IST-Africa 2021 Final Programme

10 - 14 May 2021

Hosted by

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Introduction

Due to the unprecedented circumstances during the COVID-19 pandemic, **IST-Africa 2021** will take place as a virtual event from 10 - 14 May. An activity of **IST-Africa, IST-Africa 2021** is the sixteenth 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.

Hosted by the Government of South Africa through the Department of Science and Innovation, Supported by the European Commission and African Union Commission, **IST-Africa 2021** focuses on the the Role of ICT, Research and Innovation in Africa’s Development and specifically on Applied ICT research in the areas of eHealth, eGovernment, einfrastructures, Technology Enhanced Learning and ICT Skills, Cyber Security, Next Generation Computing, eAgriculture, Societal Implications of Technology, International Cooperation and ICT4D. **IST-Africa 2021** will provide a collegiate setting for presentations and discussions of national & regional developments, issues of concern & good practice models, and networking with peers. **IST-Africa 2021** will also provide an opportunity to identify potential partners for future proposals under Horizon Europe.


**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 2021** 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 2021** 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 Europe. 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 2021** will take place as a virtual event from 10 - 14 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:

**Monday 10 May** - CyberSecurity, Collaborative Open Innovation and ICT-enabled Entrepreneurship, Global Development, Content Technologies

**Tuesday 11 May** - eHealth, eGovernment, Societal Implications of Technology

**Wednesday 12 May** - Next Generation Computing, einfrastructures, ICT Supporting Power Delivery

**Thursday 13 May** - Technology-enhanced Learning

**Friday 14 May** - eAgriculture, Environment Sustainability

Plenary presentations will provide insights into Horizon Europe, Lessons Learnt from Leveraging Technological Innovation to Manage a Pandemic; Fourth Industrial Revolution (4IR) and Open Science in Africa.

The programme is subject to change and the **IST-Africa 2021** Organising Committee reserves the right to alter the contents and/or speakers. This Programme is accurate as at 11 May 2021. **The timing of all sessions are based on South Africa Time (GMT+2).**

**Conference Proceedings**

The **IST-Africa 2021** conference proceedings will published on an open access basis in the Paper Repository on the Conference Portal.

Papers that are physically presented during the event will also have the option after the event for their paper to be included in the **IST-Africa 2021** Conference Proceedings submitted for publication in IEEE Xplore. Each presenter will present one paper.
Plenary Speakers

Plenary Speakers as at 11 May 2021 include:

- Welcome Address - Hon. Buti Manamela, Deputy Minister of Higher Education, Science and Technology, South Africa
- Horizon Europe - Building on EU-Africa Cooperation - Maria Cristina Russo, Director, Global Approach & International Cooperation in R&I, DG: Research & Innovation, European Commission
- Lessons Learnt from Leveraging Technological Innovation to Manage a Pandemic - Dr Mmboneni Muofhe, Deputy Director-General: Technology Innovation, Department of Science and Innovation, South Africa
- IST-Africa Journey - Daan du Toit, Deputy Director-General: International Cooperation and Resources, Department of Science and Innovation, South Africa
- Fourth Industrial Revolution (4IR) - Professor Tshilidzi Marwala, Vice-Chancellor and Principal of the University of Johannesburg, South Africa
- From Principles to Actions: Open Science in Africa - Dr Sepo Hachigonta, Director, Strategic Partnerships, National Research Foundation, South Africa
- C4IR South Africa - Supporting Transformation of Manufacturing by Leveraging the Current Wave of Technological Revolution - Ntsibane Ntlatlapa, Head of the South African Affiliate C4IR Centre

International Programme Committee

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

The IST-Africa 2021 International Programme Committee includes:

