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Contributions from readers are welcome on any matter relevant to the mission of COMSATS, namely the promotion of South-South cooperation in science and technology for sustainable progress of the developing countries. The responsibility for the accuracy of any information rests with the original source. Views expressed in this publication do not necessarily reflect those of its editors, publisher or COMSATS.



The 26th Board of Governors meeting of COMSATS Institute of Information Technology being chaired by the Executive Director COMSATS (page 2)

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From the Executive Director s Desk

The Group of 77 and China (G77) formed on 15th June 1964, currently comprising of 133 Member States, is celebrating its 50th anniversary this year. These countries represent almost 80% of the world population but, unfortunately, their say in the world's political and economic affairs is still woefully insignificant. The Group was created at a time when liberation movements were breaking the last shackles of colonization and the newly independent countries were looking forward to an era of economic prosperity with great hopes and aspirations. The seventy-five countries that initially formed the Group were aware of the uphill task of re-building their nations and enormous obstacles on their path to progress. Their individual weaknesses forced them to raise their voices collectively through a platform that envisages to provide the means for the countries of the South to articulate and promote their collective economic interests and enhance their joint negotiating capacity on all major international economic issues , and moreover, to promote South-South cooperation for development. ¹⁾

Fifty years on, the golden jubilee celebrations did not have much to cheer about. The communiqué of the Extraordinary Summit of the Group, held in Santa Cruz, Bolivia, on 14-15 June 2014, portrays a world economic and strategic scenario that is still under control of the other 20% of the international community. If anything, the stranglehold of rich countries has become even stronger with the advent of new technologies,

which enable further projection of power through land, water, air, space and cyberspace. The Internet and its related technologies, firmly in control of a small number of countries, have further eroded the precepts of privacy, sovereignty and reciprocity. While the Members of the group lament the role of Bretton Woods Institutions and call for their comprehensive reform, they are fully aware that an alternate world economic order is yet a distant dream.

The road map defined for the future endeavours of the Group is well-justified and highly realistic but it also reveals the pathetic ground realities in the South. The Group wishes for its Members to achieve, inter alia, the sovereignty over natural resources; provision of basic needs as a human right; eradication of hunger; and building economic, scientific, technological and cultural partnerships²⁾. These are the dreams that did not come true or were partially realized even with the passage of five decades. There are scores of other areas where the countries of the South face disadvantageous international environment, such as finance, trade, intellectual property rights, and global warming. A silver lining of this state of affairs, if it may be called so, is that G77 has remained united, increased its membership and expanded its role for cooperative action. It will not be unreasonably optimistic to hope that the Group would be able to make its *raison d'être* obsolete in the next 50 years, by creating a world where disparities among nations with respect to their

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¹⁾ www.g77.org

²⁾ Martin Khor, the South Bulletin, Issue 81, 25 July 2014

NEWS/ACTIVITIES/HIGHLIGHTS FROM COMSATS SECRETARIAT

EXECUTIVE DIRECTOR COMSATS CHAIRS A SPECIAL MEETING (26TH) OF BOARD OF GOVERNORS OF CIIT-PAKISTAN

On July 10, 2014, the Executive Director COMSATS, Dr. Imtinan Elahi Qureshi, chaired a special meeting (26th) of the Board of Governors of COMSATS Institute of Information Technology (CIIT), at its Islamabad Campus. This meeting was held on a one-point agenda: consideration and approval of amendments in the draft bill for the establishment of COMSATS University .

The members of the Board include senior officials of the Principal Seat of CIIT, Dr. S. M. Junaid Zaidi, Rector CIIT, Dr. Haroon Rashid, Pro-Rector CIIT (by invitation), and Dr. Izhar Hussain, Registrar CIIT. The Federal Secretary, Ministry of Science and Technology (MoST), Government of Pakistan, was represented in the meeting by Mr. Tahir Maqsood, Additional Secretary MoST, while Dr. Naveed A. Malik, Rector, Virtual University, Pakistan, attended the meeting through Skype as a representative of Higher Education Commission of Pakistan. Other members present in the meeting were Dr. Inam-ur-Rahman, Scientist Emeritus, Pakistan Atomic Energy Commission, Mr. Sabih-ur-Rahman, Advisor (Host Country Affairs) COMSATS Headquarters, Directors of CIIT's Lahore, Abbottabad, Attock, Wah, Sahiwal and Vehari Campuses and Deans of Faculties of Information Sciences & Technology, and Architecture and Design.

Dr. Qureshi informed the Members of the Board that the Ministry of Science and Technology had finalized the Draft Bill for the establishment of COMSATS University after the approval of the Federal Minister for Science and Technology, Government of Pakistan, who is the Chancellor CIIT. The Bill would be presented for the Cabinet's approval, after concurrence of the Board of Governors.

During the meeting, the Draft Bill was deliberated upon by



Executive Director COMSATS and some participants of the Board of Governors meeting of CIIT

the participants of the special meeting and a few amendments were agreed upon. The Board appointed Registrar CIIT as the focal person for taking up matters relating to the Draft Bill with the Ministry of Science and Technology, and he would also be communicating the aforementioned amendments to MoST, keeping COMSATS Headquarters informed of future developments and progress.

Dr. Qureshi concluded the meeting with a vote of thanks, appreciating the worthy inputs of all the participants and anticipatory congratulations for completing an important milestone towards well-deserved status of CIIT as a University.

COMSATS TO CO-ORGANIZE CAPACITY BUILDING EVENTS

In June 2014, COMSATS and the Islamic Educational, Scientific and Cultural Organization (ISESCO) reached an understanding to implement the Joint Cooperation Programme for the biennium 2014-2015. The Programme activities for the latter part of year 2014 include the following five capacity-building events in different countries:

- 7th National Training Workshop on 'Repair and Maintenance of Scientific Engineering Equipment in Universities, Research Institutions, and Small-Scale Industries', Tehran, Iran (Sept. 28 to Oct. 02, 2014);
- 4th International Workshop on Internet Security: Enhancing Information Exchange Safeguards, Dar-es-Salaam, Tanzania (October 19-23, 2014);
- 2nd Consultative Regional Workshop on 'National Innovation System and Intellectual Property (African Region)', Rabat, Morocco (November 10-12, 2014);
- International Conference on 'Nanomaterials and Nano-devices', Cairo, Egypt (December 8-9, 2014);
- International Workshop on 'Applications of ICTs in Education, Healthcare and Agriculture', Islamabad, Pakistan (December 14-16, 2014).

