Transforming Africa:
Innovating our way toward sustainability

26 - 29 February 2024
Johannesburg, South Africa

CONFERENCE PROGRAMME

JBS Park, 69 Kingsway Ave, Auckland Park

Johannesburg 2092

DSI/NRF Trilateral Research Chair in Transformative Innovation

UNIVERSITY OF SUSSEX

African Centre for Technology Studies
ACTS
Knowledge for Better Livelihoods

SARChI
SOUTH AFRICAN RESEARCH CHAIR IN TRANSFORMATIVE INNOVATION, 4 IR AND SUSTAINABLE DEVELOPMENT

UNIVERSITY OF JOHANNESBURG

IN ASSOCIATION WITH

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation

UNIVERSITY OF JOHANNESBURG
COLLEGE OF BUSINESS AND ECONOMICS

BRITISH COUNCIL

openAIR
AFRICAN INNOVATION RESEARCH

IDRC · CRDI
International Development Research Centre
Centre de recherches pour le développement international
Canada

DEEP TRANSITIONS LAB
FOR TRANSFORMATIVE INVESTMENT

Utrecht University

CENTRE FOR GLOBAL CHALLENGES

#STI4SDGs

#GreenAndJustTransitions

#InnovationAndDevelopment

#Innovation4Sustainability

#InclusiveInnovation

Overview

This event is hosted by the DSI/NRF Trilateral Chair in Transformative Innovation, the 4IR and Sustainable Development, marking its 5th anniversary, with its core collaborating networks: SPRU, ACTS, Open AIR, TIP-SA, TIPC, DSI and NRF. This event brings together a diverse ensemble of thinkers, leaders, innovators, and change-makers from across the globe.

The DSI/NRF Trilateral Research Chair in Transformative Innovation, the 4th Industrial Revolution and Sustainable Development, is hosted at the University of Johannesburg, where it operates as a research centre within the College of Business and Economics. Prof. Erika Kraemer-Mbula holds the Chair.

The Objectives of the Conference

This conference is a call to action, a convening of minds, and a platform where ideas can flourish. Our focus is on ***sharing ideas*** and ***problem-solving***. We seek to create an environment that is ripe for constructive dialogue and proactive engagement. The conference includes high-level moderated discussions, multistakeholder indabas, exhibitions, and a research symposium, each day focusing on a core thematic area of the Chair's activities: **Inclusive innovation, Digital transformation, and Green and just Transitions**:

Objectives	
Research	• Showcase the research conducted by the Trilateral Research Chair and its partners. • Foster multi-and trans-disciplinary discussions to bridge academic research with real-world needs and challenges.
Innovation	• Showcase African innovations in green transitions, inclusive innovation, and digital transformation. • Inspire younger generations by making the expo accessible to schools.
Multistakeholder engagement	• Create a multidisciplinary platform for dialogue on crucial issues affecting Africa's sustainable and inclusive development. • Inspire actionable strategies for innovation-led sustainable transformation in Africa.

Expected Outcomes

The expected results of the conference include:

1. Increased understanding and awareness of transformative innovation and the policy requirements
2. Multi-sectoral interactions and increased networking amongst new constellations of science, technology and innovation actors
3. Identification of improved policy options that African countries could deploy to strengthen and promote transformative innovations.

Structure and Themes of the Conference

The conference is organised around three pivotal themes: [1] Inclusive Innovation for Impact, [2] Transformation through digital innovation, and [3] African Green & Just Transitions. Across each day, the conference will present a dynamic mix of sessions, encompassing not just academic discourse but also embracing multi-stakeholder conversations. This diverse approach is designed to acknowledge and integrate the multitude of knowledge types essential for translating transformative innovation into practical action. By blending scholarly insights with practical wisdom from various stakeholders, the conference aims to foster a comprehensive understanding and effective strategies for addressing the complex challenges in these key areas.

The conference is designed to ensure high levels of engagement through interactive sessions. A core activity each day with be a 'multistakeholder indaba' – a space for immersive discussions on critical issues affecting the field of African innovation and development. A parallel technology and innovation-focused expo will provide opportunities for innovators and entrepreneurs to showcase their work and impact stories. School students have been invited to engage with the expo at designated times.

Attendance

The conference is free to attend but some sessions will be restricted in numbers and/or targeted to a closed set of participants. All participants are responsible for their own travel, accommodation, and any other costs incurred in attending the conference.

Parking and security

Parking is available on site. Please enter off Kingsway Avenue. Security will direct you to the parking area.

If you are attending in person, please make sure you bring a form of photographic ID with you as this will be needed to enter JBS Park.

Livestreaming

All plenary sessions will be livestreamed on the Chair's YouTube channel @uj-trcti.

Programme overview

Please note that each day starts and finishes at different times

Monday 26 February	
Morning	Arrival of participants Side meetings for the Chair and its partners
13:00 – 14:00	Arrival and registration
14:00 – 15:30	Opening session
15:30 – 16:30	Keynote addresses
16:30 – 17:00	Photos and interviews (closed session)
17:00 – 18:30	Welcome reception

Tuesday 27 February: Inclusive innovation and development	
07:30 – 08:30	Registration
08:30 – 10:00	Chair's showcase
10:00 – 10:30	Break
10:30 – 10:45	Indaba 1: Inclusive Innovation for Impact Provocation
10:45 – 12:30	Indaba 1: Inclusive Innovation for Impact Facilitated breakouts sessions
12:30 – 13:30	Lunch
13:30 – 15:00	Panel 1: Regulation for Inclusive Innovation
15:00 – 15:15	Break
15:15 – 16:00	Indaba 1: Inclusive innovation for Impact Feedback from breakouts and artist's showcase
16:00 – 17:30	Research symposium 1: Inclusive innovation and development
17:30	Close for the day

Wednesday 28 February: Digital Transformation and the 4IR	
08:00 – 09:00	Registration
09:00 – 10:00	Keynote address
10:00 – 10:30	Break
10:30 – 10:45	Indaba 2: Transformation through Digital Innovation Provocation
10:45 – 12:30	Indaba 2: Transformation through Digital Innovation Facilitated breakout sessions
12:30 – 13:30	Lunch
13:30 – 15:00	Panel 2: AI and healthcare in South Africa
15:00 – 15:15	Break
15:15 – 16:00	Indaba 2: Transformation through Digital Innovation Feedback from breakouts and artist's showcase
16:00 – 17:30	Research symposium 2: Digital transformation and the 4IR
17:30	Close for the day

Thursday 29 February: Green and just transitions	
08:00 – 08:30	Registration
08:30 – 10:00	Panel 3: The theory and practice of sustainable transitions
10:00 – 10:30	Break
10:30 – 10:45	Indaba 3: African Green and Just Transitions Provocation
10:45 – 12:30	Indaba 3: African Green and Just Transitions Facilitated breakout sessions
12:30 – 13:30	Lunch
13:30 – 15:00	Research symposium 3: Green and Just Transitions
15:00 – 15:15	Break
15:15 – 16:00	Indaba 3: African Green and Just Transitions Feedback from breakouts and artist's showcase
16:00 – 16:30	Closing session

Innovation Expo

On Tuesday 27 and Wednesday 28 February, an all-day expo will be held showcasing South African innovators and entrepreneurs working in the three thematic areas: Inclusive Innovation, Digital Innovation, and Green and Just Transitions. The expo will be made available to groups of primary and high-school students, at designated times.

Poster exhibition

Posters showcasing the work of students and affiliates of the Chair will be visible during the conference. A dedicated time to talk to the researchers about their work showcased in the posters is programmed for Thursday 29 February.

Side events

Several side events will take place during the same week. Please contact the side event organisers for more details on these events. These include:

- A workshop on Building a Collaborative Network of Innovation Agencies in Africa (Friday 1st March 2024)
- A workshop on transformative innovation policy (Friday 1st March 2024)

These events are closed and by invitation only.

Detailed Programme

Monday 26 February *Moderator: Prof. Erika Kraemer-Mbula*	
Morning	Arrival of participants Side meetings for the Chair and its partners
13:00 – 14:00	**Arrival and registration** *Location: JBS Park, LG entrance hall*
14:00 – 15:30	**Opening session** *Location: LG Auditorium (+ LG15)* **Welcome addresses** • Prof. Ntsalaze, Dean, College of Business and Economics, University of Johannesburg • Prof. Mpedi, Vice Chancellor, University of Johannesburg • Amb. Jacquiline Kenani, Deputy Head of Mission, Kenyan High Commission • His Excellency Amb. Antony Phillipson, British High Commissioner • Ms Nonkqubela Thathakahle Jordan-Dyani, Director General from the Department of Communications and Digital Technologies • Dr Phil Mjwara, Director General from the Department of Science and Innovation Musical interlude provided by the UJ Choir.
15:30 – 16:30	**Keynote addresses and introduction** *Location: LG Auditorium (+ LG15)* Two short keynotes will be given highlighting key issues that the event will discuss over the coming days. These keynotes will be given by: • Prof. Carlota Perez, Honorary Professor, Science Policy Research Unit, University of Sussex, UK *(online)* • Prof. Mariana Mazzucato, Professor in the Economics of Innovation and Public Value, University College London, UK *(online)* **Introduction to the Chair and the conference** Speaker: Prof. Erika Kraemer-Mbula, UJ-TRCTI
16:30 – 17:00	**Photos and media/ press session** *Location: LG Auditorium*
17:00 – 18:30	**Welcome reception** *Location: LG common areas* All participants are invited to a welcome reception. Music by the Themarabiband Trio (jazz band).

