

IST-Africa 2017

Conference Report

Windhoek, Namibia

31 May - 02 June 2017

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ISTAfrica

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Introduction

IST-Africa 2017 Conference took place 31 May - 02 June 2017 in Windhoek, Namibia, as part of **IST-Africa Week 2017**. An activity of **IST-Africa**, which is supported by the European Commission and African Union Commission and co-funded under the EU Framework Programme, **IST-Africa 2017** was the twelfth in an Annual Conference Series bringing together senior representatives from leading public, private, education & research organisations, to discuss ICT policy, showcase research results and share knowledge.

European research activities are structured around consecutive multi-annual programmes, or so-called Framework Programmes. Horizon 2020 sets out the Priorities and thematic areas, including ICT, for 2014 - 2020. Horizon 2020 is fully open to international co-operation with the aim to jointly address major challenges where significant added value is expected to be gained from a world-wide R&D cooperation. In this context, the European Commission has co-funded **IST-Africa** since 2006, to promote African - European research cooperation and support Information Society and ICT aspects of the Africa-EU Strategic Partnership.

Hosted by the Government of Namibia through the National Commission on Research, Science and Technology and Technically Co-Sponsored by IEEE, **IST-Africa 2017** focused on the the Role of ICT, Research and Innovation in Africa's Development and specifically on Applied ICT research in the areas of eHealth, Technology Enhanced Learning and ICT Skills, eInfrastructures, eAgriculture, Societal Implications of Technology, International Cooperation, ICT4D and eGovernment. **IST-Africa 2017** provided a collegiate setting for presentations and discussions of national & regional developments, issues of concern & good practice models, and networking with peers. **IST-Africa 2017** provided an opportunity to identify potential partners for future proposals under Horizon 2020.

IST-Africa directly supports Information Society, Innovation and ICT aspects of the Africa-EU Strategic Partnership, the African Ministerial Council on Science and Technology (AMCOST) and the Consolidated Plan of Action for the African Regional Action Plan on the Knowledge Economy (ARAPKE).

The goals of the **IST-Africa** Conference Series are Community Building to facilitate EU-African research cooperation and successful exploitation of research results, to stimulate take-up of RTD results, to promote knowledge sharing between commercial, government and research organisations, to exchange experiences about the current state of eAdoption at a sectoral, national or regional level, and to support International Cooperation and open up the European Research Area (ERA) to Africa.

Participants at IST-Africa 2017

IST-Africa 2017 Conference attracted over 400 delegates from 36 countries representing policy makers, practitioners, and researchers from leading commercial, government and research organisations around the world. Unlike many research conferences, **IST-Africa** provided an opportunity to meet with senior managers, practitioners, project managers, software engineers and researchers from industry, government and research organisations. Delegates and speakers attended to share knowledge, experience and lessons learnt, and network with their peers from around the world.

IST-Africa 2017 Conference also provided the unique opportunity to identify partners and opportunities to co-operate in international ICT research projects co-funded by the European Commission under Horizon 2020. The Programme also facilitated sharing of interim results from ongoing Horizon 2020 projects including projects funded under the ICT-39-2015 Call.

The Venue

IST-Africa 2017 Conference took place in Safari Hotel Conference Centre, Corner of Auas & Aviation Streets, Windhoek, Namibia.

The Programme

The 3-day programme featured an invigorating mix of business and government case studies, technical and policy papers and interactive workshops. As well as opening and closing plenary sessions, delegates could participate in 40 thematically focused parallel sessions featuring different aspects of International Cooperation, eHealth, Technology Enhanced Learning and ICT Skills, CyberSecurity, Privacy and Trust, Next Generation Computing including Internet-of-things, eGovernment, ICT4D, eAgriculture, Content Technologies and Societal Implications of Technology. Session Chairs will ensure active discussion and facilitate delegate participation.

In the context of focusing on the Role of ICT, Research and Innovation in Africa's Development, the Opening Plenary on Wednesday 31 May features a high level Roundtable on the Role of ICT, Research and Innovation in Supporting Entrepreneurship and Socio-Economic Development in Africa.

Horizon 2020

Horizon 2020 commenced in January 2014 as the new Framework Programme to implement the Innovation Union with research and innovation funds of €80 billion from 2014 - 2020.

Three main priorities include:

- Excellence Science – Research Infrastructures, Marie Curie (Mobility Grants), Future and Emerging Technologies
- Leadership in Enabling and Industrial Technologies (LEIT) – Components & Systems, Advanced Computing, Future Internet, Content Technologies and Information Management, Robotics, Micro and Nano-electronics and photonics
- Societal Challenges – Health, Food Security & Agriculture, Energy, Transport, Climate action and Environment, Innovation and Reflective Societies and Secure Societies

Work Programmes for 2016 and 2017 for each thematic area were published on 25 July 2016.

ICT is a horizontal activity that is included across a number of Work Programmes within LEIT and within Societal Challenges.

The IST-Africa Guide to 2017 Calls for Proposals within Horizon 2020 provides an overview of Calls, themes and deadlines within the Marie Curie, eInfrastructures, Leadership in Enabling and Industrial Technologies and each of the Societal Work Programmes.

Please visit

www.ist-africa.org/home/default.asp?page=horizon2020

to download the individual Work Programmes and IST-Africa Guide to 2017 Calls for Proposals

IEEE Experts in Technology and Policy (ETAP) Forum, 30 May

IST-Africa cooperating with IEEE to organise the first IEEE Experts in Technology and Policy (ETAP) Forum on Internet Governance, Cybersecurity, Privacy and Inclusion to take place in Africa as the pre-conference event on Tuesday 30 May.

This pre-conference workshop was designed to bring together technology developers and policy makers to debate current and future Internet governance, cybersecurity and privacy issues across the African continent. Presentations shared experiences from Namibia, South Africa, Cameroon and NEPAD, followed by group work around specific topics.

Conference Proceedings

The **IST-Africa 2017** conference proceedings were published on a USB Drive and published on an open access basis in the Paper Repository on the Conference Portal. Each delegate received a free copy of the conference proceedings at Registration.

Papers that were physically presented during the event also had the option for their paper to be included in the **IST-Africa 2017** Conference Proceedings submitted for publication in IEEE Xplore.

IST-Africa Initiative

Supported by the European Commission (EC) and African Union Commission (AUC), and Co-Funded under Horizon 2020 (Contract 723240), **IST-Africa** facilitates and supports:

- International Innovation, Research and Policy Cooperation
- Knowledge Sharing and Skills Transfer between IST-Africa Partners
- Collaborative Innovation, Entrepreneurship & Adoption of Living Labs
- Africa – EU Strategic Partnership (Information Society, ICT, Innovation)

IST-Africa Activities include:

- an Annual IST-Africa Week Hosted by IST-Africa Partner Governments and associated Scientific Proceedings;
- Monitoring and Analysis of ICT-related research and Innovation Activities in IST-Africa Partner countries; Coordination of national Innovation ecosystem stakeholders to formulate Research and Innovation priorities;
- Awareness raising of Research and Innovation Cooperation opportunities between Africa and Europe;
- Horizon 2020 Training Workshops to Support Research Capacity Building and Help Desk supporting African - European Research Collaboration; and
- Participation in Information Society, ICT and Innovation related International Cooperation

IST-Africa is a collaborative initiative between IIMC International Information Management Corporation Limited (Ireland, Coordinator), Department of Science and Technology (South Africa), Ministry of Transport and Communications (Botswana), Ministry of Communications, Science and Technology (Lesotho), National Commission for Research Science and Technology (Namibia), INTIC (Mozambique), National Computer Board (Mauritius), Ministry of Information Communication Technology (Swaziland), National Commission for Science and Technology (Malawi), COSTECH - Tanzania Commission for Science and Technology, Uganda National Council for Science and Technology, Ministry of Higher Education, Science and Technology (Kenya), Ministère de l'Enseignement Supérieur et de la Recherche Scientifique (Burundi), Ministry of Communication and Information Technology (Ethiopia), Agence Nationale des Technologies de l'Information et de la Communication (Cameroon), Ministère de l'Enseignement Supérieur, des Universités et de la Recherche (Senegal), Ministère de l'Enseignement Supérieur et de la Recherche Scientifique (Tunisia) and Information Technology Industry Development Agency (Egypt).

Plenary Session Speakers



H.E. Dr Nickey Iyambo
Vice President, Republic of Namibia



Hon. Dr Itah Kandji - Murangi
Minister of Higher Education,
Training and Innovation



Hon. Tjekero Tweya
Minister of Information and
Communication Technology



Dr Eino Mvula
CEO
NCRST



Mr Mbeuta Ua-Ndjarakana
Permanent Secretary
Ministry of ICT



Mr Festus K. Mbandeka
CEO,
CRAN



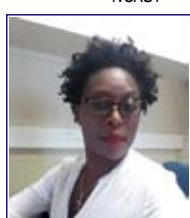
Prof Kingo Mchombu
Pro-Vice Chancellor Academic
and Research, IUM



Dr Anicia Peters
Dean, Faculty of Computing
and Informatics, NUST



Mr Theo Klein
Managing Director
Telecom Namibia



Mrs Karin Fröhlich
DPSITM, Office of Prime
Minister



Mr John Sifani
Centre for Innovation and
Development, UNAM

Plenary Speakers & Panelists as at 18 May 2017 included:

- **His Excellency Dr Nickey Iyambo**, Vice President, Republic of Namibia
- **Hon. Dr. Itah Kandji-Murangi**, Minister of Higher Education, Training and Innovation, Namibia
- **Hon. Tjekero Tweya**, Minister of Information and Communication Technology, Namibia
- **H.E. Ambassador Jana Hybaskova**, European Union Delegation to Namibia
- **Presenter to be confirmed**, African Union Commission
- **Dr Eino Mvula**, CEO, National Commission on Research Science and Technology, Namibia
- **Mr Festus K. Mbandeka**, CEO, Communications Regulatory Authority of Namibia
- **Mr Mbeuta Ua-Ndjarakana**, Permanent Secretary, Ministry of ICT, Namibia
- **Mrs Karin Amukugo**, Department of Public Service Information Technology Management, Office of Prime Minister, Namibia
- **Wilfred Kuria**, CEO, Xnet Development Trust, Namibia
- **Prof Kingo Mchombu**, Pro-Vice Chancellor Academic and Research, International University of Management
- **Dr Anicia Peters**, Dean: Faculty of Computing and Informatics, Namibia University of Science and Technology
- **Mr. John Sifani**, Director: Centre for Innovation and Development, Office of PVC: Research, Innovation and Development University of Namibia
- **Mr Theo Klein**, Managing Director, Telecom Namibia
- **Mr Francesco Affinito**, Head of Sector for Research and Innovation, DG DEVCO, European Commission
- **Towela Nyirenda-Jere**, NEPAD Agency, South Africa
- **Mrs Ndeshipanda Ndilula**, Former Director, DPSITM, Office of the Prime Minister, Namibia
- **Flora Ismail Tibazarwa**, SAIS II, Namibia
- **Dr Maïke Luiken**, IEEE, Canada

International Programme Committee

A distinguished Programme Committee was formed to review and provide feedback on papers and presentations, and chair sessions.

The **IST-Africa 2017** International Programme Committee includes

- **Paul Cunningham** (Conference Chair), IIMC International Information Management Corporation Ltd, Ireland
- **Oscar Alvear Alvear**, Universitat Politècnica de València, Spain
- **Tiwonge Msulira Banda**, Ubuntunet Alliance, Malawi
- **Dr. Philip A. Catherwood**, NIBEC Research Labs, Ulster University, Northern Ireland
- **Laurens Cloete**, Meraka Institute, CSIR, South Africa
- **Miriam Cunningham**, IIMC International Information Management Corporation Ltd, Ireland
- **Kim Davis**, Research Council of Norway, Norway
- **Dr Shirley Davey**, School of Engineering, Ulster University, Northern Ireland
- **Prof. Nomusa Dlodlo**, Informatics Department, Namibia University of Science and Technology, Namibia
- **Prof. Love Ekenberg**, DSV, University of Stockholm, Sweden
- **Leonardo Chancay Garcia**, Universitat Politècnica de València, Spain
- **Attlee Gamundani**, Computer Science Department, Namibia University of Science and Technology, Namibia
- **Seilendria A. Hadiwardoyo**, Universitat Politècnica de València, Spain
- **Dr. Charmayne Hughes**, Health Equity Institute, San Francisco State University, USA
- **Dr. Mike Joy**, University of Warwick, United Kingdom
- **Dr. Chipo Kanjo**, Department of Computer Science, Chancellor College, University of Malawi, Malawi
- **Vasilis Koulolias**, eGovLab, Stockholm University, Sweden
- **Kristiina Lahde**, 4Front, Finland
- **Jorge E. Luzuriaga**, Universitat Politècnica de València, Spain
- **Dr. Sirkku Männikkö Barbuti**, DSV, Stockholm University, Sweden
- **Dr. Johann Marquez-Barja**, Trinity College Dublin, Ireland
- **Jorge Luis Zambrano Martinez**, Universitat Politècnica de València, Spain
- **Prof. Maurice Mars**, University of KwaZulu-Natal, South Africa

- **William Zamora Mero**, Universidad Laica Eloy Alfaro de Manabí, Ecuador
- **Morten Møller**, GRENEN, Denmark
- **Dr Fungai Bhunu Shava**, Computer Science Department, Namibia University of Science and Technology, Namibia
- **Richard Stevens**, IDC, Italy
- **Jorge Herrera-Tapia**, Universidad Laica Eloy Alfaro de Manabí, Ecuador
- **Dr Marita Turpin**, Department of Informatics, University of Pretoria, South Africa
- **Prof. Darelle Van Greunen**, Nelson Mandela Metropolitan University, South Africa

Organising Committee

- **Miriam Cunningham**, IIMC, Ireland
- **Paul Cunningham**, IIMC, Ireland
- **Diina Shuuluka**, National Commission on Research Science and Technology, Namibia
- **Gernot Piepmeyer**, National Commission on Research Science and Technology, Namibia
- **Ebenhezer Kauhonina**, National Commission on Research Science and Technology, Namibia



Conference Secretariat

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Wednesday, May 31, 2017

08:00

Registration

09:00 Opening Plenary 1a: [Opening Plenary](#)**Opening Remarks**

Dr Eino Mvula, CEO, National Commission on Research Science and Technology, Namibia

EU Africa Research and Innovation Cooperation

H.E. Ambassador Jana Hybaskova, European Union Delegation to Namibia

African Union Commission Address

Presenter to be confirmed, African Union Commission

Importance of Research and Innovation within the Higher Education sector in Namibia

Hon. Dr. Itah Kandjii-Murangi, Minister of Higher Education, Training and Innovation, Namibia

Importance of ICT in Namibia

Honourable Tjekero Tweya, Minister of Information and Communication Technology, Namibia

Official Welcome

His Excellency Dr Nickey Iyambo, Vice President, Republic of Namibia

10:30

Coffee Break

11:00 Plenary Session 2a: [High-Level Roundtable focused on Role of ICT, Research and Innovation in Supporting Entrepreneurship and Socio-Economic Development in Africa](#)

Moderator: [Paul Cunningham, IIMC, Ireland](#)

Panelists include:

Dr Eino Mvula, CEO, National Commission on Research Science and Technology, Namibia

Dr Alfred van Kent, Permanent Secretary, Ministry of Higher Education, Training and Innovation, Namibia (tbc)

Mr Mbeuta Ua-Ndjarakana, Permanent Secretary, Ministry of ICT, Namibia

Mr Festus K. Mbandeka, CEO, CRAN

Mrs Karin Fröhlich, Department of Public Service Information Technology Management, Office of Prime Minister

Wilfred Kuria, CEO, Xnet Development Trust, Namibia

Prof Kingo Mchombu, Pro-Vice Chancellor Academic and Research, International University of Management

Dr Anicia Peters, Dean: Faculty of Computing and Informatics, Namibia University of Science and Technology

Mr. John Sifani, Director: Centre for Innovation and Development, Office of PVC: Research, Innovation and Development, UNAM

Mr Theo Klein, Managing Director, Telecom Namibia

12:30

Lunch

14:00 Workshop 3a: [IST-Africa - Research Capacities and Priorities I](#)

Chair: [Paul Cunningham, IIMC, Ireland](#)

IST-Africa Initiative

Paul Cunningham, IIMC, Ireland

ICT Initiatives and Research Capacity in Namibia

Ebenhezer Kauhonina, NCRST, Namibia

ICT Initiatives and Research Capacity in Mozambique

Augusto Nunes, National Institute for ICT, Mozambique

ICT Initiatives and Research Capacity in Botswana

Phodiso Phole, Ministry of Transport and Communications, Botswana

ICT Initiatives and Research Capacity in Lesotho

Lieketseng Tjokotsi, Department of Science and Technology, Lesotho

ICT Initiatives and Research Capacity in South Africa

Peacemaker Dlamini, Department of Science and Technology, South Africa

14:00 Session 3b: [eHealth I](#)

Chair: [Charmayne Hughes, San Francisco State University, United States](#)

mHealth in Palliative Care for Cancer Patients & Care givers

Newton Andebe, University of Nairobi, Kenya

Enhancing Management of Nutrition Information Using Mobile Application: Prenatal and Postnatal Requirements

Neema Mduma, The Nelson Mandela African Institution of Science and Technology, Tanzania

The Feasibility of Using an Android-Based Infant Fingerprint Biometrics System For Treatment Follow-Up

Paul Macharia, Ministry of Health, Kenya

Mobile Technology for Health Information Dissemination

Nikodemus Angula, Namibia University of Science and Technology, Namibia

14:00 Session 3c: [Technology-enhanced Learning I](#)

Chair: [Jacob Njagih, Ministry of Education, Science and Technology, Kenya](#)

Results of Smart Device Based Arithmetic Competition in Blue Nile State, Sudan, in Hindi-Arabic Script

Mohammed Elbasheir, Sudan University of Sciences and IT, Sudan

Introducing Computer Programming in Secondary Schools: A Case Study of NAMTOSS

Tulimevava Mufeti, University of Namibia, Namibia

Rethinking Tertiary Computer Science Education: Let's have Pi

Anton Limbo, University of Namibia, Namibia

An e-Converter: Digitizing Manual Conversions of Mathematics and Physics Quantities

Bongisa Dyosoba, University of Fort Hare, South Africa

Agile Software Development Methods Practise in Computer Science Education: Adoption and Recommendations in Tanzania

Diana Severine Rwegasira, University of Dar es Salaam, Tanzania

14:00 Session 3d: [CyberSecurity, Privacy and Trust I](#)

Chair: [Njei Check, ANTIC, Cameroon](#)

Measuring Cyber Security Capacity Building in Africa

Basie von Solms, University of Johannesburg, South Africa

Towards Quantifying and Defining Privacy Metrics for Online Users

Frans Blauw, University of Johannesburg, South Africa

Do Users Know or Care About What is Done with their Personal Data: A South African Study

Paula Kotze, Council for Scientific and Industrial Research, South Africa

Are Organisations in South Africa Ready to Comply with Personal Data Protection or Privacy Legislation and Regulations?

