

Report on Workshop to discuss collaboration between PASET's Regional Scholarship and Innovation Fund and the University Mohammed VI Polytechnic in Morocco to Strengthen Africa's Capacity for the Applied Sciences, Engineering and Technology

Dates: 4-6 September 2019

For more information please contact:

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1.0 Introduction

In May 2019, The Partnership for skills in Applied Sciences, Engineering and Technology (PASET)¹ represented by Prof. George A.O. Magoha, Cabinet Secretary for Education of the Government of Kenya and Chair of the PASET Governing Council and the Mohamed VI Polytechnic University (UM6P)² (Represented by M. Hicham El Habti, Executive Vice-President of UM6P) signed a Memorandum of Understanding (MoU) to collaborate in broad areas of capacity building, research and innovation in the applied sciences, engineering and technology. The MoU was the first step towards a long-term collaboration between the two parties. The intent of the collaboration was to i) strengthen the quality of the PhD programs in the RSIF Host Universities in SSA countries through sandwich PhD programs offered in the RSIF Host Universities and in UM6P and its ecosystem; ii) facilitate visits of faculty from UM6P for short duration teaching in the RSIF Host Universities; visits of faculty from RSIF Host Universities to UM6P to enhance their capacities for research, innovation and PhD training; iii) undertake collaborative research between faculty of UM6P and faculty of RSIF Host Universities as well as RSIF Scholars who have completed their PhDs in the sandwich programs; and, iv) engage in and support innovation projects in RSIF Host universities aimed to address the needs of SSA countries in the selected thematic areas and, which can involve collaboration with private sector firms or the development of new products and processes.

To support implementation of the MoU, an inaugural workshop was co-organized by Mohamed VI Polytechnic University (UM6P), icipe and the World Bank at the UM6P campus in Benguerir Morocco between 4-6 September 2019. The overall purpose of the workshop was to discuss the implementation arrangements for the recently signed MoU. Specifically, the objectives of the three-day workshop were to:

1. Identify potential areas for collaboration and partnership between the two institutions, including in new research areas;

¹ The Partnership for skills in Applied Sciences, Engineering and Technology (PASET) aims to address systemic gaps in skills and knowledge in Sub-Saharan Africa's priority ASET fields, and to build the capacity of African education and training institutions to train high quality technicians, engineers and scientists to meet the demands of the economy. The Regional Scholarship and Innovation Fund is PASET's flagship program. Icipe is the Regional Coordination Unit for RSIF. For more information, please visit www.rsif-paset.org.

² Mohammed VI Polytechnic University is an institution dedicated to research and innovation in Africa and aims to position itself among world-renowned universities in its fields. The University is engaged in economic and human development and puts research and innovation at the forefront of African development. Located in the municipality of Benguerir, in the very heart of the Green City, knowledge, science and technology development is the primary mission of the university. The University seeks to bring forth a new generation of competent African leaders, develop sustainable partnerships, promote research, and share the values of social responsibility and sustainable development. Please visit www.um6p.ma for more information.

2. Identify opportunities for joint research and supervision for PhD students registered at the PASET RSIF African Host Universities to undertake research at UM6P as part of their sandwich training;
3. Deepen understanding of Innovation platforms/ systems and related capacity available at UM6P and identify opportunities for collaboration to strengthen AHU innovation capacity and training;
4. Identify opportunities for exchange of faculty professors and researchers;
5. Discuss how to strengthen partnerships between PASET and the OCP Group (i.e. by joint research & innovation through competitive grants on specific thematic areas of relevance to OCP).

The Workshop was attended by representatives from the eleven AHUs and counterpart research teams from UM6P. Representatives from the World Bank, OCP, and icipe also attended the three-day meeting (See Annex 1 for List of Participants). The workshop was designed to allow the two parties to better understand their respective missions and 'modus operandi' to facilitate partnership building and identification of specific areas and activities for the collaboration. The three-day workshop included facilitated discussions, site visits and breakout sessions. The discussions were arranged based on the five PASET thematic areas of i) food security & agribusiness, ii) climate change, iii) energy including renewables, iv) ICT including artificial intelligence and v) Minerals and Material Science.

