Introduction

Due to the unprecedented circumstances during the COVID-19 pandemic, IST-Africa 2020 will take place as a virtual event from 18 - 22 May. An activity of IST-Africa, IST-Africa 2020 is the fifteenth 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 co-funded IST-Africa from 2006 - 2018, to promote African - European research cooperation and support Information Society and ICT aspects of the Africa-EU Strategic Partnership.


IST-Africa directly supports Information Society, Innovation and ICT aspects of the Africa-EU Strategic Partnership, the Science, Technology and Innovation Strategy for Africa (STISA-2024), the Digital Transformation Strategy for Africa (2020-30) and the UN Sustainable Development Goals.

The goals of the IST-Africa Conference Series are Community Building to facilitate EU-African research cooperation and successful exploitation of Research and Innovation 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, to support International Cooperation and open up the European Research Area (ERA) to Africa.

Who will you meet?

IST-Africa 2020 Conference attracts policy makers, practitioners, and researchers from leading commercial, government and research organisations around the world. Unlike many research conferences, IST-Africa provides an opportunity to meet with senior managers, practitioners, project managers, software engineers and researchers from industry, government and research organisations. Delegates and speakers attend to share knowledge, experience and lessons learnt, and network with their peers from around the world.

IST-Africa 2020 Conference also provides 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 facilitates sharing of interim results from ongoing Horizon 2020 projects as well as projects supported by national and international funding sources.

Virtual Event

Due to the unprecedented circumstances during the COVID-19 pandemic, IST-Africa 2020 will take place as a virtual event from 18 - 22 May.

The Programme

The 5-day programme features 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 may participate in 31 thematically focused sessions featuring different aspects of eGovernment, eHealth, eInfrastructures, Technology Enhanced Learning and ICT Skills, CyberSecurity, Next Generation Computing, ICT4D, eAgriculture, Content Technologies, Entrepreneurship and Societal Implications of Technology.

Plenary presentations will provide insights into how Research, Innovation and Entrepreneurship is being supported in Uganda, the Digital Transformation Strategy for Africa (2020-30), Research and Innovation for Sustainable Development, AfricaConnect, Support for Innovation and Entrepreneurship in Southern Africa and how IEEE is supporting Sustainable Development and activities in Africa.

The programme is subject to change and the IST-Africa 2020 Organising Committee reserves the right to alter the contents and/or speakers. This Programme is accurate as at 17 May 2020. The timing of all sessions are based on Uganda Time (GMT+3).
International Programme Committee

A distinguished Programme Committee reviewed and provided feedback on blind peer reviewed papers.