Tuesday 27 February
Theme of the day: Inclusive innovation and development

MC: Mr. Percy Mabandu

07:30 – 08:30	**Arrival and registration** *Location: JBS Park, LG entrance hall*
08:30 – 10:00	**Chair's showcase** *Location: LG Auditorium (+ LG15)* Prof. Erika Kraemer-Mbula will provide an overview of the achievements and contributions of the Research Chair over the past five years. This session will summarise key research findings, collaborations, and their impact on academic thought as well as society.
10:00 – 10:30	Break
10:30 – 10:45	**Indaba 1: Inclusive Innovation for Impact** **Provocation** *Location: LG Auditorium (+ LG15)* Dr Michael Gastrow from the Human Sciences Research Council's Impact Centre will provide a 10-minute intervention on key challenges and issues facing South Africa and the continent.
10:45 – 12:30	**Indaba 1: Inclusive Innovation for Impact** **Facilitated discussions** *Location: LG 20, LG 21, LG 22* Invited participants will discuss a series of questions that will provide the basis for the development of policy briefs following the event. The questions are available on later pages of this programme.
12:30 – 13:30	Lunch
13:30 – 15:00	**Panel 1: Regulation for Inclusive Innovation** Convener: Prof. Caroline Ncube, SARChI in Intellectual Property, Innovation and Development, UCT *Location: LG Auditorium (+ LG15)* The purpose of this plenary panel is to facilitate discussions between lead agencies and intergovernmental organisations on regulatory frameworks for inclusive innovation. Panel speakers: • Mr. Godfrey Walakira, AfCFTA Secretariat • Dr. Mohammad Kyari, African Scientific, Research and Innovation Council • Ms. Ainna Vilengi Kaundu, Namibian Business and Intellectual Property Authority • Mr Arthur Kwesiga, Uganda Registration Services Bureau
15:00 – 15:15	Break
15:15 – 16:00	**Indaba 1: Inclusive Innovation for Impact** **Feedback from breakouts and artist's showcase** *Location: LG auditorium (+ LG15)* Presentation of the key messages that came out of the Indaba session. Drumbusters dance troupe will present their interpretation of the indaba discussions.

16:00 – 17:30	**Research symposium 1: Inclusive Innovation and Development** Conveners: Dr Ellen Chipango & Dr Dennis Osei, UJ-TRCTI *Location: LG 20, LG 21, LG 22, LG15* Parallel sessions where key research questions are discussed and findings from students, senior scholars, and project teams are presented. Please refer to the research symposium specific programme for details of the speakers, titles of papers and abstracts. • **PS1:** Measuring Informal Innovation Activity in Africa's Formal SMEs: Examples from Egypt, Kenya & South Africa *(LG20)* • **PS2:** Capturing innovation in "unseen places" *(LG21)* • **PS3:** Toward TK/TCEs and Genetic Resources Subsidiary Protocol for AfCFTA *(LG22)* • **PS4:** A green transformation that is inclusive *(LG15)*
17:30	Close for the day

Wednesday 28 February Theme of the day: Digital transformation and the 4IR *MC: Mr. Percy Mabandu*	
08:00 – 09:00	**Arrival and registration** *Location: JBS Park, LG entrance hall*
09:00 – 10:00	**Keynote address** *Location: LG Auditorium (+ LG15)* Speaker: Prof. Tshilidzi Marwala – Rector, United Nations University *(online)* Title: AI as a transformative force in Africa
10:00 – 10:30	Break
10:30 – 10:45	**Indaba 2: Transformation through Digital Innovation** **Provocation** *Location: LG auditorium (+ LG15)* Prof. Mpho Primus from Primus Tech Hub will provide a 10-minute intervention on key challenges and issues facing South Africa and the continent.
10:45 – 12:30	**Indaba 2: Transformation through Digital Innovation** **Facilitated discussions** *Location: LG 20, LG 21, LG 16* Invited participants will discuss a series of questions that will provide the basis for the development of policy briefs following the event. The questions are available on later pages of this programme.
12:30 – 13:30	Lunch
13:30 – 15:00	**Panel 2: AI and Healthcare in South Africa** Convener: Prof. Rebecca Hanlin – UJ-TRCTI *Location: LG Auditorium (+ LG15)* A panel of speakers will discuss the latest advancements and future potential of artificial intelligence on the healthcare sector with a specific focus on key policy and regulatory challenges affecting the introduction and uptake of AI technologies. Panel speakers: • Mr. Marlon Burgess, Sanrai Health

	• Dr Herman Myburgh, Metaverse Research Unit, UJ • Dr Rolan Christian, Care Connect • Dr Aobakwe Segwe, Centre for Medical Imaging SA
15:00 – 15:15	Break
15:15 – 16:00	**Indaba 2: Transformation through digital innovation** **Feedback of discussions and artist's showcase** *Location: LG Auditorium (+ LG15)* Presentation of the key messages that came out of the indaba session. Mandisa Vundla will present her interpretation of the indaba discussions.
16:00 – 17:30	Research symposium 2: Digital Transformation and the 4IR Conveners: Dr Ellen Chipango & Dr Dennis Osei, UJ-TRCTI *Location: LG 20, LG 21, LG 22, LG15* Parallel sessions where key research questions are discussed and findings from students, senior scholars, and project teams are presented. Please refer to the research symposium specific programme for details of the speakers, titles of papers and abstracts. • **PS1**: Dynamics of digital technology adoption in Africa • **PS2**: Twin transition: digital innovation as a driver of green transition • **PS3**: Policy Frameworks for the Fourth Industrial Revolution: Navigating Digital Transformation in Africa • **PS4**: Copyright and the Right to Research for Innovation and Development in the 4IR
17:30	Close for the day

Thursday 29 February
Theme of the day: Green and just transitions

MC: Mr. Percy Mabandu

08:00 – 08:30	**Arrival and registration** *Location: JBS Park, LG entrance hall*
08:30 – 10:00	**Panel 3: The theory and practice of sustainable transitions** Convener: Prof. Johan Schot – Utrecht University, Centre for Global Challenges *Location: LG Auditorium (+ LG15)* A discussion on how transformative innovation policy strategies and policies can effectively address environmental challenges while fostering economic and social sustainability. Panel speakers: • Prof Alinah Segobye: CEO, Human Resource Development Council (HRDC), Botswana • Dr Frank Ndakala: Assistant Director of Research, State Department of University Education, Directorate of Research, Science & Technology (DRST), Kenya • Kondwani Gondwe: Acting Director of Planning, National Commission for Science and Technology (NCST), Malawi • Imraan Patel: Deputy Director-General: Research Development and Support, Department of Science and Innovation (DSI), South Africa
10:00 – 10:30	Break

10:30 – 10:45	Indaba 3: African Green and Just Transitions Provocation *Location: LG auditorium (+ LG15)* Dr Fatima Denton from UNU Institute for Natural Resources in Africa and Ms. Julie Courtnage from Mandela Mining Precinct will provide a 10-minute intervention on key challenges and issues facing South Africa and the continent.
10:45 – 12:30	Indaba 3: African Green and Just Transitions Facilitated discussions *Location: LG 20, LG 21, LG 22* Invited participants will discuss a series of questions that will provide the basis for the development of policy briefs following the event. The questions are available on later pages of this programme.
12:30 – 13:30	Lunch
13:30 – 15:00	Research symposium 3: Green and just transitions Conveners: Dr Ellen Chipango & Dr Dennis Osei, UJ-TRCTI *Location: LG 20, LG 21, LG 22, LG15* Parallel sessions where key research questions are discussed and findings from students, senior scholars, and project teams are presented. Please refer to the research symposium specific programme for details of the speakers, titles of papers and abstracts. • PS1: GOCIA (Governing Climate Innovation – Africa) • PS2: Innovation & sustainability: local, regional and global dynamics • PS3: Unblocking a green transition: focus on finance • PS4: Thinking differently about sustainability transitions
15:00 – 15:15	Break
15:15 – 16:00	Indaba 3: African Green and Just Transitions Feedback from breakouts and artist's showcase *Location: LG Auditorium (+ LG15)* Presentation of the key messages that came out of the Indaba session. Dumisani Jere will present his interpretation of the Indaba discussions.
16:00 – 16:30	Closing session *Location: LG auditorium (+ LG15)* The event will finish with closing remarks from: • Dr Ellen Chipango (on behalf of staff and students of the Chair) • Prof. Erika Kraemer-Mbula, UJ-TRCTI • Prof Hossana Twinomurinzi, UJ - College of Business and Economics • His Excellency Amb. Chris Cooter, Canadian High Commissioner
16:30	Event closure

Overview of the Trilateral Chair

Objectives

The Trilateral Chair is hosted at the University of Johannesburg (UJ), where it operates as a research centre located in the College of Business and Economics. Originally funded by the South African National Research Foundation and the British Council, the programme is an international research collaboration between the University of Johannesburg, the African Centre for Technology Studies (ACTS) in Nairobi, and the Science Policy Research Unit (SPRU) at the University of Sussex in the UK. The programme builds on the expertise of three partners to strengthen African scholarship for examining transformative innovation and its policy dimensions in the context of the fourth industrial revolution (4IR) and efforts to achieve sustainable development. The Trilateral Chair started operating in July 2019 and is formed by a dynamic team of national and international researchers that engages in cutting-edge research; builds the capacity of younger scholars to help develop the next generation of African thinkers leading transformative change; and engages with policymakers, key stakeholders, and research partners, to influence policy change.