This Report provides a summary of the workshop proceedings and highlights the key agreements from the workshop.

2.0 Summary of key activities

2.1 Day 1: Opening ceremony and guided visit to the UM6P campus

- The first day of the workshop began with presentations from UM6P, OCP, the World Bank and *icipe* representatives.
- UM6P and OCP spoke to the vision of establishing a unique pan-African partnership to address the skills gap in ASET fields and providing creative solutions to address African challenges through innovation, collaboration and cutting-edge research through the spirit of partnership.
- The PASET Executive Board Director, Professor Aminata Sall Diallo, reminded the workshop of the need to embark on an ambitious goal to train a critical mass of knowledgeable future science leaders in sub-Saharan Africa (SSA) through thought leadership, innovation and grit.
- Dr. Sajitha Bashir, WB Advisor for Science, Technology and Innovation provided a background presentation on the genesis and ambition of the PASET initiative and its flagship program, the RSIF. Dr. Bashir's presentation offered a historical context for the vision and design of the Regional Scholarship and Innovation Fund which is envisaged to become the only sustainable pan- African Science Fund led by African governments. Dr. Bashir also spoke to the impetus for developing the PASET initiative which is borne out of the need to train a critical mass of technicians, technologists, scientists in order for Africa to adopt, diffuse, and adapt to new technologies sweeping the world.
- Dr. Safaa El-Kogali, WB Education Practice Manager delivered opening remarks on behalf of the World Bank and informed the meeting of the strong support of the Bank leadership for the PASET Program. Dr. El-Kogali's remarks echoed the imperative to strive to lead through collaboration and the World Bank's commitment to the PASET initiative.
- Dr. Moses Osiru, Manager of the RSIF at *icipe* provided grounding in the implementation of the RSIF initiative including the competitive and iterative process involved in selecting universities and doctoral students. Dr. Osiru noted the important need for partnerships to strengthen doctoral education in Africa. He noted that UM6P due to its relationship with OCP has important experience, expertise and lessons to share with RSIF AHUs.

The welcome addresses were followed by presentations from teams across UM6P including members which included details the OCP research collaborations, innovation models and spaces as well as the UM6P foundation.

Guided UM6P campus tour included the following:

1. **Teaching Centre:** This guided tour provided insight into the learning environment available at UM6P including visits to the digital learning lab, learning centre and E-Tech lab. These facilities were designed to offer students with spaces to engage in learning as well as faculty members to design instruments for remote learning. The digital learning lab is equipped with a green room and interactive tools to produce virtual content for students. The learning centre is a full library and designed to offer students with creative spaces to enhance their learning experience.
2. **Research Centre:** This is a vast space where students, researchers and faculty are encouraged to engage in theoretical and practical exploration. The UM6P research model is unique in the sense that the daily research activities conducted on campus respond to real-time challenges. UM6P is currently engaged in over 200 research projects (65% basic / 35% applied) with the plan of growing exponentially in the next few years. The research centre is equipped with tools and technologies for students and researchers to participate in basic and applied research.
3. **Incubator:** This is a creative space which offers training in innovation and fosters a spirit of innovation on campus. The vision of the UM6P incubator is to build a strong community of African Entrepreneurs driving innovative solutions across the continent. This space is also home to the collective intelligence team which explores machine learning, cognitive science and design. Innovation ecosystems at UM6P include:
 - a. Pcuriously (iLab): This action-oriented innovation lab is intended to explore, prototype and test innovation services supporting smallholder farmers through the development of solutions in the area of farmer wellbeing, farm sustainability and environmental health.
 - b. IMPULSE: The program is intended to strengthen OCP Group's innovation systems and contribute to the development of the entrepreneurship and innovation ecosystems in Morocco and Africa. This is a 12-week acceleration program is dedicated to innovative startups in the fields of Ag tech; Mining Tech; Biotech; Materials science & Nanotechnology. The program offers mentorship and coaching, access to business opportunities, financing as well as a possible cash prize of \$250,000, access to UM6P infrastructure, study trips and access to 430 m2 co-working space.
 - c. UM6P ventures: This is a venture fund of \$15 million dollars dedicated to student entrepreneurs and university startups.
4. **Green Energy Park:** This is a vast space which includes innovative laboratories including a grid laboratory and sustainable construction laboratory. Through the smart campus model, UM6P has established an experiential learning space to explore and test difference techniques for a more sustainable future. An example of the learning includes testing the energy interaction of the smart city of tomorrow, testing different communication protocols and smart grids all of which are grounded in the following UM6P green energy primary research focus areas; solar photovoltaic, solar thermal, modeling and electric mobility. The tour concluded with a visit to the student led construction site for the 1st edition of the UM6P and IRESEN 'Solar Decathlon Africa'. This is the largest student competition in the world gathering more than 1000 students from 51 universities in Africa to design and build solar powered houses.