The IST-Africa 2020 International Programme Committee includes

- Paul Cunningham (Conference Chair), IST-Africa Institute / IIMC, Ireland
- Tiwonge Banda, UbuntuNet Alliance, Malawi
- Dr Donia Smaali Bouhlila, University of Tunis El Manar, Tunisia
- Laurens Cloete, University of Pretoria, South Africa
- Miriam Cunningham, IST-Africa Institute / IIMC, Ireland
- Edem Emmanuel Eilu, Uganda Christian University, Uganda
- Dr Emmanuel Eilu, Uganda Christian University, Uganda
- Dr Max Imaton, SAIS2, Namibia
- Miriam Cunningham, IST-Africa Institute / IIMC, Ireland
- Kim Davis, Research Council of Norway, Norway
- Dr Fadila Boughanemi, Deputy Head, International Cooperation II (Asia, Africa, Middle East & External Relations), DG Research and Innovation, European Commission
- Prof. Magdalena Salazar Palma, Director, IEEE Region 8
- Prof. Kenyatta Ramaphosa, University of Pennsylvania, USA
- Prof. Jelel Ezzine, ENIT, Tunisia
- Prof. Kenneth Foster, North Carolina State University, USA
- Dr Charmayne Hughes, Health Equity Institute, San Francisco State University, USA
- Ilari Lindy, SAIS2, Namibia
- Prof. Mohamed Jmaiel, University of Sfax, Tunisia
- Dr Chipo Kanjo, Chancellor College, University of Malawi, Malawi
- Vasilis Koulolias, eGovLab / DSV, Sweden
- Kristina Lahde, Saliens Ltd, Finland
- Esteban Municio, University of Antwerp - imec, Belgium
- Prof. Johann Marquez-Barja, University of Antwerp - imec, Belgium
- Paul Kostek, IEEE Humanitarian Activities Committee Events Chair
- Vincent Kaabunga, IEEE Africa Council Chair
- Dr Tshiamo Motshegwa, University of Botswana, Botswana
- Moses Bayingana, Senior Policy Officer for ICT, African Union Commission
- Tom Fryer, Head of International Relations, GÉANT
- Dr. Elioda Tumwesigye, Minister for Science, Technology and Innovation, Uganda
- Daan du Toit, Deputy Director-General: International Cooperation and Resources, Department of Science and Innovation, South Africa
- Moctar Yedaly, Head, Information Society, African Union Commission
- Dr Fadila Boughanemi, Deputy Head, International Cooperation II (Asia, Africa, Middle East & External Relations), DG Research and Innovation, European Commission
- Prof. Magdalena Salazar Palma, Director, IEEE Region 8
- Moses Bayingana, Senior Policy Officer for ICT, African Union Commission
- Tom Fryer, Head of International Relations, GÉANT
**Monday, 18 May, 2020**

### Opening Plenary 1

**Welcome Address**
Paul Cunningham, IST-Africa Institute, Ireland

Moctar Yedaly, Head, Information Society, African Union Commission

Prof. Magdalena Salazar Palma, Director, IEEE Region 8

Dr. Elioda Tumwesigye, Minister for Science, Technology and Innovation, Uganda

### Session 2: eInfrastructure

**Advancing Rural Connectivity in South Africa through Policy and Regulation: A Case for Community Networks**
Shaun Pather, University of the Western Cape, South Africa

**Telecentre Users as Mediators of Empowerment of Rural Communities in Malawi**
Sellina Khumbo Kapondera, Royal Holloway University of London, United Kingdom

**Silent Adoption of Bring-Your-Own-Device in Tanzania Higher Learning Institutions - Adoption Policies**
Mawazo Mageza, Sokoine University of Agriculture, Tanzania

**Electricity and Solar Power in Health Institutes, complexities in rural Zimbabwe**
Ronald Manhibi, SolidarMed, Zimbabwe

### Session 3: Global Development Applications and Case Studies

**Unmanned Aerial Vehicles: Opportunities for Developing Countries and Challenges**
Sheila Mugala, Makerere University, Uganda

**Transforming Paratransit in Africa's congested Cities: An ICT-enabled Integrated Demand Responsive Transport (iDRT) Approach**
Innocent Ndibatya, Stellenbosch University, South Africa

**Assessment of the Value of an Academic Preparation for Short-Term International Humanitarian Missions**
Bernard Cohen, Neurological Monitoring Associates, LLC, United States

### Plenary 4

**IST Diplomacy in the Fight against Covid-19 - Perspectives from South Africa**
Daan du Toit, Deputy Director-General: International Cooperation and Resources, Department of Science and Innovation, South Africa

### Break

### Session 6: Societal Implications of Technology - Supporting Financial Transactions

**Role of Mobile Applications in Mitigating Challenges Faced by Informal Saving Groups**
Patrick Kanyi Warnuyu, USIU-Africa, Kenya

**Towards Small-Scale Farmers Fair Credit Scoring Technique**
Benjamin Otieno, Kibabii University, Kenya

**An Information Technology Controls Evaluation Prototype for Financial Institutions in Kenya**
Bernard Shibwabo, Strathmore University, Kenya