The Inter Islamic Network on Information Technology (INIT) will also be a partner for two of these events. Iranian Research Organization for Science Technology (IROST), Tanzania Commission for Science and Technology (COSTECH), National Research Center (NRC), and COMSATS Institute of Information Technology (CIIT), would be the host institutions for the events being held in Iran, Tanzania, Egypt, and Pakistan, respectively.

Apart from the continuing activity on Strengthening of the Islamic World Science Net Portal and Enhancing the Thematic Groups, this biennium's cooperation agreement also stipulates ISESCO-COMSATS Cooperation for Supporting Joint Research Projects in Common Member States. Also lined up for November 2014 is COMSATS observance of World Science Day for which a seminar is

planned to be organized in collaboration with ECO Science Foundation. This year, the theme of the day is Promoting Quality Science Education .

COMSATS SECRETARIAT CONTRIBUTES TOWARDS URDU TRANSLATION OF THE BOOK: ONE HUNDRED REASONS TO BE A SCIENTIST

As part of its mandate of creating science culture, COMSATS Secretariat is leading a project of translating a world famous book entitled One Hundred Reasons to be a Scientist into Urdu. The book was originally published in English language by the Abdus Salam International Centre for Theoretical Physics , Trieste, Italy, on the occasion of its 40th Anniversary in 2004. The book has been previously translated into dozens of other languages. The initiative to translate the book in Pakistan, where COMSATS Secretariat is also based, was taken in consideration of the large population of Urdu speaking people spread across the world.

The book draws its worth from its inspirational value. It

comprises of more than ninety articles written by world-famous scientists (including some Nobel Laureates), who have talked about their life-long experiences in pursuit of international scientific prominence. With personal accounts of their motivations, ambitions, hard work, pleasures of research, and excitement of discoveries, they have created an aura that beckons young students to adopt scientific careers. Such a book, when widely distributed and read by students and public at large, would surely allure bright minds to becoming future scientists. That eventuality naturally fits well with the generic objective of COMSATS; namely, to create scientific capacity in developing countries and development of relevant human resource.

The Executive Director COMSATS is leading a team of 20 experts from CIIT, which is reviewing the translation to ensure that scientific content is correctly represented. A number of meetings of the core Editorial Committee were held in July-August 2014 to finalize the script. It is expected that the soft copy of the translated book would be launched in October 2014.



On August 4, 2014, a social gathering of all COMSATS officials and staff was organized, to celebrate the festival of Eid ul Fitr at the Headquarters. The ceremony had participation of the Executive Director COMSATS who cut a cake specially prepared for the occasion. COMSATS colleagues exchanged felicitation messages at the ceremony.

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states of development would no longer warrant a North-South division paradigm.

COMSATS has always stood by its commitment to play a role in bridging the socio-economic gap between the rich and the poor countries. Its instrument of choice in this regard is the South-South cooperation in various fields of S&T that are most relevant to developmental needs of its Member Countries. This is exactly what G77 strives for, through various mechanisms, such as Consortium on Science, Technology and Innovation for the South (COSTIS), which provides "a unique platform for government agencies for funding research and development to interact with leaders in academia and industry"³⁾. In view of the commonality of stake-holders and objectives of G77 and COMSATS, a letter was sent to H.E. Mr. Mourad Ahmia, Executive Secretary of G77, to offer the resources available

³⁾ Prof. M. H. A. Hassan, Address to the Foreign Ministers of G77 as Executive Director TWAS, 21st Sept. 2006

with COMSATS to further the cause of South-South solidarity through bilateral and multilateral cooperation in S&T capacity-building. It was pointed out that the human resources available in COMSATS' system comprise of thousands of high caliber scientists working in nineteen Centres of Excellence of COMSATS, including the organization's unique asset in the form of COMSATS University.

As in the case of 'The South Centre', COMSATS has credentials of an independent platform of developing countries not governed by the UN system. Through this editorial, COMSATS reaffirms its willingness to act as one of the S&T cooperation arms of G77.

As always, the offer of giving space on the pages of this Newsletter to any comments, observations and suggestions by our worthy readers is reiterated.

ACTIVITIES/NEWS OF COMSATS CENTRES OF EXCELLENCE

TIRDO-TANZANIA STRENGTHENS ITS COOPERATIVE TIES WITH CSIR-INDIA

The Tanzania Industrial Research and Development Organization (TIRDO) reviewed its existing Memorandum of Understanding with the Council of Scientific and Industrial Research (CSIR), India, and strengthened its collaboration ties by signing another MoU with CSIR-India. Under the collaboration with CSIR, TIRDO sent four of its scientists working in the areas of Food Microbiology, Energy (Coal) and Leather Technologies to CSIR-India, for a three-month attachment and training. The aim of this activity was to learn best practices adopted by CSIR and to further the cooperative ties for scientific research between the two organizations in areas of mutual interest. The TIRDO scientists that received training were Dr. Veronica Mirambo, Dr. Wilson Lugano, Mr. Humphrey Ndossi and Mr. Hossen Iddi.

After training, the energy experts prepared a proposal on characterization of coal deposits in Tanzania and development of coal utilization technologies for enhancing socio-economic development of the country. It is expected that once indigenous capacity for coal characterization is built, Tanzania will save a lot of money spent on getting samples analyzed/tested overseas. Moreover, in September, the senior official of TIRDO, its Director General, Prof. Mkumbukwa Mtambo, and Director of Industrial Research, Dr. Ludovick Manege, will visit India and hold meetings with CSIR officials to explore other avenues of cooperation.

NATIONAL CIVIL AWARD OF PAKISTAN CONFERRED UPON THE RECTOR CIIT-PAKISTAN

In recognition of his outstanding contributions and achievements in the field of Science and Technology, the Rector COMSATS Institute of Information Technology (CIIT), Dr. S. M. Junaid Zaidi, has been conferred upon yet another national award, the *Hilal-i-Imtiaz (H.I.)*.



