

Aide Memoire

REPUBLIC OF UGANDA Uganda Millennium Science Initiative Project Project Review Mission 16 – 28 June, 2011

I. INTRODUCTION

1. The Uganda Millennium Science Initiative (MSI) Project was approved for a credit of \$30 million equivalent on 25 May 2006 and became effective on 2 March 2007. A review of the Project was conducted from 16th-28th June 2011. The objective of the Mission was to review all aspects of the Project against performance indicators and activities specified in the Project Implementation Plan and Operations Manual to identify key issues that may need to be addressed or rectified. The mission also sought to identify lessons learned and make recommendations for the strengthening of the STI sector in Uganda building on project outputs. The Mission comprised Sukhdeep Brar (Senior Education Specialist and Team Leader), Elizabeth Mutesi (Procurement Specialist), Paul Kamuchwezi (Financial Management Specialist), and Dr Peter Tindemans, (Science and Technology Consultant). The Mission was supported by Agnes Kaye, Program Assistant. Ms. Apophia Atukunda will undertake an assessment of environmental safeguards with particular reference to proper disposal of waste from the research and industrial incubation projects. The report will be submitted to the Ministry of Finance, Planning and Economic Development (MoFPED), Uganda National Council Science and Technology (UNCST) and Uganda Industrial Research Institute (UIRI) upon its availability.

2. The mission held extensive discussions with officials from MoFPED, UNCST and UIRI. The Mission visited several grantees in Kampala and Kabale. A list of persons met is at Appendix 1. This aide memoire records the discussions and agreements reached during the review mission and were agreed upon in a wrap up meeting held on 27 June 2011 chaired by Ms. Jennifer Muwuliza, Commissioner, Aid Liaison, MoFPED.

II. PROJECT DEVELOPMENT OBJECTIVES

3. The MSI's overall development objective is for Ugandan Universities and research institutes to produce more and better qualified science and engineering graduates, and higher quality and more relevant research; and for firms to utilize these outputs to improve productivity for the sake of enhancing S&T led growth. The project supports these objectives through two components. Component 1 supports competitively awarded grants through three different windows, each serving a specific purpose. Window A funds research groups led by senior researchers or emerging investigators to conduct relevant, high quality scientific and technological research closely connected to graduate training; Window B funds the creation of undergraduate programs and rehabilitation and upgrading of existing degree programs in basic science and engineering; Window C supports grants for Technology platforms through which firms and researchers collaborate to conduct research for solving problems of direct interest to industry. Component 2 supports an outreach program, institutional strengthening for UNCST and UIRI, monitoring and evaluation, and policy studies. The Mission confirms that the project objective remains valid.

A. Implementation progress in terms of results on PDO Indicators

4. The Project had identified five Project Development Indicators (PDO Indicators) and three Intermediate Results. Surveys were to take place on a 2-yearly basis, starting in 2007 to get baseline data. A progress monitoring survey was conducted in 2009 and another survey will be conducted in September 2011. The PDO Indicators, together with a brief statement on the progress made are listed below:

- (i) *PDO Indicator 1: Size/number and productivity (measured by publications, patent applications, and number of students trained) of researchers and research groups doubles.*

Survey results indicate that PDO 1 of doubling of size/number and productivity of researchers and research groups was already achieved by 2009. The number of active researchers increased from 261 in 2007 to 655 in 2009, More researchers publish papers (all categories included), and though still a small percentage (around 7%) the number of them publishing in international peer reviewed journals shows a significant increase.

- (ii) *PDO Indicator 2: Pipeline of science, technology, and engineering undergraduates and postgraduates increases by 50% in key disciplines.*

The goal defined in PDO 2, namely to increase the number of undergraduates and postgraduates in science, technology and engineering, has proved to be a difficult one. The 2009 data show an increase of about 10% in absolute numbers, though relatively speaking there is hardly a rise in the percentage of students enrolled opting for Science, Technology and Engineering (STE). The mission was informed that quite a few Masters' thesis and at least one PhD thesis have been submitted. For the review mission in September 2011 UNCST will collect more precise data on this, as well as on the number of publications written and submitted

- (iii) *PDO Indicator 3: Firms active in technology development/evaluation employ more S&T talent and profitably use more technology.*

Data on On PDO 3 is not available but will be collected as part of the new surveys to be undertaken in September UNCST will consult with UIRI how to combine any data in the Industrial Resource Centre (IRC) with a new survey.

- (iv) *PDO Indicator 4: Survey of clients reveals that UNCST and UIRI provide effective services.*

Survey results indicate that knowledge about and client satisfaction with UNCST's and UIRI's services has been considerably enhanced. Satisfaction with response to stakeholder needs increased from 36% in 2007 to 78% in 2009 for UNCST and from 34% to 58% for UIRI for the same period.

- (v) *PDO Indicator 5: Positive impressions of careers in science and technology increase.*

Survey results for PDO 5 are more challenging: in 2009 the percentage of A-level students having a positive interest in or planning careers in S&T was at 65 % in 2009 against 86% in

2007. This is possibly due to the quality of science education at the secondary level impacted by the significant increases in enrolments at secondary level in recent years with schools facing an even larger shortage of qualified teachers, science laboratories, text books and other learning materials.

5. The project's intermediate outcome indicators are as follows:

Intermediate Results A: (i) MSI funding facility established, grantees selected through a transparent, merit based competition.

Intermediate Results B: (ii) Senior Research Teams (SRTs) and Research Teams (RTs) fully staffed, equipped and operational, undergraduate programs admitting students; Technology Program activities lead to transfer of specific technologies and to follow on research by firms and partners; and

Intermediate Results C: (iii) research results leading to planned publications; students progressing towards undergraduate and post graduate degrees; firms demonstrate greater technology use as a result of participation in the MSI; firms hire interns upon graduation.

A more detailed overview of the status as regards the PDOs and Intermediary Outcome indicators is at Annex 2.

III. OVERALL PROJECT IMPLEMENTATION, SUMMARY FINDINGS AND KEY RECOMMENDATIONS

6. The two lead agencies, UNCST and UIRI, are performing well. The process of submission, peer reviewing and selection for the award of competitive research grants has been deemed professional, transparent and thorough by independent International and Ugandan scientists. Some projects from Round 1 are completed; others will be completed on schedule. The projects from Round 1 and 2 are making good progress. There is an issue of financing Round 3 grantees. Reallocation of funds from project savings approved in January 2011 will support some of the grantees and it is possible some additional savings may accrue. However UNCST, in consultation with MoFPED, needs to address the issue of the shortfall for funding Round 3 grantees. It also needs to estimate the time required by the Round 3 grantees supported by the project to complete their research in order to expeditiously request a no-cost extension of the Project's closing date. UIRI has significantly enhanced its infrastructure, scope, activities and visibility among industry. Considerable and increasing additional Government of Uganda (GoU) funds demonstrate the confidence in and potential of UIRI. The National Science Week, the key part of the Outreach part of Component 2, is going to be held for the fifth time in September 2011, as well as the School visits are a resounding success and will need to be continued.

7. Monitoring and Evaluation is being performed on a routine basis through quarterly field visits, annual progress reviews and periodic PDO indicator reviews against the 2007 baseline. UNCST is also undertaking policy studies on a regular basis.

8. Procurement for Round 1 is at almost complete, for Round 2, is at 47% completion with the category of goods trailing somewhat at 70%. This is expected to improve when the equipment and consumables held up at Entebbe airport due to tax issues are released and delivered. Procurement for Round 3 is held up pending resolution of financial problems as

indicated above. Procurement for UNCST is stands at approximately 95%, and for UIRI at almost 100%.