Ntsako Baloyi, Council for Scientific and Industrial Research, South Africa

Privacy in Social Media: Big Data Perspective

Nobubele Shoji, CSIR, South Africa

Cyber Security, Privacy and Trust

Alfredo M. Ronchi, Politecnico di Milano, Italy

14:00 Session 3e: [Next Generation Computing I](#)

Chair: [Fungai Bhunu Shava, Namibia University of Science and Technology](#)

Smart Renewable Energy Systems: A Great Opportunity for Developing Countries

Zenville Erasmus, University of the Western Cape, South Africa

An Efficient Cluster-Based and Energy Aware Scheme for M2M Communication Networks

Isaac Woungang, Ryerson University, Canada

BER Performance for Feasible FSOC Deployment in Namibia and South Africa

Abraham Salom, University of Namibia, Namibia

Assessing the Effects of Various SchedTypes and CoS

Combinations on WiMAX QoS and GoS

Phumzile Nomnga, University of Fort Hare, South Africa

15:45

Coffee Break

16:15 Workshop 4a: [IST-Africa - Research Capacities & Priorities II](#)

Chair: [Paul Cunningham, IIMC, Ireland](#)

ICT Initiatives and Research Capacity in Malawi

Gift Kadzamira, National Commission for Science and Technology, Malawi

ICT Initiatives and Research Capacity in Swaziland

Rejoice Maseko, MICT, Swaziland

ICT Initiatives and Research Capacity in Mauritius

Ashwin Seegolam, National Computer Board, Mauritius

ICT Initiatives and Research Capacity in Kenya
Jacob Njagih, Ministry of Education, Science and Technology, Kenya
ICT Initiatives and Research Capacity in Ethiopia
Leulseged Alemie, MCIT, Ethiopia
ICT Initiatives and Research Capacity in Tanzania
Mauridi Abubakari, COSTECH, Tanzania

16:15 Session 4b: [eHealth II](#)

Chair: [Chipo Kanjo, Chancellor College, University of Malawi, Malawi](#)

A Reflective Analysis of the North and South Research Collaboration in Mobile Health Projects

Felix Ntawanga, University of South Africa, South Africa

Agent-based Interoperability System in Health Insurance

James Liech, National Hospital Insurance Fund, Kenya

A Framework for Low Cost Automatic Pill Dispensing Unit for Medication Management

Gift Arnold Mugisha, Uganda Martyrs Secondary School, Uganda

Structuring Information on the Web, An Example with Pharmacies Services

Mateus Padoca Calado, Universidade Agostinho Neto, Angola

16:15 Session 4c: [Technology-enhanced Learning II](#)

Chair: [Mweneni Shahungu, NCRST, Namibia](#)

Technology in Education and Training – Opportunities to transform Learning

Maike Luiken, IEEE, Canada

Learner Experience of E-learning Mode in Institutions of Higher Learning: A Case of Kenyan Universities

Elizaphan Maina, Kenyatta University, Kenya

An Assessment of Predictors of Learner's Attention and their Influence to Learner's Engagement and Learning outcomes in a Mobile Learning Classroom

Ruth Wario, University of the Free State, South Africa

Student's Experiences of Using Blogs to Promote Experiential Learning in a Blended Classroom: A Case of a Kenyan Public University

Rhoda Gitonga, Kenyatta University, Kenya

Using Log Data of Virtual Learning Environments to Examine the Effectiveness of Online Learning for Teacher Education in Rwanda

Jean Claude Byungura, Stockholm University, Rwanda

16:15 Session 4d: [CyberSecurity, Privacy and Trust II](#)

Chair: [Haitham Hamza, ITIDA, Egypt](#)

Towards a Conceptual Framework for Information Security Digital Divide

Emmanuel Chisanga, CITC Namibia, Namibia

A Gap Analysis of the ISO/IEC 27000 Standard Implementation in Namibia

Diana Tjirare, Namibia University of Science and Technology, Namibia

Developing a Cyber Counterintelligence Maturity Model for Developing Countries

Victor Jaquire, University of Johannesburg, South Africa

A Proposed Digital Forensic Investigation Framework for an eGovernment Structure for Uganda

Hein Venter, University of Pretoria, South Africa

A Security Model for Namibian Government Services

Licky Erastus, Namibia University of Science and Technology, Namibia

A Secure Cloud Storage System for Small and Medium Enterprises

Basie von Solms, University of Johannesburg, South Africa

16:15 Session 4e: [Next Generation Computing II](#)

Chair: [Attlee Gamundani, Namibia University of Science and Technology](#)

Adoption of RFID in Large Scale Organisations – A review of challenges and solutions

Abdulbaqi Badru, University of KwaZulu-Natal, South Africa

A Data Management and Analytic Model for Business Intelligence Applications

Misheck Banda, University of South Africa, South Africa

Features of Conceptual Blending in the Context of Visualisation

Coral Featherstone, Meraka Institute, South Africa

Elastic everything, what of the developing world?

Diamuid O'Brian, netLabs!UG Research Centre, Makerere University, Uganda

An IoT Architecture for Financial Services in Developing Countries

Suvendi Rimer, Nedbank, South Africa



Thursday,
June 01, 2017

09:00 Workshop 5a: [IST-Africa - Research Capacities & Priorities III](#)

Chair: [Paul Cunningham, IIMC, Ireland](#)

ICT Initiatives and Research Capacity in Uganda

Loi Namugenyi, Uganda National Council for Science & Technology, Uganda

ICT Initiatives and Research Capacity in Cameroon

Njei Check, National Agency for Information and Communication Technologies (ANTIC), Cameroon

ICT Initiatives and Research Capacity in Egypt

Haitham Hamza, Information Technology Industry Development Agency (ITIDA), Egypt

ICT Initiatives and Research Capacity in Senegal

Toumane Doumbouya, Ministère de l'Enseignement Supérieur et de la Recherche, Senegal

ICT Initiatives and Research Capacity in Tunisia

Mourad Zghal, Ministry of Higher Education and Scientific Research, Tunisia

09:00 Session 5b: [eHealth III - Health Information Systems](#)

Chair: [Darelle Van Greunen, Nelson Mandela University, South Africa](#)

Exploring Information Assurance to support Electronic Health Record Systems

Liezel Cilliers, University of Fort Hare, South Africa

Digitization of Antenatal Health Card and Integration with OpenMRS Platform: System Analysis and Design

Erica Kimei, Nelson Mandela African Institution of Science and Technology, Tanzania

Design of Tooltips for Health Data

Mari Iversen and Helene Isaksen, University of Oslo, Norway

09:00 Session 5c: [Technology Enhanced Learning III](#)

Chair: [Maggy Beukes-Amiss, University of Namibia](#)

ICT Based Professional Development Programmes: Impact of Demographic Factors on Teachers' Attitude

Lovemore Motsi, Unisa, South Africa

Barriers in Rural Technology Integration: A Case Study from the Trenches

Adele Botha, CSIR Meraka Institute, South Africa

Using Digital Badges in South Africa informing the validation of a multi-channel Open Badge system at a German University

Marlien Herselman, Meraka Institute, CSIR, South Africa

Electronic Proofs in Mathematics Education - A South African

Teacher Professional Development (TPD) course informing the conceptualisation of an E-proof System Authoring Support Workshop

Melanie Platz, University of Koblenz Landau, Campus Landau, Germany

09:00 Session 5d: [CyberSecurity, Privacy and Trust III](#)

Chair: [Towela Nyirenda-Jere, NEPAD Planning and Coordinating Agency, South Africa](#)

Advances Towards a Secure IoT through Trust Management

Caroline Gurajena, University of Fort Hare, South Africa

Beyond the Convenience of Internet of Things: Security and Privacy Concerns

Sophia Moganedi, CSIR, South Africa

Mobile Subscribers Vulnerability to Financial Crime over the SMS Platform

Evanson Kiburio, Africa Nazarene University, Kenya

Session Hijacking Attacks in Wireless Networks: A review of existing mitigation techniques

Enos Letsoalo, Tshwane University of Technology, South Africa

Pick Location Security: Seamless Integrated Multi-Factor Authentication

Icconies Ramatsakane, PwC, South Africa

18:00

End of Parallel Sessions

Potential Digital Evidence Acquisition and Retention
Stacey Omeleze, University of Pretoria, South Africa

09:00 Session 5e: **Next Generation Computing IIII**

Chair: **Peacemaker Dlamini, Department of Science and Technology, South Africa**

Lightweight Cloud Computing for Development: A Graph Based Data Model

Antoine Bagula, University of the Western cape, South Africa

Cloud Computing Adoption in The Kenya's Banking Sector: An Institutional Perspective

John Oredo, Kisii University, Kenya

Securing M-voting using Cloud Intrusion Detection and Prevention system: A new dawn

Dina Moloja, Central University of Technology, South Africa

Critical Success Factor Categories for Big Data: A Preliminary Analysis of the Current Academic Landscape

Sunet Eybers, University of Pretoria, South Africa

Big Data: We're Almost at Infinity

Valerianus Hashiyana, University of Namibia, Namibia

10:45

Coffee Break

11:15 Session 6a: **eGovernment I**

Chair: **Vasilis Koulolias, eGovlab, Sweden**

An Integrated Framework for Benchmarking e-Governance Projects

Sylvester Hatsu, University of South Africa/Accra Polytechnic, Ghana

A Citizen-Centric Framework for Government e-Services Uptake

Mohammad Abu Dawood Mulung, University of Mauritius, Mauritius

Evaluating the Effects of e-Government Initiatives on Citizen-centric Goals at Selected Namibian Government Ministry

Karin Fröhlich, DPSITM, Office of the Prime Minister, Namibia

A Citizen-Oriented e-Municipality System for Service Delivery Improvement: A Case Study of Raymond Mhlaba Local Municipality

Thabo Linake, University of Fort Hare, South Africa

Challenges to the Successful Implementation of E-Governance Systems in Africa: A Case of Taita Taveta County, Kenya.

Tabitha Mberi, Strathmore University, Kenya

11:15 Session 6b: **eHealth IV - Health Information Systems**

Chair: **Joseph Mudjuu, Ministry of Health and Social Services, Namibia**

Boundary Object in HIS: Designing and Implementation of a Regional Scorecard

Wilfred Senyoni, University of Dar es Salaam, Tanzania

Exploring Integrative Approach of GIS Implementation: The Case of GIS in Health Management in Malawi

Patrick Chikumba, University of Malawi

Usability for Novices and Experts: a layered design in a case study in Malawi

Jens Kaasbøll, University of Oslo, Norway

Pooling Human Resources Needed to Leverage Open Source Health Information Software Platforms in Developing Countries

Brown Msiska, University of Oslo, Norway

11:15 Session 6c: **Technology Enhanced Learning IV**

Chair: **Martin Ujakpa, International University of Management, Namibia**

An Implementation Readiness Framework for Education Systems: Integrating ICT into Teaching and Learning

Sifiso Dlamini, CSIR Meraka Institute, South Africa

An Adaptive Recommender-System Based Framework for Personalised Teaching and Learning on E-Learning Platforms

Munyaradzi Maravanyika, Namibia University of Science and Technology, Namibia

Elearning Induction Model for the Uptake of Online Courses: A Case of Kenyatta University

Rose Njoroge, Kenyatta University, Kenya

Technology-Enhanced Learning Through Sakai (Thuto) at The National University of Lesotho

Lebajoa Mphatsi, National University of Lesotho, Lesotho

Determinants of eLearning Adoption Among Instructors in Ugandan Public Universities

Sonny Nyeko, Makerere University Business School, Uganda

11:15 Session 6d: **CyberSecurity, Privacy and Trust IV**

Chair: **Chipo Kanjo, Chancellor College, University of Malawi**

A Review of Security Challenges for Control of Access to Wi-Fi Networks in Tertiary Institutions

Stanford Musarurwa, Namibia University of Science and Technology, Namibia

Design and Implementation of an Intrusion Detection System using MLP-NN for MANET

Innocent Mapanga, Harare Institute of Technology, Zimbabwe

Vulnerability Testing in the Development Cycle

Alice van Rensburg, University of Johannesburg, South Africa

Development of an SMS System Used to Access Bitcoin Wallets

Nelisiwe Dlamini, CSIR, South Africa

Requirements for Stereovision-based Access Control for Physical Spaces

Brian Greaves, University of Johannesburg, South Africa

11:15 Session 6e: **Next Generation Computing IV**

Chair: **Peacemaker Dlamini, Department of Science and Technology, South Africa**

Spectrum Regulation for Future Internet Networks in Developing Economies

Luzango Mfupe, CSIR Meraka Institute, South Africa

A Scalable Zigbee WPAN for Water Flow Telemetry

Kirori Mindo, Kabarak University, Kenya

Home Intercommunication System using Visible Light Communications

Olorato Precious Lekgotle, University of Johannesburg, South Africa

13:00

Lunch

14:00 Session 7a: **eGovernment II**

Chair: **Augusto Nunes, National Institute for ICT, Mozambique**

Understanding eGovernment Utilisation within the SADC

Willard Munyoka, University of Venda, South Africa

Towards an eGovernment Framework for the Republic of Uganda

Ivans Kigwana, University of Pretoria, South Africa

Evaluating a Mobile Visualization System for Service Delivery Problems in Developing Countries

Ingrid Sieborger, Rhodes University, South Africa

The Use of Sentiment Analysis and Topic Modelling to Understand Online Communicative Ecologies in MobisAM

Hannah Thinyane, Rhodes University/United Nations University, South Africa

Understanding how the City of Johannesburg Metropolitan Municipality's Social Media Platforms are Perceived by Young Citizens

Lutendo Phuluwa, University of Pretoria, South Africa

14:00 Session 7b: **eHealth V**

Chair: **Ashwin Seegolam, National Computer Board, Mauritius**

A Scoping Review of Digital Health Innovation Ecosystems in Developed and Developing Countries

Gloria Iyawa, University of Namibia/University of South Africa, Namibia

Comparative Usability Evaluation of a Mobile Health App

Alida Veldsman, Nelson Mandela University, South Africa

A Model for Telemedicine Adoption in Remote Healthcare Settings

Gilbert Maiga, Makerere University, Uganda

Upper Extremity Injuries in Sub-Saharan Africa

Charmayne Hughes, San Francisco State University, United States

14:00 Session 7c: **Technology Enhanced Learning V**

Chair: **Sashah Mutasa, International University of Management, Namibia**

Evaluating the Impact of Digital Divide on the Performance of First Year IT Students: A Case of UKZN

Victor Faniran, University of KwaZulu-Natal, South Africa

Designing and Exploring Study Field Recommender System for Prospective Students

Tlou Ramabu, Tshwane University of Technology, South Africa

Barriers Towards the Adoption of a Practical Training Management System at the University of Dar es Salaam

Christine Mwase, University of Dar es Salaam, Tanzania

Towards the Development of an Agent-based Model for Increased Access to Knowledge

Elizabeth Muli, Technical University of Kenya, Kenya

Using Data Mining Techniques for the Prediction of Student Dropouts from University Science Programs

William Tichaona Vambe, University of Fort Hare, South Africa

14:00 Session 7d: **CyberSecurity, Privacy and Trust V**

Chair: **Robert Jere, Namibia University of Science and Technology**

From Risk Factors to Detection and Intervention: A Metareview and Practical Proposal for Research on Cyberbullying