As is the tradition, the award was presented on the occasion of 68th Independence Day of Pakistan by the President of Pakistan, H.E. Syed Mamnoon Hussain. *Hilal-i-Imtiaz* is the 2nd highest national award given to the individuals (civilian and military

officers) who have made outstanding contributions in various fields getting international recognition for their country.

Earlier Dr. Zaidi was decorated with *Sitara-e-Imtiaz (S.I.)* in 2004.

CIIT FORMALIZES COLLABORATION WITH VALPARAISO UNIVERSITY, USA

CIIT has been interacting with faculty members at Valparaiso University, USA, for the past several months in order to develop a meaningful international collaboration that strengthens both the institutions. The Dean for International Affairs Valparaiso University had also visited CIIT twice in an effort to reach an agreement. These efforts on part of both the institutions substantiated in July this year when Dr. Arshad S. Malik, Head International Office CIIT, signed an Memorandum of Agreement (MoA) with Dr. Mark L. Biermann, Provost Valparaiso University on 22nd July, and an Aide Memoire with Dr. Zsuzsanna Szaniszló, Associate Dean, on July 25, 2014, on behalf of their respective institutions. Also present at the signing ceremonies were Dr. Jaishankar Raman, Assistant Provost for International Affairs and Dr. Jennifer Ziegler, Dean of the Graduate School.

This MoA encompasses extensive collaboration, including commencement of an MS Dual Degree programme at the Mathematics Departments of both institutions. Potential students can spend one year at CIIT and one at Valparaiso University, and graduate with an MS Mathematics degree from CIIT and an MS Analytics and Modeling degree from Valparaiso University, with an option of working in the USA.

RENOWNED ACADEMICIAN FROM UNIVERSITY OF WESTERNAUSTRALIA VISITS CIIT

On June 17, 2014, Prof. James Trevelyan, a renowned engineer and academician from the University of Western Australia, visited CIIT's Islamabad Campus. Prof. Trevelyan was received by Ambassador Fauzia Nasreen of the Center of Policy Studies, as well as representatives from the International Office. He appreciated the growth that CIIT has achieved over the years and the scope of its future activities. Speaking with the senior academics, he shared his research



The Head of International Office CIIT Formalizing Agreements with Representatives of Valpo University

findings on insufficient training of engineers in developing countries. He believed that such trainings should have greater emphasis on developing engineering students entrepreneurial, problem-solving and managerial skills. Prof. Trevelyan also shared his thoughts on the need for energy efficiency and creative problem-solving on the part of engineers for development and socio-economic uplift. All the participants of the meeting found Dr. Trevelyan's ideas of great interest and in line with CIIT's current initiatives aimed at addressing societal needs.

ICCBS-PAKISTAN ACQUIRES FOUR US PATENTS

During July-August, 2014, four new U.S. patents from International Center for Chemical and Biological Sciences (ICCBS) were published by United States Patents and Trademark Office (USPTO).

1. Artonin I to Treat Resistant Infectious Staphylococcus Aureus, US-Patent Application No. 13/740,919;
2. Synthesis and Biological Studies of an Isomeric Mixture of (E/Z) Isoxylitones and Its Analogues, US-Patent Application No. 13/758/027;
3. Bio-active Antioxidants from Plant Foods for Nutraceutical Product Development, US-Patent Publication No. 2014/0221634; and
4. Heterocyclic Schiff's Bases as Novel and New Anticancer Agents, US-Patent Publication No. 2014/0221429A1, Application No. 13/757,956.

ICCBS ORGANIZES PROTEIN CHEMISTRY AND GENOMICS WORKSHOPS

Diagnosis and management of complex biological disorders is a real challenge, which can only be overcome by understanding the cutting-edge techniques in the field of biological sciences. ICCBS is continuously contributing towards the capacity-building of Pakistani researchers in this area. In a similar effort, the Center organized 3-day



The participants of the ICCBS workshops with its Director, Dr. Iqbal Choudhary (in the last row)

workshops on Protein Chemistry and Genomics, held during August 19-22, 2014. The workshop participants were trained under the supervision of leading experts from the USA, Prof. Dr. Aftab Ahmed and Dr. Obaid Ullah Beg.

Speaking at the concluding ceremony of the workshops, Director ICCBS, Prof. Dr. Iqbal Choudhary, stated that complex diseases, such as diabetes, neuromuscular disorders and cardiac diseases, are the consequences of different biological, as well as environmental factors. Patients having such problems could be benefitted by the outcomes of research in this discipline. Dr. Choudhary distributed certificates among registered participants.

ICCBS FACULTY MEMBER SELECTED TO ATTEND 64TH LINDAU NOBEL LAUREATE MEETING

Dr. Saima Rasheed, Research Officer H.E.J. Research Institute of Chemistry of ICCBS, was selected as young scientist to participate in 64th Lindau Nobel Laureate Meeting (Physiology and Medicine), in Germany, from 29th June to 4th July 2014.

Dr. Rasheed completed her Ph.D. in bio-organic chemistry in 2013 under the supervision of the Director ICCBS. The Council for the Lindau Nobel Laureate Meeting invited her as young scientist from Pakistan to deliver and share with them her research (poster presentation). She was one of the 600 young researchers selected from 80 countries for participation in the Lindau Meeting through an open application process by the Meeting's committee.

The process is a global competition among the young scientists to get the privilege of meeting and spending time with 37 Nobel Laureates and international eminent scientists, such as Dr. Jules Hoffmann, Dr. Brian Kobilka, Dr. Jean-Marie Lehn, Dr. Kurt Wüthrich.

IROST-IRAN SIGNS AN MOU WITH DICLE UNIVERSITY-TURKEY

On August 25, 2014 IROST and Dicle University of Science and Technology Application and Research Center of Turkey signed a Memorandum of Understanding (MoU) to strengthen scientific and academic cooperation in the areas of mutual interest relating to research and academic proficiency.

Under this MoU, IROST and Dicle University agreed to cooperate, inter alia, for exchanges of information and knowledge sharing as well as postgraduate students, experts. Both the institutions will also share research findings in the areas of mutual interest including industrial technologies in crystallography, solar cells, thin films, fuel cells, environmental development and inorganic chemistry.