- Prof. Paul Cunningham (Conference Chair), IST-Africa Institute / IIMC, Ireland
- Tiwonge Banda, UbuntuNet Alliance, Malawi
- Prof. Mouna Baklouti, National Engineering School of Sfax, Tunisia
- Prof. Abdessattar Ben Amor, National Institute of Applied Sciences and Technology, Tunisia
- Dr Yassine Ben Salem, University of Gabes, Tunisia
- Dr Hatem Ben Sta, University of Tuis El Manar, Tunisia
- Prof. Faouzi Benzarti, High School Engineering of Tunis, Tunisia
- Dr Laurie Butgereit, Nelson Mandela University, South Africa
- Laurens Cloete, University of Pretoria, South Africa
- Prof Bruno Crispo, University of Trento, Italy
- Miriam Cunningham, IST-Africa Institute / IIMC, Ireland
- Kim Davis, Research Council of Norway, Norway
- Dr Jan-Carel Diehl, Delft University of Technology, Netherlands
- Prof Love Ekenberg, DSV, Stockholm University, Sweden
- Prof. Jelle Ezzine, ENIT, Tunisia
- Prof Farid Farahmand, Sonoma State University, USA
- Prof. Kenneth Foster, North Carolina State University, USA
- Felix Hall, DigiHealth Institute, Neu-Ulm University of Applied Sciences, Germany
- Prof. Mohamed Jmaiel, University of Sfax, Tunisia
- Dr Chipo Kanjo, Chancellor College, University of Malawi, Malawi
- Vasilis Koulolias, eGovLab / DSV, Sweden
- Kristiina Lahde, Saliens Ltd, Finland
- Ilari Lindy, SAIS II, Namibia
- Prof. Johann Marquez-Barja, University of Antwerp - imec, Belgium
- Prof. Maurice Mars, University of KwaZulu-Natal, South Africa
- Morten Møller, GRENEN, Denmark
- Dr Tshiamo Motshegwa, University of Botswana, Botswana
- Esteban Municio, University of Antwerp - imec, Belgium
- Dr Joshua Ndjege, United States International University - Africa, Kenya
- Dr Sameerchand Pudaruth, University of Mauritius, Mauritius
- Prof. Hamadou Saliah-Hassane, TELUQ University, Canada
- Prof. Ilhem Slama-Belkhodja, University of Tunis El Manan-ENIT, Tunisia
- Dr Fungai Bhunu Shava, Namibia University of Science and Technology, Namibia
- Dr Julian Sterling, Bath University, United Kingdom
- Dr Oteng Tabona, Botswana International University of Science and Technology, Botswana
- Martin Ujakpa, International University of Management (IUM), Namibia
- Prof Darele van Greunen, Nelson Mandela University, South Africa
- Dr Amin Zribi, Higher Institute of Communication Technologies (ISETCom), Tunisia

Organising Committee

- Miriam Cunningham, IST-Africa Institute / IIMC, Ireland
- Prof. Paul Cunningham, IST-Africa Institute / IIMC, Ireland
- Daan du Toit, Department of Science and Innovation, South Africa

Conference Secretariat

IIMC Ltd / IST-Africa Institute
Docklands Innovation Park, 128 East Wall Road, Dublin 3, Ireland
Tel: +353 (0) 1 8170607, Fax: +353 (0) 1 8170606
e-mail: secretariat@IST-Africa.org
www.IST-Africa.org/Conference2021
Monday, 10 May, 2021

09:00 Opening Plenary 1

Welcome Address
Paul Cunningham, IST-Africa Institute, Ireland
Welcome Address
Hon. Buti Manamela, Deputy Minister of Higher Education, Science and Technology, South Africa

09:15 Session 2: Cyber Security 1

Assessing Organisational Information Security Culture Among Stanford Musarurwa, Namibia University of Science and Technology, Namibia
Predicting Cyber Attacks in a Proxy Server using Support Vector Machine (SVM) Learning Algorithm
Moses Agana, University of Calabar, Nigeria
Recursive Feature Elimination for DDoS Detection on Software Define Network
Lonnie Shumirai Matsa, Namibia University of Science and Technology, Namibia
A Preliminary Integrated Network Security Framework for Tertiary Institutions
Knowledge Rusere, University of South Africa, Namibia

10:35 Break

10:40 Session 3: Cyber Security 2

Security by Design: Rethinking Resilience of IoT in Healthcare
Sophia Moganedi, CSIR, South Africa
A Model for Protecting Personal Information using Blockchain
Tharirique Jappie, University of Johannesburg, South Africa
Towards User Online Security and Privacy Protection
Julius Silaa, Namibia University of Science and Technology, Namibia
An Intelligent Security Model For Online Banking Authentication
Zanele Zwane, Tshwane University of Technology, South Africa

12:05 Plenary 4

Lessons Learnt from Leveraging Technological Innovation to Manage a Pandemic
Dr Mboneni Muofhe, Deputy Director-General: Technology Innovation, Department of Science and Innovation, South Africa