9. MSI is due to close in December 201. The mission has examined the sustainability issues that need to be addressed if the achievements and progress made under the project are not to be lost. These issues are discussed in detail in the relevant sections of this aide memoire. The mission's key recommendations are summarised below:

- The Project is officially due to close on 31 December 2011. However, due to a variety of factors that are discussed in the aide memoire, it is clear that the project activities will not be completed within this time frame. The Government of Uganda needs to urgently send in a request for a no-cost project extension to enable adequate time for project activities to be completed.
- No procurement will be undertaken which cannot be completed by 31 December 2011 until the project extension is approved by the Bank. Unless an extension of the project is approved, the financing liability for any incomplete project activities will devolve to the Government of Uganda.
- UNCST needs to precisely establish, by the 1st of August 2011, the financing for Rounds 1 and 2 grantees in order to identify savings, if any, and resolve the financial gap threatening the progress of Round 3 of the competitive grants
- MSI has demonstrated the complementary value of competitive funding for high quality research, some of which already shows commercial potential. To sustain the system of supporting competitive merit based research, its financing should be ensured within the overall funding structure that also includes funding for research in public universities and research institutes.
- The institutional capacity created under MSI of UNCST and UIRI must be fully utilized and further strengthened to enable: (i) UNCST to undertake competitive program and work with other stakeholders for effective coordination of STI policies in Uganda; and (ii) UIRI to play a pivotal role in industrial development and practical training of technicians and their teachers.
- GoU should consider consolidating and capturing consolidated expenditure of the GoU on STI research (for core funding to institutions, for different categories of centrally funded research programs; and all other adhoc investments) in the national budget to indicate the total funding being allocated to research
- In order to strengthen the management of UNCST the GoU needs to urgently appoint the Council and Executive Committee of UNCST.
- The School Visit Programme and the National Science Week play a key role in raising awareness of STI and need to be continued. UNCST has the capacity to continue these but needs committed financial support by the GoU while strengthening the partnerships with other stakeholders to jointly implement the National Science Week (NSW) and exploring private sector financial contributions.
- MoFPED and UNCST, in agreement with the Uganda Revenue Authority (URA), need to urgently clarify and establish procedures for implementing the tax exempt status of procurement of equipment and consumables for scientific purposes. It is unacceptable that research equipment and consumables are sitting at Entebbe airport for half a year due to unresolved tax issues despite a tax exemption status of UNCST.

IV. MISSION FINDINGS

A. Component 1: Provides competitively awarded grants through three different windows, each dedicated to a specific purpose.

10. The UNCST visits the research teams on a regular basis and obtains regular progress reports. The Mission visited seven grantees funded under Windows A, B and C. The assessment of progress given below is based on data on progress, disbursement and procurement obtained from the UNCST as well as information obtained during the Mission's visits to the grantees.

(i) Windows A and B

Round 1 and 2 of competitive grants.

11. Results from the quarterly field visits and annual progress reviews indicate that, under this component, over 500 scientists have been trained in research grant proposal writing skills; and grants have been competitively awarded to multi-disciplinary research teams working in universities, research institutes and industrial establishments across the country. The Window A projects have produced promising and potentially commercial results such as livestock feeds, and new sorghum and banana varieties that require incubation for industrial production. A list of projects with commercialization potential is at Annex 3. The Window B projects have provided training to over 3660¹ scientists and engineers, at least 102 of whom are being trained at Masters and PhD levels.

12. Reviews also indicate that for several projects of Round 1, and Round 2 the intended scientific goals are being reached. A number of publications have been written, though both the experience and the culture to publish to international standards in international journals is not yet widespread. This is an area that UNCST may consider supporting by inviting a few internationally well-known Ugandan scientists to share their experience and provide assistance, maybe in the form of a short course, to aspiring Ugandan researchers.

13. Through Window B new and strategic undergraduate courses have been created, for example in bio systems engineering and in textile technology that are expected to make a significant contribution to the Ugandan economy. The working conditions and experimental facilities for students and teaching staff have also been considerably improved. Given that the project completion date is drawing near, and the significant delays that occurred in many projects because of late arrival of equipment and consumables or late refurbishment of buildings, the Principal Investigators (PIs) need to make sure that students can complete their studies, including the writing of the theses and publications. This may involve extending the completion date beyond the original project schedule and some additional stipend support. The Project targets for the number of students benefitting under the Masters and PhD programs is on track.

¹ Includes students under Best Research Practice training; students enrolled in new STE programs, and students trained under Window A, B and C funding portfolios of the MSI

Round 3 of competitive grants

14. There is a major issue related to Round 3 grantees that impacts both the financing as well as a necessary extension of project duration in order for the research activities under this round to be completed. During the review mission in September 2008, it was agreed that a third round of proposals for research grants would be invited to be financed through supplemental financing that MoFPED would request from the Bank. It was also anticipated that financing for the third round could also be partially available from savings within the project budget. Under this premise, in January 2009, a call for proposals for Round 3 was made. The call elicited a response from the scientific community that showed an improvement both in numbers and quality over the previous two rounds and the technical committee recommended 11 proposals for financing out of 137 received. However, the issue of financing remained unresolved despite it being raised during the review missions in September 2009 and 2010. In September 2010, MoFPED requested the Bank for reallocation of funds among categories based on savings accruing within the project. Within a total reallocation of XDR 2,673,083, research grants received an amount of XDR 2,058,274. This amount however, is not adequate to finance fully all the selected grantee projects under Round 3. It is also learnt that UNCST has signed contracts with all Round 3 grantees selected.

15. The Mission held very detailed discussion on possible resolution of this financing dilemma. It was agreed that UNCST will:

- Immediately undertake an exercise to determine the available excess funding with Round 1 and 2 grantees. It was also emphasized that the grantees must be made aware that any excess funds after completion of research need to revert to the project. While some grantees have submitted requests for additional funds for completion of approved activities, it is expected that savings will accrue from a large number of the research projects.
- Immediately make an assessment of pending equipment procurement of Rounds 1 and 2 to determine whether it is necessary to initiate procurement when the teams have already moved far ahead in their research through alternative sources.
- Consult with Round 3 grantees to assess realistic needs for proposed equipment and identify existing alternative sources.
- Consult with Round 3 grantees to examine their budgets to rationalize costs, particularly in areas where Rounds 1 and 2 have shown the possibility for savings.
- Identify savings from within institutional budgets under the MSI.

16. Based on the above, a clearer picture will emerge of funds available and the number of Round 3 grantees that the project can finance. UNCST will develop transparent and defensible criteria to carry out prioritization of research teams to be funded. Any financing gaps, based on commitments already made by UNCST will need to be funded by GoU and the Project bears no liability for it. This will be accomplished by 31 July 2011 and a final decision taken in consultation with the World Bank team.

Procurement Issues

17. Procurement for Round 1 and Round 2 projects is almost complete. However, given the delays experienced in procurement, broad lessons can be drawn, and problem areas identified where improvement is both necessary and possible:

- There are large gaps in the capacity of the institutions to undertake procurement. For example, the NARO institutes have carried out procurement very efficiently but, and surprisingly, Makerere University has experienced difficulties. UNCST has had to step in on several occasions to help struggling institutions.
- The possibility of greater decentralization needs to be explored. This may require strengthening capacity at the institutional level.
- Additionally, although consolidated procurement has clear advantages in providing lower prices, it can also result in serious delays because the weakest link determines the pace.
- For research projects with considerable procurement needs, start of research activities should trail the planning of procurement by 3-6 months to ensure timely availability of equipment and materials.
- In case of any future calls for proposals, grantees should be required to identify the equipment they will need at the time of proposal submission so that procurement might start immediately after grant winners are announced

18. Several grantees have expressed concerns about currency devaluation and its impact on their budgets which were denominated in local currency. UNCST should consider whether for specific projects some compensation is possible so that genuine dislocations of project budgets do not have a negative impact on project outcomes. A key lesson learned, which was also recorded in the Aide-Mémoire of September 2009, is that there is a need for more stringent scrutiny of proposed budgets, including the requirement for equipment. By September 2009, the Round 3 selection was completed, and since no further Rounds have followed, this conclusion could not be put to practice. However, in any future program for competitive research grants, or for that matter for any funding of STI projects, more detailed information on equipment needed or works to be carried out should be provided by proponents at the time of submission of proposals, including a realistic estimate of the costs. Scrutiny of these figures by the International Technical Committee would provide a reasonable guarantee for these data to be correct.