Panayiotis Zaphiris, Cyprus University of Technology, Cyprus

Cyber-Smart Children, Cyber-Safe Teenagers: Enhancing Internet Safety for Children

Tracy Weru, Strathmore University, Kenya

Humanitarian Perspective of Cybersecurity and Cybersecurity Governance

Rossouw de Bruin, University of Johannesburg, South Africa

Applying the Gordon & Ford categorisation and the Routine Activities Theory to Cybercrime: A Suitable Target

Sagwadi Mabunda, University of the Western Cape, South Africa

An Evaluation of Security Issues in Cloud-Based File Sharing Technologies

Sikhumbuzo Ngwenya, University of Fort Hare, South Africa

14:00 Workshop 7e: **WAZIUP**

Chair: **Md Abdur Rahim, Create-net, Italy**

WAZIUP - Affordable IoT and Big Data Solution in Africa

Md Abdur Rahim, Create-net, Italy

IoT, An Affordable Technology to Empower Africans Addressing Needs in Africa

Philippe Cousin, Easy Global Market, France

IoT, Big Data, and Cloud Platform for Rural African Needs

Mehdi Sheikhalishahi, InnoTec21 GmbH, Germany

IoT Innovation Community Building and Business Spin-off

Amy Ndiaye, CTIC Dakar, Senegal

Panel Discussion

15:45

Coffee Break

16:15 Session 8a: **eGovernment III**

Chair: **Phodiso Phole, Ministry of Transport and Communications, Botswana**

The ITS4LAND Project

John Horn, Faculty for Geo-Information Science and Earth Observation (ITC), Netherlands

Quantitative Metadata on e-Government Ontologies in the oeGov Repository

Jean Vincent Fonou Dombeu, Vaal University of Technology, South Africa

Validation of the Framework for Corporate Governance of ICT in Local Government

Petrus Delpont, Nelson Mandela Metropolitan University, South Africa

Managing IT Skills Transfer in an Outsourcing Partnership within the Namibian Ministries Computing Environment

Irja Shaanika, Namibia University of Science and Technology, Namibia

IT Project Management Maturity in South African Municipalities

Silma Koekemoer, Nelson Mandela University, South Africa

16:15 Workshop 8b: **mHealth4Afrika**

Chair: **Paul Cunningham, IIMC, Ireland**

mHealth4Afrika Initiative

Paul Cunningham, IIMC, Ireland

Implications of Baseline Study Findings from Rural and Deep Rural Clinics in Ethiopia, Kenya, Malawi and South Africa for the co-design of mHealth4Afrika

Miriam Cunningham, IIMC, Ireland

mHealth4Afrika Alpha Validation Results

Darelle Van Greunen, Nelson Mandela University, South Africa

16:15 Session 8c: **Technology Enhanced Learning VI**

Chair: **Gift Kadzamira, National Commission for Science and Technology, Malawi**

Systemic Levers for Change Towards Sustainable Institutionalisation of ICT in Schools

Isabel Meyer, Impact Advantage, South Africa

Information and Communication Technology Platforms Deployment: Technology Access Reaches South African Rural Areas

Tumiso Thulare, CSIR, South Africa

Learners' Perceptions on the Adoption of Mobile Technology in High Schools: A Case of Otjozondjupa Region in Namibia

Jude Osakwe, Namibia University of Science and Technology, Namibia

16:15 Session 8d: **ICT4D I**

Chair: **Marita Turpin, University of Pretoria, South Africa**

Development Aid 2.0 – Towards Innovation-Centric Development Co-operation: The Case of Finland in Southern Africa

Lauri Johannes Hooli, University of Turku, Finland

Mozambique/Norway Accessibility Partnership

G. Anthony Giannoumis, Oslo and Akershus University College of Applied Sciences, Norway

Social Mapping for Supporting Sensemaking and Collaboration: the Case of Development Informatics Research in South Africa

Mario Marais, CSIR, South Africa

Evolving a new community through Tuckman model and WhatsApp messaging platform

Adebowale Owoseni, UNISA / Union Bank of Nigeria Plc, Nigeria

The Usage of Khudze Multipurpose Community Telecentre in Mwanza District, Malawi

Sellina Khumbo Kapondera, Mzuzu University, Malawi

16:15 Session 8e: **Internet of Things**

Chair: **Njei Check, National Agency for Information and Communication Technologies (ANTIC), Cameroon**

Internet of Things Data Integrity

Zinhle Mngomezulu, University of Johannesburg, South Africa

Re-Using Old Cellphones for IoT Applications

Karabo Modise, University of Johannesburg, South Africa

How an IoT-enabled "Smart Refrigerator" can play a Clandestine Role in Perpetuating Cyber-crime

Victor Rigworo Kemande, University of Pretoria, South Africa

Internet Society Chapter Activities in Namibia

Nashilongo Gervasius & Annastasia Shipepe, Internet Society Chapter, Namibia

18:00

End of Parallel Sessions



Friday,
June 02, 2017

09:00 Session 9a: **eGovernment IV**

Chair: **Leulseged Alemie, Ministry of Communications and Information Technology, Ethiopia**

Accessibility and Usability of Government Websites in Tanzania
Joel Mtebe, University of Dar es Salaam, Tanzania

Unlocking the Supply of Open Government Data for SDGs: A Case of Kenya National Bureau of Statistics (KNBS)
Lorna Mutege, Strathmore University, Kenya

E-voting Experiences: A Case of Namibia and Estonia
Noluntu Mpekoa, Central University of Technology, South Africa

The Role of ICT in Enhancing Transparency and Accountability in Public Funds Management in DRC
Itulelo Matiyabu Imaja, University of KwaZulu-Natal, Congo (DRC)

Addressing Service Delivery in Rural Areas through Deployment of Information and Communication Technology Platforms
Lebogang Legare, CSIR, South Africa

09:00 Session 9b: **eHealth VI**

Chair: **Joseph Mudjuu, Ministry of Health and Social Services, Namibia**

Towards a Deployment Model for E-Monitoring of Geriatric Persons in Rural Developing Countries. Case of Kenya
Njeri Ngaruiya, University of Nairobi, Kenya

Fighting Obesity: A Proposed Formula for Calculating Gamified Airtime Rewards for Using Public Exercise Equipment
Laura Martinus, CSIR, South Africa

Managing Diseases Thru' Asclepios: An Agile Information Exploitation Framework
Lakshmi Narasimhan, University of Botswana, Botswana

A Web-Based Health Patient Information Sharing Model for Namibia (WBHPISM): Case Study of Windhoek Health Centres
Sinte Mutelo, Namibia University of Science and Technology, Namibia

09:00 Session 9c: **Technology Enhanced Learning VII**

Chair: **Jacob Njagih, Ministry of Education, Science and Technology, Kenya**

Learning in a Virtual Classroom: Efforts to Improve Ways of Learning and the Environment
Francis Mungofa Manzira, University of Venda, South Africa

Exploring How Technology Complements Constructivism Using A Lesson Plan
Gorge Onyango, Kenyatta University, Kenya

An Overview of FunGIS: Functional Geospatial Information System with an Emphasis on Aiding Disabled People
V Sampath Kumar, Botho University, Botswana

Amateur Radio as a Vehicle for Technology Literacy
Chris Burger, CSIR Meraka Institute, South Africa

09:00 Session 9d: **ICT4D II**

Chair: **Rejoice Maseko, Ministry of Information Communication Technology, Swaziland**

Complex Societal Problem Related to the Internet Access and Electricity access in DRC
Isaac Kamiba, Ecole Supérieure d'Informatique Salama, Congo (DRC)

ICT and COMPRAM to Assess Road Traffic Congestion Management in Kinshasa
Antoine Kayisu, University of Johannesburg, South Africa

Network Monitoring System for Network Equipment Availability and Performance Reporting
Baphumelele Masikisiki, University of Fort Hare, South Africa

09:00 Session 9e: **eAgriculture**

Chair: **Loi Namugenyi, Uganda National Council for Science & Technology**

IoT at the Grassroots – Exploring the Use of Sensors for Livestock Monitoring in Low Resourced Farms
Ciira Maina, Dedan Kimathi University of Technology, Kenya

Jaguza Livestock App, the App Transforming Livestock Production and Strengthening Food Security
Ronald Katamba, AFROSOFT IT Solutions, Uganda

The Development of a Mobile Information System to Assess the Food Security of Rural Communities in South Africa
Marita Turpin, University of Pretoria, South Africa

Farmers' Perceptions of ICTs and its Effects on Agricultural Input Information in Developing Countries: Case of Sikasso, Mali
Suama Hamunyela, Namibia University of Science and Technology, Namibia

10:45

Coffee Break

11:15 Session 10a: **ICT & Financial Services**

Chair: **Mauridi Abubakari, COSTECH, Tanzania**

ICT Solutions for Financial Inclusion: Reaching Out to the Unbanked in Low Resource Settings
Chipo Kanjo, Chancellor College, University of Malawi

Understanding User Experience of Mobile Money Services in Emerging Markets
Gorretti Byomire, Makerere University Business School, Uganda

Assessing the Diffusion and Use of Mobile Payment Solutions: a Case of South African Townships
Jabu Mtsweni, CSIR, South Africa
A Zero Effort Technology-enabled Automated Teller Machine for the Blind

Bekithemba Ntini, University of Fort Hare, South Africa

11:00 Session 10b: **eHealth VII**

Chair: **Puumue Katjuanjjo, Ministry of Health and Social Services, Namibia**

eSurveillance for Public Health – An Implementation Approach for sub-Saharan Africa
Karl Stroetmann, empirica GmbH, Germany

Modelling Health Information during Catastrophic Events - A Disaster Management System for Sudan
Ahmed Mustafa, SUST, Sudan

Mitigating Vulnerabilities and Threats for Patient-centric Healthcare Systems in Low Income Developing Countries
Darelle Van Greunen, Nelson Mandela Metropolitan University, South Africa

Blockchain as an Enabler for Public mHealth Solutions in South Africa
Martin Weiss, South African Medical Research Council, South Africa

11:00 Session 10c: **Content Technologies**

Chair: **Gift Kadzamira, National Commission for Science and Technology, Malawi**

Digitisation as a Preservation Strategy of National Heritage: A case of the Owela Museum, Windhoek
Isobel Green, Namibia University of Science and Technology, Namibia

Digitisation Technologies for Newspaper Archives in Zimbabwe: The ICT Requirements for Digitising a Selected Bulawayo Newspaper Publication at the National Archives of Zimbabwe
Delight Sigauke, National University of Science and Technology, Zimbabwe

Universal Design (Ud) and Visual Impairment: Can Ud Principles be Applied for Mobile Sharing Platform?
Tuliameni Kanyemba, Namibia University of Science and Technology

Named Entity Recognition for Amharic Using Deep Learning
Bjørn Gambäck, Norwegian University of Science and Technology, Norway

11:15 Session 10d: **Societal Implications of Technology**

Chair: **Ebenhezer Kauhonina, National Commission on Research, Science and Technology, Namibia**

African Ethics for Enhancing Soft Skills in Young IT Professionals in Southern Africa
Wai Sze Leung, University of Johannesburg, South Africa

Broadband in Schools: Towards a Definition and Model of Broadband for South African Schools
Merryl Ford, Meraka Institute, CSIR, South Africa

Investigating Battery Consumption in Low-end Smartphones: Preliminary Results

Shree Om, University of the Western Cape, South Africa

'Jobs256' Mobile App Linking Job Seekers to Job Opportunities

Emily Bagarukayo, Makerere University, Uganda

Understanding ICT Students' Knowledge and Awareness on e-Waste Management in Tanzania

Zaituni Kaijage, University of Dar es Salaam, Tanzania

11:15 Session 10e: **eAgriculture and Environmental Sustainability**

Chair: **Lieketseng Tjokotsi, Department of Science and Technology, Lesotho**

"Virtuous Cycles" for Rural Innovation and Agri-Entrepreneurship Development

Johann (Rensie) Janse van Rensburg, CSIR, South Africa

Demonstrating Communications and Control Systems for Smart Irrigation

Robert Basominger, Carnegie Mellon University, Rwanda

MCDA Criteria Elicitation For Dams In Conflicted Regions - Merowe Case Study

Mohamed Abdallah, Sudan University of Science and Technology, Sudan

Leakage Detection In Tsumeb East Water Distribution Network Using Epanet and Support Vector Regression

Joseph Kemba, University of Namibia, Namibia

Linking Climate Information to Livelihood Strategies through ICTs: the Role of Integrated Sustainable Livelihoods Framework

Michaelina Yohannis, University of Nairobi, Kenya

13:00

Lunch

14:00 Closing Plenary 11a

Chair: **Paul Cunningham, IIMC, Ireland**

Development Instrument funding of ICT R&I in the ACP countries and sub-Saharan Africa

Francesco Affinito, DG DEVCO, European Commission, Belgium

NEPAD Activities Supporting Infrastructure and ICTs

Towela Nyirenda-Jere, NEPAD Agency, South Africa

e-Government Initiative - Lesson Learned

Ndeshipanda Ndilula, Former Director, DPSITM, Office of the Prime Minister, Namibia

Growth through Stronger Innovation Systems - SAIS II

Flora Ismail Tibazarwa, SAIS II, Namibia

Preliminary Outputs from IEEE ETAP Forum

Maike Luiken, IEEE, Canada

Best Paper Award

IEEE ETAP Forum on Internet Governance and Cyber Security (30 May)

IST-Africa cooperated with IEEE Internet Initiative to organise the first IEEE Experts in Technology and Policy (ETAP) Forum on Internet Governance, Cybersecurity, Privacy and Inclusion to take place in Africa, as the pre-conference event on Tuesday 30 May.

There were over 65 participants from 25 countries. This pre-conference workshop was complemented by a full track related to Cyber Security in the Scientific Programme of **IST-Africa 2017**.

This workshop focused on CyberSecurity. **IST-Africa** invited a range of speakers to share experiences in relation to policy development, cyber security awareness and implementation at Member State level as well as insights into the AU Convention on Cybersecurity from NEPAD, South Africa, Namibia and Cameroon: Mr. Nhlanhla Lupahla, Deputy Director: Innovation, Ministry of Higher Education, Training and Innovation, Namibia on behalf of the Permanent Secretary; Prof Basie von Solms, Centre for Cyber Security, University of Johannesburg, South Africa; Elizabeth Kamutuezu, Acting Deputy Director: IPRM, Ministry of Information and Communication Technology, Namibia; Dr. Towela Nyirenda-Jere, Principal Programme Officer, NEPAD Agency, South Africa and Njei Check, Agence Nationale des Technologies de l'Information et de la Communication, Cameroon.

Following the formal presentations the participants voted on a number of topic areas and selected five main topics to focus group work around: Combatting cyber crime while maximizing Internet inclusion for all; Public awareness and education on Internet safety and cyber crime; Trends in cyber attacks and cyber crime; Data protection, privacy, and resilience in the era of Internet of Things (IoT) and National CIRT development

The participants learnt a lot during this interactive knowledge sharing event and made contacts in other countries to continue this dialogue while they are supporting activities at national level. The findings from this pre-conference event also fed into the CyberSecurity track during **IST-Africa 2017** and in the Closing Plenary.

Opening Plenary



The Opening Plenary Session was in two parts, starting with a number of high-level presentations from the Host Government and European Commission to provide an overall political context for the **IST-Africa 2017** Conference.

Ms Iyaloo Kandjabanga, National Commission on Research Science and Technology, as the Master of Ceremonies for the formal Opening Plenary invited the participants to stand for the national anthem. After the anthem Iyaloo welcomed the plenary speakers (Right Hon. Dr. Saara Kuugongelwa-Amadhila, Prime Minister of Namibia representing His Excellency Dr Nickey Iyambo, Vice President, Republic of Namibia; Mr Mbeuta Ua-Ndjarakana, Permanent Secretary, Ministry of ICT,

Namibia representing Honourable Tjekero Tweya, Minister of Information and Communication Technology, Namibia; Dr Eino Mvula, CEO, National Commission on Research Science and Technology, Namibia; Mr Raniero Leto, First Counsellor, European Union Delegation to Namibia representing H.E. Ambassador Jana Hybaskova, European Union Delegation to Namibia and Mr. Nhlanhla Lupahla: Deputy Director: Innovation, Ministry of Higher Education, Training and Innovation, Namibia representing Hon. Dr. Itah Kandjii-Murangi, Minister of Higher Education, Training and Innovation, Namibia), participants and dignitaries to **IST-Africa Week 2017** Conference. She invited Dr Eino Mvula, CEO, National Commission on Research Science and Technology to make the opening remarks.

Opening Remarks, Dr Eino Mvula, CEO, National Commission on Research Science and Technology



Dr Eino Mvula acknowledged Right Hon. Dr. Saara Kuugongelwa-Amadhila, Prime Minister of Namibia, Mr Mbeuta Ua-Ndjarakana, Permanent Secretary, Ministry of ICT, Mr Raniero Leto, First Counsellor, European Union Delegation to Namibia, Mr. Nhlanhla Lupahla, Deputy Director: Innovation, Ministry of Higher Education, Training and Innovation, Mr. Paul Cunningham, IST-Africa Founder and Coordinator, Representatives from the public, private and research and education sectors, distinguished participants, and press. Eino extended all conference participants and invited guests a very warm welcome. He outlined that the National Commission on Research, Science and Technology (NCRST) was honoured to be hosting **IST-Africa Week 2017** and believes this provided an important opportunity to bring various stakeholders in innovation together in order to foster collaboration.