**Predicting Online Purchase Intentions in Business Administration Graduate Students**
Joseph Kizito Bada, Makerere University Business School, Uganda

### Break

### Session 7: Societal Implications of Technology 3

**Managing the Challenges of the Digital Divide among First Year Students: A Case of UKZN**
Temitayo Faloye, University of KwaZulu-Natal, South Africa

**Industry 4.0: University Students’ Perception, Awareness and Preparedness - A Case of Namibia**
Aussie Mutalya, International University of Management, Namibia

**Semantic Web and Grid Technology use in Collaborative Researches for Universities in Kenya**
Julius Murumba, The Technical University of Kenya, Kenya

### End of Sessions
Tuesday, 19 May, 2020

09:00 Session 8: eGovernment

Evaluating a Citizen-Centric e-Government Solution in Practice
Karin Fröhlich, Aalto University, Finland
Digital Ecosystems for Public Enterprises: Prospects and Challenges
Simon Shikongo, Namibia University of Science and Technology, Namibia
Open Innovation in Government Services: An Empirical View of Citizens’ Participation
Collins Oduor Ondiek, United States International University-Africa, Kenya
Smart City Citizens’ Service Provision using Participatory Design and Participatory Sensing: Lessons for Developing Cities
Stephen Kyakulumbwe, University of the Western Cape, South Africa
Increasing Participation and Security in Student Elections through Online Voting: The Case of Kabarak University
Moses Thiga, Kabarak University, Kenya

10:40 Plenary 9

The Digital Transformation Strategy for Africa (2020-30)
Moses Bayingana, Senior Policy Officer for ICT, African Union Commission

11:00 Break

11:05 Session 10: Content Technology Applications

Towards a Sign Language Hand Gesture Recognition Design Framework
Casam Nyaga, University of the Free State, South Africa
Instagram as a New Marketing Platform for Informal Traders in Tanzania
Nasibu Mramba, College of Business Education, Tanzania
A Framework for Items Recommendation System Using Hybrid Approach
Samuel Wairegi, Jomo Kenyatta University of Agriculture and Technology, Kenya
Question Answering using Automatically Generated Semantic Networks – the case of Swahili Questions
Barack Wanjawa, University of Nairobi, Kenya

12:30 Lunch Break

13:30 Plenary 11

Research and Innovation for Sustainable Development-Future Perspectives
Fatima Boughanemi, Deputy Head, International Cooperation II (Asia, Africa, Middle East & External Relations), DG Research and Innovation, European Commission

13:55 Session 12: eHealth Issues and Applications 1

Prediction of Cancer Basing on Risk Factors using Ensemble Learning
Ruth Warlo, University of the Free State, South Africa
Wednesday, 20 May, 2020

10:00 Session 15: Entrepreneurship in Uganda

- IEEE Entrepreneurship at a Glance
  Janati Nakimera, IEEE Uganda Section, Uganda
- Online Digital Payments that Every Startup Should Consider
  Kenneth Bintu, Cavendish University Uganda, Uganda

09:45 Plenary 16

- SAIS Programme - Supporting Innovation and Entrepreneurship in Southern Africa
  Ilari Lindy, SAIS2, Namibia

10:20 Session 17: Next Generation Computing

- Using the Internet-of-Things and Clustering Algorithms to Help Allocate Temporary Work to the Unemployed
  Laurie Butgereit, Nelson Mandela University, South Africa
- Towards a Strategic Application of IoT and Big Data for African Societal Solutions
  Jackson Machii, The Technical University of Kenya, Kenya
- Checkpointing as a Counter to Security Issues in Cloud Computing Infrastructures
  John Msagha Mbogholi, Maseno University, Kenya
- Personal Cloud Computing Adoption: Integrating IT Mindfulness with TAM
  John Oredo, University of Nairobi, Kenya
- A Prototype of an Android Application Controlled Lawnmower
  Valerianus Hashiyana, University of Namibia, Namibia

