatively low cost, i.e. without the need for heating or cooling technologies.

These tantalising titbits of information on Uganda's indigenous bio-resources and knowledge systems hold great promise for the RTD policy dialogue, as the country tries to play a more beneficial role on the globalised market in the New Age.

Case Study 6: Open RTD management: the network of Ugandan researchers and research users (NURRU)

Given that there would appear to be so many 'secret' RTD programmes in the country, NURRU stands out as a refreshing counter-example of an open system. Launched in 1994 as a network of 25 institutions, mainly NGOs and departments of government and university, it is dedicated to the promotion of research and the utilisation of research results in Uganda's socio-economic development. Areas of focus are household poverty and welfare, development conditions and policies, and how they interact in a multidisciplinary way. The NURRU is an NGO funded by the Dutch Ministry of Foreign Affairs in The Hague, the Netherlands.

RTD promotion works by awarding small grants to researchers for fieldwork, and assisting them right through the process, starting with project initiation and ending with the dissemination of research findings. The grants also carry an element of research capacity-building. In the past six years, 70 grants involving over 100 researchers have been awarded and managed. Most of them have now been successfully completed as the NURRU prepares for phase II.

The openness of the system began with the participatory setting of the research agenda at the founding of the network by the various member organisations. At the same time, the very membership of the NURRU itself ensures an open dialogue through its structural linkage and the interaction of researchers and research users in the whole process of conception, generation, and dissemination of RTD results. Proposals are gathered in an open process, and public requests for proposals (RFP) advertised in the media. These are open to the entire research community in Uganda, and not just to people from member organisations. Many of the progress review steps are already public and open. This has fostered the broadening of the RTD policy dialogue and networking way beyond the confines of the NURRU.

The openness also extends to NURRU's relationship with its EU-based donor, which is characterised by arms-length autonomy. Thus, the organisation is entirely Ugandan, and it sets its own research agenda and executes it itself. There is no forced collaboration with Dutch researchers or excessive interference, technical assistance or supervision at the programme level. We have learned that managing such autonomy presents major challenges, i.e. mainly accountability and quality assurance in RTD. These require integrity and mutual respect, not to mention innovation, conflict resolution, robust institution-building, experience and maturity.

The NURRU has confronted all these issues and emerged as a model others are starting to emulate (e.g. UNCST/ATPS). It could offer an option for future EU-ACP RTD cooperation. The other model is the NUFU/NORAD cooperation with Makerere University in the RTD sector, which I have also had an opportunity to evaluate.

Case Study 7: Hi-tech/low-tech in the ICT landscape

I have tracked (and promoted) the growth of ICT in Uganda in a professional capacity since 1990. But I have now observed that those of us who were promoting the Internet in Africa in the early days had got hold of the wrong (i.e. high-tech, futuristic and high-cost) end of the stick. ISPs and e-mail accounts grew very slowly in Uganda until two breakthroughs occurred at the

low-tech end of the spectrum, triggered from an unexpected quarter: Uganda's liberalisation of the communications industry. These breakthroughs were the FM radio revolution that began in 1993, and the mobile telephone explosion in 1998.

Suddenly, all the young DJs in town were surfing the Internet, downloading jokes or RTD stories and broadcasting them, giving away prizes (a computer) upon receipt of an e-mail message, and hence enticing other young people to acquire an e-mail address. The final 'middle energy level' in this quantum model is also occupied by two recent global innovations in ICT: the cyber cafés based on the wireless VSAT antenna/pipe and the free global e-mail accounts offered by providers such as yahoo, hotmail, etc. The low-tech/high tech spectrum in ICT is now more complete and driving the process. I await more innovations for the RTD observatory.

Conclusion

In a country like Uganda at the current juncture of its development, RTD policy dialogue proceeds in very unconventional mechanisms that contrast with traditional ones. The environment for RTD dialogue is highly politicised, in the sense that political actors play a more effective leading role in driving the dialogue, rather than technocrats in the traditional systems. The participation of political actors also makes it truly a more open learning process, while the technocrats tend to close it up and even prevent learning. President Museveni has even stated that the science of innovation in Uganda is up to the political class, not the civil servants.