The Chair addresses existing gaps in global knowledge, by making theoretical and empirical contributions to understanding how innovation, policy, and sustainable development intersect within the unique context of the African continent. Through its focus on developing and disseminating knowledge that is deeply rooted in African realities, the Chair ensures that the contributions by scholars and communities are prominently represented in international discussions on transformative innovation and its broader implications. This emphasis not only enriches the academic discourse but also ensures that policy formulations and practical applications are informed by insights that reflect the continent's diverse challenges and opportunities.

People

The Chair's senior management is located across all three sites: UJ, ACTS and SPRU.

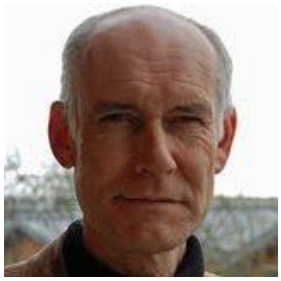
Prof. Erika Kraemer-Mbula

Professor of Economics and the Chair holder of the DSI/NRF Trilateral Research Chair in Transformative Innovation, the Fourth Industrial Revolution and Sustainable Development, based at the College of Business and Economics, University of Johannesburg. She specialises in the analysis of innovation systems in connection to equitable development and inclusive development and has done pioneering work on innovation in the African informal sector.

Prof. Rebecca Hanlin

Science, technology, and innovation policy expert. She joined the UJ part of the Chair in 2023 after 13 years with ACTS in Nairobi. Prof. Hanlin leads the Chair's teaching and learning work. Her research focuses on capabilities and capacity strengthening for improved research, science, technology and innovation on the African continent.

Dr Rob Byrne



Senior Lecturer at the University of Sussex's SPRU. His research focuses on the comparative success of PV markets in Kenya and Tanzania and demonstrates his commitment to interdisciplinary work at the interface of technology, society and sustainable development.

Dr Ann Kingiri

Science, technology, and innovation policy researcher with a focus on inclusive and sustainable development in Africa. She is currently the Director, Research & Innovation at ACTS. Her research spans the fields of agricultural innovation, gender and innovation policy.

Dr Chux Daniels

Research Fellow in Science, Technology and Innovation Policy at SPRU/ University of Sussex. He joined the University of Sussex in 2011. He is the Director of the Transformative Innovation Policy (TIP) Africa Hub.

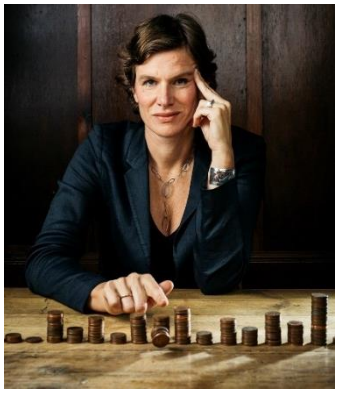
Speakers' bios

Keynote speakers

Prof. Carlota Perez

Honorary Professor at the Science Policy Research Unit, University of Sussex, UK and at the UCL Institute for Innovation and Public Purpose (IIPP). Prof. Perez is a distinguished economist and scholar renowned for her expertise in the field of technology and economic development. Her groundbreaking work focuses primarily on the relationship between technological revolutions and their impact on economic and social structures. As a prominent scholar, Prof Perez has made important contributions to our understanding of long-term economic cycles and the role of innovation in shaping the development of societies.

Prof. Marianna Mazzucato



Founding Director of the Institute for Innovation and Public Purpose at University College London, UK. She is winner of international prizes including the Grande Ufficiale Ordine al Merito della Repubblica Italiana in 2021, Italy's highest civilian honour and 2018 Leontief Prize for Advancing the Frontiers of Economic Thought. She is the author of multiple publications including The Entrepreneurial State: debunking public vs. private sector myths (2013) and most recently The Big Con: How the Consulting Industry Weakens our Businesses, infantilizes our Governments and Warps our Economies (2023).

Prof. Tshilidzi Marwala

Rector of United Nations University and UN Under-Secretary-General. Prof Marwala is an artificial intelligence engineer, a computer scientist, a mechanical engineer and a university administrator. He is a member of the United Nations scientific advisory council and previous Vice Chanceller of the University of Johannesburg. He has extensive academic, policy, management, and international experience, and is a co-holder of five patents. His research has been multi-disciplinary, involving the theory and applications of artificial intelligence to engineering, social science, economics, politics, finance, and medicine. He has served on a variety of global and national policymaking bodies and has worked with such United Nations entities as UNESCO, UNICEF, WHO, and WIPO.

Other speakers

Panel, Indaba provocateurs as well as opening and closing speakers are given in order of appearance on the programme.

Prof Lungile Ntsalaze	Executive Dean of the University of Johannesburg's (UJ) College of Business & Economics (CBE). He is a Chartered Accountant and holds a PhD in Development Finance.
Prof Letlhokwa Mpedi	Vice-Chancellor and Principal of the University of Johannesburg. He is an expert in social security and labour law in Southern Africa.
Her Excellency Amb Jacquiline Kenani	Deputy Head of Mission, Kenyan High Commission in South Africa.
His Excellency Amb Antony Phillipson	Appointed British High Commissioner to the Republic of South Africa. He has held this position since 2021 and has held various positions in His Majesty's Government since 1993.
Ms Nonkqubela Thathakahle Jordan-Dyani	Currently serves as the Director-General in the Department of Communications and Digital Technologies. She was Acting Director-General (DG) in the department for two years before her permanent appointment in August 2023.
Dr Phil Mjwara	Director-General of the Department of Science and Innovation since 2006 and recently won the NSTF's 2023 Ukhozi Award for his contributions to the South African National System of Innovation.
Dr Michael Gastrow	Director of the Science in Society unit at the Human Sciences Research Council's Impact Centre. He is also a Professor of Practice at the DSI/NRF Trilateral Research Chair in Transformative Innovation, 4IR and Sustainable Development.
Mr Godfrey Walakira	Member of the AfCFTA Secretariat and previously was the Principal Commercial Officer, Ministry of Trade, Industry and Cooperatives, Uganda
Dr Mohammad Kyari	Senior Scientific Officer at the African Scientific Research and Innovation Council, Nigeria.
Ms Ainna Vilengi Kaundu	Veteran IP Executive and the Executive for Intellectual Property at the Business and Intellectual Property Authority in Namibia.
Mr Arthur Kwesiga	Director of ICT and Innovation at the Uganda Registration Services Bureau.
Prof Mpho Primus	NRF rated researcher specializing in computational linguistics who is the founder of a tech advisory and consulting firm focusing on digital transformation strategies. She is also co-director at the Institute for Intelligent Systems, University of Johannesburg
Mr Marlon Burgess	Formerly Country Manager Southern Africa of GE HealthCare and a Board member of SAMED. He is currently Country Manager of Sanrai Group.
Dr Herman Myburgh	Head of the Metaverse Research Unit at the Institute for Intelligent Systems, University of Johannesburg.
Dr Rolan Christian	CEO of Care Connect, which recently received first prize in the BCX Digital Innovation Awards, 'Best in Society and Sustainability' SME category.
Dr Aobakwe Segwe	Founding partner of the Centre of Medical Imaging SA and is passionate about AI and its ability to transform access to healthcare in rural areas.
Prof Alinah Segobye	Chief Executive Officer of Botswana Human Resource Development Council. She is formerly the Dean of Faculty (Human Sciences) at the Namibia University of Science and Technology

Dr Frank Ndakala	Research Scientist within the Directorate of Research Management of Development (DRMD) within the *Ministry* of *Higher Education* Science and Technology, Kenya
Mr Kondwani Gondwe	Acting Director of Planning at the National Commission for Science and Technology in Malawi.
Mr Imraan Patel	Deputy Director-General: Research Development and Support at the South African Department of Science and Innovation
Ms Julie Courtnage	Executive Director of the Mandela Mining Precinct in Johannesburg, South Africa.
Dr Ellen Chipango	Research Fellow within the DSI/NRF Trilateral Chair in Transformative Innovation, 4IR and Sustainable Development at the University of Johannesburg
Prof Hossana Twinomurinzi	Vice Dean, Research and Innovation within the College of Business and Economics at the University of Johannesburg.
His Excellency Amb. Chris Cooter	High Commissioner for Canada in South Africa.