Actions

- All outstanding procurements financed under the project Rounds 1 and 2, and UNCST and UIRI needs to be completed before the Project's closing date.
- For Round 3, UNCST will undertake the action as indicated in Para 15 in order to inform decision making in consultation with the Bank team.

(ii) Window C

19. Most Window C projects have either been already completed or will be completed by the end of 2011. Though the outcomes are promising, as noted by previous missions, improvements in the design are needed, particularly to create higher and more balanced incentives for participants from industry and universities and/or institutes. Due to budgetary as well as constraints, no new projects can be undertaken. The Mission's focus, therefore, has focused on lessons learned that may guide any future funding for competitively based research grants.

Lessons learned- Component 1

- The focus of research should shift towards areas of national priority where research is critically needed but is under or unfunded.

- Improved planning for execution of research grant funds – e.g. research to start later than procurement, greater scrutiny of research budgets, early identification of equipment and works.
- Promote collaboration between teams of different institutions, including, wherever possible, international partners
- Reassess the size of grants to be supported – focus should be more on relevance of research than the size of grant.
- UNCST should continue to supervise the projects under the various Windows, and report any emerging institutional issues for action to the concerned institutions.
- For Window B projects the beneficiary institutions need to strengthen their internal supervision of these projects and incorporate these into their broad strategies for institutional strengthening.
- In future, proposals for Technology Platforms type activities should also be competitive. Strategies must be devised to significantly increase the number of applicants.
- More financial scrutiny of project budgets both before approval and during implementation; UNCST should improve its mechanisms of budgetary control.
- All relevant tax issues must be discussed and resolved during the design stage of any future project or undertaking of any research program that involves procurement. All options, within institutional and government guidelines, must be explored for increasing flexibility, improving efficiency and reducing time lags in procurement. Necessary training may be provided for minimizing capacity related delays. The grantees should be required to provide equipment needs at the time of proposal submission.
- Companies and educational institutions should improve their processes keeping in mind the following: curricula must reflect industry needs; assigning students to specific individuals in companies and assisting these employees to mentor students; and identifying student projects relevant for the company before the start of a Technology Platform.
- In calls for proposals, the relevance of Technology Platforms for product development in particular areas such as energy, or products based on natural materials should be stressed. In addition, entrepreneurship training should be explicitly part of the proposals.
- Grant agreements for Technology Platform need to comprise arrangements (MoUs) between companies and universities and/or research institutes about intellectual property rights and sharing of any revenues/income deriving there from. .
- To create a structural basis for Window C-like projects, UIRI should more actively engage with industry organisations such as the Uganda Manufacturers Association, and those representing the service sector and public utilities. This would also serve as a learning process for industry. The internship programme needs to be re-designed so as to better accommodate constraints of students as to duration, ensure training of company staff to guide students, and working more closely with faculty at concerned institutions. Marketing needs to better address the ‘end-users’, i.e. students, as well as university departments.

B. Component 2: Support an Outreach program, plus institutional strengthening, M&E, and policy studies.

21. **Outreach Program:** The overall aim of the Outreach program is to raise public awareness and appreciation at all levels for STI and its role in national development. The programme has three components: (i) school visits by science role models (SVP), (ii) the

national science week (NSW) and (iii) policy studies. In addition, UNCST is trying to step up its role in communicating science, technology and innovation more widely through a communications campaign.

(i) School visits

22. The program of school visits has become a highly appreciated element in UNCST's efforts to reach out to secondary schools and thus give prospective students a glimpse into studying and/or a career in science. The programme was originally linked to the NSW but is now ongoing throughout the year. UNCST has developed a good methodology that includes a stakeholder workshop for education practitioners, and target schools and role models so as to align expectations and increase effectiveness. Sixty secondary schools (both public and private) will have been visited by the end of June 2011 across the country, in both urban as well as in rural areas. Twenty thousand students, parents and teachers will have participated, with involvement of over 40 role models representing a diverse background (universities, private companies, parliament, UNESCO, the Ministry of Education and Sports (MOES), SchoolNet, etc.). With more targeted publicity, the number of participating schools can be increased substantially. UNCST has gained valuable insights and experience from implementing the program. For example, it is observed that for girls and students from rural areas the idea of getting involved in science is exciting and new but the lack of guidance in schools about careers in general and science in particular inhibits the pursuit of science education. There is also little knowledge of the relevance of S&T in daily lives and of the simple things that can be done at home and in schools, such as recycling of waste or energy conservation. The disparities in teaching resources such as labs, teachers, equipment or books among schools are huge and the lack of enthusiasm of teachers is reported to be a major stumbling block.

Actions

- UNCST will seek funding to continue the School Visits program beyond the MSI project. It would be appropriate for UNCST to explore the possibility of contributory funding for this program through the MOES
- UNCST should share its observations and recommendations with MOES as these may inform policy interventions for improvements in the quality of science education at the school level.

(ii) National Science Week (NSW)

23. The NSW has been an annual feature for the last four years with the scope enlarged and deepened in each successive year. It has now come to encompass a variety of elements:

- The National Researchers' Conferences,
- Recognition of valuable research and scientific activity (MSI awardees, winners of secondary school science quizzes, Presidential Science Awards, Best Papers at Annual Scientific Conference, Best Exhibitors at National STI Exhibitions),
- Providing a platform to eminent policy makers, national and regional scientists, educational institutions, and the private sector for Policy Dialogues on STI related topics,
- Organizing Science contests; Science Clubs, Science Cafés; and STI Exhibitions,
- Public Communication Campaigns through TV, Radio, and the press.

24. The NSW events are attracting increasing attention from scientific institutions and scientists, local governments, schools, museums² and politicians. Several key stakeholders have cooperated with UNCST to plan and implement the NSW.

25. UNCST has carried out an internal evaluation of the NSW which suggests that there are areas for continuing improvements. For example, (i) the National Researcher's conference might be expanded into an event that provides a meeting place for researchers from several disciplines (currently it focuses on only one) using satellite technologies if feasible to hold events following a high-profile plenary session (ii) the Policy Dialogue would benefit from more focused themes and concentration in time; and (iii) a science policy inspired dialogue which might be valuable for both scientists, heads of scientific institutions, policy makers and politicians, private sector representatives and the media.

Actions

- UNCST will seek more formal partnerships with the organisations that are already cooperating in planning and implementing the NSW to share the human resources efforts required to organise the NSW. Private sector financial contributions should also be explored.
- In order to provide for a stronger regional base for the school contests (such as debates and quizzes) , ensuing in a national contest of regional winners, UNCST will attempt, together with MOES, to create a network of science teachers throughout Uganda who could then be responsible for organising the regional contests with UNCST's support and guidance. .
- The School Visits programme and the Science Communications Campaign will be formally developed into continuous activities, and no longer linked to the NSW only.