As an agency, which is mandated to promote, develop, coordinate and fund research, science, technology and innovation in Namibia, one of the NCRST strategic goal is to Improve Partnership and Cooperation among all actors in STI.

The NCRST holds the view that the solutions of tomorrow evolve in the junction where different perspectives and competences meet hence we work to connect innovative actors in different sectors and fields of knowledge with one another. NCST grabbed this opportunity and worked closely with IIMC to ensure that **IST-Africa Week 2017** become a resounding success.

A call for papers was issued last year and researchers and innovators from Africa and beyond have taken advantage of this opportunity to submit papers which are being presented at **IST-Africa Week 2017**. NCRST were pleased with the overwhelming response from policy makers, practitioners and researchers who have submitted their papers to share their work with each other. NCRST were also pleased to note that there are many delegates from across Africa, Europe and other parts to the world engaging in the discussions over the next three days.

Without pre-empting what the next speakers will address in their statements, Dr Eino outlined that he was sure that we would learn more about the importance of the **IST-Africa** initiative in supporting the Continent as it strives to redefine its own development trajectory by using of Science, Technology and Innovation as an important vehicle for economic growth and development.

With this unique platform in place, Dr Eino outlined that he was confident that the conversation will increase not only among the research academic community (intra- disciplines and inter-discipline) but also between

academia, industry and policy makers which will provide the opportunity to find solutions to our daily challenges. Dr Eino reiterated that our collective mandate from **IST-Africa Week 2017** to ensure that we change the rules, by creating a sustainable future for our people and communities through innovative products and services. Dr Eino encouraged the delegates to take full advantage of this 3 day event by participating actively in the deliberations and building new partnerships for future collaboration.

The Master of Ceremonies thanked Dr Eino Mvula for the opening remarks and then invited Mr Raniero Leto, Acting Head of European Union Delegation to Namibia to present on behalf of the Ambassador.

European Commission Address on Digital4Development Strategy, Mr Raniero Leto, First Counsellor, European Union Delegation to Namibia representing H.E. Ambassador Jana Hybaskova, European Union Delegation to Namibia



Mr Raniero Leto acknowledged Right Hon. Dr Saara Kuugongelwa-Amadhia, Prime Minister of Namibia, distinguished panellists and delegates. On behalf of the European Commission Mr Leto welcomed all the participants to **IST-Africa Week 2017** Conference in Namibia. He highlighted that he was representing Her Excellency Jana Hybaskova, the EU Ambassador to Namibia as she was attending the launch of Namibia's 5th National Development Plan presided by His Excellency Dr. Hage Geingob, the President of the Republic of Namibia this morning.

Mr Leto outlined that the EU and its Members States are the world's largest donor of official development assistance and in 2016 they provided 68 billion euros, more than half of all aid. However to date little of this funding has been invested in digital technologies. This has been primarily for two reasons. Firstly, digital technologies are relatively new and changing so fast that their potential benefits are not yet fully understood by many development practitioners (such as himself). Secondly, during the bilateral programming

process that the EU undertakes with each country, the countries did not select digital technologies and services as a priority area for funding. This is understandable given the pressing needs many countries face in meeting basic needs in sectors such as health, water and sanitation, food security and education. He highlighted the need to have faith in digital technologies; they act as an accelerator and an enabler of many - or perhaps even all - of the 2030 Sustainable Development Goals. In short, investing in digital solutions will help us meet needs in health, water and sanitation, food security and education.

Mr Leto then outlined how the European Commission plans to work with African countries to increase the usage of digital technologies. In the past, donors have sometimes asked partner countries to "do as I say" rather than to "do as I do"; we have not always been coherent in our policies - doing one thing at home but advocating another abroad. However, in this case the digital economy stands at the center of the EU own priorities for growth and jobs. In May 2015, the European Commission (EC) adopted a Digital Single Market Strategy, which recognised the potential of the digital economy for growth in Europe and how it can help EU countries meet their own Sustainable Development Goals. The EC would now like to incorporate the same approach into the EU's development policy by promoting digital economies in developing countries with an immediate focus on Africa - where the digital divide is the greatest.

In just 15 years mobile phone penetration in Africa has leapt from 20 to 80%. Telecommunications now contributes more than 7% of the continent's GDP. Digital innovation is starting to emerge in Africa, driven by the largest youth population in the world, with hubs forming in cities offering high-speed broadband Internet connections. Recently eHealth solutions have shown to be effective in helping to stop the spread of the Ebola virus in West Africa, as well as providing increased health care to remote areas. e-Government is already making an impact in Africa by increasing the transparency of the public sector and the efficiency of how public funds are spent. He was pleased to announce that the EU funded Parliamentary Support Programme in Namibia just this month has made all Namibian laws, as well as the national budget, available on-line. Mr Leto recalled His Excellency Dr. Hage Geingob, the President of Namibia, saying at the opening of the Parliament at the beginning of the year that 'government accountability plus government transparency equals trust in the government'; e-Government can do just that. For these reasons and many the EC believes that for Africa, the digital economy is not a topic for the future; it is for today.

In order to mainstream digital solutions into the EU's development policy, the European Commission earlier in May 2017 laid out its vision in a framework document called "Digital4Development". "Digital4Development" whose acronym is "D4D" defines four inter-related priorities for action.

The first priority is to continue to promote affordable broadband connectivity by investing in backbone infrastructure using a mixture of public and private financing – what we call 'blending'; as well as supporting governments to put in place the necessary regulatory frameworks that ensure competition, predictability and encourages investment. But the "Digital4Development" approach goes beyond the usual infrastructure assistance and looks to support functioning digital economies in developing countries.

Therefore the second priority is supporting the development of digital skills and literacy by embedding them into national educational systems. As we know, people with digital skills are highly employable; all they need is a good

internet connection. It is interesting to note that the EU cannot currently meet the demand for skilled ICT workers. On average a skilled outsourced ICT expert can earn €35 an hour, while a low skilled worker earns significantly less (just €3 per hour) but that is still 3 times more in one hour than the daily wage of many people in Africa.

The third priority area is fostering digital entrepreneurship and job creation. Digital entrepreneurship is already expanding across Africa. Besides creating jobs, entrepreneurs are developing local solutions to local problems. However, African entrepreneurs are often operating in difficult environments, so we will look to create opportunities for them to work together in partnerships with the so-called “EU tech ecosystem” which has expanded impressively.

The fourth and last priority area is promoting digital technologies as enablers of sustainable development; be it in the health, education, agriculture or the governance sector. Simply put; digital technologies offer us new possibilities and new solutions across all sectors of society, the economy, and the environment.

However, the increasing Africa’s inter-connectivity with the rest of the world also brings risks. “Digital4Development” will also support cross cutting issues such as cyber-security and privacy and help ensure that countries have the regulatory means to protect the integrity of communications and their citizens’ right to privacy.

In terms of funding D4D will not have a dedicate budget. Instead it will receive funding from existing programmes as well as the newly established European External Investment Plan, which is expected to reach 88 billion euros through the blending of funding from donors, financial institutions and the private sector. Of particular note is the new guarantee scheme, which will help to reduce the risks of investing in fragile countries, where financial institutions and investors often fear to tread.

The Digital4Development strategy has received support from both EU Members States as well as the private sector. While we have managed to establish a policy framework, the success of D4D will be measured by how it changes people lives in Africa and other developing countries. In order to have an impact on the ground we need to forge partnerships with the African countries. We will look to engage with countries which are committed to putting in place policies and regulatory frameworks that will promote genuine competition in the market, help bring investments and support digital innovation.

The upcoming 5th EU-Africa Summit, which will take place in Abidjan, Ivory Coast on 29-30 November this year, will be key to this engagement. The central theme of the Summit is “Investing in Youth,” which ties in well with the African Unions’ theme of the year of “Harnessing the Demographic Dividend through Investments in Youth.” A Digital Business Event will take place the day before the summit in order showcase the potential of digital technology to political decision-makers. The event will invite 20 African and 20 EU startups to demonstrate their products; it will also hold a high-level roundtable with African digital companies to discuss potential investment; and organise a workshop on digital youth. Abidjan will be crucial in reaching agreement with African countries on the D4D strategy and ensuring that we set off in the same direction. It will be an opportunity to translate our D4D priorities into clear actions.

Mr Leto concluded by reaffirming that the European Commission genuinely believes in the capacity of digital technologies to contribute to sustainable African economies, stable African societies, African growth and African jobs. The European Commission is proud to support this event and is very pleased that it was hosted by the Namibian Government in this beautiful country. Mr Leto wished the participants a very stimulating and productive three days.

The Role of Research and Innovation in Higher Education, Mr. Nhlanhla Lupahla: Deputy Director: Innovation, Ministry of Higher Education, Training and Innovation, Namibia representing Hon. Dr. Itah Kandjii-Murangi, Minister of Higher Education, Training and Innovation, Namibia



Mr Nhlanhla Lupahla acknowledged Right Hon. Dr. Saara Kuugongelwa-Amadhila, Prime Minister of Namibia, distinguished panellists and delegates. He outlined that it was his pleasure and true privilege to present a statement on the role of research and innovation in Higher Education on behalf of Hon. Dr. Itah Kandjii Murangi, Minister of Higher Education, Training and Innovation.

In recent years, a number of developments have occurred that put enormous pressure on higher education institutions in terms of expectations to meet the demand of stakeholders. Public sector higher education institutions are expected to respond to government regulations and policy initiatives, new market pressures and new technological developments. Innovative thinking and approaches are required for higher education institutions to meet this demand. These usually centre around an environment experiencing rapid growth, restricted funding,

changing models of financing, shifting priorities for teaching and research programmes, new measures that seek to lift institutional productivity, new processes that seek to assure programme quality, rising competition from private sector and offshore competitors, the rise of online modes of education, and demand for greater industry and community engagement.

This is a global trend which has been observed in both developing and developed countries, albeit at different levels, and Namibia is no exception. Mr Lupahla shared a vision of the potential role of research and innovation in higher education sector, with an emphasis on national higher education policy and strategy as well as national research and innovation policy and strategy.

Mr Lupahla started by providing an insight into Namibia's Higher Education Landscape. Since 1990, the Government of the Republic of Namibia (GRN) has made significant investments in the higher education sector. There are two public universities in Namibia namely, the University of Namibia (UNAM) established in terms of University of Namibia Act No. 18 of 1992, and the University of Science and Technology (NUST) established in terms of the University of Science and Technology Act No. 6 of 2015. As national, public universities, both UNAM and NUST have a key role to play in national development. There is also a private University, the International University of Management (IUM) which was founded in 1994 and obtained its University status in 2002. Since its inception, IUM has gained recognition as a centre of excellence for the teaching of Management Science and ICT disciplines.

Mr Lupahla then provided insights into Higher Education Policy and Strategy. Today higher education is much more diversified, and includes institutions such as universities of technology, university colleges and technological institutes (Meek and Davies, 2009). This has resulted in an increased amount of pressure on the part of higher education institutions to supplement public funding with private income; demonstrate performance more transparently; manage resources more effectively; collaborate more widely; and compete in markets both locally and across national borders. On the other hand, policy makers are also faced with challenges related to aligning national and institutional priorities; financing the whole system sustainably; ensuring that higher education programmes of study are high on quality, and student access, and responsiveness to employer needs; and ensuring that the results of research programmes are robust, relevant and widely disseminated.

Some of the above-mentioned challenges are relevant to the Namibian higher education system and form the basis of public policy debate on higher education in Namibia. The public policy debate on higher education in Namibia centres primarily on four issues namely, funding of the higher education, access to higher education, quality of higher education and responsiveness to employer need. From the policy makers' perspective, these have been well articulated in various national documents such Vision 2030, National Human Resources Plan and Higher Education Act No. 26 of 2003.

In 2004 Namibia adopted a long-term perspective plan, namely Vision 2030 (GRN, 2004), which serves as a basis for planning the country's future. Vision 2030 sets the macro-economic framework and the long-term targets through which the vision of Namibia's society is to be achieved. The "Vision" stipulates that Namibia, by 2030, will transition into an industrialised and globally competitive country of equal opportunity, realising its maximum growth potential in a sustainable manner, with improved quality of life for all Namibians. In order to achieve this ambitious goal, Namibia needs to develop human capital and build institutional capacity to absorb the labour force necessary to meet the demands of the economy, and address the problem of human resources skills shortages across all industrial sectors.

The Government of the Republic of Namibia set the foundations to provide the country with the necessary roadmap to respond to the structural mismatch between skills and available jobs by formulating the National Human Resources Plan (NHRP) (GRN(2012)). The NHRP is the instrument of choice for Namibia to directly address unemployment and skills shortages, and hence contribute to the competitiveness of domestic firms for increased private sector growth and improved performance. The focus is to direct the NHRP to the labour market demand, improve the quality of educational and training outcomes, and invest substantively in research and development (R&D).

Mr Lupahla then provided insights into the Science, Technology and Innovation Policy and Strategy landscape. At national level the Namibian government adopted the National Policy on Research, Science and Technology (NPRST) in 1999 and enacted the Research, Science and Technology Act of 2004 (Act no. 23 of 2004). This signifies the importance of effective application of scientific and technological skills for the production of goods and services tailored to the requirements of national development. This is the same Act that set up NCRST to spearhead research. The overall objectives of the Policy and Act are to enhance coordination, thus increasing efficiency in resource use; facilitate scientific human and institutional capacity building; ensure sustained financing of priority R&D projects; and promote science as a preferred area of study. In line with the National Policy on Research, Science and Technology (NPRST), both UNAM and NUST developed and approved a Research strategy which has been revised and developed into a fully-fledged Research Policy for the University together with the Research Ethics Policy.

The government research priority has been formulated in response to the challenges identified in the fourth National Development Plan 4 (NDP 4). In 2014, the National Commission on Research, Science and Technology, through a stakeholder consultation process developed Namibia's first ever National Programme for Research, Science,

Technology and Innovation. This programme sets the national agenda for research and development as well as setting priorities over the next three years. The areas covered include: a) Economic and Social Enablers (Health, Agriculture and Fisheries, Water, Energy, Indigenous knowledge, Social Sciences and Humanities Logistics, Environment and Tourism, Mining and Geosciences); b) Technology Enablers (ICT, Manufacturing technologies, Biotechnology). The report on the progress made towards the implementation of the first National Programme on Research, Science, Technology and Innovation and its contribution to the overall attainment of the goals of NDP4 will be made public during the second quarter of 2017/18.

Mr Lupahla then provided insights into Namibia's National System of Innovation. In early 2016, a national process which involved support from UNESCO was launched to conduct a comprehensive review of the National Policy on Research, Science and Technology (NPRST) of 1999 and to identify strengths and weaknesses of the National System of Innovation (NSI) and to modernise Namibia's STI policy and invest more proactively in policy implementation. The overall objectives and strategies of this NSTI Policy is to grow Namibia's NSI into a dynamic and strong configuration of public and, private, education and research and societal sector institutions that produce, procure, use and govern science, technology and innovation for sustainable development. To achieve these objectives and strategies the NSTIP aims to improve the policy, legislative and regulatory environment; strategic partnerships; and scientific and technical competences and infrastructure in Science, Technology, Engineering and Mathematics (STEM).

In conclusion Mr Lupahla outlined that the higher education institutions in Namibia are thus expected to align themselves to national development imperatives as articulated in national policies and strategies such as the Higher Education Policy, Human Resources Development Policy and Research and Innovation Policy. In the case of Namibia, like in many developing countries, limited funding continues to be a major constraint in the operations of institutions of higher learning which could also affect their research and innovation capacity and output. It is thus expected for the institutions of higher learning to step up efforts to seek more funding from other sources especially industry. Furthermore, incentivising innovation and research can go a long way in encouraging academics who are eager to conduct research but lack resources. There is also a great need to identify priority areas in which the scarce funds are spent in a particular year. Setting priority areas should be part of the research strategic planning and management of every higher education institute.

Mr Lupahla outlined that the Ministry of Higher Education, Training and Innovation wishes to actively encourage higher education institutions to leverage the Research and Innovation funding available through competitive calls under Horizon 2020. NCRST regularly circulates information prepared by **IST-Africa** in relation to upcoming calls and organised an **IST-Africa** Horizon 2020 training workshop in Windhoek in November 2016. The Ministry also wishes to request the European Commission to continue to include dedicated research and innovation calls focused on addressing African end-user community requirements in the upcoming Work Programmes for 2018 – 2020 period.

Finally, Namibia has made progress in growing its research and innovation system since the early 1990s. The Gross Expenditure on Research and Development (GERD) as a percentage of GDP has grown from below 0.02% in the 1990s to 0.35% in 2016. The human resource base for R&D and innovation in the country has grown to about 750 full-time equivalent personnel in R&D of which about 250 are full-time equivalent researchers. The country has also increased the number of trademark registrations, patent applications and registrations, and industrial design registrations since the beginnings of the 2000s from one patent in 2004 to eight patents in 2014 (WIPO 2016 data).