But the challenge of capacity in the various building blocks for an RTD policy dialogue still remains. Big gaps and/or weaknesses in the system will cause the dialogue to stop spreading like a fire that meets a wet log. The challenge in Uganda is to ensure that all the building blocks are stoked with good dry logs so that the fire of RTD policy dialogue can continue to blaze.

6. Recommendations for improving RTD policy dialogue in Uganda

Recommendation 1. Raise the political profile of RTD policy-making

All the respondents agreed that the National Council for Science and Technology has been ineffective in fostering RTD policy dialogue, partly because of its low political profile. Its positioning, very low in the powerful Ministry of Finance and Planning, is incongruous, as the Ministry appears not to view RTD as a priority. Many of the public events organised by the UNCST attract no ministers who can project and amplify their importance vis-à-vis the general public. No minister ever speaks on behalf of RTD either in parliament or in cabinet. No wonder Uganda's S&T policy has been languishing in a state of limbo. Many RTD organisations that are supposed to be coordinated by the UNCST ignore it with impunity. The Council's apparently non-transparent working methods are partly abetted by this low profile, that does not attract more political accountability and interest. Shine more light on the UNCST and an RTD policy dialogue will most likely blossom.

Even the President has lost marks in RTD promotion by having nobody to effectively follow up his many inspiring ideas on RTD. He throws them all the way down to the UNCST, gets distracted by other issues, and the Council has no obvious route to get back to him for decisions

on how these ideas should be implemented. There is a need for a minister to follow up ideas, fight for policies, and allocate budgets and resources to them so that RTD activities can be implemented in practice.

Proposals for improving the political championship of RTD have hinged around the creation of a Ministry of Science and Technology. Under one particular proposal, the Council would be incorporated with a number of similar departments at the Ministry of Trade and Industry under a Higher Education, Research, Science and Technology (HERST) ministry. The argument here is that Higher Education already controls over 60% of the country's RTD human resources, who work in academic institutions and also influence the whole S&T education and training system. This consolidation would bring about more interaction and less fragmentation of mandates between ministries over RTD issues.

The current minister of state for higher education is a senior scientist, yet young, dynamic and a natural champion of RTD. The only caveat one of the respondents raised is the danger of focussing on one individual instead of designing systems and robust structures. Tomorrow he could be transferred to another ministry, and RTD could again fall into the domain of a less interested politician. More RTD policy dialogue is needed on this.

Recommendation 2. Quickly establish a unifying body for all Uganda-based scientists

According to proposals made by respondents, this should be an independent NGO, preferably an academy that can mobilise the scientific community as a special interest group to articulate its needs, and project its aspirations and problems to society. It should develop enough prestige, credibility and acumen to advise government, the private sector and society in general on RTD matters.

Although efforts to create such a body started as long ago as 1984, it is clear that the scientific professional community has not yet been really ready for it during the past ten years. It has been too weak and survival-oriented, and not up to the role of the volunteerism that it is required to play. Nor has the obstructiveness of the UNCST helped. Now that we have reached the year 2000, however, the scientific community is ready. A critical mass of dedicated, non-hungry scientists has emerged as a task force to organise this body, which should be in place before the end of 2000. Even the UNCST has jumped on the bandwagon and given an initial micro-grant to fund the unifying body. EU donors have been encouraged to support this initiative, which will greatly improve the RTD policy dialogue.

Recommendation 3. Mobilise parliamentary and media support for RTD policy dialogue

There is a sizeable caucus of scientists, technologists and scholars in parliament ready to help develop an RTD policy dialogue. These need to be mobilised and lobbied to promote RTD. Techniques have to be developed for working with them. Experienced groups in the EU could work with the unifying body, once formed, to galvanise this group. The same applies to the media, which need more training and orientation to help promote an RTD policy dialogue. Opportunities abound in this area.

Recommendation 4. Mobilise the decentralised system for RTD dialogue

Basically, follow up the UNCST and MOES/IICD initiatives. The unifying body will be able to do this. The results will be highly instrumental in resolving the STET debacle.