12:00 Lunch Break

13:00 Session 19: Cyber Security Issues - 1

- Secure Information Infrastructure Framework Components for a Smart City: A Case Study of Windhoek
  Fungai Bhunu Shava, Namibia University of Science and Technology, Namibia
- Design and Implementation of an IPSec Virtual Private Network: A Case Study at the University of Namibia
  Flavia Kyeyago Ouma, Uganda Bureau of Statistics, Uganda
- A Systematic Review: Vulnerability Assessment of Wi-Fi in an Educational Institution
  Emily Bagarukayo, Makerere University, Uganda
- A Methodology for Evaluating Security in MNO Financial Service Model
  Sigsbert Rwiza, University of Dar es Salaam, Tanzania

15:05 Session 20: Cyber Security Issues - 2

- A Two-tier Fragile Audio Watermarking Algorithm Final
  Dumisani Mfune, Mzuzu University, Malawi
- Social Engineering Based Cyber-Attacks in Kenya
  James Obuhuma, Africa Nazarene University, Kenya
- Using Apriori Algorithm Technique To Analyze Crime Patterns for Kenyan National Crime Data: A County Perspective
  Edgar Adero, Technical University of Kenya (TUK), Kenya
- A Real-Time Location Based Prototype for Notification of Crime Hotspots Using Crowdsourcing
  Bernard Alaka, Strathmore University, Kenya
- Emerging Network Security Issues in Modern Tertiary Institutions
  Knowledge Rusere, University of South Africa, Namibia

16:45 End of Sessions
Thursday, 21 May, 2020

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 21: Technology-Enhanced Learning 1 - Supporting Skills Development</th>
</tr>
</thead>
</table>
| 09:00      | **Starting from Scratch: Introducing Primary School Learners to Programming**  Afikile Sikwebu, Nelson Mandela University, South Africa  
|           | **Learning to program on KaiOS: a Hands-on Coding School for Developing Climate Service Apps**  Ville Myllynpää, University of Turku, Finland  
|           | **Co-designing a European Future Tech Lab in Africa as a Place for Open Innovation**  Marko Lahti, University of Turku, Finland |
| 10:15      | Plenary 22  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 22: Technology Enhanced Learning in Schools 2</th>
</tr>
</thead>
</table>
| 10:40      | Break  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 23: Technology Enhanced Learning in Schools 2</th>
</tr>
</thead>
</table>
| 10:45      | Break  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 24: Technology-Enhanced Learning 3 - Applications</th>
</tr>
</thead>
</table>
| 12:00      | Lunch Break  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 25: Technology-Enhanced Learning 4 - Issues and Applications</th>
</tr>
</thead>
</table>
| 13:15      | Break  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 26: Technology-Enhanced Learning 5 - Issues and Applications</th>
</tr>
</thead>
</table>
| 14:30      | Break  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 26: Technology-Enhanced Learning 5 - Issues and Applications</th>
</tr>
</thead>
</table>
| 14:35      | Break  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 26: Technology-Enhanced Learning 5 - Issues and Applications</th>
</tr>
</thead>
</table>
| 15:50      | Break  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 26: Technology-Enhanced Learning 5 - Issues and Applications</th>
</tr>
</thead>
</table>
| 15:55      | End of Sessions  

- **AfricaConnect: a Past, Present and Future Success Story for African Research and Education**  
  Tom Fryer, Head of International Relations, GÉANT  

- **A Mobile Ad-hoc Strategy to Enhance ICT Based Education in Zimbabwean Rural Schools**  
  Beauty Mugoniwa, UNISA, Zimbabwe  

- **eReadiness Assessment Tool for Schools**  
  Alida Veldsman, Nelson Mandela University, South Africa  

- **SESEMAT In-service Pedagogical Strategies and Student Achievement in Science at Ordinary Level in Tororo SESEMAT Region**  
  Deborah Manyiraho, Busitema University, Uganda  