Mr Lupahla wished the participants very stimulating and productive deliberations over the three days.

The Role of ICT in Namibia, Mr Mbeuta Ua-Ndjarakana, Permanent Secretary, Ministry of ICT, Namibia representing Honourable Tjekero Tweya, Minister of Information and Communication Technology, Namibia



Mr Mbeuta Ua-Ndjarakana acknowledged Right Hon. Dr. Saara Kuugongelwa-Amadhila, Prime Minister of Namibia, distinguished panellists and delegates.

Mr Mbeuta Ua-Ndjarakana outlined that it was his pleasure and true privilege to present a statement on the importance of ICT in Namibia during the **IST-Africa Week 2017** Conference. Appropriate adoption of ICT is a critical enabler of socio-economic development, supporting generational leapfrogging, breaking down the digital divide, and making information more easily accessible to citizens. Achieving sustainable economic development goals is facilitated through the availability and accessibility of many essential ICT services. ICT has a particularly important contribution to make in helping those living outside major urban locations to access important information and stay up to date on important issues related to agriculture, social welfare, health and

education among others that impact on their everyday lives.

International, multi-stakeholder and inter-disciplinary conferences such as **IST-Africa Week 2017** have a critical role to play in fostering greater levels of national and pan-African awareness, as well as facilitating cross-border cooperation and strategic partnerships between different stakeholder groups leveraging ICT. As a Ministry, we undertake a number of initiatives focused on harnessing the application of ICT to support sustainable socio-economic development. Last year, the Ministry of ICT hosted the third annual Information and Communication Technology summit under the theme “Digital Transformation Towards Economic Growth and Prosperity”. The Ministry believes that optimizing the utilization and application of scarce ICT resources, infrastructure and investment, especially during these tough economic times, will lead to breakthrough economic growth and prosperity. The national ICT summit has been running since 2014 under the custodianship of the Ministry of Information, Communication & Technology (MICT). The purpose of the national ICT summit is to bring together diverse stakeholders in the ICT value chain to discuss and share exciting ideas, which will help strengthen and position Namibia as a competitive nation in the region and beyond. We have started focusing on how ICT can be applied to solve societal challenges at home, thus achieving a wider impact on rural and deep rural as well as urban communities.

With the introduction of e-governance, significant strides have been made in improving government service delivery to Namibia’s population of 2.3 million. Important examples include enhancement of the Integrated Financial Management System, speedy processing of passports and Visas and real-time border control among others.

The Namibian Government continues to bear testimony of integrating ICTs into the lives of many of its citizens. With the just ended elections, voters used the Electronic Voting Machine (EVM) system for the second time. Key perceived benefits of using EVMs in Namibia include creating a reliable data base of voters, minimises the length of queues and speeding up the process of counting votes and reducing risks associated with potential human interference in the election process.

ICT has been declared a priority by the Government of the Republic of Namibia (GRN). A sound foundation has been established through the creation of the Ministry of Information and Communication Technology (MICT) in 2008, the same year that the 3rd annual **IST-Africa Week** was first hosted by the Government of Namibia. MICT responsibilities include to accelerate use and development of ICT in Namibia, and coordinate information management within Government. Namibia is also at an advanced stage of implementing the Scan-ICT programme aimed at identifying ICT indicators and build capacity to measure Information Communication Technology for Development (ICT4D). The programme is implemented with a view of harnessing ICTs for development to measure the impact of ICTs on various sectors of the economy and citizens at large. The central scan-ICT portal /database will support the policy development and implementation process, with ICTs forming an integral part of the country’s vision.

ICT statistical data is critical for identifying areas where governments can use ICT to implement and improve national development strategies. Quality data can help them define strategies for E-government and e-business. They also help governments monitor their own policies and draw comparisons with other countries.

In contributing to the Harambee Prosperity Plan, the ICT sector will strive to ensure that modern and reliable ICT infrastructure network and services will be in place to support sustainable socio-economic development. The Ministry of Information and Communication Technology (MICT) is working very hard for our society and the local media industry continues to grow, thanks to the conducive environment created by our Government. The Communications Regulatory Authority of Namibia (CRAN) was established to help transform the national telecommunication environment by establishing an appropriate legal frame work and not allow any technology with harmful effects to enter into Namibia. Moreover, the National Telecommunication Company is also upgrading international link capacities to facilitate high speed connections to the rest of the world.

Namibia’s focus during the fifth National Development Plan (NDP5) which is being launched this week, is to further enhance the use of ICTs in applied research and utilization of research findings. The objective is to ensure that research outputs translate into products and services that address national challenges and priorities. The realisation of objectives set out in Vision 2030, NDP5 and the Harambee Prosperity Plan will focus on key strategies and initiatives to increase access to ICT related services. These strategies and initiatives include providing necessary ICT infrastructure, ICT skills and human resources, modern broadcasting services and increased e-services in an integrated multipronged approach.

Critical to the productivity and dynamism of any national ICT related research and innovation ecosystem is the availability of the necessary number of technicians, managers, researchers as well as practicing engineers. Indeed, technologically advanced and innovative economies tend to have the necessary critical mass of scientists, technicians and engineers employed in a variety of roles across scientific research, technology development and industrial manufacturing enterprises in various sectors. Namibia has a shortage of fulltime ICT researchers, technicians and engineers. According to recent R&D surveys, the country has less than 250 fulltime equivalent researchers and few engineers with postgraduate degrees. The Ministry of Higher Education, Training and Innovation has designed various policy measures and programmes for Universities and TVET which are intended to significantly increase the country’s available skills capacity in ICT, scientific and technical areas over the coming years.

Mr Mbeuta Ua-Ndjarakana highlighted that since ICT is a rapidly evolving environment, it is also important the GRN builds coherent policy, legislative and regulatory frameworks needed for a strong, dynamic, national ICT ecosystem that is pervasive and positively impacting on all aspects of economic and human development. Through policy research and analysis, public policies related to ICT should be reviewed and revised to ensure they are coherent with existing trends and policies and where necessary new specific technology policies will be developed. Examples include to: review and revise the national policy and related legislative measures on ICTs with aim of promoting access to and security and cyber security of ICTs; conduct research to develop local content and applications of ICTs in agriculture, health, education, conservation and trade; and conduct research to develop environmentally sound ways and policies for disposing ICTs (e-waste systems).

In conclusion, Mr Mbeuta Ua-Ndjarakana emphasised that for Namibia to remain competitive, Information, Communication and Technologies infrastructure and services are one of the crucial enabler attainment of Vision 2030. For developing countries such as Namibia, ICT partnerships are crucial for leveraging and using the growing pool of scientific knowledge, having timely access to modern technologies and build indigenous capabilities. Over the past decades Namibia has benefited from a wide range of collaborative initiatives to build its ICT capacities through training of its nationals at foreign universities, acquisition of equipment for research, access to external funding for research, and policy-learning through participation in SADC, AU and UN programmes. Namibia also continues to benefit from ICT related cross-border knowledge sharing, capacity building and research and innovation collaboration opportunities facilitated by Namibia's long-standing participation in **IST-Africa**. Success of the ICT sector in Namibia remains a collective responsibility between the Government, Non-Governmental Organisations, Higher Education Institutions, Private Sector and International Partners.

Mr Mbeuta Ua-Ndjarakana wished the participants very stimulating and productive deliberations over the three days.

Keynote Address, Right Hon. Dr Saara Kuugongelwa-Amadhila, Prime Minister of Namibia representing His Excellency Dr Nickey Iyambo, Vice President, Republic of Namibia



Right Hon. Dr. Saara Kuugongelwa-Amadhila, Prime Minister of Namibia acknowledged the distinguished panellists and delegates. She commenced by warmly welcoming the delegates to Namibia and highlighted that Namibia was proud to host **IST-Africa Week 2017**, the 12th annual flagship **IST-Africa** event dedicated to promoting international research, innovation and policy cooperation and coordination across the African Continent and between Africa, Europe and the rest of the world. This event is also showcasing African research and innovation capacity, stimulating exploitation and adaptation of research and innovation results by the public, private, education and research and societal sectors and supporting the development of the information society and knowledge economy in Africa. Dr Kuugongelwa-Amadhila acknowledged with appreciation the role played by the organizers of this event, the National Commission on Research, Science and Technology (NCRST) from Namibia and the IST-Africa coordinator, IIMC International Information Management Corporation from Ireland. She also thanked other stakeholders including the European Commission for supporting this

event.

Dr Kuugongelwa-Amadhila highlighted that **IST-Africa Week 2017** focuses on the Role of Innovation, Science and Technology in Africa's Development and specifically on Applied ICT research, innovation, policy and implementation in critical areas of Cyber Security, e-Health, Technology Enhanced Learning and ICT Skills, e-Infrastructures, e-Agriculture, Societal Implications of Technology, International Cooperation, ICT4D and e-Government. **IST-Africa Week**, which was last hosted by the Government of Namibia in 2008 through the Ministry of Education, provides a collegiate setting for presentations and discussions of national & regional developments, issues of concern & good practice models, and networking with peers. It also provide an opportunity to identify potential partners for future proposals under Horizon 2020 and other cross-border funding programmes.

IST-Africa Week 2017 takes place at a time when the African Continent continues to work towards achieving the global Sustainable Development Goals (SDGs) as well as successful implementation of the African Union (AU) Agenda 2063. Africa has recognised that the achievement of the SDGs and goals as set out in the AU Agenda 2063 requires significant advancements in Science, Technology and Innovation. For this reason, the AU adopted a ten-year plan, Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024), which places science, technology and innovation at the epicentre of Africa's social- economic development and growth..

Both the SDGs and the AU Agenda 2063 integrate social, economic and environmental aspects of development. The overall goal is to provide global policy guidance to countries to achieve sustainable development by 2030 and 2063, respectively. The Goals focus on poverty eradication, food and nutritional security, good health and wellbeing, education, gender equality, clean energy and climate change, clean water and sanitation, industry, innovation and infrastructure, climate action, blue economy, responsible consumption and production, peace and justice, and partnerships.

As a country, Namibia is fully committed to achieving the SDGs by 2030, and have aligned national plans accordingly. In 2015, Namibia has adopted the Harambee Prosperity Plan, a targeted Action Plan to accelerate development in clearly defined priority areas, which lays the basis for attaining prosperity in Namibia, and Namibia's 5th National Development Plan (NDP5), which provides a framework for development for the period 2017/18 to 2021/22 is being launched today (31 May 2017).

Namibia's prospects of achieving its Vision 2030, the SDGs and the AU Agenda 2063 are dependent on how well it harnesses and applies Science, Technology and Innovation in development. This has been well recognized by the Government of the Republic of Namibia.

As articulated in Vision 2030, the Harambee Prosperity Plan and NDP5, Namibia aspires to be a knowledge economy: harnessing and applying knowledge to address its socio economic challenges of poverty, inequalities, and environmental degradation, while at the same time diversifying and industrializing our economy. The country is positioning itself to contribute to the global pool of knowledge and effectively participate in international efforts on climate change mitigation to promote the welfare of our people and the protection of the environment for both present and future generations.

Scientists and innovators, the world over, continue to be targeted to provide knowledge, as well as solutions to the challenges affecting humanity, ranging from diseases, global environmental issues to industrial processes and products. Africa relies heavily on the **IST-Africa** Partners as well as public, private, education and research societal and funding sector members of the global **IST-Africa** Community to address the many challenges faced by the African Continent.

ICT related research, innovation, policy and implementation have a critical role to play in improving the socio-economic and political stability of developing nations across Africa. Dr Kuugongelwa-Amadhila highlighted that it was her wish that **IST-Africa Week 2017** provides an opportunity to both showcase challenges, opportunities and trends across the continent and also trigger actions from all participating stakeholders to further strengthen ICT penetration and adoption.

IST-Africa has been very successful in raising international awareness of African research and innovation capacity and facilitating African research and innovation stakeholder participation in European funded research and innovation. **IST-Africa** is to be congratulated on the critical role it played in the phenomenal increase in African participation under the 7th EU Research and Innovation Framework Programme (FP7, 2007 – 2013), with research funding of over €171.5 million going into African research institutions across 45 African Member States.

IST-Africa also provided DG CONNECT, European Commission with the necessary evidence to include two dedicated calls in 2015 and 2017 focused on leveraging ICT to addressing end-user community requirements in Africa under relevant thematic areas. With total funding of €26 million secured in the 2015 – 2017 ICT Work Programme of Horizon 2020, ICT-39-2015 Call was very successful with 45 proposals submitted of which following the evaluation, over 50% were eligible for funding. Unfortunately, there was only available funding for four proposals, with participation from 11 African Member States. The ICT-39-2017 Call was even more heavily over-subscribed with 71 proposals submitted by the 25 April 2017 deadline. Results of this call will be available by September 2017.

It is clear that **IST-Africa** has been phenomenally successful since its foundation in 2002. It has successfully raised international awareness of African research and innovation capacity, and built sustainable relationships with European international research partners to help further strengthen the research and innovation capacity and culture in African universities. As a direct output of these activities, **IST-Africa** has supported African research and innovation stakeholders to secure over €100 million of European research and innovation funding.

Building on the significant level of momentum achieved to date, it is important that the European Commission continues to include dedicated calls for Research and Innovation focused on African end-user community requirements as well as a coordination mechanism in the next Work Programme currently being finalised for 2018 – 2020.

Dr Kuugongelwa-Amadhila invited all participants to explore the rich programme of **IST-Africa Week 2017** and consider the implications for strategy and policy formulation. We need not over emphasize the importance of the innovative use of ICT to implement low-cost scalable solutions addressing societal challenges.

With regards to the application of ICT in education, Dr Kuugongelwa-Amadhila underscored its relevance in improving the quality of the higher Education system across the African continent. Higher education across the world faces numerous challenges and teaching institutions must change their modes of operation to deliver knowledge in a faster, more effective way by taking advantage of innovative methodologies and technologies.

Dr Kuugongelwa-Amadhila encouraged the education and research community to exploit the opportunities offered by **IST-Africa Week 2017**, especially those that are centred on the enhanced learning and ICT skills development. Dr Kuugongelwa-Amadhila encouraged all participants to make use of this platform to network and discuss opportunities that ICT and other technologies provide in addressing socio-economic challenges in Africa and beyond.

In conclusion, Dr Kuugongelwa-Amadhila expressed a warm welcome to all guests and wish the participants fruitful deliberations on behalf of the Namibian people. She highlighted that it was her pleasure to declare **IST-Africa Week 2017 Conference** officially open.

Ms Iyaloo Kandjabanga, Master of Ceremonies for the formal Opening Plenary, thanked her Right Hon. Dr Saara Kuugongelwa-Amadhila, Prime Minister of Namibia for the official opening and invites the participants to stand for the national anthem.

High Level Roundtable: Role of ICT, Research and Innovation in Supporting Entrepreneurship and Socio-Economic Development in Africa

IST-Africa Week was previously hosted by the Government of Namibia in 2008, and this was regarded as a great success. In the introduction, the panel moderator Paul Cunningham, IST-Africa Coordinator, highlighted that this High Level Roundtable was positioned to build on everything that has been achieved in Namibia over the last number of years. He noted that it would focus on sharing ideas, vision and strategy, breaking down silos and the importance of multi-stakeholder collaboration and the key role that technology plays in making life better for all members of society. Paul challenged conference delegates to think not just about the potential benefits of technology adoption but also the societal implications and potential applications that investors may not have thought of yet for any of the 41 countries represented at **IST-Africa Week 2017**. He made the point that just because contributors are technology experts does not mean they understand the environment, culture and local stakeholders of the countries delegates represent.



Paul then introduced the very distinguished panellists: Dr Eino Mvula, CEO, National Commission on Research Science and Technology, Namibia; Mr Mbeuta Ua-Ndjarakana, Permanent Secretary, Ministry of ICT, Namibia; Ms Emilia Nghikembua, Head of Legal Affairs, Communications Regulatory Authority of Namibia; Prof Kingo Mchombu, Pro-Vice Chancellor Academic and Research, International University of Management; Dr Anicia Peters, Dean: Faculty of Computing and Informatics, Namibia University of Science and Technology; Wilfred Kuria, CEO, Xnet Development Trust (the National Education and Research Network of Namibia); John Sifani, formerly from the Ministry and currently Director: Centre for Innovation and Development,

University of Namibia and Laban Hiwilepo, Chief Operations Officer, Telecom Namibia.

Paul explained that following consultation across all IST-Africa Partner Countries, a number of talking points were identified, with panellists contributing to some or all according to their interests.

Innovative ways ICT is being applied across Africa to strengthen socio-economic development and entrepreneurial capacity and culture

The Roundtable commenced by discussing some of the more innovative and impactful ways in which ICT is being applied across Africa to strengthen socio-economic development, and how ICT could be leveraged to further strengthen Entrepreneurial capacity and culture in Namibia as well as in a broader African context

Paul invited **Prof Kingo Mchombu, Pro-Vice Chancellor Academic and Research, International University of Management** to provide the first intervention.