Recommendation 5. Expand the UIRI into a real NIRDO as a matter of urgency
According to several respondents, this country cannot be industrialised without a NIRDO made up of at least 10 institutes to provide the expertise and services for underpinning the industrial sector in the same way as the NARO does for the agricultural sector. It is as simple as that and as complex as that. The challenge is clear.

Recommendation 6. Develop and utilise local capacity RTD backup services (science and technology services)
One respondent reported that he had designed a set of kits for teaching practical electronics at secondary schools and teacher training colleges. These were produced to a high standard of quality by the STEPU. He claimed that a USD 10m programme would be enough in order to introduce an electronic syllabus at most secondary schools in Uganda.

Even with the very basic kits used in a school electronics club, the potential for RTD policy dialogue is immense. Three schools in the Kampala region have already acquired such kits, and they are used to produce some of the most exciting material the pupils display on Parents' Day, hence helping to popularise science and encourage an RTD dialogue with the public.

I convinced the respondent to build and donate a kit for a rural school. Efforts will also be made to incorporate this electronics component into the MOES/IICD ICT initiative. Talks have already started on this.

This model of linking STS with STET is similar to the Gatsby Trust model, which links STS with industry. These efforts must be promoted and enhanced in order to generate better results. They represent a great opportunity for RTD policy dialogue and EU-ACP cooperation.

Recommendation 7: Introduce incentives for the private sector to support RTD
A number of respondents proposed that government or EU donors or business groups should encourage industry to participate in RTD by subsidising or making tax-exempt contributions to the growth and utilisation of RTD. Examples include sponsoring training courses for technicians and machine operators on the scientific principles underlying machines and instruments. Another interesting model involves the promotion of partnerships between RTD and industrial sectors. The example of the Uganda Beef Producers Association also makes challenging reading in this context.

7. Conclusion

The Ugandan RTD policy dialogue is not a completely open learning process yet. It has a high consultative element, but this consultation is not broad enough and is concentrated on a small number of people in a few cocooned empires. This makes it basically a token dialogue with no binding commitments. Indeed, in some cases, it is a monologue as various sectors have not been

brought into it. It is certainly a process, but the learning acquired through it is as yet limited, with a few exceptions and flashes of brilliance as well as a number of dramatic failures.

But the RTD policy dialogue in Uganda is definitely poised for take-off and increased effectiveness, mostly because the driving forces and megatrends are strong and inexorable. We shall definitely see an acceleration in the RTD policy dialogue in Uganda, and we shall definitely reap the benefits.

Just as I was writing up this report, four separate but interconnected events occurred in just one week. First of all, the embattled Fisheries Department called all stakeholders to a public meeting to help finalise the new policy (to counter the EU fish ban). Secondly, in a move usually associated with NGO or private sector marketing campaigns, the agricultural modernisation programme distributed a brochure through the main daily newspaper, the New Vision, which reaches 50,000 readers, asking for input from the public. Thirdly, the Private Sector Foundation launched its national hub for the 'SMART partnership, managing socio-economic development through institutionalised dialogue.' And, finally, a parliamentary committee challenged the Minister of Agriculture to explain why he should not resign for failing to immunise Ugandan agriculture from drought and rainfed agriculture, despite the availability of suitable irrigation technologies.

A future RTD policy dialogue observatory based in Uganda will therefore definitely have a lot to observe, much of which could be very useful for future EU-ACP cooperation on RTD. I shall be very happy to run such an observatory.

Appendix 1

Interviews

10-11 July 2000
Mr. Rutger Eugelhard, ECDPM briefing.

17 July 2000
1. Ms Anastasia Nakazzi (briefing by phone), Secretary General, National Commission for UNESCO.
2. Dr W.M. Ssali, Head, Food Science and Technology Research Institute (FOSRI), of the National Agricultural Research Organisation (NARO).
3. Prof. Wilson Byarugaba, Department of Pathology, Makerere University and Chairman, Uganda National Academy of Science and Technology (UNAST).