Artists

Percy Mabandu is an artist, writer and art dealer interested in poetics and portraiture, monuments, and symbolic meaning. He creates paintings, prints, and drawings that study both real and fictitious subjects that he iconizes to explore their symbolic energy. His work as an artist is connected to the same interests and energy that governs his work as a writer. Mabandu is also a leading writer and art journalist whose work has appeared in major publications in South African and abroad. https://www.instagram.com/percy_mabandu/

Drumbusters are a drumming and dance troupe that focus on connecting people through music. Running interactive drumming and dance sessions in Johannesburg and the surrounding environs they emphasise how everyone's little contribution is essential to create harmonized beautiful music by working efficiently together. https://www.drumbusters.co.za/

Dumisani Jere is a visual artist working with the August House collective in Johannesburg. He is an illustrator, art director and animator who runs Devolutionery Design. His latest work was exhibited in a show he co-curated entitled 'Choice Assorted: The Business of Becoming an Artist' supported by the META Foundation. https://www.instagram.com/devolutionery/

Mandisa Vundla is a spoken word artist, the founder of Poetry Zone ZA and was one of Mail and Guardian's 200 Young South African's of 2022. The goal of Poetry Zone ZA is 'improve the quality of spoken word poetry in South Africa, one word at a time.' https://www.instagram.com/mandivundla/

An introduction to the indabas

The Indaba sessions at the conference are conceived **as dynamic and interactive forums** with the aim of:

- Creating a **multidisciplinary platform for dialogue** on crucial issues affecting Africa's sustainable and inclusive development.
- **Facilitating the exchange of ideas, experiences, and best practices** among diverse stakeholders.
- **Inspiring actionable strategies** for innovation-led sustainable transformation in Africa.

The structure of these sessions is as follows:

- **Plenary Provocation** Each day one or two speakers will provide an initial set of arguments and ideas that will provide a jumping off point for discussions. This will take place in plenary.
- **Smaller facilitated group discussions**
- **Report back** in plenary.

Performers and creatives will be present at the Indaba to artistically depict the substance of the conversations. Their work will be showcased in a dedicated showcase each afternoon.

The conference will hold three indaba sessions, one per day. Each indaba will focus on the day's thematic area and participants will be asked to agree on two or three specific areas where their discussions will focus. More details of these are provided below.

Inclusive Innovation for Impact

In a world where challenges are increasingly complex and interconnected, **inclusive innovation is not just beneficial; it is essential**. This 2-hour Indaba session aims to foster a dialogue on how diverse perspectives can lead to more resilient, effective, and sustainable solutions. It seeks to uncover strategies to incorporate inclusivity at every innovation stage, from ideation to implementation. It will also reflect on the policy implications and the measurement of impact and inclusive outcomes.

This indaba will address following questions:

- What is the most important area of exclusion that needs to be tackled?
- How can innovation be harnessed to reduce these areas of exclusion?
- What actionable steps can we recommend to promote inclusivity in innovation?

Transformation through Digital Innovation

Digital technologies are rapidly reshaping societies, economies, and individual lives, which presents both unprecedented opportunities and challenges in the context of Africa. This Indaba session aims **to dissect the multifaceted nature of digital transformation, exploring its implications for innovation, governance, environmental sustainability and societal well-being**. Over the course of 2 hours, participants will engage in a critical dialogue on harnessing 4IR technologies for sustainable and inclusive development in Africa. The session will pay particular attention to the policy implications of supporting a sustainable and inclusive digital transformation in Africa.

This indaba will consider the following questions:

- Which sector or area of society offers the most leapfrogging opportunities for accelerated development using digital technologies?
- How can innovation be harnessed to assist in the use of these digital technologies?
- What actionable steps can we recommend to promote transformation through digital innovation?

African Green and Just Transitions

As Africa stands at the crossroads of development and environmental stewardship, the concept of 'Green and Just Transitions' emerges as a critical pathway to ensure that progress is both sustainable and equitable. This 2-hour Indaba session aims to explore the multifaceted aspects of building inclusive ecosystems and innovative dynamics that are essential for driving a green transformation across the continent. It will also delve into the role of digital technologies and creative approaches to finance and investment, recognising their pivotal role in enabling a green and just transition in Africa. The session will highlight the importance of strategic policy approaches, ensuring that the frameworks we develop effectively guide and support the transformative changes needed.

This indaba will consider the following questions:

- What is the most important intersection between greening of the economy and issues of ethics, justice and democracy?
- How can innovation be harnessed to support action at this intersection?
- What actionable steps can we recommend to promote an African green and just transition?

To answer these questions, each day, the indaba attendees will brainstorm around the following points:

- What are the key challenges to solve their chosen focus area?
- What are some of the cases of success that we can learn from?
- What are the lessons we can learn?
- What do these lessons provide us with in terms of potential strategies, action areas or policy solutions?

It is expected that a communique or policy brief will be developed after the event outlining the most viable strategic action areas and policy solutions that are discussed during these indabas.

The research symposium

Across three days the event will provide an opportunity for students and affiliates of the Chair to present their research work. These sessions will take two forms. First, there will be a series of paper presentation sessions where three or four papers are presented (10-15 minutes per paper) followed by dedicated feedback from one or more discussants. Second, several of the sessions will take a panel discussion format.

Tuesday 27 February 2024, 16.00 – 17:30
Research symposium 1: Inclusive innovation and development
Conveners: Dr Ellen Chipango & Dr Dennis Osei, UJ-TRCTI
Location: LG 20, LG 21, LG 22, LG15

PS1: Measuring Informal Innovation Activity in Africa's Formal SMEs: Examples from Egypt, Kenya & South Africa
Location: LG20
Session Chair: *Prof Nagla Rizk, The American University in Cairo*
Session Discussant: *Dr Irie Vroh, AOSTI*

While a wealth of innovation activities take place daily across Africa, African countries tail rankings in global innovation metrics. The implication that Africa lacks innovation is a premise contradicted by empirical evidence revealing a plethora of organic innovations happening on the ground on the continent. Guided by the epistemological premise that what constitutes knowledge stems from community histories and experiences, and that, accordingly, innovation is driven by context-specific needs, we propose that conventional assessment metrics be complemented by appropriate measurement tools that are devised to better capture innovation realities in Africa and the rest of the Global South. This has been the theoretical grounding of our theme "Metrics, Laws and Policies" within the Open African Innovation Research (Open AIR) Partnership. Led by Open AIR's North African hub, the overarching objective of the theme is to develop a sharper lens to better understand and gauge the realities of innovation activities in both formal and informal contexts across Africa. A more accurate depiction of African innovation can better inform policy makers in the fields of innovation and entrepreneurship, and the larger realm of development planning and inclusion. This helps give rise to initiatives that capitalize on and enhance existing human resources and advance skill development. Our work has progressed over two tracks: The first is constructing the "Innovation Activity Index" (IAI)" based on revised definitions and scopes of the above three pillars; and second, is fieldwork surveys to detect unmeasured innovation within these three pillars on the ground. We have adopted a 'grounded theory approach' where we collect 'real-world evidence', from empirical data on innovation activities that are currently not captured by conventional innovation metrics and develop complementary metrics of innovation to document and account for them.

This session will present the results of collaborative research efforts in Egypt, Kenya and South Africa capturing informal innovation activities in formal small and medium enterprises in the manufacturing sector. We have utilized a survey instrument developed and updated by A2K4D in consultation with the teams at the Centre for Intellectual Property and Information Technology Law (CIPIT), Strathmore University, Kenya, and the University of Johannesburg. The session will also present the ongoing efforts in developing a novel 'Innovation Activity Index' by the team in A2K4D.

Speakers:
- *Prof Nagla Rizk, Access to Knowledge for Development Center (A2K4D), School of Business, The American University in Cairo, Egypt*
- *Ms Caroline Wanjiru Muchiri, Open AIR & New and Emerging Researchers Group (NERG)*
- *Prof Islam Hassouna, A2K4D and Open AIR*
- *Prof Erika Kraemer Mbula, Professor of Economics, University of Johannesburg TRCTI*

PS2: Capturing innovation in "unseen places"
Location: LG21
Session Chair: *Ms Khalalelo Mokoena, UJ-TRCTI*
Session Discussant: *Prof Jeremy de Beer, University of Ottawa*

Measurement of innovation in the South African cultural and creative industries: Framework and results from a single-province survey pilot

Mr Gerard Ralphs, TRCTI, University of Johannesburg, South Africa (online)

Innovation measurement experiments in African settings, as elsewhere, have tended to concentrate efforts on collecting and analysing data from one institutional sector, whether formal or informal businesses, public sector entities, not-for-profit institutions serving households, or households. Following Gault, in a systems approach to measurement, which is possible with the introduction of a general definition of innovation in the 2018 Oslo Manual, data is collected from statistical units in multiple institutional sectors from within one or more economic sectors. In this paper, I report on the development and piloting of three innovation survey questionnaires customised by institutional sector and targeting the South African cultural and creative industries. A purposive stratified sampling frame was generated, with a focus on carrying out the experiments in South Africa's Western Cape province. In total, five completions were realised in Phase I (informal and cognitive testing) and 10 self-completions and 10 interview-assisted completions (n=20) were realised in Phase II (piloting). Methodological insights from the testing and piloting data include the value of testing, reasons for non-participation, and pitfalls and benefits of combining subject- and object-based approach questions for validation of respondent understanding of innovation. This paper aims to contribute to current thinking on approaches to innovation measurement in African contexts oriented to specific societal and economic development goals, and the specific contextual constraints and conditions of respondents operating in different institutional and economic sectors.