5. **Experimental Farm:** The visit to the living laboratory spaces offered insight into the convergence of research and experiential learning at UM6P. The philosophy of the living lab is grounded in the generation of sustainable solutions for stakeholders with a focus on end-user solutions. Through the partnership with OCP, UM6P experiential learning spaces provide services and solutions to improve the efficiency and effectiveness of OCP production. The space includes simulation and automation systems to provide innovation in the area of mining and farm production. The experimental spaces are equipped introduce real-life conditions and to improve operationalization.

2.2 Day 2: Visit to the Jorf Lasfar Industrial Park

The OCP Jorf Lasfar industrial park is the largest fertilizer complex in the world. In 2016, the African Fertilizer Complex was inaugurated in an industrial park of 490 ha as a fertilizer production plant dedicated entirely to Africa.

2.3 Day 3: Roundtable Discussions

The roundtable discussions and workshop included presentations and discussion on the PASET thematic areas. Dr. Moses Osiru facilitated the discussions and centered the exercise in order to deepen the engagement between AHU representatives and UM6P counterparts. There were four breakout groups to engage in discussion to identify areas of common research interest, knowledge production and staff exchange, doctoral student training, innovation along the five PASET thematic areas described above. In order to facilitate discussion, the thematic area on climate change and food security were merged into one group. A summary of the roundtable discussion outcomes are below.

2.3.1 GROUP 1: ICT INCLUDING BIG DATA AND ARTIFICIAL INTELLIGENCE

The following priority research areas/ topics were identified for the partnership:

1. Optimal planning of mass transit systems in African cities
 - Urban transportation, School buses, Distribution of products & services, Airline industry and transportation for persons with limited mobility
2. Solutions for improved road safety
 - Collection and Digitalization of data
 - Analyzing the characteristics of road accidents in African cities
 - Developing new strategies to reduce the increasing rates of accidents
 - Modeling the capacity roundabouts (Joined faculty research)
 - Efficient allocation of police patrols
3. Solutions for improved Healthcare management
 - Infrastructure level & IoT
 - Software for e-Health (HER (Electronic Health Records), MPHR (Mobile Personal health records))
 - Data analytics & Machine learning for health record)
4. Education
 - Using cognitive science
 - Data analysis / platform
 - Profiling of students
 - Recommend adapted courses for student

2.3.2 GROUP 2: FOOD SECURITY, AGRIBUSINESS AND CLIMATE CHANGE

1. **The following Priority Student Research areas were identified under this thematic area:**
 - a) Soil sciences & fertility of soils (fertilisers)
 - b) Loss of productivity (pests, plant diseases, yield gap)
 - c) Water management in the context of climate change
 - d) Nutritional quality of agricultural products (micronutrients, legumes, bio fortification, etc.)
 - e) Economics and policy (commercialisation, value chain, macroeconomics and sectorial policies)
2. **Types of collaborations to be pursued (including institutional capacity building) are:**
 - a) Sandwich training
 - b) Development and delivery of core courses for PhD students in the domain in the host Universities (e.g. Research methodology/ statistics and their application; Data Science, Data Visualization, Scientific Writing, Intellectual Property and Technology Transfer, Management and Economic and Social Impact Policy). These courses to be co-designed and modality of deliver to be decided by AHUs and UM6P (live streaming/ online courses).
 - c) Development of joint research proposals
 - d) Staff exchange
3. **Modality of collaborations and other issues discussed**
 - a) Sandwich training
 - b) Defining IP policy harmonization
 - c) Core courses and how they are delivered (especially in francophone contexts)
 - d) How do you inculcate the spirit of innovation (educating the future leaders in academia, entrepreneurship, policy, etc.)
 - e) Networking with other initiatives