S&T INDICATORS OF MEMBER STATE

In Spectrum: Republic of Ghana



Ghana is the 33rd largest country on continental Africa and 82nd largest in the world, having a land mass of 238,535 km². It is located along the Gulf of Guinea and Atlantic Ocean, in the sub-region of West Africa.

Ghana is well-endowed with natural resources. However, the country depends heavily on international technical and financial assistance. The country has been a significant petroleum and natural gas producer since December 2010, and is one of the world's largest gold and diamond producers. Moreover, the country is projected to be the largest producer of cocoa in the world by 2015. Over all, the services sector contributes about 50 % to the gross domestic product (GDP), while industry and agriculture sectors contribute 28.7 % and 21.2 %, respectively.

According to the Index of Governance (2013), today Ghana is the 7th best governed country in Africa and rates 13th highest on the Human Development Index (HDI) in continental Africa. Ghana is the 6th largest economy in the African continent by purchasing power parity (PPP) and Nominal GDP, making it one of the fastest growing in the world. In terms of PPP, Ghana has the highest per capita income (Table-A) in the sub-region of Western Africa, while it has the 10th highest per capita income in continental Africa.

mentioned HDI indicators over the years. Ghana's commitment to education is evident from the fact that its total public spending on education in terms of percent of GDP for 2011 was nearly 8.15. In terms of healthcare, the public health expenditure, over the last five years, has been in the range of 3 % of GDP. Ghana's military spending (in terms of percentage of GDP) is one of the lowest in the world, which reflects upon the country's foreign policy, which is characterized by a commitment to the principles and ideals of non-alignment and regional cooperation.



Ghana's expenditure on R&D is about 0.3 percent of its gross domestic product (GDP), nearly all of which comes from government outlays equivalent to around \$49 million or 1.1 percent of the budget (Table-C).

Table-A: Socio-economic Indicators of Ghana

Year	Population (Million)		GDP per capita (current US\$)		GDP growth (annual %)		Merchandise Exports (current Billion US\$)		High-tech Exports (current Million US\$)	
	2000	2013	2000	2013	2000	2013	2000	2012	2000	2012
	18.8	25.9	264.7	1,850.2	3.7	7.1	1.67	12	3.0	72.7

Source: World Bank Development Indicators

Ghana's gross national income (GNI) per capita increased by about 71 percent between 1980 and 2012. In the same period, Ghana's life expectancy at birth increased by 11.5 years, the mean years of schooling increased by 3.4 years and expected years of schooling increased by 4.1 years. Table-B depicts Ghana's progress in some of the above

Table B: Ghana's HDI trends*

Year	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (2005 PPP\$)	HDI value
1980	53.1	7.3	3.6	984	0.391
1990	56.9	7.5	5.3	886	0.427
2000	58.4	7.9	6.3	1,037	0.461
2010	63.8	10.7	7	1,451	0.54
2012	64.6	11.4	7	1,684	0.558

* New component indicators and methodology

Source: UNCTAD ST&I Policy Review

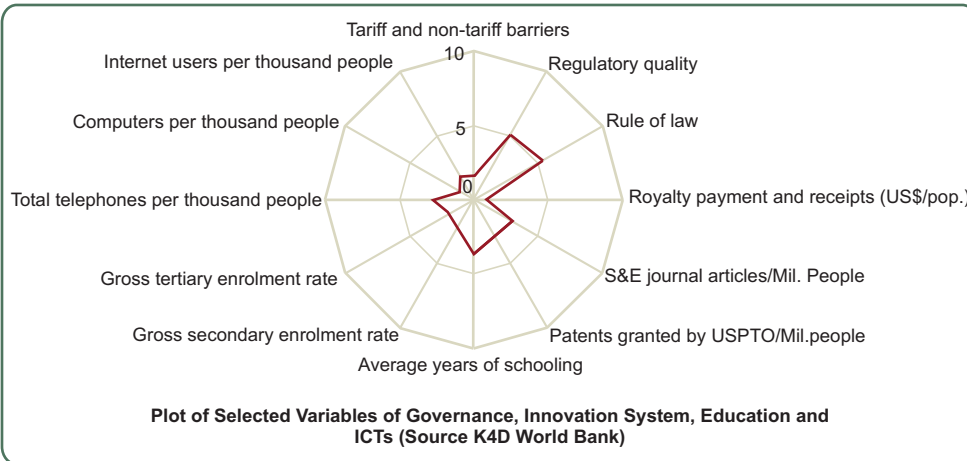
objective of transforming Ghana into an information-rich, knowledge-based and technology-driven economy and society.

Table-C: Allocation for R&D in Ghana's Budget, 2008

Budget line item	New Ghanaian cedis*	Percentage
Total government expenditure	4,292,084,203	100
Basic research	201,500	0.005
R&D general public services	151,412	0.004
R&D economic affairs	44,314,486	1.032
R&D Health	3,942,081	0.092
Total S&T	48,609,479	1.133

* US\$ parity to new Ghanaian cedis were close to a 1:1 (2008)

Source: UNCTAD, STI Policy Review, 2010



than 1 % of the total enrolled students. This implies that the institutions have not contributed many even for the replenishment of their own faculty.

According to the World Bank Knowledge for Development (K4D), Knowledge Assessment Methodology (see Table-E), Ghana needs to improve immensely in ICT sector, as well as Innovation capacity and education in order to reflect well on the Knowledge Economy Index (KEI), where it ranks 113 out of 146 countries with a score of 2.72 (2012). The KEI describes economy over 4 essential pillars: (i)

Several resulting initiatives aimed at deploying ICT in schools and communities have been launched in partnership with the private sector and international organizations. These initiatives have created a momentum for the introduction of ICT in education and were therefore at the origin of development of an ICT in education policy and strategy that embraces the ICT4AD Vision for Ghana. Nevertheless, the country faces major challenges of slow growth of Internet and personal computer penetration. In addition, despite Ghana's connection to an international fibre-optic cable, broadband Internet is still at an early stage of deployment within the country. In contrast, Ghana has experienced rapid growth in mobile telephony access since 2003.