12:20 Lunch Break

13:20 Session 5: Collaborative Open Innovation and ICT-enabled Entrepreneurship

Biotechnology as a Tool: Empowering Women to Lead Change in Africa
Freda Gbande, Kumasi Hive, Ghana
Transcending from Academic Innovation to Viable Humanitarian Technology: The Next Steps for the OpenFlexure Project
Joe Knapper, University of Bath, United Kingdom
An Ecosystem enabled Framework for Digital Co-operation - A Collaborative Platform that Supports Technology Enabled Entrepreneurship
Brian Omwenga, University of Nairobi, Kenya
Mind the Gap: Aligning Software Engineering Education and Industry in Namibia
Maria Nsapewe Ntinda, University of Turku, Namibia

18:15 End of Sessions
A Dictionary Learning Approach for Joint Reconstruction and Denoising in Low Field Magnetic Resonance Imaging
Emmanuel Ahishakiye, Mbarara University of Science and Technology, Uganda

15:20 Break
15:25 Session 12: eGovernment

Open Government Data Support for the Awareness of Employment Opportunities Among the Youth in Alexandra Township in Gauteng Province in South Africa
Vincent Mwendwa Masavah, University of South Africa, South Africa

Residential Plot Record Management System for Windhoek City
Valerianus Hashiyana, University of Namibia, Namibia

A Review of the Siyakhula Living Lab’s Network Solution for Internet in Poor Communities
Hilbert Muchatibaya, Rhodes University, South Africa

E-Recruitment System: A Case of Namibian Government
Theodora Mukaya, University of Namibia, Namibia

16:15 End of Sessions

Tuesday, 11 May, 2021

09:00 Session 8: eHealth 1: Applications and Case Studies

Factors Affecting e-health adoption in South African Public Hospitals: A Case of Edendale Hospital
Samuel Faloye, Varsity College, Westville, South Africa

Lessons Learnt from Initial Deployments of Rocket Health Telemedicine Service to Deliver Last Mile Medical Services in Uganda
Louis Kamulegeya, The Medical Concierge Group, Uganda

Designing a Data Exchange Model for the Directorate of Special Programs Systems - Namibia
Puyoipawa Ndaendela Kandume, University of Science and Technology, Namibia

Acceptability, Feasibility and Accuracy of 99DOTS Adherence Technology in Mining Region of Tanzania
Egwuma Efo, KNCV Tuberculosis Foundation, Netherlands

Best Practices to Address Medical Identity Theft Awareness
Brandon Ah Why, Nelson Mandela University, South Africa

10:40 Break
10:45 Session 9: eHealth 2: Applications and Case Studies

Electronic Health Records for Improved Data Sharing during Patient’s Mobility Across Namibian Public Hospitals
Irja Shaanika, Namibia University of Science and Technology, Namibia

Performance Evaluation for Electronic Health Information Systems in Uganda
Margaret Nagwovuma, Makerere University, Uganda

A Framework for e-Health Information Management in Ugandan Hospitals: A Case of Kampala and Arua
Lawrence Nkamwesiga, MUNI University, Uganda

Gluing Papers to Computers: How QR- and Bar-codes Enable Hybrid Information Systems
Tiwonge Manda, University of Malawi, Chancellor College, Malawi

Asynchronous Transmission Mode as the Entry Point of Teleradiology Connectivity in Developing Countries: Case Study Tanzania
Kenedy Greyson, Dar es Salaam Institute of Technology (DIT), Tanzania

12:25 Plenary 10

Fourth Industrial Revolution (4IR)
Professor Tshilidzi Marwala, Vice-Chancellor and Principal of the University of Johannesburg, South Africa

12:40 Lunch Break
13:40 Session 11: eHealth 3: Applications and Case Studies

Experimental Investigation on the Analysis of Three Data Imputation Methods for Cervical Cancer Risk Prediction Algorithms
Emmanuella Budu, University of Botswana, Botswana

Comparative Performance of Machine Learning Algorithms in Prediction of Cervical Cancer
Ruth Wario, University of the Free State, South Africa

Sensitivity Analysis of Coronary Heart Disease using Two Deep Learning Algorithms CNN & RNN
Mildred Nwonye, University of Botswana, Botswana

A Fuzzy Patient Matching Algorithm Based on HIV/AIDS Patient Identifiers in Kampala, Uganda
Patience Atukunda, Makerere University, Uganda
### 10:40 Break