2.3.3 GROUP 3: MINERALS, MINING AND MATERIALS ENGINEERING

Priority research areas identified include:

1. Sustainable mining and mining lifecycle
 - a. Waste management
 - b. Bio-mining
 - c. Environmental impact of mining
 - d. Mineral beneficiation
 - e. Extraction
 - f. New technologies for exploration
 - g. New resources and technologies for new fertilizers
 - h. Digital mines
2. Smart/ novel materials
 - a. Materials for energy
 - Thermal storage
 - Smart window coatings
 - Battery materials
 - b. Corrosion protection
 - c. Drying technologies
 - d. Sensors
 - e. Perovskites and solar technologies
 - f. Wear-resistance coatings
 - g. New technologies in geological exploration
3. Biomass valorization and water management

- a. Water treatment including filters and filtration (ceramic, clay, etc.) and membranes
 - b. Heavy metals extraction
 - c. Fire retardants
 - d. Biofuels
 - e. Building materials
 - f. Lignocellulosic materials
4. Some foreseeable joint activities
- a. Joint PhD program (incoming RSIF students)
 - b. Joint research and supervision
 - c. PhD program strengthening
 - d. Faculty exchange
 - e. Training opportunities
 - f. Joint curriculum development
 - g. Meetings, joint conferences + other events at UM6P

2.3.4 GROUP 4: ENERGY INCLUDING RENEWABLES

A. Priority research areas identified include:

1. Smart materials for energy and processes
 - Valorization of African materials (biomass, minerals)
 - Applications: Catalyst, energy storage, PV, Photothermal, H₂, Fuel cells, Solar cells etc.
2. Energy efficient processes
 - Energy management systems
 - Unconventional heating systems (microwave, induction, plasma etc.)
 - Carbon capture systems
3. Energy economics, policy, management
 - Transition, regulation/tariffs, behavior, energy mixes, alternative uses in Africa/value addition

B. Sandwich Ph.D. Program

1. Joint supervision
 - a. Joint proposal development
 - b. Regular meetings (in-person, virtual)
2. Ensure the right student for the right project and right environment
 - a. Background, capability, interest
 - b. Start planning together early
 - c. Based on the research project, agree on what aspects of research study to be done where
3. Interdisciplinary teams
4. Academic/faculty exchange
 - a. Courses, seminars, teaching, training/workshops, conferences,etc.
5. Involving an industry partner
 - Provide issues and problems, advice, consultation, etc.
 - Regular meetings, internship, R&D labs, financial support (if possible)

C: Innovation

1. Intellectual property
 - a. Licensing
 - b. Patenting

2. Share ownership
 - a. More freedom to students to exploit ideas
 - b. University policies to be respected
3. Strengthen incubation/tech transfer systems at AHUs
 - a. Create strong links with industry
 - b. Innovation must be the aim of each project (market-oriented research).

3.0 Way forward

Following the workshop, the following actions will be taken as the 'next steps' from the workshop.

1. UM6P and icipe to draft the meeting report and share with all participants for input prior to finalization;
2. Agree on initial short courses to be co-developed between the AHUs and UM6P and how these should be delivered. The use of open educational resources should be seriously considered for the delivery;
3. UM6P to share a short report with OCP group, clearly articulating the key areas for joint research of relevance to OCP and to suggest partnership modalities between OCP, UM6P and PASET;
4. Consider the organizing of a write shop to respond to specific calls for proposals along the joint areas of research and student collaboration;
5. Identify available opportunities at UM6P to partner with AHUs either through the RSIF scholars, joint projects, and beyond;
6. Need to prepare a story on the workshop and broadly on the collaboration for sharing with the media and widely;
7. Need to build a virtual collaboration space to facilitate and nurture communities of practice in the five key thematic areas of PASET. Discussions groups/ virtual platforms will be created to enable further deliberations on the priority areas and to facilitate the creation of communities of practice for the thematic areas; and,
8. Need to explore further the interlinkages between all priority areas (i.e. between ICT and mining; mining, minerals and materials science and energy; climate change and energy etc) as a means to improve outcomes.