Economic Incentive and Institutional Regime (EIR); (ii) Innovation and Technological Adoption; (iii) Education and Training; and (iv) Information and Communications Technologies (ICT) Infrastructure. A detailed look at the profile of Ghana reveals weaknesses in nearly all pillars with exception of 'Regulatory Quality', 'Rule of Law' and to a certain degree the 'Average years of schooling'. While along with negligible 'royalty payments', 'computers per 1000 people' and 'Internet users' remain very low, indicating low

Table-D shows basic indicators for Ghana's three largest universities. In 2007, the share of Science and Technology graduates from these universities were: 8.5 % from University of Ghana (UoG), 23.6 % from University of Cape Coast (UCC), while for Kwame Nkrumah University of Science and Technology (KNUST), the share was 63.5 %. It is important to note that all the three universities produced PhDs in Science and Technology subjects, which were less

Table-E: Knowledge Economy Index - Ghana

1	Knowledge Economy Index (Average of 3,4,5,6)	2.72
2	Knowledge Index (Average of 4,5,6)	2.28
3	Economic Incentive and Institutional Regime	4.05
4	Education	2.68
5	Innovation	2.24
6	ICT	1.93

Source: World Bank Knowledge for Development (K4D), Knowledge Assessment Methodology 2012

innovation and ICT penetration. Similarly, gross tertiary enrollment rate too is quite low. Overall, there is quite some room for improvement in the overall knowledge economy.

Table-D: Basic Indicators of Ghana's largest universities

	UoG	KNUST	UCC
Year Established	1948	1952	1962
Enrollment			
Total	29,756	23,868	16,808
Post-graduate	1,818	1,599	396
Undergraduate	26,156	22,271	16,142
% of graduate	6.1	6.7	2.3
International students	1,144	738	-
S&T Teaching			
Science Students (%)	19.9	48.8	26.0
S&T Graduates, 2007 (%)	8.5	63.5	23.6
S&T PhD Graduates, 2007 (%)	0.16	0.08	0

Source: UNCTAD, ST&I Policy Review (2010)

According to the UNCTAD Science, Technology and Innovation (ST&I) Policy Review, the Government of Ghana has ambitious plans for the country. In order for Ghana to become a medium income country, growth will have to accelerate and productivity will have to rise. In the terminology of Ghanaian planners, the country is ready to move from the economics of reconstruction and rehabilitation to the economics of accelerated growth (National Development Planning Commission, 2005). This implies diversification away from the cocoa-gold-timber structure and towards industrialization, technology and higher productivity, all with a view to achieving middle-income status by 2020. Achieving these ambitious goals will necessarily involve, among other things, a more effective application of ST&I in order to drive productivity growth and diversification in production.

ARTICLE: SCIENCE - WHAT CAN IT DO FOR THE SUSTAINABLE DEVELOPMENT GOALS?

Rachel Mundy*

The Sustainable Development Goals (SDGs) are taking shape with the zero draft of 17 proposed goals published last month and now being revised for the UN General Assembly this September. This is part of preparations for the post-2015 development agenda that will follow the expiration of the Millennium Development Goals (MDGs) next year.

In 2010, as the MDGs were scrutinised a decade after being set up, *SciDev.Net* asked eight leaders in their fields what they thought science contributed to the achievements — patchy as they were — of the MDGs. They thought science did a lot, though more could have been done to involve researchers in developing countries more actively. Now, as the MDGs near their end and their successors are being finalised, we went back to some of those experts to ask them what science can do to ensure the SDGs are more successful than the MDGs. Scientists are playing an active role in drafting the SDGs, through, for example, the Sustainable Development Solutions Network and the UN's Science Advisory Board. But not everyone thinks the SDGs are as specific as they should be on improving science capacity and recognising its importance to such goals. Here, for example, we hear that science needs to be unpacked for ordinary people to use it, and that research on climate change and micronutrients needs to be put on the goals' agenda.

Saleemul Huq is a senior fellow in the Climate Change Group at policy research organisation the International Institute for Environment and Development in the United Kingdom. He was lead author of the chapter on adaptation and mitigation in the panel's Fourth Assessment Report.

One of the big issues is whether or not climate change should be included in the SDGs, or ignored completely. The MDGs were focused on poverty alleviation, and some thought that climate change was extraneous to what they were trying to do. But the strength of climate science is now at a point where the environmental dimension is coming into the picture. Fighting poverty is interlinked with fighting climate change and that is what the sustainable development — not just development goals — speak to. There have been two types of resistance to including the urgency of climate change mitigation in the SDGs: there is already a framework to tackle it, and/or it would just be too complicated to take into account. These arguments are still being fought, but it is healthy to at least have this debate, as the scientific argument needs to be made.

In the SDGs, there will be a focus on universal actions — also requiring richer nations to do more to curtail over consumption and pollution at home. This is a significant paradigm shift regardless of what we achieve in the end. The scientific research shows that the poorest countries are the most vulnerable to the effects of climate change, so this double hit of poverty and vulnerability needs to be factored into the goals that are set.

Arne Tostensen, senior researcher and former Director of Research for Development Foundation, the Chr. Michelsen Institute in Norway, is a co-leader on behalf of the Research Council of Norway with the Ministry of Education in Rwanda of a

work package on climate change under the auspices of the European Union-funded CAAST-Net Plus project.

Research has a lot to offer the SDGs, but it needs to be translated into practical, actionable activities and it is this bridging between research, policy making and practice that is so critical. The real hurdle for research is to go beyond communication in journals to make a difference to the ultimate beneficiaries: the citizens of each country. Meeting the challenges of uptake requires packaging and communicating research findings so that they are accessible to a lay audience, including policymakers. The route from research to application is a very long and convoluted one, and it can be very difficult for researchers to attribute a result directly to their research findings. This attribution problem is tremendous. Not only is there a complex relationship between research and policymaking, there is also a very long gestation period before a result can be attributed to research. Although many researchers are unable to say what activities and inputs their projects will lead to down the line, they should at least be able to have a dialogue with policymakers and practitioners about their research. That way we can create arenas or forums for discussion between researchers, policymakers, stakeholders and grass-roots practitioners.