### 10:45 Session 15: Next Generation Computing 2

- **A QoS-based Evaluation of SDN Controllers: ONOS and OpenDayLight**
  - Lusani Ravhuanzwo, CSIR, South Africa
- **Enhanced Corporate Network Management using Software Defined Network: The Case of Salt Essential, Namibia**
  - Nalina Suresh, University of Namibia, Namibia
- **Techno-economic Analysis for 5G Network Slicing: eMBB Slice**
  - Mpho Nkosi, CSIR, South Africa
- **Fault-tolerance to Cascaded Link Failures of Video Traffic on Attacked Wireless Networks**
  - Akeem Owoade, University of South Africa, South Africa
- **Deepfake Detection using a Two-Stream Capsule Network**
  - Zane Joseph, University of the Western Cape, South Africa

### 12:25 Plenary 16

- **C4IR South Africa - Supporting Transformation of Manufacturing by Leveraging the Current Wave of Technological Revolution**
  - Ntsibane Ntlatlapa, Head of the South African Affiliate C4IR Centre

### 15:25 Session 18: eInfrastructures

- **AfricaConnect3: Connecting Africa to Unlimited Possibilities**
  - Leila Dekkar, Geant, Netherlands
- **Leveraging TV White Spaces for Rural Broadband Connectivity**
  - Ronald Lukanga, netLabs/UG, Uganda
- **A Survey of 5G for Rural Broadband Connectivity**
  - Claire Najjuuko, Makerere University, Uganda
- **IPv6 Adoption in South Africa: Barriers, Benefits and Government Interventions**
  - Themba Shozi, Council for Scientific and Industrial Research, South Africa
- **Experiences with TVWS, a Technology for Connecting the Unconnected**
  - Albert Lysko, CSIR South Africa

### 17:10 Session 19: ICT Supporting Power Delivery

- **Improved Efficiency in Solar Cells using Fe-doped ZnS Quantum Dots as Sensitizer**
  - Abhigyan Ganguly, Howard College, University of KwaZulu-Natal, South Africa
- **Water for Gashora Clinic**
  - Geraldine Light, Walden University, United States
- **Understanding Mobile Phone Use in Electricity Scarce Context: Extended TAM for Sub-Saharan African Countries**
  - Martin Ujakpa, International University of Management, Namibia
- **A Brazilian Legal and Technical Evaluation about Energy Binomial Tariff**
  - Marcelo Daniel Berejuck, Federal University of Santa Catarina, Brazil

### 18:30 End of Sessions

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**Wednesday, 12 May, 2021**

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Thursday, 13 May, 2021

09:00 Session 20: Technology-Enhanced Learning 1 - Issues and Applications

- Enhancing Parent-Teacher Communication through USSD-Based Services amid COVID-19 Lockdown
  Titus Haiduwa, University of Namibia, Namibia

- Role of Activity Theory in Examining the Interaction between ICT and Education
  Shaloam Mutetwa, University of Cape Town, South Africa

- Impact of Vocational Motivation for Teaching ICT Online During COVID-19 Pandemic in Sub-Saharan Africa
  Narasimha Rao Vajjhala, American University of Nigeria, Nigeria

- Adoption of Technology Enhanced Teaching and Learning Innovations during Covid-19 Lockdown in Rural Uganda
  Deborah Manyiraho, Busitema University, Uganda

- A Game-based Approach to Revive Cultural Heritage amongst the Youth
  Kisa Mwangonde, University of Namibia, Malawi

10:40 Break

10:45 Session 21: Technology-Enhanced Learning 2 - Applications and Case Studies

- An Overview of the Integration of Basic Research and Digital Skills in the High School Curriculum
  Hope Mauwa, University of Mpuamalanga, South Africa

- Teaching and Learning CS1 with an Assist of Manipulatives
  Tlou Ramabu, Tshwane University of Technology, South Africa

- An Investigation of the Use of Career Guidance App by Undergraduate Students: Case Study of Namibia
  Aussie Mutalya, International University of Management, Namibia

- Adopting Course Completion Tracking and Conditional Activities to Enhance Engagement in eLearning for University Students
  Anthony Wambua, Daystar University, Kenya

12:05 Plenary 22

From Principles to Actions: Open Science in Africa
Dr Sepo Hachigonta, Director, Strategic Partnerships, National Research Foundation, South Africa

12:25 Lunch Break

13:25 Plenary 23

Horizon Europe - Building on EU-Africa Cooperation
Maria Cristina Russo, Director, Global Approach & International Cooperation in R&I, DG: Research & Innovation, European Commission

13:45 Session 24: Technology-Enhanced Learning 3 - Applications

- The Importance of Innovation in Agile Project Management
  Boingotlo Peege, University of Johannesburg, South Africa