Annex 1: List of Participants

For PASET RSIF

1. Prof. Aminata Sall Diallo, Executive Director of the PASET Executive Board
2. Madam Safaa El-Kogali, Education Practice Manager at the World Bank
3. Sajitha Bashir, Advisor for Science, Technology and Innovation Office of the Global Director for Education
4. Moses Osiru, PASET / ICIPE, Kenya
5. Rob Skilton, PASET / ICIPE, Kenya
6. Julius Ecuru, PASET / ICIPE, Kenya
7. Prof. Irene Egyir, Agricultural Economics and Agribusiness at the University of Ghana, Accra, Ghana
8. Prof. Sharadhuli Kimera, Professor of Veterinary Epidemiology, Lead of Community of Practice for Food Security at Sokoine University of Agriculture | Africa Center of Excellence for Infectious Diseases of Humans & Animals in Southern & Eastern Africa (SACIDS), Morogoro, Tanzania
9. Prof. Sunday Sunday Ikiensikimama, Department of Petroleum & Gas Engineering at the University of Port Harcourt | African Centre of Excellence for Oilfield Chemicals Research (ACE-CEFOR)", Port Harcourt, Nigeria
10. Prof. Julius M. Mwabora, Chairman, Department of Physics at the University of Nairobi, Nairobi, Kenya
11. Prof. Cherif Mamadou, Laboratory of Plant Physiology and UFR Biosciences at the University Felix Houphouet Boigny | Africa Center of Excellence for Climate Change Biodiversity and Sustainable Agriculture (CCBAD), Ivory Coast
12. Prof. Jibrin Mohamed, Director, African Centre for Dryland Agriculture (CDA) at Bayero University, Kano, Nigeria
13. Prof. Mwemezi Rwiza, Dept of Water, Environmental Science and Engineering (WESE) at The Nelson Mandela Institute of Science and Technology, Arusha, Tanzania
14. Prof. Walter Njoroge, Physics Department at Kenyatta University, Nairobi, Kenya
15. Prof. Peter Onwualu, Coordinator in Materials Science and Engineering Programme, Director Academic Planning at African University of Science and Technology and Co-Centre Leader, Pan African Materials Institute (PAMI), Abuja, Nigeria
16. Dr. Didacienne Mukanyiligira, Lecturer, Computer and Software Engineering at University of Rwanda | African Center of Excellence in Internet of Things (ACEIoT), Kigali, Rwanda
17. Prof. Cheikh Ba, Associate Professor, Computer Science at University Gaston Berger (UGB) | Africa Center of Excellence for Mathematics, Informatics, and ICT (MITIC), Dakar, Senegal