Developing world scientists should play a critical role at the design stage of research priorities. Too often research projects are formulated in Europe and experts from the global South are asked to join. This is the wrong way to go about it — it should be a joint endeavour from the start.

Viroj Tangcharoensathien, a health economist at the Ministry of Public Health in Thailand and a senior advisor to the ministry's International Health Policy Program, was involved with negotiations on health in the post-2015 SDG forum, the UN Foreign Policy and Global Health group.

While political process drives the decisions on which health issues should be in the SDGs, science implicitly contributes to the debates in terms of what works, and what doesn't, in the implementation of interventions to achieve health improvements. A lack of implementation capacity, good governance, political commitment and health system readiness are major bottlenecks to implementing improvements in health in low- and middle-income countries.

These countries are mostly in favour of health system strengthening and universal access to services by all people based on the scientific evidence that failing health systems, including a lack of funding support, financial access to care, health workers and infrastructure for service delivery, especially at the primary healthcare level, are the main bottlenecks to not being able to achieve health-related MDGs, notably in Sub-Saharan African countries, such as Sudan and Zambia. Science could have contributed more to the evidence on why some countries are not achieving health-related MDGs, generating lessons to avoid mistakes in achieving health improvements in the post-2015 SDGs agenda.

* Rachel Mundy is a freelance science journalist and a member of the Association of British Science Writers (ABSW) and Stempra. She has written for *SciDev.Net*, *New Scientist*, the *Royal Society*, *ABSW*, *London Student* and many other publications.

Guido Schmidt-Traub is Executive Director of the UN Sustainable Development Solutions Network, which UN Secretary-General Ban Ki-moon commissioned in 2012 to mobilise science for practical problem-solving.

The SDGs are taking a much broader approach to health, for example, than the MDGs, and this has been down to the UN Open Working Group on SDGs inviting many of the world's leading scientists to speak to the negotiators about the challenges. The medical profession, among others, have been very effective at consolidating decades of careful scientific research and disseminating it widely in a way that reaches the policymaker community. When it comes to the implementation stage of the goals, local scientific knowledge will become very important. It hasn't yet been included in a systematic manner in the negotiations.

The SDGs must apply to the world as a whole, yet their implementation is dependent on the specifics of local knowledge and conditions. There needs to be problem-solving at regional, national and international levels that takes this into account. But, science should have — and needs to — do more on the 'so what?' question. So, for example, many policymakers accept that climate change is a real challenge, but they struggle to understand what they should do about it. Those are the questions that haven't really been asked in most countries, rich and poor.

Ricardo Uauy is professor of public health nutrition at the London School of Hygiene & Tropical Medicine in the United Kingdom, and former director of Chile's Institute of Nutrition and Food Technology. Science tells us it is not enough to reduce hunger by half one of the MDGs we need new goals targeting the availability of the right foods, with essential micronutrients, not just calories. We have put the emphasis on eliminating hunger by producing enough cereals that provide calories energy.

This is a good starting point, but it is clearly insufficient, as we need not just more food, but better quality food to achieve healthy growth. We know that micronutrient malnutrition prevents children from growing, and affects their immune system and brain development. Preventing death is not enough. Until we cover the basic needs for healthy growth and brain development, we are condemning millions of children to frequent infections, poor growth and a life of poverty. Yet, it is important to note that local, quality food production systems should be an aspiration, as otherwise you are dependent on supplying vitamin capsules or fortifying the food — which is an expensive and unsustainable option. Scientists know that if things go wrong in the early years it is very hard to rectify, but unless you have the appropriate delivery systems and the basic infrastructure at a national level this can be difficult to achieve.

Carlos Pérez del Castillo is chair of the consortium board of CGIAR, a global partnership of research organisations focused on food security.

The linkage between improved agricultural food systems and the alleviation of extreme poverty, hunger and malnutrition in the developing world is increasingly recognised and reflected in the internationally proposed SDGs. Science and innovation are of

critical importance to address the challenges of increasing agricultural productivity, making food healthier, improving the quality of diets and conserving biodiversity. Enormous advances have been made in most of the basic sciences underpinning agriculture.

Progress over the horizon of the SDGs will require a renewed focus on the 'science of delivery', particularly the efficient and rapid translation of scientific discoveries to deliver positive impact at the scale of millions of people. The critical role that CGIAR will play in the future is to facilitate the application of advanced technologies to address the needs of subsistence and poor farmers in developing countries who are most in need. This is because there are unique challenges facing the delivery of technology to poor farmers include including the development and deployment of low-cost and robust technologies.

Success in the global developmental agenda over the horizon of the SDGs and beyond will require enhanced agri-food system performance in parts of the world that have the least scientific capacity to achieve it on their own, and enhanced agri-food system performance for sectors of the rural population, women in particular, who have not had full or fair access to science-based innovations.

Salim Karim, director of the Centre for the AIDS Programme of Research in South Africa, is an expert on aspects of HIV/AIDS prevention and treatment.

Looking back at the headway made on health-related MDGs 4, 5 and 6, which focus on child deaths, maternal health, HIV/AIDS, malaria as well as other diseases, little did we know how much of this progress would be fundamentally dependent on scientific advances. For example, one of the largest contributors to child deaths in many of the poorest countries, especially in Africa, is HIV infection. About a decade ago, grave concern permeated the discussions on whether the MDG 4 targets could be met, as past progress in improving childhood survival in many African countries was being wiped out by the high fatality rates in HIV-infected babies.

Today, that pessimism has been replaced by great optimism, thanks to scientific progress and new technological innovations. A simple, quick and cheap diagnostic for HIV infection, together with readily available and affordable antiretrovirals, have turned the situation around. In 2012, an estimated 63 per cent of all HIV-positive pregnant women in the world received antiretroviral prophylaxis or treatment. In some parts of the world, mother-to-child transmission of HIV has been virtually eliminated. While there is much to celebrate, there remains much more to do. There are still about 35 million people living with HIV globally and women are disproportionately affected by the HIV epidemic in almost all of the 20 most HIV-affected countries. In these settings, AIDS is now the leading cause of death and disease in women of reproductive age.