(iii) Policy Studies

26. The World Bank had supported a two day policy workshop in December 2010 to enable UNCST to develop a framework which could guide in developing a detailed implementation plan for the STI study. The study *Science Technology and Innovation in Uganda* was also disseminated at the workshop. Since then, UNCST has conducted policy studies as part of process for developing a plan for implementing the national STI policy (2009) with the objective of identifying benchmarks and best practices in implementing national STI policies. These studies have examined the National STI structures, financing and coordination systems of India, Malaysia and Finland with a view to adapting and customizing their systems or informing the development of Uganda's STI system. These complement the policy dialogues and consultative exercises that UNCST has engaged in with subject matter specialists in the various thematic areas that the national STI plan will address. Policy studies were also conducted on the relevance of the technology achievement index (TAI) in measuring technological achievement in developing countries, rethinking public perceptions of brain drain/brain gain in the context of increased financial remittances by Ugandan Diaspora, and the extent and areas of increased participation of women in science and technology.

² the Uganda Museum has offered their facilities every year since 2009

Lessons learned: Outreach programs

- Outreach, including quality publicity material and website, needs to become a permanent and ongoing feature.

(iv) Strengthening of UNCST

27. The restructuring and strengthening of UNCST focused on strengthening the implementation capacity for MSI; reorganizing the structure and management; adopting strengthened internal mechanisms; upgrading skill levels and administrative procedures; and providing for a modern, efficient working environment. It is also sought to strengthen the Council capacity for engaging with sectoral stakeholders in joint activities as a practical form of coordination; publishing annual accounts of budgets; and building human capital.

28. UNCST has made considerable progress towards strengthening its capability to implement a program such as MSI in addition to its other responsibilities such as its role in formulating national policies for STI, research registration, bio safety etc. It needs, however, to be acknowledged that overall capacity is stretched. The use of interns was crucial to deliver MSI as UNCST's staff strength is fixed by the GoU. A larger role as envisaged in UNCST's statutes and more particularly in the implementation of the National STI Policy approved by the GoU in 2009, will require a reassessment of its complement of staff. Work pressures are enhanced for the small staff complement due to leave and other professional obligations etc.

29. The **infrastructure (housing, ICT including videoconferencing, furnishing)** has been completely renewed, thanks to MSI and additional support from the GoU. The new office complex at Ntinda now houses all staff and provides a modern, functional and efficient work environment for UNCST's personnel. **Human resources capabilities** too have been considerably improved in all relevant areas through extensive training and in-house practice. However, some problems persist, largely related to weak ICT infrastructure. UNCST's website has recently suffered significant problems. It has been down for several weeks and was expected to be operational by 25 June, but it deserves proper attention from the responsible staff as well as senior management to prevent similar problems from recurring. The e-mail system too seems to suffer from problems. The **capacity for grants management**, from supporting the selection process through international peer review to maintaining the contacts with a substantial number of grantees (from 7 to 42), has developed to a significant degree. The statements of the International Technical Committee endorse this.

30. The **procurement** team has been able to cope with the full range of procurement categories (from works to goods to services) including both volumes and diversity of items. The speed of putting together procurement plans has improved substantially. Audits, both by the World Bank and the GoU have attested to this, though some procedural aspects need further improvement. Areas for further attention include maximising the flexibility in order to reduce delays in procurement, and streamlining procedural agreements with MOFPED and URA with regard to tax exemptions for scientific equipment and consumables arriving in the country. The June 2011 communication of MOFPED confirming the general tax exemption status of scientific equipment and consumables acquired by UNCST is helpful, but further simplification of arrangements regarding allocation of budget to offset tax payments and the transfer of these budgets to the revenue authorities is needed to avoid delays currently occurring. Currently equipment and consumables have been held up at Entebbe airport for half a year. This situation is untenable as it costs money for storage, delays the research,

equipment may need repairs because of inadequate storage conditions, and chemicals may be rendered useless for the same reason.

31. The reviews of the World Bank's Financial Management team indicate that the quality of the **financial administration and accounting** is far improved. The accounting system in use is based on an advanced version of previously used Navision software, and delivers full accounts of the previous year on the first day of a new fiscal year. Disbursement from UNCST to beneficiaries is smooth. Any existing problems in this area are due largely to absorption problems at the recipient end. An independent audit undertaken by the Bank points to some areas of weakness that need further strengthening.

32. All necessary **procedural manuals**, whether dictated by national requirements such as in the financial and auditing area or by UNCST's own needs as in the operational area, are in place and staff is trained to work in accordance to their prescriptions.

33. A **schedule of annual plans and budgets** (for UNCST as a whole, and for MSI in particular) is maintained according to internal rules, with units providing inputs to management for approval and consolidation.. Stable and predictable budgetary allocations from MSI have made it possible for the UNCST to have a structured annual work program. As the project winds down, a predictable and stable budgetary allocation from GoU, will be necessary to ensure sustainable continuation of UNCST's ability to deliver on its mandate as well as build upon the activities successfully launched under MSI.

34. The restructuring of UNCST prior to the implementation of MSI has resulted in an **organisational structure** that has proved effective over the past years in providing for adequate enabling conditions to implement MSI and support UNCST in working together with other key stakeholders in Uganda's STI system. UNCST's role and the national agency for coordinating STI efforts and leading policy dialogue will become increasingly important as the National STI Policy is implemented, and may require a further review and strengthening of its organisational structure. The current on-going Public Service review is examining the options in this regard: should UNCST remain as is; should it become an "Authority"; or should it develop into a ministry for S&T. Whatever the outcome of the above review, there are two issues that need immediate attention:

- **Active leadership of senior management** is crucial to motivate staff, and supporting UNCST on its mandate of providing clear direction on important policy and implementation issues, building relations with other STI organisations and ministries concerned, and fostering international partnerships. The Mission has noted the lack of progress in nominating members to the formal Council and the Executive Committee of UNCST. The Aide-Memoire of the review mission of September 2010 had highlighted this issue and was assured that this would receive attention. The mission reemphasises this and urges MoFPED to urgently address this issue. This is essential to enhance management accountability in UNCST, and to strengthen its role as Government's premier agency for STI.
- **International cooperation with countries such as South Africa.** UNCST signed a Memorandum of Understanding with the Republic of South Africa in 2009 for cooperation in the field of STI. This MoU has potential to be an effective instrument to strengthen the STI agenda in Uganda. UNCST should propose an agenda for cooperation under the MoU without further loss of time. Concrete proposals should be made to South

Africa, which may include areas such as: (i) assistance in building up capabilities in IPR; (ii) faculty exchange in subject areas of priority, (iii) strengthening capabilities in the oil and mining sector, and (iv) the transportation business. It may also explore a program for joint calls for proposals for research projects.

Actions

- UNCST and MOFPED (in consultation/agreement with the URA) reach an agreement, at the earliest opportunity, on efficient procedures to deal with issues of tax exemption and clearance at entry points into Uganda to ensure speedy clearance of items procured..
- MOFPED and UNCST will simplify and expedite the process for opening letters of credit for bulk equipment procured using International Competitive Bidding.
- MOFPED will urgently address the appointment of non-ex officio members of the Council, as well as its Chairperson.
- UNCST will prepare concrete proposals for scientific and technological cooperation with South Africa within the principles of the existing MoU between the two countries.

(v) Strengthening of UIRI

35. The MSI has supported UIRI for; (i) establishing the Industry Resource Centre; (ii) strengthening the Technology Development Centre, refurbishing the pilot facilities and laboratories; (iii) improving the general purpose infrastructure (including the ICT infrastructure); (iv) strengthening business incubation and business development, and embarking on an ambitious programme of staff development. In addition UIRI was responsible for promotion of the MSI project's component Window C (technology platforms and internships) among companies and the academic community. Of the total amount of US\$ 5 m set aside for UIRI \$US 4.6 m was for investments, and about \$ US 0.4 m was for recurrent costs to be spread over the duration of the MSI project.