Household Innovation in South Africa: Nature and types

Dr Larry Onyango and Prof Erika Kraemer-Mbula, UJ-TRCTI

Innovation has been recognised as an important cornerstone of economic development. A recent literature has started to unpack informal innovation, by focusing on businesses. This has been based on the fact that existing literature on innovation studies has not captured a significant section of society that innovates, which is at the household level. This is more so in Africa where innovation is taking place in the informal economy, especially within households in townships. Household innovation has started gaining the attention of scholars in the Global North and China. Few studies have investigated household innovation in the Global South, especially Africa. This paper explores and categorizes the nature and types of household innovation taking place in South African townships, using Orange Farm in Gauteng as a case study. Based on a collaborative project with Utrecht University and MIT (de Jong et al, 2023), the paper utilizes a qualitative approach and data is analysed thematically. The paper establishes that household innovation is prevalent in South African townships, even though some of the innovators are not aware that they have innovated. In addition, household innovation in the township emerges from necessity, hedonism, and personal need, and in many cases is purely a survivalist strategy. The innovations are often freely shared, and their diffusion advances human welfare. The study concludes that though some innovations may lead to the setting up of entrepreneurial enterprises, few people in townships innovate for setting up businesses.

Connecting innovation to human capabilities: a case study of township innovators in South Africa

Prof Alejandra Boni, INGENIO (CSIC-Universitat Politècnica de València), Prof Erika Kramer-Mbula, UJ-TRCTI and Dr Larry Onyango, UJ-TRCTI

This paper aims to integrate the concept of innovation capabilities with that of human capabilities to (1) explore the extent to which innovation capabilities and their underlying learning processes are important in expanding valuable human capabilities, and (2) explore if core elements of the human capabilities approach (such human capabilities, functioning, conversion factors and agency) provides an analytical approach to assess the process and the effects of innovation. We test these ideas through a case study of the eKasiLabs programme in South Africa, which is a network of incubator facilities spread across the populous province of Gauteng, aimed at building a culture of innovation and entrepreneurship in townships. These incubators directly engage with township innovators operating in multiple sectors. The qualitative approach allows for the contribution to both empirical and conceptual understanding of how innovation capabilities and human capabilities connect in practice in the constrained context of South African townships. We first present some fundamental concepts of the human capabilities approach and innovation capabilities. Then we briefly describe

the context of capabilities in the context of South African townships; later on, we describe the methodology and present some preliminary results. Finally, we discuss the implications of using the human capability approach in reframing responsible and inclusive innovation.

Harnessing Innovation in the Informal Food Services Sector: Insights for public policy in the age of COVID-19

Ms Nicole van Rheede and Dr Il-haam Petersen, Centre for Science, Technology and Innovation Indicators, HSRC (online)

The prevailing view of enterprise formality as a linear, binary process does not help inform policy interventions that foster inclusive development in Africa. This paper argues that a refined conceptual and empirical grasp of the transition from informal businesses to sustainable micro-enterprises is needed. It emphasizes that innovation is key to any strategy promoting sustainable business evolution in the informal sector. Drawing on recent research focusing on informal food enterprises in South Africa, the study examines how innovation supports the kinds of business evolution required to build and strengthen local food systems serving low-income and impoverished households. The question of how informal enterprises can harness innovation to increase their complexity, thereby integrating into and improving local food innovation and production systems in a post-COVID economy, is central to this inquiry. Utilizing a survey on innovation among informal enterprises, which incorporates methods from both informal sector studies and the standard Oslo Manual (OECD, 2018), alongside a detailed case study on local innovation within informal food services in a peri-urban region of KwaZulu Natal, the paper investigates the link between crisis-induced innovation responses and the progression of informal food enterprises towards varying degrees of formality. It argues that the design of public policies for economic recovery post-COVID should acknowledge the resilient nature of the informal sector and significantly recognize the importance of innovation in ensuring this resilience and the expansion of informal enterprises.

PS3: Toward TK/TCEs and Genetic Resources Subsidiary Protocol for AfCFTA: Positioning TK for Inclusive and Sustainable Innovation in Africa

Location: LG22

Session Chair: *Ms Gaboile Mabeba, UJ-TRCTI*

Session Discussant: *Prof Chidi Oguamanam, Research Chair, Sustainable Bio-Innovation, Indigenous Knowledge Systems and Global Knowledge Governance, University of Ottawa*

The 2018 instrument establishing the African Continental Free Trade Area (AfCFTA) is one of the boldest initiatives of the African Union in its over two-decade history. The AfCFTA's phase I negotiations yielded three protocols. The protocols are built into the inaugural instrument. They are the protocols on: Goods, Trade in Services and Rules and Procedures for Settlement of Disputes. Since 2018, AfCFTA has recorded significant milestones with impressive rapidity, making real the advent of the world's largest FTA. AfCFTA came quickly into force in 2019 following an impressive number of ratifications. To date, less than nine countries out of 55 have yet to join AfCFTA. In 2021, trade in goods under AfCFTA commenced on a modest note. This was followed by trade in services in 2023. Negotiations have since been concluded on three major protocols pursuant to phase II of AfCFTA under Article 7. Those are the Protocols on: Intellectual Property Rights; Investments and Competition Policy. With all these progressive milestones, Africa's resolve to leverage its 1.3million population into a single market for economic prosperity and strategic realization of AU's Agenda 2063 and the attainment of the Sustainable Development Goals (SDGs) is unmistakable. The Intellectual Property Protocol is decidedly a skeletal instrument. It outlines Africa's contextual and strategic policy principles around intellectual property as trade instrument within AfCFTA and globally. The IP Protocol is extensive. It applies to "all categories of intellectual property including plant variety protection, geographical indications, marks, patents, utility models, industrial designs, undisclosed information including trade secrets, layout designs (topographies) of integrated circuits, copyrights and related rights, traditional knowledge, traditional cultural expressions, and genetic resources, and emerging technologies, and other emerging issues." In each of these regimes, the IP Protocol outlines core principles for further detailing in a subsidiary annex to the IP Protocol.

This panel session will explore the adequacy, inadequacy or gaps in the principles of the AfCFTA IP Protocol relating to TK/TCEs and genetic resources. Considering developments in various international regimes, notably the WIPO IGC, regional and national developments (especially in Africa) on emerging legal frameworks on TK/TCEs and genetic resources, the panel will be an independent forum to foreshow the content and contours of a subsidiary protocol on TK/TCEs and GRs under the AfCFTA framework. As the AfCFTA is set to open negotiations on a subsidiary protocol

on TK/TCEs, the panel is intentionally timely. It will build on Open AIR's antecedent intervention to the AfCFTA IP Protocol and contribute to shaping ideas and perspectives on a potential AfCFTA's annex on TK/TCEs and genetic resources.

Speakers:

- *Prof Caroline Ncube, SARChI in Intellectual Property, Innovation and Development, UCT*
- *Dr Titilayo Adebola, University of Aberdeen*
- *Ms Ainna Vilengi Kaundu, Namibian Business and Intellectual Property Authority*
- *Prof Yonah Seleti, African Centre in Indigenous Knowledge Systems, University of Kwa-Zulu Natal*

PS4: A green transformation that is inclusive

Location: LG15

Session Chair: *Ms Amanda-Leigh O'Connell, UJ-TRCTI*

Session Discussant: *Mr Ernest Chitechi, Kenya Climate Innovation Center (KCIC)*

A feminist political ecology analysis of solar energy distribution in Côte d'Ivoire

Ms Wondia Yeo, TRCTI, University of Johannesburg, South Africa

Solar energy has the potential to provide access to sustainable energy to those lacking access and living in remote areas from grid systems due to its decentralised characteristic. Solar energy suppliers play an important role in implementing access by distributing and deploying off-grid technologies. This article explores the off-grid solar energy sector in Côte d'Ivoire and analyses the participation of women and men as suppliers in this sector. Based on a qualitative research method, this study uses the feminist political ecology (FPE) theoretical framework to conduct the analysis. The study explores the emergence of the Ivorian solar energy sector including the occupational patterns of suppliers. The results demonstrate that women and men suppliers are distinctly concentrated in certain positions. Gendered knowledge, stereotypes and cultural norms are among the factors responsible for the way in which women and men participate into the off-grid solar energy sector. The results also reveal the challenges faced by suppliers in the Ivorian solar energy sector. The paper concludes that more initiatives are needed to facilitate, increase and diversify the involvement of women in the sector. Gender inclusion at the supplier level is essential to achieve an equitable and inclusive energy transition in Côte d'Ivoire

The paradox of energy poverty datafication: An Ubuntu view

Dr Ellen Fungisai Chipango, TRCTI, University of Johannesburg

While datafication- the growing presence, use and impact of data in social processes play a significant role in new technologies for energy accessibility and energy poverty alleviation, little has been said about how these technologies, such as digital meters, affect certain relational values between the state, the citizenry and service providers. It is easy for engineers and energy policy planners to show the efficiency of datafication; it is harder to show in what ways the use of this technology would undermine valuable relationships, such as identifying with others and exhibiting care for them. This study draws from extensive qualitative research in Zimbabwe, the findings of which suggest that datafication is a paradoxical phenomenon where, on the one hand, a lack of data manifests in the state using it as a scapegoat for failure to deliver service and, on the other, datafication is used to mask these realities. The study concludes that energy technology creates new forms of exploitation, and positive socio-economic and equitable outcomes are not inherent in its deployment. The implication for policy is that energy technologies must be of benefit to society, but the deployment of these technologies should be conditioned on good relationality.