For UM6P

18. Prof. Rachid Doukkali, Poles Humanities
19. Prof. Gabriel Marka, Director, Centre Interface Applications Medicales (CIAM)
20. Dr. Khalil Mjahed, Deputy Director, Agricultural Innovation and Technology Transfert Center AITTC
21. Mehdi KHOULOUD, Researcher, Chemical & biochemical sciences- Green process engineering (CBS/GPE)
22. MARTIN JEMO, Professor Agrobiosciences (AGBS)
23. Abdallah OUKARROUM, Agrobiosciences Professor (AGBS)
24. Otmane RAJI, Professor Geology & Sustainable Mining (GSM)
25. Mohammed Benkammoun, Professor, School of Computer and Communication Science, SCCS
26. Laurent DESHAYES, Lead Manager Innovation Lab for operations (ILO),
27. Ikram Chairi, Professor, Modeling, Simulation and Data Analysis
28. Nizar El Hachemi, Professor, Logistic Supply Chain Program
29. Abdulmutallib Metrane, Professor, Logistic Supply Chain Program
30. Ilyas Himmich, Researcher, Logistic Supply Chain Program
31. Jones Alami, Full Professor and Department Lead, Materials science, energy and nanoengineering (MSN) Jean-Louis BODINIER: Department Head, Geology & Sustainable Mining (GSM)
32. Bouazzaoui EL JABBAR: Researcher, Geology & Sustainable Mining (GSM)
33. Hicham benyoucef, Professor, Materials science, energy and nanoengineering (MSN)
34. Houssine Sehaqui, Professor, Materials science, energy and nanoengineering (MSN)
35. Youssef Tamraoui, Professor, Materials science, energy and nanoengineering (MSN)
36. Mounir El Achaby, Professor, Materials science, energy and nanoengineering (MSN)
37. Mohamed EL KHOUAKHI, Project Manager for Mineral Processing, Innovation Lab for Operation (ILO)
38. Khadija LALAM, Project Manager for Mineral Processing, Innovation Lab for Operation (ILO)
39. Redouane BENIAZZA, Professor, Chemical & biochemical sciences- Green process engineering (CBS/GPE)
40. Mohammed MAKAN, Researcher, Materials science, energy and nanoengineering (MSN)
41. Sliman MANAR, Researcher, Chemical & biochemical sciences- Green process engineering (CBS/GPE)



42. Abdelhjani Chehbouni, Lead of International Water Resources Institute (IWRI/UM6P) et Lead of « Excellence Center for Remote sensing Applications (CRSA/UM6P)
43. Mouad Dahbi, Professor Professor, Materials science, energy and nanoengineering (MSN)
44. Mohammed Makha, Researcher, Materials science, energy and nanoengineering (MSN)
45. Ahmed Chebak, Professor, Innovation Lab for Operations (ILO)

Annex 2: Breakout group participants			
PASET 5-Fields	RSIF AHUs African Host Universities	UM6P Mohammed VI Polytechnic University	Moderator
Food Security and Agribusiness	<ul style="list-style-type: none"> • Prof. Irene Egyir, Agricultural Economics and Agribusiness at the University of Ghana, Accra, Ghana • Prof Sharadhuli Kimera, Professor of Veterinary Epidemiology, Lead of Community of Practice for Food Security at Sokoine University of Agriculture Africa Center of Excellence for Infectious Diseases of Humans & Animals in Southern & Eastern Africa (SACIDS), Morogoro, Tanzania 	<ul style="list-style-type: none"> • Prof. Rachid Doukkali, Poles Humanities • Prof. Gabriel Marka, Director, CENTRE INTERFACE APPLICATIONS MEDICALES (CIAM) • Dr. Khalil Mjahed, Deputy Director, Agricultural Innovation and Technology Transfert Center AITTC • Mehdi KHOULOUD, Researcher, CHEMICAL & BIOCHEMICAL SCIENCES.GREEN PROCESS ENGINEERING CBS/GPE • MARTIN JEMO, Professor AGROBIOSCIENCES (AGBS) • Abdallah OUKARROUM, AGROBIOSCIENCES Professor (AGBS) • Otmame RAJI, Professor GEOLOGY & SUSTAINABLE MINING (GSM) 	Sajitha Bashir, Advisor for Science, Technology and Innovation Office of the Global Director for Education
Energy including renewables	<ul style="list-style-type: none"> • Prof. Sunday Sunday Ikiensikimama, Department of Petroleum & Gas Engineering at the University of Port Harcourt African Centre of Excellence for Oilfield Chemicals Research (ACE-CEFOR)", Port Harcourt, Nigeria • Prof. Julius M. Mwabora, Chairman, Department of Physics at the University of Nairobi, Nairobi, Kenya 	<ul style="list-style-type: none"> • Mouad Dahbi, Professor Professor, MATERIALS SCIENCE, ENERGY AND NANOENGINEERING (MSN) • Mohammed Makha, Researcher, MATERIALS SCIENCE, ENERGY AND NANOENGINEERING (MSN) • Ahmed Chebak, Professor, Innovation Lab for Operations (ILO) 	Julius Ecuru, PASET / ICIPE, Kenya
Climate Change	<ul style="list-style-type: none"> • Prof Cherif Mamadou, Laboratory of Plant Physiology and UFR Biosciences at the University Felix Houphouet Boigny Africa Center of Excellence for Climate Change Biodiversity and Sustainable Agriculture (CCBAD), Abidjan, Ivory Coast • Prof. Jibrin Mohamed, Director, African Centre for Dryland Agriculture (CDA) at Bayero University, Kano, Nigeria 	<ul style="list-style-type: none"> • Abdelhjeni Chehbouni, Lead of International Water Resources Institute (IWRI/UM6P) et Lead of « Excellence Center for Remote sensing Applications (CRSA/UM6P) 	Moses Osiru, PASET / ICIPE, Kenya