Prof. Kingo Mchombu focused his remarks on three components (ICT, Development and Human Capacity and entrepreneurial culture) and how best to integrate these to achieve human development. He noted that ICT is only a tool – a means to an end with potential positive and negative results depending on how it is employed. Development means many things to many people, and sometimes development of one group can negatively impact on another. ICT provides an opportunity to leverage human knowledge from many parts of the

world to avoid reinventing the wheel and accelerate local development. Namibia has high mobile penetration (2.7 million compared with 2.3 million population) as a common means of accessing the Internet. Converting ICT tools to national development outcomes is a challenge – health, agriculture, education and eCommerce all provide wonderful opportunities for exploitation of ICT. However, local content (in a local language) for each of these areas is essential to achieve impact. English language content may not be accessible to a local farmer. Things are easier in health and education for accessing English language content. Nurses may not have the necessary level of training to deal with all the deliveries they are expected to assist. Telemedicine can play an important role in supporting this need for local knowledge. ICT must be manipulated to achieve development goals. While the Knowledge Economy is an abstract concept, the digital divide is very real, putting Namibia on the periphery of the Knowledge Economy. Preparatory activities must be carried out to create local knowledge in local languages. This requires local effort to achieve desired developmental outcomes. Another key application of ICT is access to knowledge about trade opportunities across borders, including rules and how local practices are interpreted.

Paul thanked Kingo for this insight and invited **Dr Anicia Peters, Dean: Faculty of Computing and Informatics, Namibia University of Science and Technology** to provide her perspective.

Dr Anicia Peters focused her comments on innovation across Africa and specifically in Namibia. She noted the importance of resource scarcity on promoting innovation, the benefits of a young population and mobile phone access to knowledge around the world. Young people are ambitious and excited to use technology. Anicia discussed the importance of the 314 innovation spaces in 93 cities across 42 countries across Africa as of July 2016. iHub in Nairobi, Kenya alone has birthed 117 start-ups since its foundation in 2010. In Namibia University of Science and Technology, there are currently three Innovation Spaces including the Business Innovation Centre, Innovation Design Centre and a FabLab, where a solar taxi is being developed that will leverage sensors. A national innovation centre is still at the planning stage. UNAM also has an innovation space. Anicia has seen a willingness amongst the young to leverage ICT, with particular strengths in the use of social media supporting eCommerce. However, there are still problems with online payment systems in Namibia impacted by regulatory constraints. A Kenyan payment system has been available in Namibia since December 2016 and a number of mobile operators are also implementing payment options. However, many companies are targeting cross-border opportunities, which requires solutions. She also discussed the activity of master students in Namibia promoting awareness of national domestic violence through YouTube videos. While these have been well received, they are receiving more comments from outside Namibia than within Namibia. Anicia suggests that while innovation is accelerated through scarcity, the necessary infrastructure and support is required to support young entrepreneurs to bring opportunities to market. She then focused on the importance of entrepreneurship during school, suggesting that there is a need to support young people to become entrepreneurs in their own right to address the high level of national unemployment. The internet provides an important opportunity to access international markets.

Paul thanked Anicia for this insight and invited **Emilia Nghikembua, Head of Legal Affairs, Communications Regulatory Authority of Namibia** to comment.

Emilia Nghikembua focused on how entrepreneurship can be strengthened. The perceived risks associated with ICT include the risk of automation. She noted two kinds of stakeholders affected by innovation and ICT – those who lose their jobs due to automation and young people who are curious about the opportunities that ICT provides. Emilia talked about the enormous growth of the mPesa innovation, where ICT can be used to enhance entrepreneurship. MPesa users grew to 17 million from 2009 to 2012. However, ICT in a Namibian context requires supporting entrepreneurs to leverage this technology. From a regulatory perspective, there is a need for a framework that supports competition, level playing field and opportunities to leverage ICT to provide services. Emilia noted that Namibia now has a 120% mobile penetration rate, with a population of 2.3 million and 2.6 million active SIM card subscribers, reflecting that some subscribers have SIM cards on different networks. She noted that some parts of Namibia are not currently adequately serviced and that the regulator must ensure consumer have access to quality ICT services and products at affordable prices. Emilia discussed the importance of ICT to encourage entrepreneurship but again emphasised that unless mobile devices are affordable and quality of service is appropriate, there are still going to be problems. The universal service and access fund is under development and is designed to identify and support services in “smart subsidy zones” which would not otherwise be financially viable for telecom operators. She noted that in a country as vast as Namibia, it is necessary to support putting necessary level of infrastructure in place based on market demand, including taking account of the developing of new housing which will increase demand on existing infrastructure. Emilia suggested that you cannot have a one-size-fits-all approach and this is something all national regulators need to take into account.

Role and Contribution of Multi-stakeholder Collaboration in supporting Research and Innovation

The next issue addressed by the panel was the role and potential contribution of multi-stakeholder Collaboration in supporting Research and Innovation, focusing on addressing African societal challenges and policy priorities at both a national and continental level.

Paul invited **Mbeuta Ua-Ndjarakana, Permanent Secretary, Ministry of ICT, Namibia** to share his perspective.

Mbeuta Ua-Ndjarakana started by focusing on the enormous resources of Namibia that have as he said attracted “three consecutive uninvited guests” into Namibia before Namibia became an independent nation. Taking a multi-stakeholder approach and identifying our strengths and weaknesses is necessary to consider how ICT can enable us to overcome poverty and unemployment and create a secure, dependable environment. Mbeuta then discussed the importance of two pieces of legislation, the Communication Act 8/2009 (then called a spy bill) and the Cyber Law and Security Bill submitted to Parliament and then subsequently withdrawn because not all key stakeholders had adequate opportunity to inform its formulation. This extended consultation period ended on 16 June 2017. He mentioned that the media had described this bill as a spy bill which requires ensuring ICT is harnessed to address societal challenges. Mbeuta discussed the collaboration required with Botswana to develop the West Africa cable system, where both countries invested equally to fast track bringing the cable to the African coast and connecting both countries. This highlights the importance and potential benefits of multi-stakeholder collaboration, laying a common playing field, mutually reinforcing legislative frameworks that can assist us getting our countries to where it needs to be, particularly for the current youth who will be the future grandparents of our planet. Mbeuta concluding by emphasising the important role of tertiary institutions, and suggested that the delegates should consider how to enable students from neighbouring countries to come together to work on projects addressing cross-border needs. He suggested that following **IST-Africa Week** there was a wonderful opportunity to leverage through a value chain the exchange and application of knowledge between participants from many countries so that all participating countries benefit.

Paul Cunningham noted the clear importance of cross-border collaboration, with the topics coming up three times before the issue has even been formally addressed as planned later in the panel program. He also noted Mbeuta’s last comment was a powerful concept and briefly describing the Erasmus Program run in Europe, that allows graduates of any University across Europe to take a course either for a year or semester in another University in another country and then they can take that credit back as credit towards the degrees are completing at home either at undergraduate or postgraduate level. Paul noted that this exchange program has been found to be a phenomenal tool in terms of breaking down silos, encouraging greater consistency of educational standards across Europe. Paul suggested that participants should try to take advantage of Mbeuta’s suggestion, leveraging frameworks that already exist within RECs (Regional Economic Communities) and the African Union and existing cooperation between 18 IST-Africa Partner Countries including Namibia. Paul proposed that participants should actively look for opportunities to implement the African version of Erasmus. He requested that if anyone had ideas of how to operationalize this idea, that they should discuss it with him.

Paul then called on **Dr Eino Mvula, CEO, National Commission on Research Science and Technology, Namibia**.

Dr Eino Mvula started his remarks by focusing on bilateral and multilateral collaboration and interdisciplinarity from a funder’s perspective. He noted that the challenges faced by the national research funding agency are similar to those in other African countries. He suggested considering putting our collective resources together to address common problems across Africa. Eino suggested that we have an opportunity to work together to address common societal challenges through collaborative research projects. He gave the example of the current arrangement between Namibia and South Africa, where the National Research Foundation of South Africa and NCRST have entered into a memorandum of understanding where we have agreed to collaborate on key issues of common interest to the two countries. An open call is issued and researchers and innovators in both countries are encouraged to jointly write research proposals which are then evaluated by a team of experts who decide which proposals warrant funding. Eino emphasised the importance of leveraging bilateral and multilateral collaboration within Africa to find solutions to common challenges. He then moved onto the importance of taking an interdisciplinarity, when often we approach problems from a single discipline perspective. Quite often problems do not manifest themselves however in a single discipline. Eino noted that some conference participants are trained ICT experts, while others are experts in areas including health and agriculture. He suggested that where people work in isolation, opportunities to find the solution to real challenges may be missed. Eino emphasised the importance of getting out of our comfort zone and to work with each other to find solution to real challenges. He noted that from the funder’s and policy maker’s perspective, they have a key role to play in try to package these challenges in what are called Grand Challenges, and encouraging people to work in teams across their respective disciplines rather than in isolation.

Paul thanked Eino for this insight and called on **Laban Hiwilepo, Chief Operations Officer, Telecom Namibia** to share a private sector perspective.

Laban Hiwilepo focused on potential benefits of collaboration and the role innovation based research has to play in addressing societal challenges, suggesting there was no better approach available. He noted that institutions have different strengths across countries and across Africa, and through collaboration can leverage those respective strengths. Laban noted the importance of focusing on needs driven research with the potential to have a huge impact on many individuals across the continent. Noting the challenges associated with attracting funding,

he suggested that being able to demonstrate the intended large scale impact on Society and also the impact on human development across borders would increase the chances of securing such funding. Internet is borderless, so it is a key enabler. A lot of work is still required to ensure that research networks are addressing the minimum standards required and the appropriate connections are in place to enable meaningful collaboration to take place.

Paul thanked Laban for this insight and called on **Dr John Sifani** formerly from the Ministry and NCRST and currently **Director: Centre for Innovation and Development, University of Namibia** who noted that Societal Challenges have been identified and prioritised by the African Union in the 2063 STI Policy and by the European Commission in Horizon 2020. Two continents have agreed to work together through the EU-Africa High Level Dialogue, where policy makers from the EU and AUC regularly meet to coordinate how to address common research and innovation issues. John mentioned Erasmus Plus and that the three universities in Namibia were benefiting from this program. At a national level, John noted the importance of multi-stakeholder collaboration looking at the national innovation ecosystem, government, academia and industry. Government provide an enabling environment through which industry and academia can collaborate. John noted that this is a powerful tool when harnessed effectively in terms of industry getting well skilled graduates and research carried out to support growth in GDP.

Paul thanked John for this insight and called on **Dr Anicia Peters, Dean: Faculty of Computing and Informatics, Namibia University of Science and Technology**. Anicia talked about the involvement of NUST in multi-stakeholder collaboration, and action research projects in Namibia as well as research partnerships with universities in 17 countries. She noted that most exchanges currently are with Europe, USA, Australia and South Africa, but there have been recent exchanges with Cameroon for a data centre. Anicia noted the importance of undertaking more collaborative research within Africa and suggested that there should be a much greater focus on such intra-Africa collaboration going forward.

Paul then noted that during FP7 (previous European framework and Innovation programme) Africa universities and institutions secured over €170 million in funding, though being involved in very strong proposals with strong partners from Africa in Europe. Paul stated his pride that IST-Africa Partners had worked together tirelessly to help secure over €100 million of that funding. He noted that the 18 IST-Africa Partner countries had worked together to provide the necessary evidence to justify the inclusion of dedicated ICT calls addressing African Societal Challenges under Horizon 2020, securing €26 million in dedicated funding for two calls in 2015 and 2017. Under ICT-39-2017, 46 proposals were received of which 26 were shortlisted for funding. Unfortunately, there was only funding available for four proposal. However, the very fact that there were 26 of those 46 proposals (which typically included two or more African partners) eligible for funding provides very strong evidence of the quality of those submissions. Paul noted his pride that 71 proposals were received for the ICT-39-2017 Call which closed in April 2017. This means that just from those two calls instigated by IST-Africa, there was appetite for over one hundred proposals focused on African research challenges. Paul suggested that this provides all the evidence anyone needs to see that there is great creativity in the African research community and there's a great willingness for partners to work in a cross-border basis. He noted that problems in Africa are not delineated by borders and very often people on either side of national border have more in common with one another in terms of societal challenges that they may have with those living in the respective capital cities. Paul concluded his remarks by emphasising the importance of continuing to think along those lines.

Noting that despite the importance of policy issues and applications addressing societal challenges, Paul emphasised that unless the necessary underlying infrastructure is in place, nothing will work.

Steady progress is being made in improving eInfrastructure across Africa. What still needs to be done to further strengthen Research and Innovation related capacity and related infrastructure to achieve even greater societal impact?

Paul noted that steady progress is being made in improving eInfrastructure across Africa through initiatives such as AfricaConnect and African Internet Exchange System (AXIS), the evolution of national and regional research & education networks (NRENs) and their interconnection to the European GÉANT2 network.

He then called on **Wilfred Kuria, CEO, Xnet Development Trust** (the National Education and Research Network of Namibia) to discuss what needs to be done to further strengthen Research and Innovation related capacity and related infrastructure to achieve even greater societal impact?

Wilfrid focused his initial remarks on bandwidth as one of the major challenges that needs to be addressed, a key “elephant in the room”. He noted that since the West African cable landed in Namibia in 2012, there has been a decline in bandwidth pricing and an increase in bandwidth availability. However, he noted that a lot more still needs to be done to make it to competitive levels similar to what people are paying for international access. XNet was established in 2003 connecting schools with 56k dial-up modems. Today 500 schools are connected across the country with 1MB lines. As Namibia is a big small country (a large country with a small population), there are only 1800-1900 schools in the country, of which 600 - 700 cannot be connected because of lack of electricity. Wilfrid noted that bandwidth is obviously one of the biggest issues. High bills were forcing schools to stop connecting to the Internet. He explained that they negotiated with a local telecommunication provider in 2004 and secured a flat rate deal for schools to allow

them to budget on a dial-up line. This was the launch of XNet.

Wilfrid pointed out that a key challenge for Research and Education Networks (NRENs) is that too often they focus only on bandwidth issues and forget to actually engage with key partners such as the government and regulators to achieve the necessary recognition of the work being carried out and influence key policies which can assist or become barriers. It is critical that NRENs actively engage with government and regulators and ensure they understand the role and contribution of NRENs to the development of our countries. Having achieved recognition, he explained the importance of developing policies that promote research and education. Wilfrid noted the very good relationship that XNet have the Ministry of ICT, NCRST and CRAN, the regulator in Namibia. However, in many African countries it is a challenge to have a relationship with one of these stakeholders, let alone all of them. When African NRENs get together, quite often this is the major topic of discussion, looking at good practices in other African countries. There are currently 15 – 16 NRENs who are members of UbuntuNet Alliance. Kenya and South Africa are some of the strongest research and Education Networks in Africa. South Africa has a 12 GB line for all of their education institutions, compared to less than 1GB in Namibia for 500 schools, libraries and three universities. Because of this, it is difficult to achieve economies of scale. Wilfrid noted the importance of policy in such a situation to achieve lower pricing for education and the health sector as well. He also discussed the challenge of funding for many African NRENs. AfricaConnect was supposed to provide affordable connectivity to the education sector via their NRENs. Of the 15 networks, only five have actually signed up to the AfricaConnect project, signalling the key challenge of funding. Those who have been able to participate in AfricaConnect have seen remarkable differences in terms of lower pricing, which has in many cases influenced commercial providers to lower their pricing to compete. Other countries could not afford the initial contribution each NREN is supposed to pay to participate in AfricaConnect, and therefore could not participate. Wilfrid also discussed the challenge of the lack of defined research Communities, which requires mapping the entire country to work out who needs to be served in addition to the schools and research and educational institutions. A key challenges for many countries is bandwidth, which is a barrier to value added services in other countries. With Eduroam for example, you can connect automatically to networks in other countries without authentication. Other value added services include plagiarism checkers.

Paul thanked Wilfred for sharing this insight and called on **Laban Hiwilepo, Chief Operations Officer, Telecom Namibia** to share his perspective. Laban started by discussing the time and effort invested in securing necessary regional connectivity within Africa. A critical problem for a long time was that traffic to neighbouring countries often had to be sent to Europe and back because the necessary cross-border infrastructure was not in place. It is obviously fundamentally important to put the basic infrastructure in place within the continent to connect countries and cities. When this is in place then we can install data centres and provide the potential opportunity to leverage local cloud based solutions while reducing infrastructure costs. Developing the economy of Namibia for example requires making it possible for local companies and small businesses to be able to afford reliable connectivity. Putting this minimum infrastructure in place is important to realise the potential benefits Research and Innovation related capacity to achieve societal impact. We need to clearly define what it costs and how will it be funded. Unfortunately, currently the discussion in a board room fixates on the business case, and often the discussion will stop there. This is not just a challenge in Namibia but right across the continent.

John Sifani, Director, Centre for Innovation and Development, University of Namibia added to Laban's remarks by focusing on equity, quality and responsiveness, removing he barriers that exist especially in primary and secondary schools. There are two schools in Windhoek 2.5km apart, one private school where iPads and phones are used to access assignments and a public school which does not allow iPads.