Making green growth feasible. Lessons from critical minerals in Argentina and Chile.

Dr Anabel Marin, Institute of Development Studies, United Kingdom & Mr Santiago Cunial, Interamerican Development Bank (online)

In this paper, based on evidence from the mineral sector in Argentina and Chile, we show that the absence of citizens' programmatic participation in green industrial policymaking processes is becoming increasingly problematic for global green transitions. The growing awareness of environmental and social challenges associated with mineral extraction in these two countries has led to the mobilization of local communities to resist mining, which is blocking operations central to the green policy and energy transition. The evidence suggests that as communities become more aware of the environmental and social problems caused by mineral activities, their active engagement and resistance is a response to the lack of their involvement in decision-making

processes. We argue that new industrial policy approaches that seek to actively involve citizens in policy making are not just desirable for issues of justice but necessary for the viability of global processes of green transition. Drawing on insights from participatory research and existing experiences of civil society engagement in policies related to the mineral sector, we then explore key aspects that these approaches should consider promoting to move participatory processes from being only instrumental or symbolic to be transformative.

Just electrification: Connecting rural households through decentralized systems

Mr Mbeo Ogeya, Jaramogi Oginga Odinga University of Science and Technology, Kenya

Renewable energy mini grids are expected to play a major role in pursuit of universal access to modern energy services, particularly in rural Africa where grid extension is technically or financially unviable. But experiences across the region suggest that mini-grid sustainability remains difficult to achieve. Mini grids are concentrated individual systems with significant infrastructure requirements, which are highly sensitive to the local energy resource, needs and socio-economic context and unable to rely on economies of scale due to limited customer base. In this sense, they are very different from stand-alone and national grid electricity service solutions, which both benefit from economies of scale and political support. Distributed stand-alone solutions such as solar lanterns and solar home systems work on a retail basis, with manufacturers covering costs from the sale of multiple units of off-the-shelf models through a large, distributed sales and installation network. On the other hand, across its large network of customers, national grids can absorb low loads and cross subsidize unprofitable regions to ensure uniform tariffs. The historical preference for centralized national grids means that utility expertise, government policy and regulatory frameworks tend to give much more support to such systems. Yet, the set cost reflective tariffs of mini grid electricity are often several times higher than grid electricity tariffs, raising questions of fairness and justice in electricity access. The perspective paper aim is to understand key electricity reform measures that are needed to support mini-grids, and whether path dependency is sufficient to explain limited uptake. The study suggests that tariff injustice is exacerbated by the political economy factors surrounding mini-grid development.

Wednesday 28 February 2024, 16.00 – 17:30

Research symposium 2: Digital transformation and the 4IR

Conveners: Dr Ellen Chipango & Dr Dennis Osei, UJ-TRCTI

Location: LG 20, LG 21, LG 22, LG15

PS1: Dynamics of digital technology adoption in Africa

Location: LG20

Session Chair: *Mr Tafadzwa Chirowamangu, UJ-TRCTI*

Session Discussant: *Dr Shawn Cunningham, UJ-TRCTI*

The Relationship between Indigenous Knowledge and 4IR Digital Technology in South Africa

Ms Gaboile Mabeba, UJ-TRCTI

This paper is motivated by the rich Indigenous Knowledge (IK) that South Africa possesses and its potential contribution to economic development. At the same time, the research acknowledges the greatest challenge confronting Indigenous Knowledge in the face of globalisation, the high technological environment, and the realities of the Fourth Industrial Revolution (4IR). The erosion and marginalisation of Indigenous Knowledge through processes of colonisation and globalisation pose a threat to the development and preservation of indigenous knowledge. Africa prides itself in its identity, heritage, culture, and shared values, which makes Africa distinct from other countries. However, digital transformation and the emerging 4IR are a new driving force for development and bring new opportunities and challenges for Africa's knowledge systems. It is against this backdrop of digital transformations that this paper uses a systematic literature review to explore the relationship between indigenous knowledge and 4IR emerging technologies by establishing first (i) how indigenous knowledge is applied within the 4IR emerging technologies, and lastly (ii) establishing the challenges and prospects associated with the application of IK in the 4IR digital technologies?

Healthcare 4.0 Situation Analysis in South Africa: A review of the landscape concerning artificial intelligence radiology technologies

Mr Tebogo Ramaoka, UJ-TRCTI

The influence of advances in technologies is increasingly impacting the provision of healthcare services (Thimbleby, 2013) through the adoption and usage of frontier technologies in digital healthcare (such as artificial intelligence systems in patient scheduling and triage management, cloud computing and genomics for instance (Tortorella et al., 2022)). Traditionally, healthcare service providers relied primarily on manual data entry (that is., clinical data collection, assessment, and monitoring) as part of clinical practice. This approach led to discrepancies in patient management due to factors such as misplaced documents or afar healthcare amenities, particularly in remote rural areas where physicians make occasional visits (Lehman et al., 2008, Atiyeh et al., 2010), leading to patients forgoing or postponing treatment. 4IR technologies in healthcare in the form of healthcare 4.0 has the potential to increase access to healthcare by improving and strengthening healthcare systems (Keasberry et al., 2017) that are characterised by smart and interconnected systems that support clinical practice (Li, 2023). This study presents an analysis of South Africa's artificial intelligence landscape in radiology through a situation analysis. The study relies on the PRISMA 2015 protocol with articles retrieved from both Scopus and Google Scholar. The study reveals a lack of focus on healthcare 4.0 technology studies in the country, thus prompting a need for further research in radiology-related technologies and potential benefits for the sector as it relates to healthcare 4.0. In contributing to the existing body of literature, the study identifies as the first to analyse the landscape of South Africa's healthcare sector regarding artificial intelligence technologies.

Transforming South Africa's Electoral System Through Blockchain Technology: A Multi-Level Perspective

Dr Lebogang Mosupye-Semenya, UJ-Johannesburg Business School

This study examines how South Africa can transition from its current electoral system to a more sustainable and fairer one, using Blockchain technology. Using the Multi-Level Perspective framework it analyzes this transition and conducts analysis using a Systematic Literature Review and Meta-synthesis analysis. In South Africa, the current electoral system combines online registration with manual voting. The literature highlights several landscape-level and external factors, including manipulation/fraud, inaccurate vote recording, voter intimidation, a lack of trust and transparency, system inefficiencies, integrity concerns in the election process, and limited awareness about alternative technologies. These factors destabilize the system, prompting the emergence of niche blockchain-based e-voting. However, regulatory clarity remains elusive. Despite obstacles such as a lack of digital infrastructure, scalability challenges, hesitancy from regime actors, cyberattack risks, political resistance, and environmental impacts linked with Blockchain technology, its integration into the mainstream is spurred by electoral system destabilization. This study provides practical insights for the South African government on transitioning the current electoral socio-technical system to a fair and just one, using Blockchain technology.

PS2: Twin transition: digital innovation as a driver of green transition

Location: LG21

Session Chair: *Dr Neville Mangwiro, UJ-TRCTI*

Session Discussant: *Prof Roberta Rabellotti, Università di Pavia (Italy)*

Innovation and digital technologies in the South African green economy

Prof Rasmus Lema, UNU-MERIT & UJ-TRCTI

There is considerable debate in both business and policy circles about the 'twin transition' in which potential synergies may arise from the concurrent processes of digitalization and greening. There are high hopes that the adoption of digital technologies may help increase green practices and improve the viability of green business. In this short 'work-in-progress' paper, we report on a recent survey on the use of digital technologies by South African firms operating in the green economy. The purpose of the survey was to understand which digital technologies are being used and whether their adoption improves innovativeness in the sector. We distinguish between three broad green economy categories of the green economy: (a) Clean energy generation, (b) Energy efficiency and storage, (c) Materials use, pollution mitigation and waste handling, each with various sub-domains. The first finding of the study is that surveyed firms are frequent users of digital technologies. The vast majority of firms use digital technology daily such as ecommerce and mobile banking at least once a week. Secondly, digital technologies promote innovation in the green economy. Most firms surveyed report that their digital technologies in use are important for innovation in the enterprise. Third, the paper

assesses how innovation impacts societal goals (alter also focusing on whether digital technologies affect this impact). Interestingly, innovations also often yield economic advantages such as improved economic performance and job creation. Additionally, there are social benefits like enhanced health, better energy access, and reduced poverty, albeit to a lesser degree. The paper ends by discussing barriers constraining the adoption of new digital technologies and the overall policy implications.