18 July 2000
4. Hon. Dr. Jack Nyeko Pen-Mogi, Member of Parliament, Kilak, Gulu District.

19 July 2000
5. Mr Moses Ssebunya, Public Relations Officer, Uganda National Bureau of Standards (UNBS).

20 July 2000
6. Ms Joyce Muwanga, Assistant Executive Secretary, Uganda National Council for Science and Technology (UNCST).
7. Dr Z.N. Nyira, Executive Secretary, UNCST.
8. Hon. Dr Johnson Nkuuhe MP, Isingiro South; Interim Chairman, Internet Society of Uganda (ISUGA).

21 July 2000
9. Mr Alessandro Villa, Rural Development and Socio-economic Attaché, European Union Delegation of the European Commission in Uganda.

22 July 2000
10. Eng. W. Balu-Tabaro, Mineral Dressing Engineer, Department of Geological Survey and Mines, G.O.U.

24 July 2000
11. Visit to UNESCO Commission Library.

25 July 2000
12. Mr Abel Kaahwa, Acting Executive Director, Uganda Industrial Research Institute (UIRI).
13. Dr Moses Musaazi, Lecturer, Electrical Engineering, Makerere University; Assistant Project Coordinator - Innovations, Uganda Gatsby Trust (UGT).

14. Dr F.F. Tusubira, Senior Lecturer, Faculty of Technology, MUK; member, Uganda Communication Commission; member, Electricity Regulatory Authority.
15. Dr Eve. Kasirye-Alemu, Executive Director, Uganda National Bureau of Standards (UNBS).

26 July 2000
16. Hon. Dr Abel J.J. Rwendeire, Minister of State for Higher Education.

27 July 2000
17. Bro. Fr. Anatoli Wasswa, Director, St. Luke Ganda Health Clinic (traditional healer).
18. Dr Peter Ngategyize (Public Lecture), Resource Person, Plan for Modernisation of Agriculture, Ministry of Finance and Economic Planning.

28 July 2000
19. Dr Tom Egwang, Director, MedBiotech Laboratories.

1 August 2000
20. Dr Mackay Okure, Lecturer, Mechanical Engineering, MUK; member, National Core Team, 'Vision 2025' National Long-term Perspective Studies Project.
21. Prof. B.T. Kiremire, Department of Chemistry, MUK; Hon. Secretary, Uganda National Innovation Trust (UNIT).
22. Dr Jesudas Mwanje, Professor of Physics, Institute of Teacher Education Kyambogo (ITEK); Director, Pioneers Instruments Ltd.

2 August 2000
23. Eng. Hillary Obonyo, Executive Director, Uganda Manufacturers Association (UMA).
24. Eng. Sarah Nalumansi (briefing), Director of Training, UMA.

4 August 2000
25. Prof. Eriab Lugujjo, Faculty of Technology, MUK; commissioner, Uganda National Commission for UNESCO.

8 August 2000
26. Ms Grace Akello, Gender Intern, UNDP

11 August 2000
27. Dr Charles Mugoya, Assistant Executive Secretary, UNCST.

Appendix 2

Relevant recent meetings attended

1. Deliberations on the establishment of the Uganda Chapter of the African Technology Policy Studies Network. 11 July 2000. Hotel Equatoria. ATPS National Steering Committee, UNCST.

2. Consultative workshop on the proposed establishment of a unifying body for Uganda-based scientists. 29 May 2000.

3. Uganda Society public lecture on the Plan for Modernisation of Agriculture (PMA) by Dr Peter Ngategyize, Ministry of Finance and Economic Planning. 27 July 2000.

4. First meeting of the task force on the establishment of a unifying body for Uganda-based scientists. 4 August 2000. UNCST . Elected secretary to the task force.

5. Uganda Institute of Professional Engineers (UIPE) public debate on the marginalisation of professionals in Uganda. 4 August 2000. UIPE.

6. Ministry of Education/IICD workshop on ICT in a learning society, Makerere College School, 2 August 2000.

7. Private Sector Foundation (PSF). Uganda launches the national hub for the SMART partnership dialogue. 8 August 2000.

Appendix 3

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