Paul noted that the Africa Internet Exchange system (AXIS) was designed to optimise the use of available bandwidth by aiming to keep African traffic within the continent rather than the traditional model whereby traffic was sent to Amsterdam or the States before coming back to Africa. The focus is on keeping national traffic within the country and facilitating cross-border traffic to neighbouring countries. To ensure optimal use of international connectivity, under this program the European Commission pays up to 80% of the cost of these cross-border connections, with participating countries and NRENs responsible for the balance. Unfortunately, many African countries have had budgetary challenges over the last 5 years, making it challenging for everyone to make up the difference.

How can technology be leveraged to further strengthen the availability of quality education across the continent, whether at the primary, secondary/high school, vocational or tertiary level?

Paul then asked the panellists to discuss how technology can be leveraged to further strengthen the availability of quality education across the continent, whether at the primary, secondary/high school, vocational or tertiary level? What are some of the key change management and policy challenges that must be addressed to effectively leverage technology in education?

Dr Eino Mvula noted the advancements in the use of ICT, but Africa has not taken full advantage of this. He focused on opportunities in tertiary education in the areas of distance learning, access to journals and other resources remotely and plagiarism related tools. As Namibia is so large, ICT offers benefits in terms of allowing a degree to be earned at home without having to move to Windhoek. NCRST has engaged with libraries across the country to facilitate access to scientific journals online, which are currently only available to the University of Namibia and NUST. Eino pointed out the opportunities offered by having a national license to access scientific content online. He also noted that few African universities have access to anti-plagiarism tools, which would improve supervision of students as future researchers addressing societal challenges across the continent.

Prof. Kingo Mchombu then focused on change management related issues, contrasting teachers who like or do not like students to use technology. A rural teacher was recently quoted in the papers that there was no one in their school who are qualified to teach computer science to students, despite computers being available. Kingo suggested there is a need to manage the cultural attitude of teachers, whereby if teachers are afraid of technology, this will impact on the adoption of technology across the education system. He suggested a policy change to make technology adoption in schools mandatory. Technology provides access to knowledge and should be leveraged more broadly for both informal as well as formal education. He talked about the importance of continuous professional education to ensure people are kept up to date. He suggested that the challenge today is to learn how to learn and technology can facilitate efficient education in universities if appropriately exploited. Kingo suggested that technology adoption in tertiary level is much better than at secondary or primary level. He noted the excitement that internet access costs would significantly decrease with the landing of new cables. However, internet costs in Namibia are still very high even compared to other countries across Africa. This requires a policy shift to make internet access more affordable. He noted the approach adopted by Singapore to make internet access to the home as affordable as possible. Kingo mentioned the responsibility of the government and the need for schools and libraries to provide affordable access to internet connectivity. He also commented on income distribution in Namibia, with 20% having 80% of total income in the country, with an unacceptable percentage of the population living below the poverty line. Kingo also discussed the importance of digital literacy and expanding the contribution that adult literacy departments can make to include digital literacy to the offerings currently provided.

Wilfred Kuria focused on change management. 500 schools are currently connected to the internet out of 800 schools, with 300 schools having no connectivity available. ICT is not being integrated into education with computer labs often empty because no computer science teachers are available. Change management is required to educate teachers on how ICT can help them be more impactful. Wilfred discussed a high school student who has created innovative communication technology (sim-less phone) which can support free calls over existing bandwidth. He discussed the “last mile” in rural areas who cannot access internet access because of location. Mobile has excellent penetration but broadband access to non-commercially viable areas is challenging. Wilfred noted that CRAN (national regulator) is addressing this issue.

Emilia Nghikembua looked at this issue from a policy perspective, and the responsibilities of CRAN, the education Ministries, NCRST and other key stakeholders having these policy makers all sat in same room and discussed how to coordinate to bring ICT into all schools. Emilia suggested that ICT should be an enabler of everything, but that the education system does not currently adequately support innovation. She noted that innovation may not come only from those students with straight A grades, requiring updated policies to encourage innovators. Emilia noted that some policies need to be revised to be responsive to what is happening in society, including cybersecurity and child protection. She noted that CRAN is part of a UNICEF working group is looking at these issues. In relation to funding for infrastructure, project funding to connect schools must be prioritised. Emilia remarked on a recent visit to a UMBILO Teacher Training Centre in Durban, South Africa, which is supported by the Vodafone Foundation. The South African regulator as part of license conditions, insisted that licensees incorporate education into interventions. Vodafone offers a learning module which can be downloaded free by South African Grade 1 – 12 curriculum, to support revision and preparation for examinations. She saw this an excellent example of policy implementation incorporating ICT into education.

Mbeuta Ua-Ndjarakana suggested making policy changes that support primary school learners from Grade 1 in time to learn about things in the community near their schools. He suggested that internships should be leveraged to allow university students to be able to learn about the needs of rural communities, to inform their perspectives and projects. Mbeuta recommended that the entire education society needs to be reoriented towards serving the people. He suggested that it is important for funding for internships to be oriented towards engaging with rural communities to look at how their technical knowledge can impact positively on society.

Paul noted that in Ethiopia, the entire university education process is supported by the government with all costs for qualified students are covered, and in return graduates are expected to work were needed by the government for two years after finishing university. Consideration should be given to adapting such systems from across Africa to the socio-cultural norms of the countries where we all come from.

Paul noted that as illustrated by this panel discussion, education is really at the heart of everything and essential to breaking down silos, learning from one another and addressing common cross-border issues.

Significant skills gap in many countries, in particular in the area of 21st Century (analytical, business and ICT) related Skills

The final issue discussed by the panel was the significant skills gap still faced by many countries, particularly in relation to the business and analytical skills often called 21st century skills. There is often a clear mismatch between the capacity of graduates and the requirements of both public and private sector employers. **Paul** asked the panellists to focus on discussing the concrete actions that can be taken to better align third level curriculum. He noted that the employment potential offered by vocational training is often significantly underestimated and the responsibility of key stakeholders to ensure that third level curricula is appropriate. Minimum educational standards are also essential to attract foreign direct investment or otherwise diversify national economies.

Dr Eino Mvula agreed with the challenges associated with skills shortages across Africa, either because the training is poor or not appropriate to the needs of public and private sector employers. He also mentioned the challenges associated with the brain drain. Eino suggested involving all stakeholders in this dialogue and ensure that whatever outputs are delivered by the education system is appropriate by involving industry in the design of curriculum. This will help ensure graduates meet the needs of the job market.

Dr Anicia Peters discussed the challenges associated with developing curricula to ensure relevance to national requirements and global trends, with continuous feedback loops to industry to better understand their requirements. All students at UNAM must undertake ICT training for example prior to graduation. Industry changes required adaptation of curriculum to ensure graduates meet expectations of graduates. Previously Namibia imported software engineers from China to address national demand, and there is now significant demand for a limited pool of Namibian talent. Feedback from graduates that their qualifications do not help them achieve a job has resulted in UNAM offering free training workshops, particularly on programming related topics. UNAM also provides access to their computer labs over weekends when they are underutilised. Anicia noted that computer science teachers are taking advantage of these opportunities to get training. She also noted however that relations with local schools and industry are not sufficiently strong to enter these environments to carry out applied research or to adequately prepare secondary school students before they attend university, particularly in fields such as mathematics for example. She suggested that the university sector need to consider how best to engage with industry and schools in general.

John Sifani agreed that the curriculum development is done in coordination with all key stakeholders, providing proof that industry has participated and given consent to the recommendations to revised curriculum. NDP5 is being launched today with the objective of creating 50,000 new jobs per year over the next five years. He also noted that UNAM is making good progress incorporating industry work (in fields such as engineering, medicine and computing) into the learning experience, and systems to place students into industry internships. John concluded by recommending the need to invest in promoting innovation in Namibia by harnessing social cohesiveness.

Laban Hiwilepo concluded this discussion by emphasising the opportunity for cooperation between industry and the university sector. He noted that two to three years of additional training of graduates are required after they have been employed. Laban noted that industry is not designed to train people, and there is a need to bridge the gap between the skills of graduates and the actual needs of industry and the public sector employers.

Paul concluded by thanking each of the panellists for the rich and stimulating discussion.



Scientific Programme

The Scientific Programme incorporated over 190 presenters from public, private, education and research organisations in 35 countries in 40 thematically focused sessions. Themes addressed include International Cooperation, eHealth, Technology-enhanced Learning, CyberSecurity, Next Generation Computing, eGovernment, ICT4D, Internet of Things, eAgriculture, Content Technologies and Societal Implications of Technology. Presentations share insights from projects funded at national, international and European Commission level. The sessions were well attended with a good level of discussion and knowledge sharing. All published papers will be available in the IST-Africa Paper Repository in August.

The **IST-Africa Workshop** showcased **ICT Initiatives and Research Capacities** in Namibia, Mozambique, Botswana, Lesotho, South Africa, Malawi, Swaziland, Mauritius, Kenya, Ethiopia, Tanzania, Uganda, Cameroon, Egypt, Senegal and Tunisia to raise awareness of ongoing activities and to promote national institutions with capacity to participate in LEIT and Societal Challenges calls under Horizon 2020. This mapping of research expertise to Horizon 2020 areas provides input into the planning for future Work Programmes. Delegates took the opportunity to ask the IST-Africa partners for more details in specific areas of interest.

Paper sessions on Wednesday afternoon included eHealth, Technology-enhanced Learning, CyberSecurity and Next Generation Computing.

On Wednesday evening there was a Conference Dinner supported by NCRST to facilitate in-depth networking and partnership building.

The Scientific Programme on Thursday incorporated tracks on eHealth, Technology-enhanced Learning, CyberSecurity, Next Generation Computing, eGovernment. The mHealth4Afrika, ITS4LAND and WAZIUP Horizon 2020 projects focused on African ICT Research Challenges and co-funded under the ICT-39-2015 Call shared initial results with the conference community.

The mHealth4Afrika workshop was very interactive in nature, with plenty of questions and discussion with the participants during the Health Track of **IST-Africa Week 2017**. The presentations provided insights into the mHealth4Afrika objectives and co-design approach undertaken with the Ministries of Health and health clinics in the four participating countries (Ethiopia, Kenya, Malawi and South Africa). The comparative findings from the baseline study and the implications for the alpha and beta prototypes were shared. The alpha validation was undertaken with clinics across the four countries during Q4 2016, which provided valuable insights into requirements for the beta system. Participants had the opportunity to use the CE approved sensors that the nurses will be using at the point of care in mHealth4Afrika intervention countries during the beta pilot.

Dr John Horn of ITC, Netherlands presented its4land activities during Session 8a. its4land is creating seven tools to make land rights mapping faster, cheaper and easier based on needs requirements and multi-stakeholder assessment undertaken in Ethiopia, Kenya and Rwanda. It aims to develop spatial cognition sensing tools, adapt UAV mapping and remote sensing methods, refine automatic feature extraction algorithms and tools to support web land information services.

The WAZIUP workshop provided insights into its objectives and achievements to date. It aims to provide affordable, simple to use, open source end-to-end solutions using Internet of Things. Use cases to date have focused on agriculture (weather and soil moisture), logistics, cattle rustling and fish farming in West Africa.

To complement the public dissemination the **IST-Africa** Consortium organised a coordination meeting between the four projects to share experiences and provide advice. Each project presented their objectives and achievements to date and any challenges they are facing. This knowledge sharing session was very informative and the projects brainstormed in relation to potential solutions to practical challenges being faced in different environments.

The Scientific Programme on Friday incorporated sessions on eGovernment, eHealth, Technology-enhanced Learning, ICT4D, Content Technologies and Societal Implications for Technology.

Closing Plenary

The Closing Plenary provided examples of activities supporting Research and Innovation collaboration and eGovernment from the European Commission, NEPAD, Prime Minister's office, SAIS Finnish Regional Project and IEEE Internet Initiative.

European Union Development Cooperation, Francesco Affinito, Head of Sector for Research and Innovation, DG DEVCO, European Commission



Mr Francesco Affinito outlined that he had very much enjoyed participation in **IST-Africa Week 2017** and had noticed the significant progress that has been achieved in the past five years.

Francesco commenced by providing context the context of European Union (EU) development cooperation in the Digital field. He outlined that on the EU side, there have been two main things of note this year: the adoption of the new “European Consensus” which states that the EU and its Member States will promote the application of science, technology and innovation including capacity building and continue investing in research and development in and for developing countries, including enhancing national innovation systems and the adoption of a Commission Communication on ‘post-Cotonou’ arrangements which is now being discussed in the Council of Ministers and with the ACP Group.

In 2016 it also published the first-ever thematic evaluation of the EU support to Research and Innovation in Partner Countries (2007-13) which recognised the importance of S&I support at the bilateral, regional and continental level in Africa as well as to the global and intra-ACP level. In the latter context, there was praise for the three Intra-ACP programmes financed so far (€ 78 million in all), including the initiative which has become known as the ‘African Research Grants’, designed and administered by the African Union Commission since 2009 (it should be noted that a further € 17.5 million in African research Grants have been contributed since 2014 as part of the Pan-African Programme).

The Africa-EU R&I High-Level Dialogue produced its first sectoral Partnership in 2016 (which will guide cooperation in in Agriculture, Food Security and Nutrition) and is expected to be tasked with a second topic (Renewable energy and Climate change) at the Joint Summit in Abidjan in November of this year.

EU-Africa development cooperation in Science and Innovation has traditionally been undertaken at thematic level (with a strong focus on Agriculture/Food security) or at the ACP level but in the current 2014-20 programming cycle, we see countries such as Mauritius selecting Higher Education and Research as the focal sector for their National Indicative Programme. Of course much assistance reached Research and Innovation (R&I) through Budget, but this dedicated support for R&I is very promising because it shows Africa is investing very deliberately in the knowledge economy. Something that clearly, Namibia is also doing by all accounts as are very many of the countries represented in **IST-Africa**.

He highlighted that he will return to Brussels with his eyes opened and ready to make the case even more strongly, both inside the Development community and as part of Horizon 2020 programming, for more and better support for innovation policy; ICT skills, literacy and entrepreneurship and the sharing of experiences through excellent platforms such as **IST-Africa**.

In conclusion he highlighted that a third ACP programme for Science and Innovation is being formulated now has 60 million euro set aside to cover the needs of 77 countries. It is aimed at the young people of Africa for human resources skills development.

NEPAD Activities Supporting Infrastructure and ICTs, Dr. Towela Nyirenda-Jere, NEPAD Agency



Dr. Towela Nyirenda-Jere outlined that she has very much enjoyed participating in **IST-Africa Week 2017**, getting reconnected with the **IST-Africa** community and witnessing the active collaboration between countries.

She provided some context for the work that NEPAD is doing. NEPAD is an agency and implementing arm of the African Union. The Union sets to policy direction and priorities and the NEPAD agency must then translate that into meaningful programmes and interventions across the continent. They also have a mandate to promote research and knowledge generation, as well as mobilising partnerships and resources to support these different programmes. The work is guided currently by the African Union Agenda 2063, which is an aspirational document that looks at the kind of Africa that we want to see by 2063 and it is also very closely related the sustainable development goals as well. They work through the 8 Regional Economic Communities as an interface with the 55 member States of the African Union. The NEPAD agency itself does its programming across 4 pillars. Those 4 pillars cover all sectors in terms of the work that they do: Human capital

development, which looks at institutional capacity development and also looks at specific issues related to women and the youth; National resource governance and food security; Industrialisation, Science technology and Innovation and Regional Integration, Infrastructure and Trade- ICT, Energy, Transport and Water.

Towela explains that she works in the Regional Integration, Infrastructure and Trade Programme and they primarily look at transboundary infrastructure projects across 4 sectors; ICT, Energy, Transport and Water. Regional Integration is the primary objective of the African Union. In Infrastructure Development they use five instruments in terms of promoting project implementation. Their goal is to see the Transboundary Infrastructure projects move from conception to bankability, implementation and then operations and maintenance.

RIITP (Regional Integration Infrastructure and Trade Programme) Focus areas include: Promoting regional integration; Advancing regional infrastructure development and Supporting trade facilitation initiatives. The functional Structure includes: Sectorial clusters: Energy & Water, ICT& Gender, Transport, Trade Facilitation and Instruments (supporting the Programme for Infrastructure Development in Africa (PIDA). These include: Service Delivery Mechanism (SDM) – early stage project preparation; Continental Business Network (CBN) – private sector engagement; Information Management & M&E – up-to-date information on PIDA projects; Regulatory & Policy support – enabling environment, unblocking policy and regulatory impediments and Presidential Infrastructure Champions Initiative (PICI) – high level political support.

In terms of enabling factors necessary for Cybersecurity measures that need to be implemented, NEPAD is currently looking into missing links and gaps in ICT infrastructure and what needs to be done in terms of moving forward. Looking for mechanisms for collaborations in specific cases where they jointly develop programmes and projects whether its capacity building or ICT in general, they are open to conversations around such opportunities. They see opportunities through their Internships and young professional programmes, they are very keen for new blood in the agency.