A Deep Transitions perspective on digitalisation

Dr Philip Johnstone, SRPU/ University of Sussex (online) and Prof Johan Schot, Utrecht University & UJ-TRCTI

There is a lack of historically grounded research exploring the evolution of the 'ICT revolution' in the field of sustainability transitions. Part of the issue is that digitalisation requires a focus on multi-system developments which has only recently become a focus in transitions research. The Deep Transitions framework (DT) combines the MLP with Techno-Economic Paradigms (TEP) approach to explore the evolution of multiple sociotechnical systems and their interactions. Yet, DT research has not yet examined in-depth the evolution of digitalisation which sits at the heart of the fifth surge in TEP theory. This paper mobilises the DT perspective through a case study of the digitalisation meta-regime. This paper draws on literatures from history of technology, sociology, economics, and transitions studies to provide an interpretive account of the evolution of the long-term rules that have shaped digitalisation in the 5th surge. Our case study analysis highlights the historical tensions and competition between multiple directionalities and the multi-system dynamics that led to the consolidation and stability of a dominant rule set constituting the fifth surge. We argue that the dominant rules of digitalisation prioritise optimisation and that new rules will be required in order for digitalisation to contribute to system change for sustainability.

Exploring the Nexus Between Digital Transformation and Sustainability

Dr Oluwagbenga Apata, UJ-TRCTI

Digitalization and sustainability stand out among the most critical mega-trends of the 21st century. The intersection of these two forces offers exciting opportunities to tackle global challenges, foster the creation of an equitable and ecologically sound society, and establish the foundation for realizing the Sustainable Development Goals (SDGs). Although they hold strategic importance, digital and sustainable transformations are frequently approached independently. This separation is due, in part, to the intricate and multifaceted nature of the relationship between digitalization and sustainability. An in-depth examination of various research outcomes highlights four primary areas in which sustainability and digitalization converge: Energy, Governance, Systems, and Innovation. The Governance domain is further elaborated in the context of planning and policy-making themes. Energy considerations encompass emissions, consumption, and production. Innovation is closely linked with business strategies, values, and environmental concerns. Lastly, systems are intricately connected with networks, Industry 4.0, and supply chain dynamics. These findings aim to provide insights and inspire further research and discussions on the potential interplay between sustainability and digitalization.

PS3: Policy Frameworks for the Fourth Industrial Revolution: Navigating Digital Transformation in Africa

Location: LG22

Session Chair: Ms *Wandile Mlilo, UJ-TRCTI*

Session Discussant: Dr Mafini Dosso, Organisation Internationale de l'Innovation pour de Territoires et Industries Durables

More and more companies are embracing emerging digital technologies (EDTs) to assist them with their innovation activities. However, the innovation ecosystem or facilitatory environment needs to be ready to support them. Artificial intelligence is one of a suite of EDTs that are starting to transform the innovation space on the African continent. Other EDTs include blockchain, geographic information systems (GIS), internet-of-things (IoT), and new-generation data analytics. This session explores the status and future requirements of innovation ecosystem policy frameworks for these EDTs.

Speakers:

- *Prof Rebecca Hanlin, UJ-TRCTI*
- *Dr Anicia Peters, Namibian National Commission on Research, Science and Technology*
- *Dr Lucienne Abrahams, University of Witwatersrand*
- *Prof Hossana Twinomurinzi, University of Johannesburg*

PS4: Copyright and the Right to Research for Innovation and Development in the 4IR
Location: LG15
Session Chairs: *Mr Ben Cashdan, Blackstripe and Dr Lucienne Abrahams, LINK Centre*

Digital transformation is served by the incredible growth of text and data mining (TDM) research technology that makes it possible for us to know our world faster, better, and more completely. TDM refers to the use of computers to analyze digitized information. Academic and scientific research, including through technological methods such as TDM, implicates fundamental rights to receive and impart information and to benefit from culture and science -- which may be referred to as the "right to research." A patchwork of copyright laws in Africa and global limits where and how TDM research can occur. This session will discuss TDM projects in Africa, the diversity of current copyright laws applying to TDM, and what principles may guide policy makers seeking to promote the right to research in a globally just and developmentally focused manner.

Speakers:
- *Prof Sean Flynn, Program on Information and Justice, American University Washington College of Law*
- *Dr Melissa Omino, Center for Intellectual Property and Information Technology Law, Strathmore University*
- *Dr Vukosi Marivate, Department of Computer Science, University of Pretoria*
- *Dr Sanya Samtani, Senior Researcher, Mandela Institute, University of Witwatersrand*
- *Dr Allan Rocha, Federal University of Rio De Janeiro*

Thursday 29 February 2024, 16.00 – 17:30
Research symposium 3: Green and just transitions
Conveners: Dr Ellen Chipango & Dr Dennis Osei, UJ-TRCTI
Location: LG 20, LG 21, LG 22, LG15

PS1: GOCIA (Governing Climate Innovation – Africa)
Location: LG20
Session Chair: Prof Caroline Ncube, University of Cape Town

Africa leads the development of climate adaptation knowledge and innovation that is crucial to internationally address the climate crisis. However, the current intellectual property governance and regulation on the continent is not suitable for the continent to protect the source of its ingenuity, to secure sufficient benefits from it and to motivate investments for further innovation. Despite its contribution to 2-4% of global greenhouse gas emissions, Africa is the most vulnerable continent to the climate crisis and develops world-leading innovation in adapting to climate change. International climate policy – namely UNFCCC and IPCC – has recognised the key importance of internationally disseminating this body of knowledge but existing Intellectual Property Rights systems and trade regulations hardly appear suitable to protect the source of the continent's ingenuity, to secure sufficient benefits from it and to motivate investments for further innovation. The risk of blocking access to and misappropriating African climate knowledge when disseminating cross-borders is exacerbated by the pressure to mobilise private capital to the annual funding gap of USD$ 4.2 trillion required to achieve the United Nations Sustainable Development Goals. In this session, researchers from the University of Cambridge and OpenAIR will discuss project progress in developing the first intellectual property (IP) management "toolkit" tailored to African climate adaptation innovators and their efforts to generate evidence to inform African policy and regulatory reform on climate knowledge and innovation.
Speakers:
- *Dr Frank Tietze, University of Cambridge*
- *Dr Sara Serradas O'Holleran, University of Cambridge*
- *Dr Dick Kawooya, University of South Carolina*
- *Dr Anthony Kakooza, Makerere University*
- *Dr Desmond Oriakhogba, University of the Western Cape*
- *Dr Titilayo Adebola, University of Aberdeen*
- *Prof Erika Kraemer-Mbula, UJ-TRCTI*

PS2: Innovation & sustainability: local, regional and global dynamics
Location: LG21
Session Chair: *Dr Gbenga Apata, UJ-TRCTI*
Session Discussant: *Dr Chux Daniels, Sussex, UK*

Varieties of Regional Innovation Systems around the world and Catch-up by Latecomers

Dr Jinhee Kim & Prof Keun Lee, Seoul National University & TRCTI University of Johannesburg (online)

This study identifies the characteristics and types of regional innovation systems (RIS) of regions and cities in emerging economies compared to those in advanced economies. It uses citation data of US patents filed in 33 regions. Some RIS variables are newly developed and include intra-regional, inter-regional and inter-national sourcing of knowledge and national ownership of innovation. Cluster analysis of these variables allows us to identify four major types of RIS around the world and to relate them to regional economic performance. The four types are, in descending order of per capita income levels, large, mature RIS characterized by a combination of long cycle technology specialization and high national ownership (group 1), mixed RIS characterized by long cycle and low national ownership (group 2), "strong catch-up" characterized by short cycle and high national ownership (group 3), and "weak catch-up" characterized by short cycle and low national ownership (group 4). Groups 3 and 4 include only emerging economy regions. They are similarly specialized in the same short cycle time of technology-based sectors but have different records of economic performance. The key differentiating variable is the degree of national ownership of knowledge, which can be a basis for increasing domestic sourcing of knowledge and sustainable catch-up. Another important variable is decentralization, the level of which is lower in the strong catching-up group than in the weak catching-up group. In Group 3, the catch-up process is led by large firms. Several catching-up cities, such as Moscow, Beijing and Shanghai, also show an increasing trend towards national ownership and centralization.

Coal industry transformation under sustainability transition in South Africa

Dr Olga Ustyuzhantseva, TRCTI, University of Johannesburg, South Africa

The coal industry, despite experiencing growth in demand and prices during 2022, is undergoing irreversible processes of decline. It is also true that coal won't disappear from the economies of the countries in the next 20-30 years and maybe more and will generate associated socioeconomic implications. Recognizing the advantageous time gap for managing industry change without severe consequences, the government can strategically address the challenges accompanying the decline. Meanwhile, in public discourse and academic literature, coal is considered an undesirable context or obstacle for introducing clean energy with little or no attention paid to what happens or should happen with coal industry due to sustainability transition processes. The goal of the presented study is to explore coal industry transformation in interconnection with overall sustainability transition processes and identify the implications and lock-ins the coal industry generates for them.