36. The Mission Team was given an extensive update on UIRI's accomplishments both as a result of the MSI investments as well as considerable government support triggered in no small measure by its accomplishments under the MSI. The mission is highly satisfied with UIRI's achievements. All funds except a very small fraction (approximately 5%, most of which is held up because of lack of compliant bids for procurement) have been disbursed and the works, goods and services procured have all been executed. Management of UIRI has had to prioritise the remodelling of buildings because of increases in construction costs. As a consequence some laboratories and pilot plants still lack refurbishing. ICT connectivity supported under MSI (both on the local premises and to the Internet) is considered a major asset. All equipment has been installed and is operational; the mechanical engineering department is carrying out an extensive programme of calibration and expects to be fully operational by September 2011. Despite a financing shortfall for a full CAD/CAM facility, UIRI plans to offer more basic CAD/CAM services. All the new units within UIRI that were planned are now operational including the Industry Resource Centre (IRC) which provides a variety of data on industry in Uganda for all interested parties. One problem the IRC encounters is that Ugandan companies are hesitant to share detailed information about machinery they are using and other technological investments because of concerns of leakage of information to competitors, and fears that data might be leaked to the tax authorities.

37. The Technology Development Centre has a considerable number of value addition projects at hand (bamboo, ceramics, food processing, carpentry products, and natural soap production). Other product development that has taken off includes: cosmetics, food-grade

enzymes, electronic and renewable energy systems products. The vaccine plant is operational with arrange of vaccines to be produced for the Ugandan market. The Microbiology Lab (including modern biotechnology facilities) and the chemistry lab are providing services to prestigious customers such as Air Uganda and the Ministry of Health. UIRI realises that it is now at an important juncture where it has to generate much more income from the services it offers. Such income has already risen but at US\$ 20m is still at a low level, which is partly due to choosing to offer some incubation services for free in order to stimulate potential businesses as much as possible. UIRI has made a formal proposal to the Department of Tourism and Industry to commercialise part of its services to a much larger degree, and is exploring possibility of help of Danish experts for this.

38. A key development in FY2010/2011 has been the conclusion of more partnerships with Ugandan universities and international bodies such as Council for Scientific and Industrial Research (CSIR) of South Africa. Another key development is the considerable increase in incubator services. The Business Development Centre and the pilot plants are playing a crucial in this. UIRI now assists some 30 incubatees, of which 10 are in-house. They are working mostly in the pilot processing plants where they are being trained in using expensive equipment for which bank loans would not be available to them because banks need to be convinced of the technical and commercial capabilities of would-be entrepreneurs and their employees. One incubatee works in the electrical and electronics lab on product development to set up a business in science equipment for schools. Others are being trained on how to use ICT for supporting a variety of business processes. The considerable range of equipment and machinery in UIRI enables it to provide practically-oriented training which is otherwise difficult to obtain. As there were no further calls for project proposals, the promotion of Window C activities (Technology Platforms and internships) could not be continued. However, UIRI is convinced of the great value of these activities to bridge the gap between companies and the still relatively theoretical approaches being pursued in universities and educational institutions UIRI's staff has increased from 40 in 2006 to approximately 200 at present.

39. As to the wider context, several constraints would need to be tackled to promote Ugandan industry, in particular the manufacturing industry. These include: (i) lack of instruments currently available to GoU to support SMEs, to carry out innovative R&D, or to commercialise innovations e.g. through support for scaling up; (ii) lack of adequate high quality industrial supplies in Uganda. Setting up a facility, which might originate in UIRI but needs to be an independent commercial business, for producing dedicated tools is a possible solution worth exploring. These facilities are vital for creating a culture of high-quality manufacturing in Uganda and could have a considerable regional impact; (iii) addressing the issue of quality education and skills mix. At this stage of development of Uganda, while supporting more MSc and PhD graduates and entrepreneurial skills in general, it is important to train different levels of technicians, as well as improve the quality of instructors for these technicians in an environment where advanced equipment is available for hands-on training. UIRI, which now boasts several of these facilities, can play a key role in supporting other technical institutes to significantly increase the number of technicians and trainers of technicians which would be a major boon to Ugandan industrial development.

40. The client satisfaction survey on UIRI performed as part of PDO4 underlines the greater visibility of and satisfaction with the services of UIRI.

Actions

- UIRI still has some funds remaining under MSI. UIRI will prioritise its outstanding procurement items, and a revised Procurement plan will be submitted to the UNCST by 8 July 2011 for onward submission to the WB to expedite procurement.
- UIRI should continue to monitor the evolution of the technological status of Ugandan industry, despite the reluctance of some Ugandan companies to share detailed information.
- UIRI is uniquely positioned with modern equipment that could be used to strengthen trainer competencies through hands-on training for the delivery of improved vocational and technical education. UIRI should engage in dialogue with MOES to identify the role it can play within the framework of the draft national BTVET strategy.

Lessons learned: Institutional Strengthening

- Effective leadership of the institutions is crucial. Responsibilities for decision making and review of overall implementation of programs within the implementing agency need to be clearly defined and exercised to avoid implementation ambiguities (e.g. the handling of financing Round 3 grantees beyond available project funds).
- Roles and responsibilities between UNCST and UIRI should have been clearly defined from the outset.
- Although procurement has been generally satisfactory, specific issues related to procurement highlighted in other sections of this aide memoire apply.

V. ISSUES TO DO WITH STI POLICY AND SUSTAINABILITY

41. Although MSI was developed as project with a finite time frame but in intent, it laid the foundations for supporting STI, specifically research which it was expected would be continued either through a follow up project or with budget support from the Government. The project intended to lay a strong foundation for continued development of STI through:

- Established mechanisms for a competitive and transparent funding mechanism for research grants;
- Piloting two methods of promoting cooperation between industry and public research and education institutions as a pointer towards more expanded ways of doing so;
- Strengthening key institutions to enable them to play a lead role in the conceptualization and implementation of STI policies, and for creating a base for technology development, innovation support and business development for the private sector;
- Illustrating, through the National Science Week and the School Visits Programme, the importance and the feasibility of reaching out to schools, the public at large, the media, and other key stakeholders to convince them of the central place of science, technology, education and innovation for development.

42. In general, support for STI requires a variety of distinct but complementary funding mechanisms, which fall into four broad categories:

- Core funding to institutions, to be distinguished in funding for research for public universities and funding for research institutes (such as UIRI) or organisations (such as NARO or the NHRO);

- Competitive funding to individual PIs and their teams, and/or for collaborative teams from different institutions;
- Programme funding that typically involves cooperation between teams of different institutions; and strong involvement of sector agencies in defining priorities. These programs may, but need not necessarily, be funded through a competitive mechanism, though in the absence of competition strong vetting is needed to guarantee quality;
- A variety of support mechanisms to industry with the aim of promoting innovation, which could range from tax deductions for R&D personnel or technology acquisitions, direct support for innovative development projects and for first-stage commercialisation efforts, support for business incubation/development, technology parks, etc. UIRI has the capacity to function as the executive agency for this, with Chinese walls to avoid conflict of interest with its R&D, demonstration and direct company support functions.

43. Currently a number of important funding initiatives exist in support of STI in Uganda. These include: Presidential Science Initiatives, MSI, Technology Acquisition Fund as part of the World Bank supported Second Private Sector Programme, funding for NARO and other sectoral research institutions including UIRI. Financing for these initiatives is often temporary, and lacking a strategic context, institutional embedding, and synergies and coordination. Therefore, for long term and sustained STI led economic growth and human development it is important that, in addition to the above, the diverse set of instruments, with predictable financing are employed to support STI: (i) Core funding to universities and organizations such as NARO, (ii) merit-based competitive funding to specialised teams for cutting edge research. The recognition of STI as a sector in the National Development Plan and the approval by the GoU of the National Policy for STI in 2009 provide sound foundation for building up and employing these diverse instruments to support STI. Useful innovation can emerge from competitively funded projects in universities, research institutes or in combination with industry. A few projects supported by the MSI already demonstrate commercial potential.