As we ponder the development goals needed to reach a sustainable future for our planet, the potential role of science should not be relegated to backroom and corridor discussions, but should be an integral part of what will be needed to achieve the SDGs.

Courtesy: *SciDev.Net (September 1, 2014). Reprinted with the permission from the author. Available online at: (<http://www.scidev.net/global/mdgs/feature/what-can-science-do-for-the-sustainable-development-goals.html>)*

SCIENCE, TECHNOLOGY AND DEVELOPMENT

CONTROLLING FRUIT FLIES WITHOUT PESTICIDES

Each year the Queensland fruit fly costs fruit and vegetable producers millions of dollars in damage. The main chemical currently used to control this insect populations is fenthion, which is about to be phased out due to concerns over health risks to humans. The Australian scientists may now have found the key to controlling them without dangerous chemicals.

Efforts are being made on mass production of generations of sterile male fruit flies, which can be released into the wild to help naturally suppress their population. As reported by the August 22, 2014, edition of *sciencealert.com*, the researchers at the Hawkesbury Institute for Environment at the University of Western Sydney and the University of New South Wales have identified the exact time when a fruit fly becomes either male or female, which is an important step towards creating sterile, all-male populations. The scientists found that a fruit-fly's gender is decided shortly after eggs are laid into fruit, in the early hours of embryonic development. The research, published in *Insect Molecular Biology*, looked into when genes that trigger sex determining proteins were switched on in fruit fly embryos. The challenge is now how to mass produce male-only lines.

LOW-COST CHEMICAL TEST DEVICE DIAGNOSIS WITHOUT INTERNET

According to a report published in August 19, 2014, edition of *SciDev.Net*, a handheld device that performs a range of chemical tests and transmits the results for remote analysis, through a standard mobile phone call, could be commercially available within 12 months. The device, known as the uMED (universal Mobile Electrochemical Detector), could cost as little as US\$10 once a manufacturing process is in place, its developers say. The device which was described by an article published in *Proceedings of National Academy of Science, USA*, can detect levels of glucose or malaria-causing parasites (plasmodium) in blood, salts in urine, and toxic metals in water.

The device plugs into the audio port of a mobile phone and transmits its test results to a cloud server as a series of coded tones through a standard (2G) audio phone call. Usually 3G and 4G networks are required to transmit remote diagnostics, but in the developing world their coverage can be patchy. Another advantage of the uMED is that it can operate for months at a time on a single battery charge. A user just inserts a test strip into the device, selects the test, applies the sample of blood, urine or water to the test strip and makes a phone call, which automatically transfers the results. Patients can receive their diagnoses, potentially by SMS message, once the results have been analysed remotely by an expert.

The simple construction of uMED, and the fact that it uses an

open-source controller unit, means it can be reprogrammed and adapted to local needs or conditions.

The device developing team is trying to increase the number of tests uMED can perform using one test strip, and are working on incorporating different types of detection, such as optical sensing.

3D PRINTERS USED TO CREATE CUSTOM IMPLANTS FOR TARGETED DRUG DELIVERY

A team of researchers at Louisiana Tech University has developed an innovative method for using affordable, consumer-grade 3D printers and materials to fabricate custom medical implants that can contain antibacterial and chemotherapeutic compounds for targeted drug delivery, says a report published in the *Science Daily* on August 21, 2014. The team comprising doctoral students and research faculty from Louisiana Tech's biomedical engineering and nanosystems engineering programs collaborated to create filament extruders that can make medical-quality 3D printing filaments. Creating these filaments, which have specialized properties for drug delivery, is a new concept that can result in smart drug delivering medical implants or catheters.

The nature of the 3D printing process developed at Louisiana Tech allows for the creation of partially hollow beads that provide for a greater surface area and increased drug delivery and control. Localized treatment with the 3D printed antibiotic beads also avoids large systemic drug dosages that are toxic and can cause damage to patients' livers and kidneys.

QUICK FACTS: EBOLA VIRUS DISEASE

History: Ebola first appeared in 1976 in two simultaneous outbreaks, in Nzara, Sudan, and in Yambuku, Congo. The Congo outbreak was in a village situated near the Ebola River, from which the disease takes its name.



Transmission: Ebola is introduced into the human population through close contact with the blood, secretions, organ or other bodily fluids of infected animals. In Africa, the infection has been documented to have spread through the handling of infected chimpanzees, gorillas, fruit bats, monkeys, forest antelopes and porcupines, found ill or dead in the rainforest.

Vaccine and treatment: No licensed vaccine for EVD is available. Several vaccines are being tested, but none are available for clinical use. Severely ailing patients require intensive supportive care. They are frequently dehydrated and require oral rehydration with solutions containing electrolytes or intravenous fluids.

Source: WHO Media Center, Fact sheet N°103, April 2014

PROFILE OF HEAD OF COMSATS S&T CENTRE OF EXCELLENCE

ASSOC. PROF. BAHADIR TUNABOYLU, PRESIDENT TÜBİTAK MAM, TURKEY

Dr. Bahadır Tunaboylu is the incumbent President of TÜBİTAK Marmara Research Center (MAM), a leading multidisciplinary research institution working under the patronage of Scientific and Technological Research Council of Turkey (TÜBİTAK). MAM has been the accredited COMSATS Centre of Excellence since October 1994.



Dr. Tunaboylu did his B.S. in Metallurgical Engineering (1983-1988) from ODTÜ/Middle East Technical University, Ankara, and M.S. in Ceramic Engineering (1989-1991) from New York State College of Ceramics at Alfred University, USA. From 1991 to 1997, he continued his higher education and received his doctorate degree in Materials Science from the University of California, San Diego, USA.

Dr. Tunaboylu started his professional career in 1988 at the Turkish Standards Institute, Ankara, as a Metallurgical Engineer. After over a year, he left for USA, where he worked at Alfred University (New York) and University of California (San Diego) as Research Assistant during the next eight years of his life (1989-1997). While working for Alfred University, he also upgraded his academic qualification to attain a Master's degree from the University's New York College of Ceramics. From 1997 to 2010, Dr. Tunaboylu received great professional experience working for a number of U.S. companies, before returning to his home country, Turkey. During these thirteen years he worked as Materials Scientist at Cerprobe Corp and K&S Industries (1997-2000); Project Manager/R&D at Kulicke & Soffa Industries and Test Systems Manager at SV Probe Inc. (2000-2007); and later as R&D Director at SV Probe Inc. (2007-2010).