Green windows of opportunity in the Global South

Prof Rasmus Lema, UNU-MERIT & UJ-TRCTI & Prof Roberta Rabellotti, Università di Pavia (Italy)

The green transformation has profound implications for the global economy and hence for the prospects for latecomer development. In this paper we review the insights that can be derived from case studies of developing country experiences in green technology. Based on a systematic literature review covering seven key technologies we seek to examine whether the green economy offers new opportunities for latecomer development and what characterizes the capacity of developing countries to seize these opportunities. To understand how the capacity to seize green windows of opportunity (GWOs) differ across cases, we focus on the sectoral system and concentrate our attention on two related, albeit distinct, components: (a) the preconditions to take advantage of the opportunity and (b) the strategic responses of public and private actors with respect to seizing the GWOs. We show that four different scenarios can be identified: (1) the effective seizing of opportunity, (2) the missed opportunity, (3) the active approach and (4) the distant opportunity. We conclude by assessing policy options that can support developing countries in their efforts to support green development strategies, focusing both on the opening and augmentation of windows of opportunity and on the construction of requisite sectoral systems of production and innovation.

PS3: Unlocking a green transition: focus on finance
Location: LG22
Session Chair: *Ms Wandile Mlilo, UJ-TRCTI*
Session Discussant: *Prof Johan Schot, Utrecht University & UJ-TRCTI*

Niche Finance for Sustainable Transitions: The Case of Green Hydrogen in South Africa
Ms Amanda-Leigh O'Connell, TRCTI, University of Johannesburg, South Africa
Finance plays a critical role in sustainability transitions by facilitating the development of sustainable niche technologies for transformative change. In this paper, the Strategic Niche Management (SNM) framework is used to explore how finance interacts with key niche processes of nurturing, shielding, and empowerment to shape niche development for sustainable transitions. This research, designed as an instrumental case study and grounded in critical realist principles, focuses on the developing green hydrogen sector in South Africa's energy transition. The study introduces a novel conceptual framework that outlines three modes of finance-niche interactions alongside five key financing dimensions as critical points of interaction. This research makes three significant contributions to SNM and sustainability transitions literature. Firstly, it introduces the financing mediation junction as a novel analytical construct for finance research in sustainability transitions. Secondly, it proposes a refined taxonomy of shielding mechanisms, providing practical insights for policymakers and practitioners. Thirdly, it links the concepts of shielding to empowerment, clarifying the potential of financing shields for transformative system change. The findings indicate that future research should explore the foundational role of legal forms of financing, the power dynamics embedded in actor networks at each junction, and how transformative financing principles can be systematically applied and evaluated at mediation junctions for radical change.

Understanding and accelerating the financing of green and just transition in Africa
Prof Jacob Park, Castleton University's College of Business, Castleton University, USA & UJ-TRCTI
Building on the 2023 PLOS Climate article (Understanding the USD 10+ trillion climate finance dilemma: Implications for the 2023 COP28 climate conference https://journals.plos.org/climate/article?id=10.1371/journal.pclm.0000302), this presentation argues that the keys to unlocking the challenge of green transition in Africa consist of 1) addressing the post-pandemic "debt" problems confronting many African countries; 2) mediating and resolving the multi-dimensional challenges of climate "justice" and 3) identifying and implementing "scalable" green transition finance solutions, with a special focus on community-based adaptation.

Transformative investments in green hydrogen development in the Global South: Opportunities & Challenges
Mr Stefan Gevaert, Ms Lioba Pause, Dr Eric Cezne, Prof Kei Otsuki, Utrecht University and Ms Amanda-Leigh O'Connell TRCTI, University of Johannesburg
With its potential to decarbonise hard-to-electrify sectors and mobilise new investments, green hydrogen is increasingly recognised as an important driver of the global energy transition. This research examines the development of green hydrogen in the Global South as a critical path to meeting climate targets. Through an extensive review of academic and grey literature, the study scrutinises the technological, economic, and socio-environmental implications of green hydrogen policies and strategies in these regions, exploring the possibilities for transformative public and private investments. Incorporating two case studies on green hydrogen transitions in Brazil and South Africa, alongside a participatory workshop with expert international energy stakeholders, the research offers insights into the challenges and opportunities of green hydrogen development in the Global South. The findings reveal that while green hydrogen holds significant promise, its real-world development in the Global South is still nascent, facing scalability, infrastructure, and skills capacity challenges. Key considerations highlighted by the research include the necessity for government financing, greater collaboration, and addressing concerns of justice and fairness. Furthermore, the study brings to light geopolitical implications, potential land conflicts, and the importance of energy justice, advocating for interdisciplinary research to ensure a just and equitable global energy transition.

Accelerating innovation in industrialized countries: how relevant is the interaction between financial development and environmental factors?

Dr Muazu Ibrahim, African Development Bank; Prof Samuel Adams, Ghana Institute of Management and Public Administration; Prof Xuan Vinh Vo, University of Economics Ho Chi Minh City and Dr Dennis Boahene Osei, TRCTI, University of Johannesburg

The impact of countries' levels of financial sector development in influencing innovation and environmental quality cannot be overemphasized. However, studies on the tripartite relationships among financial sector development-innovation-environmental quality have produced mixed results, necessitating further research. This study, therefore, aims to investigate the impact of financial sector development on innovation and examine how financial sector development moderates the impact of environmental factors in influencing innovation. Relying on panel data spanning 1991–2014 for 27 selected industrialized countries, findings from the system generalized method of moment (GMM) suggest that higher financial development robustly increases innovation. Further evidence also shows that while higher energy consumption, renewable energy, and carbon dioxide emissions spur innovation, increases in ecological footprint lower innovations. However, a well-developed financial sector dampens the negative impact of ecological footprint on innovation while propelling the innovation-enhancing effect of carbon dioxide emissions and energy consumption with no apparent impact on renewable energy. A key implication of the findings is that financial development has a far more significant effect on innovation in countries with high environmental degradation and energy consumption.

PS4: Thinking differently about sustainability transitions

Location: LG15

Session Chair: *Dr Ellen Chipango, UJ-TRCTI*

Session Discussant: *Prof Rasmus Lema, UNU-MERIT & UJ-TRCTI*

Interconnected or disconnected? A review of sustainability, resilience, and sustainable business model constructs in the academic business literature

Ms Liesel Kassier, TRCTI, University of Johannesburg, South Africa (online)

The global climate change and resource depletion crisis requires rethinking business models that drive the production and consumption of goods and services. This requires transdisciplinary and systemic reconfiguration and a critical evaluation of traditional economic, business, and management constructs. This research provides a systematic literature review of how the constructs of sustainability, resilience, and sustainable business models have been defined and applied in economic, business, and management academic literature from 1990 until 2022. The key contributions of this paper are (1) a review of how sustainability, resilience, and sustainable business models have been defined in the literature; (2) an identification of the interfaces and lack thereof between these constructs (3) an outline of the gaps and limitations and need for further research to address the knowledge gaps.

Transformative Learning through the Aesthetic Experience: Is this an option for sustainability transitions?

Prof David Walwyn, University of Pretoria, South Africa (online)

Art is a unique medium, unlike other forms of communication and experience. Emancipatory art is proposed as a means through which the conventional or normative interpretations of reality, what we may call ontological constructs, can be challenged and recrafted. The experience of art, whether as an artist or as a viewer, is a privileged opportunity to change attitudes towards important issues in society, such as the treatment of the environment or the attainment of sustainability goals. In brief, art is a powerful language and pedagogical instrument through which to embed new meta-rules, where the latter are fundamental to the goals of Deep Transition. In this session, the author's prior experience with pedagogies designed to facilitate sustainability transitions, will be summarised, including his research on the lecture theatre as a discursive space, in which ideas new to the students are presented and argued. These interventions had little success, leading to the conclusion that ontological constructs are difficult to change through rational argument, even in the lecture theatre, and suggesting that more phenomenological approaches, as used in transformative learning through the experience of art, would be more effective. It was considered that the emancipatory potential of art in combination with kincentricity as a meta-rule, should be explored as a pathway towards sustainability transitions. Some initial work on this approach, using artistic images to communicate the concept of nature connectedness, will be reported. The session will conclude with proposals for future work.

Household Agency in Sustainability Transitions: A Case Study of Minigrids in Kenya

Dr Elsie Onsongo, Ms Beryl Onjala, Ms Rosebella Nyumba, and Ms Mourice Kausya, Nuvoni Centre for Innovation Research, Kenya

A complex socio-technical innovation system around mini-grid development has emerged, encompassing a network of actors drawn from the private sector, development partner organizations, and households among others. Households, who are the primary target of mini-grid development projects, are largely considered a homogenous unit within the network, benefiting from the installed electricity generation projects. While holding household agency constant may sometimes be necessary to simplify the already-complex innovation system around mini-grid development, it makes for a largely inadequate analysis. The role of the household within the system is difficult to overlook, on the basis that it informs the activities and the evolution of standard practice by developers. The decision made by households to participate or abstain from the transition is important and is determined by various prevailing household dynamics. These factors, align with the agency exercised by households to determine the extent to which a household will participate in the transition. The study highlights the nuance around household agency and innovation around the use of energy from mini grids. For the different characteristics that mini grids have, households have adapted their decisions around the use of energy to challenges such as the high cost of energy, and unreliable energy supply, among others. This manifests through measures such as fuel stacking and opting for particular electrical appliances over others. The study recommendations are around measures to consider household practices of cost-cutting and supplementing energy consumption in the operations and business models of operators in underserved regions to improve sustainability measures for the various actors in the socio-technical innovation system.

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UJTRCTI@UJ.AC.ZA