44. GoU, UNCST, UIRI and other research organisations should agree on the further steps for diversifying and institutionalizing STI funding as part of the National Plan for the Implementation of the National Policy that is currently being developed by the UNCST in accordance with its mandate. A Road Map was agreed at a conference in December 2010 which was organised with the support of the World Bank. Key elements of this drafting exercise are a dialogue with all sector stakeholders for the identification of priorities, a study of a few foreign STI systems to identify most feasible options for Uganda, and regional consultation to capture the opportunities provided by diversity in the country's various regions. UNCST expects to complete the plan by November in order for it to inform budget preparation for FY 2012/2013.

45. The Mission recommends that a key element of the National Plan should be an open dialogue with sectoral and regional stakeholders (such as NARO/Min of Agriculture, UNHRO/Ministry of Health, UIRI/Min of Industry, UNCHE/Min of Education, Min. of Energy Min. of ICT, Environment, Water Resources, the oil sector etc) to come up with a *joint medium- and long-term and budgeted plan* for dedicated research programs, infrastructure investments to facilitate research, instruments to support industry, and competitive and core funding instruments for basic and strategic research.

46. While this implies an informal coordinating role for UNCST, more formal institutional mechanisms for coordination need to be developed. Independent of the outcome

of the Public Service Review as to the position of the UNCST, the increasing role of STI in development in Uganda necessitates the need for a strong and effective agency to lead and coordinate STI development. UNCST is mandated to play the lead role in STI role and should be supported for continued growth to take on the emerging responsibilities. To enable UNCST to play the lead role in STI development in Uganda, strengthening its governance system takes on added urgency. The essential prerequisite is a distinction between the executive responsibility (in UNCST's case this is the Executive Secretary) which includes preparing a strategy and bearing full responsibility for executing strategy through annual plans and budgets on the one hand, and supervisory responsibilities vested in a non-executive supervisory body (in UNCST's case the Council) whose members also operate in the sole and exclusive interest of the organization concerned, and to which the Executive Secretary reports to obtain approval on major decisions, such as approving a multi-annual strategy, the annual budget and accounts and key investments. This provides for the right balance, supervision of, and guidance to top management as well as for corrective mechanisms.

47. The recognition of STI as a sector in the NDP needs to be underpinned by an annual STI budget which captures all Government expenditure for STI. In particular it should include (a) all core government funding to universities and sectoral research institutes/organizations; (b) all centrally allocated funds, whether competitive or not, that serve strategic multi-sector, and multi-disciplinary science base, and (c) all ad-hoc funds such as the Innovation Fund and the Presidential Science Initiatives etc. Such a budget will enhance visibility of STI and will underscore the commitment of the GoU to STI.

VI. PROCUREMENT

48.. The mission reviewed overall progress for each of the components as presented in the summary below:

Description (Grantees)	Number of Grantees	Number of Grantees whose procurement has been concluded	No. of outstanding contracts
Round 1	12	11	Sorghum & Maize project (Makerere University) – 3 outstanding contracts, i.e., supply of; Textile Analyzer, Bioreactor & Ice corn making machine
Round 2	15	5 plus 2 who did not have any procurement	4 contracts for supply of laboratory equipment, reagents, textbooks and software have not yet been completed.
Round 3	12	None. 3 contracts for laboratory renovations in Gulu University, chemicals and reagents for KARL and ESMP plan for Mbarara University have been completed.	4 contracts for chemicals and reagents are under process by NASARRI, NARO, Gulu and Makerere universities. Contract for Laboratory equipment using ICB for all the institutions has not commenced

49. The mission noted that the outstanding contracts for round 1 and 2 grantees are from Makerere University. It was agreed that UNCST will establish, no later than July 10, 2011, whether the equipment is still required and undertake the procurement processes on behalf of the grantees for the contracts that are still required.

50. The mission noted that UNCST had undertaken the procurement processes for some of the key contracts initially scheduled to be implemented by the Grantees. As a result, implementation of some of the key contracts scheduled for FY 10/11 had commenced and are expected to be completed by September 2011. These include: renovation/remodeling of laboratories in Makerere university³ and Gulu university.

51. The mission was informed that for the pending equipment and supplies⁴ under Round 1 & 2 Grantees under procurement by UNCST, delivery had not yet been completed due to delays in opening letters of credit and clearance of consignments by Uganda Revenue Authority. The delays are partly due to new procedures in the MoFPED which require a series of approvals. It was agreed that the delays will be discussed with MoFPED and will be followed up.

52. The mission also reviewed the progress on procurement by UIRI and noted that all the initial contracts scheduled had been completed. The remodeling works for selected buildings at UIRI - the Business Development Centre, Laboratories and the renovation works at Kabale Business Development Centre were completed and the equipment installed. It was noted that 3 contracts for: supply and installation of machinery and equipment for plastic cup technology, equipment for design office and accounting software had not commenced. The mission recommended that UIRI will only process the contract for equipment for the design office due to insufficient funds available and the limited time period to process the supply and installation of machinery using International Competitive Bidding. The accounting software is no longer required since Integrated Financial Management System (IFMS) will be installed in UIRI in July 2011.

53. The mission discussed findings and recommendations for the post procurement review concluded during the mission. There was an improvement from the previous year's review in the areas of record keeping and preparation of comprehensive bidding documents. For contracts processed by the grantees, there were delays in obtaining approval of the contracts committee upon completion of the evaluation processes. For one of the contracts reviewed (Spectrum Analyzer), approval was obtained 6 months after completion of the evaluation. Two contracts⁵ implemented by UNCST did not comply with some of the bidding and evaluation procedures. The bidding stage for the contract for renovation of College of Health Sciences (Makerere University) included a pre-bid meeting. Following the pre-bid meeting, only 2 out of the 5 firms were issued with the addendum to the bidding document. For the contract for supply of office furniture for UNCST, two bidders were unfairly disqualified resulting in a loss of approximately Shs 32,493,000 which is the difference in price between the awarded supplier and the lowest bidder.

³ College of Health Sciences, Faculty of Veterinary Medicine, Centre for Agricultural research, Kabanyolo

⁴ Supply of Laboratory equipment for NACRRI, Makerere and Kyambogo Universities, Laboratory consumables.

⁵ Supply of Office furniture for UNCST offices and renovation of laboratories for College of Health Sciences

54. The mission also discussed the findings of the in depth financial management review and noted that the PDU did not make available the complete procurement files to the auditors during the review. With regard to findings on hotel venues, the mission recommended that the PDU undertakes the procuring of hotel venues and not the users.

Procurement by Grantees

55. The mission noted good progress with two grantee institutions – Mbarara University and NACCRI. In Mbarara University, all the contracts for Round 1 & 2 had been completed and the procurement processes for Round 3 had commenced. In NACCRI, most contracts except computer software had been completed.

56. It was noted that the grantees in Makerere University and Mulago Hospital have been slow in implementing a number of contracts. These include; Sorghum and Maize project in Makerere and School of Health Sciences in Mulago. It was agreed that The PDU of UNCST will follow up with the grantees to determine whether the items are still required and for those that are required, the PDU will undertake the procurement in light of the limited time available to complete the projects prior to the project closing date.

57. In light of the slow progress by some of the sub-grantees and limited monitoring on progress of the grantees by UNCST, the rating on procurement performance is **moderately satisfactory**.