PIDA Progress & Results include: PIDA technical experts at 7 RECs (SADC, EAC, ECCAS, ECOWAS, COMESA, IGAD, UMA) and at the Central Corridor Transit Trade Facilitation Agency (CCTTFA); Finalized implementation arrangements of PIDA CAP with 7 RECs & CCTTFA; PIDA Experts at NPCA (ICT, Transport, Energy, Gender); SDM: Abidjan-Lagos Corridor: Service Delivery Mechanism (SDM) support for early stage project preparation: Institutional Design of the Corridor Management Authority (CMA), Setting up a Legal Framework, Communications, Capacity Building; Regulatory & Policy Support: Job Creation Estimation - Methodology to estimate job creation impacts of PIDA projects developed & tested; PIDA Information Management - Virtual PIDA Implementation Centre (vPIC) enhanced and RECs and other stakeholders trained on data collection & uploading; CBN : Private Sector Engagement - De-risking report published; Campaign for 5% allocation of pension funds to infrastructure to be launched; Trade Facilitation - Move Africa launched & Traffic Light System under implementation; One Stop Border Posts (OSBPs) sourcebook published.

Towela also spoke briefly about the work in ICTs mostly around the Comprehensive ICT Strategy for Africa (CISA) and the AU Convention on Cybersecurity and Personal Data Protection.

e-Government Initiative - Lesson Learned, Ndeshipanda Ndilula, Director, DPSITM, Office of the Prime Minister, Namibia



Mrs Ndeshipanda Ndilula commenced by providing the context. The e-Government initiative in Namibia started way back in the 1990s, culminating with the designing and adoption of the e-Governance Policy in 2005. This was followed by a call for consultancy for the designing and implementation of the e-government strategic action plan for the Namibian Public Service. The consultancy process started with the e-Readiness Assessment that was focused on five areas, namely: Legal Framework (assess availability of ICT related legislation, policies and regulations); Access (assess availability of basic tools to communities); Content (assess availability of information and services over appropriate ICT platforms); Capability (assess availability of skill sets within the government. to avail information and services electronically) and Willingness (looks at preferences among different socio-economic classes for ICT-enabled information and services)

The findings from these areas of assessment informed the designing of the e-Government Strategic Action Plan which was finalised and launched during September 2014. This Plan outlined the strategic objectives, programmes and projects. Hence the implementation of the Plan started from October 2014 focusing on selected projects.

Ndeshipanda then outlined lessons learnt in terms of eGovernment Foundation, Benchmarking and Collaboration.

Like a building, e-Government requires a solid foundation to stand on. Main focus areas required for e-Government are: Organisational, Legal, Technical and Resources

Organisational: governing structures are required to establish accountabilities and responsibilities otherwise the initiative stagnates and loses focus. The Office of the Prime Minister is coordinating the e-Government programme and several committees with members from other institutions are responsible for various activities of the programme.

Legal: e-Government involves electronic transactions that need legal backing, therefore sound legislation is required to protect users' privacy as well as their rights. A practical example is when there is lawsuit involving digital fraud, lawyers need to be enabled to defend and persecute with right tools. In addition terminologies need to be clearly defined and contextualized for everyone to know. As stated earlier by Ms Kamutuezu, The Electronic Transaction and Cybercrime Bill is at advance stage of drafting and hopefully will be enacted during 2017.

Technical: Networks, relevant infrastructures, databases and standards are all required to be availed and managed. A government-wide network has been implemented and points of presence established in thirteen regions. This is allowing government institutions with regional offices to get connected and to further enable the provision of electronic services in future.

Resources: Resources include finances and human resources coupled with various skills, roles and research. The e-Government Project Management identifies cost for projects that are to be implemented so that appropriate funding is provided and relevant skilled personnel are assigned.

In terms of benchmarking, learning from pioneers and champions of e-Government worldwide is essential for Namibia. The saying "do not re-invent the wheel" has a reference. Thus, Namibia stands to learn from others through various platforms such as Conferences, Symposiums and Research. In addition, several countries were visited by government officials at different levels of responsibilities. One such country visited by officials from the Department of Public Service Information Technology Management in the Office of the Prime Minister is Estonia, as a European country which has pioneered the implementation of the Interoperability Solution known as X-Road.

Today, Namibia has implemented a similar solution with three pilot institutions. Furthermore, Namibia has technical agreement with a Solution Provider from Estonia working together to operationalize solutions aiming at achieving exchanging and sharing of data in a secure and safe way among participating institutions.

In terms of Collaboration, engaging stakeholders is essential in e-Government programmes because input from citizens, communities and businesses informs what gets implemented.

From the inception of the e-Government initiative in Namibia, stakeholders were invited to participate in discussions. These included government institutions, parastatals, private companies, the academia and community representatives. They were instrumental in the work related to the e-Readiness Assessment, prioritizing of government services into projects, development of the e-Government Strategic Action Plan as well as the implementation of prioritised projects.

In conclusion Ndeshipanda emphasized the importance of monitoring and evaluation of e-Government projects. Monitoring and evaluation keeps one informed of the progress of activities and allows sequential execution of projects. This is one area that Office of the Prime Minister is currently training our staff to enable us to measure our achievements and to continuous improve upon our successes.

Growth through Stronger Innovation Systems - SAIS II, Dr Flora Ismail Tibazarwa, SAIS, Namibia

The Southern African Innovation Support Programme (SAIS) is supported by the Ministry of Foreign Affairs of Finland. The first phase ran from 2011 - 2016. The second phase will commence in June 2017 and run until 2020 cooperating with Botswanam, Namibia, South Africa, Tanzania and Zambia.



Dr Flora commenced by providing insights into activities and lessons learnt from the TANZ ICT bilateral program funded by the Ministry of Foreign Affairs of Finland in Tanzania from 2011 - 2016. TANZ ICT supported policy development which resulted in the updated ICT Policy of 2016, ICT capacity building and providing funding grants for entrepreneurs and Living Labs through an Innovation Fund. Buni Hub was set up as an Innovation space within the Tanzania Commission for Science and Technology (COSTECH). COSTECH is now supporting Innovation Spaces to be set up within academic institutions in other parts of Tanzania.

Dr Flora summarised lessons learnt to include:

a) ICT and entrepreneurship is explicitly connected to entrepreneurship & growth. TANZ ICT found that they were providing a platform for opportunities , bringing young people together and challenging them with to come up with ICT solutions to address social economic problems. Towards the end of the programme they also started to

provide support for social innovation. ICT was always intergrated into the solutons they were coming up as an enabler or facilitator to address the target social challenge.

b) Collaboration with locals and donors can create a community of like-minded people but action requires an orchestrator.

c) Digital technologies can help in creating better, inclusive and more transparent services that can reach the poor. Tanzania has significantly taken up mobile money - can this expertise be shared?

d) Importance of agile and collaborative approaches where users and citizens work in partnership with government.

e) Instruments to build partnerships and to exchange knowledge include hubs, co-working spaces, ecosystems orchestrators instead of science parks & closed labs

Innovation is transforming from closed and linear to open and iterative. There are opportunities for disruptive players such as students, start-ups and citizens to provide access to local ideas and talent. It is important to help local Innovation champions to capture the results from young entrepreneurs' projects and accelerate further support for entrepreneurship and innovation ecosystems.

Dr Flora highlighted that SAIS II has a vision to be a testbed for the young entrepreneurs and work with them through the hubs, networking communities to find new ideas and share them across the different countries. Its mission is to strengthen the entrepreneurship and innovation skills for young people and empower the intermediaries (hubs) and provide an informed problem solving solution which is the innovative way to go. Challenge funds will be provided through 3 rounds of funding over four years focusing on Botswana, Finland, Namibia, South Africa, Tanzania and Zambia and cooperating with SADC.

Preliminary Outputs from IEEE ETAP Forum, Dr Maike Luiken, IEEE, Canada



Dr Maike Luiken commenced by providing an overview of IEEE activities. IEEE added "Technology for the benefits of humanity" as a tagline a few years ago based on the importance to leverage expertise within IEEE societies and interact with policy makers to support evidence based decision making. The IEEE Internet Initiative is focused on Connecting the Global Technology, Industry and Policy Making Communities for a Safe, Secure, Trusted, Affordable Internet for All. It provides a collaborative platform for advancing solutions and informing global technology policymaking through a consensus of sound technical and scientific knowledge in the areas of internet governance, cybersecurity, privacy and internet inclusion.

One of the activities of the IEEE Internet Initiative is to engage with technology experts and policy makers through IEEE Experts in Technology and Policy (ETAP) Forums on Internet Governance, Cybersecurity, Privacy

and Inclusion. Previously six IEEE ETAP forums have taken place (San Jose, twice in Tel Aviv, Washington DC, Beijing, Delhi).

IEEE cooperated with **IST-Africa** to organise the first IEEE ETAP Forum in Africa as a pre-conference event on 30 May, based on the high visibility of cybersecurity in the program. **IST-Africa** invited a range of speakers to share experiences in relation to policy development, cyber security awareness and implementation at Member State level as well as insights into the AU Convention on Cybersecurity from NEPAD, South Africa, Namibia and Cameroon: Mr. Nhlanhla Lupahla, Deputy Director: Innovation, Ministry of Higher Education, Training and Innovation, Namibia on behalf of the Permanent Secretary; Prof Basie von Solms, Centre for Cyber Security, University of Johannesburg, South Africa; Elizabeth Kamutuezu, Acting Deputy Director: IPRM, Ministry of Information and Communication Technology, Namibia; Dr. Towela Nyirenda-Jere, Principal Programme Officer, NEPAD Agency, South Africa and Njei Check, Agence Nationale des Technologies de l'Information et de la Communication, Cameroon.

Following the presentations the participants selected five priority areas for group work out of thirteen options, focusing on Combatting cyber crime while maximizing Internet inclusion for all; Public awareness and education on Internet safety and cyber crime; Trends in cyber attacks and cyber crime; Data protection, privacy, and resilience in the era of Internet of Things (IoT) and National CIRT development. Working groups identified the main challenges and opportunities in addressing their respective issues, and their proposed next steps. Working groups will continue their discussions and coordination on-line, to further develop and follow through on plans of action.

The IEEE ETAP Forum on Cybersecurity organised in cooperation with **IST-Africa Week 2017** has been the largest forum to date with 65 participants from 25 countries. Dr Maike thanked **IST-Africa** and all the participants for making this Forum such a success.

Awards

The Awards for Best Paper and Runner-up Paper were announced by Paul Cunningham, **IST-Africa** and presented by **Mr. Vincent Nowaseb, General Manager: Innovation and Technology Development, NCRST** during the Closing Plenary Session of **IST-Africa Week 2017**.

All papers submitted to IST-Africa are double-blind peer reviewed by members of the International Programme Committee. As part of this process the reviewers nominate a shortlist of papers to be considered for the Best Paper and Runner-up Paper Awards.



The Best Paper was awarded to “Spectrum Regulation for Future Internet Networks in Developing Economies”, authored by Bomkazi Somdyala, ICASA, South Africa; Seani Rananga, Luzango Mfupe, Moshe Masonta and Fisseha Mekuria, CSIR Meraka Institute, South Africa.



The Runner-up Paper was awarded to “A Framework for Low Cost Automatic Pill Dispensing Unit for Medication Management” authored by Gift Arnold Mugisha, Uganda Martyrs Secondary School Namugongo, Uganda; Faith-Michael Uzoka and Chinyere Nwafor-Okoloi, Mount Royal University, Canada.

Conclusion

On behalf of **IST-Africa** Paul thanked our IST-Africa partner in Namibia, the National Commission on Research Science and Technology, the Prime Minister, Minister of Higher Education, Training and Innovation, Minister of ICT, panellists and delegates for making **IST-Africa Week 2017** such a success. Paul wishes the delegates a safe travel home and looks forward to seeing them next year.

Participants

There were over 400 participants at **IST-Africa 2015** from 36 countries (Europe, Africa, US and Canada). The organisations represented are listed below.

European, US and Canadian Organisations

Organisation	Country
DG DEVCO European Commission	Belgium
Cyprus University of Technology	Cyprus
Kiteen Evankelinen Kansanopisto	Finland
University of Turku	Finland
Easy Global Market	France
empirica GmbH	Germany
InnoTec21 GmbH	Germany
University of Koblenz Landau, Campus Landau	Germany
IIMC	Ireland
FBK	Italy
Politecnico di Milano	Italy
Faculty for Geo-Information Science and Earth Observation (ITC)	Netherlands
Norwegian University of Science and Technology	Norway
Oslo and Akershus University College of Applied Sciences	Norway
University of Oslo	Norway
Embassy of Portugal	Namibia
Embassy of the Federal Republic of Germany	Namibia
European Union Delegation to Namibia	Namibia
eGovlab	Sweden
IEEE	Canada
Ryerson University	Canada
IEEE	United States
San Francisco State University	United States

African Organisations

Organisation	Country
Universidade Agostinho Neto	Angola
Botho University	Botswana
Ministry of Transport and Communications	Botswana
Southern African Development Community (SADC)	Botswana
University of Botswana	Botswana
National Agency for Information and Communication Technologies (ANTIC)	Cameroon
Ecole Supérieure d'Informatique Salama (ESIS)	Congo (DRC)
University of Johannesburg /University of Kinshasa	Congo (DRC)
University of KwaZulu-Natal	Congo (DRC)
ITIDA	Egypt
Ministry of Communications and Information Technology	Ethiopia
Accra Polytechnic	Ghana
Africa Nazarene University	Kenya
Dedan Kimathi University of Technology	Kenya

Organisation	Country
Kabarak University	Kenya
Kenyatta University	Kenya
Kisii University	Kenya
Ministry of Education, Science and Technology	Kenya
Ministry of Health	Kenya
National Hospital Insurance Fund	Kenya
Strathmore University	Kenya
The Technical University of Kenya	Kenya
University of Nairobi	Kenya
Department of Science and Technology	Lesotho
National University of Lesotho	Lesotho
Mzuzu University	Malawi
Chancellor College - University of Malawi	Malawi
National Commission for Science and Technology	Malawi
UbuntuNet Alliance for Research and Education Networking	Malawi
University of Malawi	Malawi
National Computer Board	Mauritius
University of Mauritius	Mauritius
National Institute for ICT	Mozambique
Ministry of Environment and Tourism	Namibia
August 26 Logistics	Namibia
CITC Namibia	Namibia
Communications Regulatory Authority of Namibia (CRAN)	Namibia
DPSITM, Office of the Prime Minister	Namibia
FABlab Design and Technology Centre, NUST	Namibia
International University of Management	Namibia
Internet Society	Namibia
Ministry of Home Affairs	Namibia
Ministry of Justice	Namibia
Ministry of Fisheries and Marine Resources	Namibia
Ministry of Higher Education, Training and Innovation	Namibia
Ministry of Information and Communication Technology	Namibia
Ministry of Gender Equality & Child Welfare	Namibia
Ministry of Agriculture	Namibia
Ministry of Defence	Namibia
Ministry of Finance	Namibia
Ministry of Health and Social Services	Namibia
Ministry of Industrialization, Trade and SME Development	Namibia
Ministry of Land Reform	Namibia
Ministry of Mines & Energy	Namibia
Ministry of Poverty Eradication and Social Welfare	Namibia
Ministry of Urban and Rural Development	Namibia
Namibia Fundraising Institute	Namibia
Namibia University of Science and Technology	Namibia

Organisation	Country
NamShuwe ICT Hive	Namibia
National Commission on Research, Science and Technology	Namibia
National Planning Commission	Namibia
Office of the Prime Minister	Namibia
SAIS II	Namibia
SASSCAL	Namibia
Telecom Namibia	Namibia
University of Namibia	Namibia
University of Namibia/University of South Africa	Namibia
Veterans Affairs	Namibia
Xnet Development Trust	Namibia
YALI	Namibia
Geoscape Limited	Nigeria
University of South Africa	Nigeria
University of Ibadan	Nigeria
Carnegie Mellon University Africa	Rwanda
University of Rwanda	Rwanda
Ministère de l'Enseignement Supérieur et de la Recherche	Senegal
Central University of Technology	South Africa
CSIR	South Africa
Department of Science and Technology	South Africa
Impact Advantage	South Africa
Jembi Health systems NPC	South Africa
CSIR Meraka Institute	South Africa
Nedbank	South Africa
Nelson Mandela University	South Africa
NEPAD Agency	South Africa
PwC	South Africa
Rhodes University	South Africa
Square Kilometre Array South Africa	South Africa
The University of the Western Cape	South Africa
Tshwane University of Technology	South Africa
University of Fort Hare	South Africa
University of Johannesburg	South Africa
University of KwaZulu-Natal	South Africa
University of Pretoria	South Africa
University of South Africa	South Africa
University of the Free State	South Africa
University of Venda	South Africa
Vaal University of Technology	South Africa
Sudan University of Science and Technology	Sudan
Royal Science and Technology Park	Swaziland
Ministry of Information and Communications Technology	Swaziland
COSTECH	Tanzania
Nelson Mandela African Institution of Science and Technology	Tanzania
University of Dar-es-Salaam	Tanzania

Organisation	Country
AFROSOFT IT Solutions	Uganda
Makerere University Business School	Uganda
netLabs!UG Research Centre, Makerere University	Uganda
Makerere University	Uganda
Uganda Bureau of Statistics	Uganda
Uganda Martyrs Secondary School Namugongo	Uganda
Uganda National Council for Science & Technology	Uganda
IEEE Zambia	Zambia
Harare Institute of Technology	Zambia
National University of Science and Technology	Zimbabwe