Since his return to Turkey in 2010, Dr. Tunaboylu has been affiliated with Istanbul Sehir University as Associate Professor. His association with TÜBİTAK MAM started in 2012 when he took charge as the Acting Director of the Center's Materials Institute. In early 2014, Dr. Tunaboylu took over as the President TÜBİTAK MAM.

Dr. Tunaboylu remained focused throughout his academic and professional career on materials science. Accordingly, his research interests have been in New Materials Development; Semiconductor Technologies; Design and Modeling of Renewable Energy Systems; and Engineering Management.

He has worked with a number of national/international organizations for R&D projects, including: Thermal

Management of Li-Polymer Battery Pack Modules for Efficiency Improvement to be Used in Green Transportation (a project of KORANET-EU); Development of photocatalytic, antibacterial and fire resistant nano-composite paint (funded by Turkish Ministry of Science, Industry and Technology). The two R&D projects he is currently contributing to are: 'LED Lighting Technology Development'; and 'Development of Super-alloy Turbine Blades for Aerospace Applications'.

As an academician, he has supervised three M.S. students, while four are currently benefiting from his scholastic and professional experience. Dr. Tunaboylu has to his credit a number of publications in renowned journals and industrial magazines related to materials science. He made a number of technical presentations in international seminars and his papers have been published in different conference proceedings. As a researcher, he has 23 patents with U.S. Patent Office, while five patent applications are under process.

Dr. Tunaboylu has been a part of several scientific societies and technical committees. Some of these include: Member of Organizing Committees for the 6th International Conference for Entrepreneurship, Innovation, and Regional Development (ICEIRD-2013), Istanbul; International Workshop on SSL-Solid State Lighting 2013, Istanbul; SOLAR TR 2014 Conference and Exhibition; and International Porous Materials Conference (2013), Izmir, Turkey. He has been Board Chairman of TÜBİTAK Marmara Research Center; Board Member of TÜBİTAK National Metrology Institute; Advisory Board Member of Karabuk University (Iron & Steel Institute); Co-chair of Turkey-USA Materials Working Group; and Member of Turkish Nanotechnology Platform.

Dr. Tunaboylu is a recipient of IEEE-CPMT Best Paper Award (2012); Most Inspirational Presentation Award (2010); and Intel Tool Operations, Outstanding Service and Support Award (2005 & 2006). For his scientific excellence and meritorious work, Dr. Tunaboylu also won NATO Fellowship (1989-1992); US/Lawrence Livermore National Labs/IGPP Project (1992); and US DARPA Grant, Graduate Researcher (1993).

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COMSATS BRIEF AND ANNOUNCEMENTS

4th International Workshop on Internet Security: Enhancing Information Exchange Safeguards October 19-23, 2014, Dar-es-Salaam, Tanzania

COMSATS, in collaboration with the Islamic Educational, Scientific and Cultural Organization (ISESCO); the Inter Islamic Network on Information Technology (INIT); COMSATS Institute of Information Technology (CIIT), Pakistan; and the Tanzania Commission for Science & Technology (COSTECH), Tanzania, is organizing the 4th International Workshop on 'Internet Security: Enhancing Information Exchange Safeguards' in Dar-es-Salaam, Tanzania. The international workshop will be held on October 19-23, 2014.

The workshop aims to provide a forum to the young scientists/researchers/system administrators from the developing countries to learn, inter alia, about the latest advancements in the field of Internet security; promote the use of state-of-the-art technologies for protection of network and network-accessible resources from different types of malicious attacks; and risk-analysis and security management. Partial or full financial support will be provided to selected foreign participants from Member States of COMSATS, ISESCO and INIT. For more information, please visit www.comsats.org or write to Advisor (Programmes) at husseint@comsats.net.pk.

CALL FOR PAPERS FOR COMSATS JOURNAL SCIENCE VISION: VOL. 20

Science Vision is a biannual scientific journal of COMSATS. It primarily aims at highlighting the important scientific and technological developments that have a bearing on socio-economic conditions of the people by publishing research as well as review articles. Scientists, researchers, policy-makers and young scholars from S&T organizations and R&D institutions are encouraged to contribute articles on any scientific field of interest in line with the focus of the journal.

COMSATS invites scholarly contributions for the Volume 20, Issue 2 (July to December 2014) of Science Vision. In view of 2014 being celebrated as the International Year of Crystallography, scholars are also encouraged to send papers highlighting the potential and applications of the field. As per the policy of the journal, contributors are compensated for their time and efforts with a modest amount of honorarium. Contributions may be sent to the Managing Editor at: comsats@comsats.org. For more details, please visit the journal's website:

Nominations Open for 2015 Elsevier Foundation Awards in Physics and Maths (Deadline October 17, 2014)

The Organization for Women in Science for the Developing World (OWSD) invites nominations for the Elsevier Foundation Awards (2015) in Physics and Maths for Early-Career Women Scientists in the Developing World. Launched by the Elsevier Foundation, TWAS and OWSD, these Awards celebrate the achievements of women scientists in the early stages of their careers, with the aim of creating role models for other women to follow. Each of the five winners of this Award receive a cash prize of US\$5,000, plus all-expenses paid for attending the annual meeting of the American Association for the Advancement of Science (AAAS) in 2015 in San Jose, California, USA; as well as one year's access to Elsevier's ScienceDirect and Scopus journals. In addition, this year, given the award is in Physics and Mathematics, the Abdus Salam International Centre for Theoretical Physics (ICTP) is offering each of the winners, free attendance and accommodation for one of ICTP's renowned workshops or conferences in Trieste, Italy.

For more details, please visit: <http://owsd.ictp.it>, or write to: info@owsd.net.

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A BRIEF ON COMSATS

COMSATS is an inter-governmental organization, with its Secretariat located in Islamabad, Pakistan. Currently it has 21 countries as its Member States and an affiliated Network of 19 scientific institutions.

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