Lessons learnt from Round 1 and 2 procurements

- Delays in commencement and completion of contracts were attributed to technical and procurement capacity constraints. In order to ensure timely commencement and completion of procurement contracts, a detailed assessment of the technical and procurement capacity at the grantee level should be undertaken and where there are gaps, short term technical and procurement expertise should be contracted to support the grantees.
- Monitoring of procurement performance by the Grantees. In the last three missions, it was noted that UNCST was not monitoring procurement performance at the grantee level. As a result, a number of contracts were processed late and others did not comply with the procurement arrangements specified in the financing agreement. The mission recommends that UNCST develops a monitoring plan for each of the grantee institutions. The plan will be submitted on a quarterly basis to IDA for information.

VII. FINANCIAL MANAGEMENT

58. The Bank carried out an in-depth FM review of the project in the months of April and May 2011 covering FM aspects of the project at UNCST to ascertain the overall functioning and reliability of FM arrangements. During this mission, discussions were held on the draft report with the finance and accounting staff on financial management aspects including (i) the overview of the FM arrangements for the Project, (ii) major findings of the review and (iii) possible actions to mitigate the identified risks. The overall financial management arrangements for the MSI Project are rated as **moderately satisfactory**.

59. Progress was recorded regarding quality of quarterly reporting submitted by UNCST using the improved accounting software. Internal audit reviews are regularly carried out by the responsible Internal Audit staff of UNCST covering the Council and sub grantees with recommendations addressed to management.

60. As a result of the FM review, Mission advised that emphasis be given to the following areas:

- Bank reconciliations should be carried out on a regular and timely basis while reconciling items are resolved within reasonable times.
- Accountable staff advances should be followed up and strict internal controls regarding advances should be adhered to, to avoid re-occurrence.
- The Fixed Assets Register should be comprehensive to capture key identities of assets and regularly updated.
- For enhanced governance and oversight, there is need to urgently constitute the governing Council of UNCST.
- Given that the balance on the credit is about \$11.5 million and outstanding commitments to grantees stand at \$11 million, critical financial analysis needs to be done to ensure sufficient funding is available for full implementation including UNCST mobilizing additional resources in time for full settlement of the balances.
- Mission continues to advise that UNCST pursues the recovery or compensation of the motorcycle that was stolen at their premises with the intervention of MOFPED that hires the security firm.

(i) Disbursement

61. As of June 25, 2011, disbursements under the credit stood at \$21.7 million out of the current credit value of \$33.2 million (historical credit of \$30 million) representing 65% utilization and leaving a balance of \$11.5 million where the current closing date for the project is December 31, 2011.

(ii) Sub Grants

62. About 40 MSI sub-grants have been awarded in the first, second and third rounds with a total grant amount of \$23 million of which \$12 million has been disbursed to grantees leaving a balance of \$11 million. Given that the project closes on December 31, 2011 and most sub-grant agreements run far beyond this date, there is an urgent need to ensure that all sub-agreements are fully funded for full implementation beyond this project. Full implementation will require extra funding since UNCST will need to cover its operating costs.

(iii) Audit

63. The end of year audit arrangement for the project is on course. Management of the external audit process should improve to ensure timely submission of the final audit report to the Bank. We expect the current year audit report to be submitted by December 31, 2011.

VIII. CONCLUSION

64. The Mission wishes to express its gratitude for the support and cooperation extended to the Mission by the officials and staff of MOFPED, UNCST and UIRI. The next review Mission, including the International Technical Committee is expected to be fielded in

September 2011 to coincide the 5th National Science week. The International Technical Committee would be also invited to meet in September for an overall review of research projects supported under Rounds 1 and 2.



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Uganda Country Office
Kampala

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List of Persons met

1. Ms. Jennifer Muwuliza	MoFPED
2. Mr. John Byaruhanga	MoFPED
3. Mr. Geoffrey Turyamuhika	MoFPED
4. Dr. Peter Ndemere	UNCST
5. Dr. Maxwell Otim	UNCST
6. Mr. Ismail Barugahara	UNCST
7. Ms. Mylia Rubanzana	UNCST
8. Mr. Tom Byaruhanga	UNCST
9. Mr. Anthony Okimat	UNCST
10. Mr. Robert Epaye	UNCST
11. Mr. Kato Tucker	UNCST
12. Mrs. Hellen N. Opolot	UNCST
13. Mrs. Ruth Tugume	UNCST
14. Ms. Leah Nawegulo	UNCST
15. Mrs. Deborah Kasule	UNCST
16. Mrs. Catherine Munabi	UNCST
17. Mr. Sulaiman Sebbale	UNCST
18. Ms. Loi Namugenyi	UNCST
19. Mr. Richard Lutalo	UNCST
20. Mr. Bashir Kagere	UNCST
21. Mr. Edward Tujunirwe	UNCST
22. Mr. Collins Mwesigwa	UNCST
23. Mr. Emmanuel Tumwebonire	Uganda Industrial Research Institute
24. Mr. Chris Katwesigye	Uganda Industrial Research Institute
25. Mr. Abbas Nimanya	Uganda Industrial Research Institute
26. Mr. Vincent Makhoha	Uganda Industrial Research Institute
27. Mr. Moses Ahebwa	Uganda Industrial Research Institute
28. Mr. Anthony Kwehangana	Uganda Industrial Research Institute - Kabale
29. Dr. Thomas Egwang	Medi- Biotechnology Laboratory
30. Prof. Joseph Olobo	Medi- Biotechnology Laboratory
31. Dr. Adoke Yeka	Medi- Biotechnology Laboratory
32. Dr. Jane Achan	Medi- Biotechnology Laboratory
33. Dr. Edward Ntege	Medi- Biotechnology Laboratory
34. Dr. Betty Balikagala	Medi- Biotechnology Laboratory
35. Sylvia Kiconco	Medi- Biotechnology Laboratory
36. Connie Agwang	Medi- Biotechnology Laboratory
37. Tonny Owalla	Medi- Biotechnology Laboratory
38. Mr. Eiash Mayanja	New Wave Technologies
39. Mr. Ash Luwambo	New Wave Technologies
40. Dr. Charles Mondo	College of Health Sciences – Mulago Heart Institute
41. Dr. Charles Musoke	College of Health Sciences – Mulago Heart Institute
42. Dr. Zhang Wanzhu	College of Health Sciences – Mulago Heart Institute
43. Dr. Okello Emmy	College of Health Sciences – Mulago Heart Institute

44. Dr. Yona Baguma	National Crop Resources Research Institute (NaCRRI)
45. Dr. Anthony Obua	National Crop Resources Research Institute (NaCRRI)
46. Ms. Atim Jackie	National Crop Resources Research Institute (NaCRRI)
47. Ms. Phillip Abidrabo	National Crop Resources Research Institute (NaCRRI)
48. Ms. Jacinta Akol	National Crop Resources Research Institute (NaCRRI)
49. Ms. Kasipha Katono	National Crop Resources Research Institute (NaCRRI)
50. Mr. Alex Abacha	National Crop Resources Research Institute (NaCRRI)
51. Mr. Henry Wabgaba	National Crop Resources Research Institute (NaCRRI)
52. Ms. Justin Najuma	National Crop Resources Research Institute (NaCRRI)
53. Prof. Allen Babugura	Kabale University
54. Dr. Aine-omucunguzi Adalbert	Kabale University
55. Mr. Charles Ndyomugabi	Kabale University
56. Mr. Jones Murangira	Kabale University
57. Mr. Bernard Barigye	Kabale National Teachers College
58. Ms. Betty Busingye	Kabale National Teachers College