- **Nigerian Instructors’ Acceptance of Learning Management Systems: A structural Modelling Approach**  
  Mohammed Yakubu, American University of Nigeria, Nigeria  

- **An Adaptive Gamification Model for e-Learning**  
  Samuel Muthee Kamunya, SEKU University, Kenya  

- **An Innovative Blended Learning Model for Information Technology Courses for a South African University**  
  Nosipho Mavuso, Walter Sisulu University, South Africa  

- **Manahij App as a Tool to Enhance Students’ Performance Utilizing Data Analytics and Academic Supervision - Case Study: National University Sudan**  
  Muna Mohamed Mahmoud Abu Gosseisa, Ibn Sina University, Sudan  

- **Automated Graduate Training Monitoring: The Case of Gulu University and Strategies for Institutional Adoption**  
  Benedict Oyo, Gulu University, Uganda  

- **Awareness, Accessibility and Usability of eResources: University Students Perspective**  
  Bonnie Obeka Obande, University of Agriculture Makurdi, Nigeria  

- **An Empirical Approach to Mobile Learning on Mobile Ad Hoc Networks (MANETs)**  
  Ichaba Mutuma, KCA University, Kenya  

- **Development of an Open Source Desktop Application Client Software for Running Internet Enabled Laboratories**  
  Joel Tibabwetiza Muhanguzi, Makerere University, Uganda  

- **Barriers to the Implementation of Big Data Technology in Education: An Empirical Study**  
  Jude Osakwe, Namibia University of Science and Technology, Namibia  

- **E-complaints: A Semi-structured E-forum at University**  
  Maria Ntinda, University of Namibia, Namibia  

15:50 Session 26: Technology-Enhanced Learning 5 - Issues and Applications
Friday, 22 May, 2020

09:00 Session 27: **eAgriculture**

- Blockchain based Milk Delivery Platform for Smallholder Dairy Farmers in Kenya: Enforcing Transparency and Fair Payment
  Dorothy Rambim, Masinde Muliro University of Science and Technology, Kenya
- Co-design of an Agricultural Management Application for Small-Scale Farmers
  Martin Ujakpa, International University of Management, Namibia
- Computer Vision for Smart Farming and Sustainable Agriculture
  Ronald Tombe, University of Kwazul Natal, South Africa

10:00 Plenary 28

- IEEE Africa Council
  Vincent Kaabunga, IEEE Africa Council Chair

10:20 Break

10:25 Session 29: **Green-energy driven Technology Solutions for Sustainable Small-scale Farming**

- Introduction of LEAP-AGRI Programme
  Darelle van Greunen, Nelson Mandela University, South Africa
- Project Africa
  Waldir Moreira, Fraunhofer AICOS, Portugal
- IoT Sensing Platform for e-Agriculture in Africa
  Waldir Moreira, Fraunhofer AICOS, Portugal
- Mobile Applications in Support of Small-scale Crop Farming
  Darelle van Greunen, Nelson Mandela University, South Africa
- Wrap Up

12:00 Lunch Break

13:15 Session 30: **eAgriculture & Environmental Sustainability**

- Use of Participatory Approach to Determine Adoption of ICTs Agricultural Services
  Jasper Ondulo, Masinde Muliro University of Science and Technology, Kenya
- Usability as Critical Success Factor of Mobile App for Pesticides Authenticity Verification: Reducing Risks for Farmers in Tanzania
  Catherine Cleophace Ngirwa, Dar es salaam University College of Education, Tanzania
- Development of an Integrated Framework for Knowledge Sharing and Integration on Land use and Land Management in West-Africa
  Mahamadou Belem, Université Nazi Boni, Burkina Faso

14:15 Break

14:20 Session 31: **Environmental Sustainability**

- ITIKI Success Story: Classic Application of Design Thinking
  Muthoni Masinde, Central University of Technology, South Africa
  Godfrey Odongtoo, Busitema University, Uganda