<p>Minerals, Mining and Materials Engineering</p>	<ul style="list-style-type: none"> • Prof. Mwemezi Rwiza, Dept of Water, Environmental Science and Engineering (WESE) at The Nelson Mandela Institute of Science and Technology, Arusha, Tanzania • Prof. Walter Njoroge, Physics Department at Kenyatta University, Nairobi, Kenya • Prof. Peter Onwuualu, Coordinator in Materials Science and Engineering Programme, Director Academic Planning at African University of Science and Technology and Co-Centre Leader, Pan African Materials Institute (PAMI), Abuja, Nigeria 	<ul style="list-style-type: none"> • Jones Alami, Full Professor and Department Lead, MSN, MATERIALS SCIENCE, ENERGY AND NANOENGINEERING (MSN^o) • Jean-Louis BODINIER: Department Head, Geology & Sustainable Mining (GSM) • Bouazzaoui EL JABBAR: Researcher, Geology & Sustainable Mining (GSM) • Hicham benyoucef, Professor, MATERIALS SCIENCE, ENERGY AND NANOENGINEERING MSN • Houssine Sehaqui, Professor, MATERIALS SCIENCE, ENERGY AND NANOENGINEERING MSN • Youssef Tamraoui, Professor, MATERIALS SCIENCE, ENERGY AND NANOENGINEERING MSN • Mounir El Achaby, Professor, MATERIALS SCIENCE, ENERGY AND NANOENGINEERING MSN • Mohamed EL KHOUAKHI, Project Manager for Mineral Processing, Innovation Lab for Operation (ILO) • Khadija LALAM, Project Manager for Mineral Processing, Innovation Lab for Operation (ILO) • Redouane BENIAZZA, Professor, CHEMICAL & BIOCHEMICAL SCIENCES.GREEN PROCESS ENGINEERING CBS/GPE • Mohammed MAKAN, Researcher, MATERIALS SCIENCE, ENERGY AND NANOENGINEERING MSN • Sliman MANAR, Researcher, CHEMICAL & BIOCHEMICAL SCIENCES.GREEN PROCESS ENGINEERING CBS/GPE 	<p>Rob Skilton, PASET / ICIPE, Kenya</p>
<p>ICTs including big data and artificial intelligence</p>	<ul style="list-style-type: none"> • Dr. Didacienne Mukanyiligira, Lecturer, Computer and Software Engineering at University of Rwanda African Center of Excellence in Internet of Things (ACEIoT), Kigali,Rwanda • Prof. Cheikh Ba, Associate Professor, Computer Science at University Gaston Berger (UGB) Africa Center of Excellence for Mathematics, Informatics, and ICT (MITIC), Dakar, Senegal 	<ul style="list-style-type: none"> • Mohammed Benkammoun, Professor, School of Computer and Communication Science, SCCS • Laurent DESHAYES, Lead Manager Innovation Lab for operations (ILO), • Ikram Chairi, Professor, MSDA MODELING, SIMULATION AND DATA ANALYSIS • Nizar El Hachemi, Professor, Logistic Supply Chain Program • Abdulmutallib Metrane, Professor, Logistic Supply Chain Program • Ilyas Himmich, Researcher, Logistic Supply Chain Program 	<p>Madam Safaa El-Kogali, Education Practice Manager at the World Bank</p>