MSI PROJECT RESULTS FRAMEWORK

PDO	Project Outcome Indicators	Description	Baseline Value (2007)	MSI Value (2009)	Expected Value (2011)	
Universities and research institutes produce more and better qualified S&T graduates and generate and transfer high quality and more relevant research. Firms productively utilize more trained human resources and more technology (generated and/or transferred).	<p><u>PDO Indicator 1:</u> Size/number and productivity (measured by publications, patent applications, and number of students trained) of researchers and research groups increase by 50 %</p> <p><u>PDO Indicator 2:</u> Pipeline of science, technology, and engineering undergraduates and postgraduates increases by 50% in key disciplines</p> <p><u>PDO Indicator 3:</u> Firms active in technology development/evaluation employ 25% more S&T talent and enhance technology use</p> <p><u>PDO Indicator 4:</u> Survey of clients shows</p>	Researchers (#)	261	655	522	
		Publications ¹ (%)	5 (2.0%) 4 (1.7%)	45 (6.9%) 17 (2.6%)		
		Publications ² (%)	5 (2.1%) 5 (2.2%)	35 (5.3%) 23 (3.5%)		
		Publications ³ (%)	5 (2.0%) 4 (1.5%)	14 (2.2%) 3 (0.5%)		
		Publications ⁴ (%)				
		Textbooks (%)				
		Patents (%)				
		S&E as % of Univ enrolments (%)	18,401 (22%)	20,249 (22.4%)		33%
		Doctoral (%)	91 (0.1%)	51 (0.1%)		
		Masters (%)	5,155 (6.2%)	5,044 (5.6%)		
Bachelors (%)	78,310 (93.7%)	85,301 (94.3%)				
	Managed by S&E graduates (%)	43	n/a	53.7		
	Employing S&E graduates (including interns) (%)	10	n/a	12.5		
		UNCST				

¹ Publications in internationally referred journals

² Publications in internationally non-referred journals

³ Publications in national referred journals

⁴ Publications in non-referred/non-academic journals

	that UNCST and UIRI provide effective services	Knowledge of UNCST (%)	76.3	98.0	Increased efficiency and effectiveness in service delivery
		Contribution to STI development (%)	40.0	73.0	
		Response to stakeholder needs (%)	36.3	78.0	
		<u>UIRI</u>			
		Knowledge of UIRI (%)	65.7	68.0	
		Response to stakeholder needs (%)	34.2	58.0	
	<u>PDO Indicator 5:</u> More Ugandan A-level students plan careers in S&T fields, and positive impressions of careers in science and technology increase	Interested in S&E subjects (%)	86.0	65.3	Increased positive impressions
		Perform best in S&E subjects (%)	53.0	25.2	
Intermediate Outcomes	Project Outcome Indicators	Description	Baseline Value (2007)	MSI Value (2008)	Value (2009)
<u>Intermediate Result A:</u>	<u>Indicator A1:</u> MSI Technical Committee	TC meetings	4	6	8 <i>10 (target)</i>

<p>MSI Funding Facility established, grantees selected through transparent, merited based competition.</p>	<p>seated; call for proposals issued</p> <p><u>Indicator A2:</u> Ratio of applicants to fundable proposals 3:1 or greater for Windows A & B</p> <p><u>Indicator A3:</u> 10% of top 50 technologically-active firms in the process of establishing internship programs and participating in the Technology Platforms</p> <p><u>Indicator A4:</u> UIRI completes service demand assessment</p>	<p>TC supervision visits</p> <p>Call for proposals</p> <p>Applicants</p> <p>Fundable proposals</p> <p>Ratio of applicants to fundable proposals</p> <p>Internship programs &</p> <p>Technology platforms (%)</p> <p>UIRI's service demand assessment</p>	<p>n/a</p> <p>1</p> <p>163</p> <p>12</p> <p>13:1</p> <p>-</p> <p>1 (10%)</p> <p>-</p>	<p>1</p> <p>2</p> <p>125</p> <p>15</p> <p>8:1</p> <p>-</p> <p>5 (50%)</p> <p>-</p>	<p>5 (projection)</p> <p>3</p> <p>69</p> <p>12</p> <p>6:1</p> <p>1</p> <p>5 (50%) 10 (target)</p> <p>-</p>
<p><u>Intermediate Result B:</u> Senior Research Teams (SRTs) and Research Teams (RTs) fully staffed, equipped and operational; undergraduate programs admitting students; Technology Platform activities lead to transfer of specific technologies and to follow on research by</p>	<p><u>Indicator B1:</u> Assessment of research progress by independent visiting teams reveals research and training goals on track in 80% of SRTs and RTs. Postgraduate theses topics identified</p> <p><u>Indicator B2:</u> New Undergraduate programs admitting students for full-time study; Upgraded undergraduate programs expand enrollment and implement revised curricula</p> <p><u>Indicator B3:</u> Technology Platform activities lead to acquisition of new</p>	<p>Progress on research and training goals (%)</p> <p>Topics for postgraduate thesis (no.)</p> <p>Operational new undergraduate programs</p> <p>Increased enrollment in upgraded undergraduate programs</p>	<p>n/a</p> <p>30</p> <p>2 (33%)</p> <p>2 (22%)</p>	<p>76%</p> <p>61</p> <p>3 (50%)</p> <p>4 (44%)</p>	<p>80% (target)</p> <p>90 (projection)</p> <p>4 (67%) 6 (project target)</p> <p>6 (67%) 9 (project target)</p>

firms and partners.	technology in some participating firms. Technology Platforms result in increases in cooperative research. 15% of basic science and engineering students participating in internship programs	New & emerging technologies Increased cooperative research (%) Students participating in internships programs	1 10% -	5 50% -	5 50% At least 70% (project target) 20
<u>Intermediate Result C:</u> Research results leading to planned publications; students progressing towards undergraduate and postgraduate degrees; firms demonstrate greater technology use as a result of participation in the MSI; firms hire interns upon graduation.	<u>Indicator C1:</u> Publications, patent applications, and postgraduate theses in draft, submission dates identified <u>Indicator C2:</u> New program enrollment at 70% of capacity; independent assessment rates curricula at internationally-acceptable levels of quality <u>Indicator C3:</u> Cost-effectiveness of acquired technologies/new processes and products is measured via increases in revenue; 15% of internship participants receive employment offers from participating firms upon graduation. <u>Indicator C4:</u> UIRI generating fees for technological services offered to firms	Long-term impact (%) New program enrollment at 70% of capacity independent assessment rates curricula at internationally-acceptable levels of quality Long-term impact	- 30% - -	0 56% - -	At least 80% 82% (projection) Independent assessment rates at 80% quality level -

Annex 3: Projects with Commercial Potential

No	PI	Title	Main Objective	Status of project	Grant amount Ushs
A1 – Senior Teams					
1.	Thomas Egwang Med-Biotech Lab	Malaria vaccine development	Prepare a clinical trial site and build human capacity to design vaccines and conduct clinical trials of malaria vaccines	Malaria constructs designs in existence	1,400,000,000
2.	Patrick Okori Makerere University	Unlocking the potential of maize and sorghum as new food	develop novel varieties of sorghum and maize to meet increased and diversified demands for food, feed and industrial products	Developing new sorghum and maize based value –added products such as bio-fortified breakfast cereals, malted beverages, animal, poultry and fish feed, noodles and bio-plastics	1,399,947,500
3.	Yona Baguma NaCRRI	developing varieties resistant to cassava brown streak virus disease in Uganda	Expand knowledge on CBSV, its usual virus and develop tools /technologies for sustainable cassava production	Detected two genetically distinct virus species (UCBSV and CBSV) responsible for Cassava brown streak virus disease (CBSV)	1,319,818,500
4.	Fred Kabi Makerere University	Participatory research on use of molasses urea blocks	Obtain the market potential of MUB and related difficulties of farmers taking up the MUBs	Developed MUBs for farmers to use as cattle feed. Laboratory analysis of the samples being carried out	87,227,000
5.	Eisah Mayanja New Wave Technologies	Automated Cargo Route and Vehicle Management	Provide an online database for transport companies	Developed a prototype for transporters	81,163,500