- Predictive Analytics and Artificial Intelligence in Blended Learning: A New Dawn for Institutions of Higher Learning
  Jackson Machii, The Technical University of Kenya, Kenya

- LTSP Client Image Maintenance: Utilising a Virtualisation Player to Support Educators to Directly Manage Classroom Applications
  Tichaona Zvidzaiy, Rhodes University, South Africa

- Advancing Sustainable Rural Education through ICT
  Mphele Sylvia Yelane, Ezamazwe Education Centre for Innovation, South Africa

15:05 Break

15:10 Session 25: Technology-Enhanced Learning 4 - Applications & Case Studies

- Mobile Applications in Supporting Open and Distance Learning Students' Research
  Phillip Choshi, University of South Africa, South Africa

- An Analysis on the Adoption of High-Performance Computing (HPC) by State Universities: A case of Zimbabwe
  Belinda Mutunhu, NUST, Zimbabwe

- The Readiness for Adoption of Federated Social Networking Sites to Enhance Contemporary Educational Engagement. The Case of Zimbabwean Universities
  Beauty Mugoniwa, UNISA, Zimbabwe

- Big Data Analytics Capacity Development with Radio Astronomy
  Nikhita Madhanpall, IAU Office of Astronomy for Development, South Africa

- The Intervention of Educational Big Data Analytics for an Effective eLearning Experience. The Case of Zimbabwe's Higher and Tertiary Education
  Amanda Nyasha Mutemberedza, Midlands state University, Zimbabwe

16:50 Break

16:55 Session 26: Technology-Enhanced Learning 5 - Applications & Case Studies

- The Development of a Bilingual English-Oshikwanyama Dictionary App
  Maria Alweendo, University of Namibia, Namibia

- A Workflow System for Managing Ethical Clearance in Research Work
  Olasupo Ajayi, University of the Western Cape, South Africa

- EPFIDab Combined with Cloud Computing to Process Student Ratings in DRC
  Léon Eyumu, University of Kinshasa, Congo (DRC)

17:55 End of Sessions
Session 27: eAgriculture 1

**smAvo and smaTo: Successes of eAgricultural Technologies in South Africa**
André Broekman, University of Pretoria, South Africa

**Digitalization of Indigenous Knowledge in African Agriculture for Fostering Food Security**
Hana Kubíčková, Plan4all, Czech Republic

**Impact of Information and Communication Technology in Enhancing Food Security in a Rural Area: Alice Community as a Case Study**
Dare Ebenezer Fatumo, University of Fort Hare, South Africa

**The Impact of ICTs on Smallholder Farmer Household Food Insecurity Status in iLembe District, KwaZulu-Natal Province, South Africa**
Ntabeni Jere, University of KwaZulu-Natal, South Africa

**Technology-enabled Sustainable Agriculture: the Agroecology Case**
Philippe Cousin, SENSEEN, France

10:45 Break

Session 28: eAgriculture 2

**A Bluetooth Low Energy (BLE) Based System for Livestock Tracking and Localization**
Jared Makario, Dedan Kimathi University of Technology, Kenya

**Design Considerations and Data Communication Architecture for National Animal Identification and Traceability System in Nigeria**
Mobayode O. Akinsolu, Wrexham Glyndwr University, United Kingdom

**Geo-information Technology Application Based Animal Health Management Decision Support System Development**
Sudhanshu Panda, University of North Georgia, United States

**Raspberry Pi Based Recording System for Acoustic Monitoring of Bird Species**
Gabriel Njoroge, Dedan Kimathi University of Technology, Kenya

**Farmers’ Use of Mobile Devices in Developing Countries**
Augusto Domingos, International University of Management, Namibia

12:25 Plenary 29

**IST-Africa Journey**
Daan du Toit, Deputy Director-General: International Cooperation and Resources, Department of Science and Innovation, South Africa

12:40 Lunch Break

Session 30: eAgriculture 3

**Temperature and Humidity Control Algorithm for Poultry Farm Control Systems**
Willie Kasakula, University of Rwanda, Rwanda

**Leveraging COVID-19 Impact: Innovation, Science and Technology (IST) Integration for Boosting Resilience of Citrus Fruit Farmers in Teso Region of Uganda**
John Kasse, Makerere University Business School, Uganda

**Supporting Adoption of Precision Agriculture**
Lindokuhle Mdletshe, INNOBIZ Group, South Africa

**An Analysis of Farm-based Carbon Footprint Calculators: Insights for Farmers**
Rufaida Auliar, University of Technology Mauritius, Mauritius

17:05 End of Sessions