

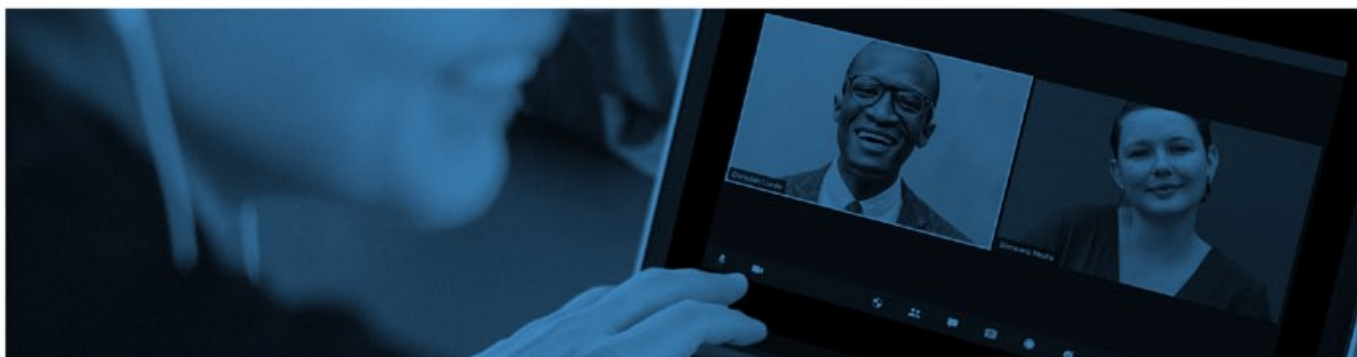


**HSRC**  
Human Sciences  
Research Council



**CENTRE FOR SCIENCE,  
TECHNOLOGY AND  
INNOVATION INDICATORS**

2019/20  
ANNUAL REVIEW  
REPORT





**CeSTII**  
Centre for Science, Technology  
& Innovation Indicators

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# CONTENTS

<b>STRETCHING OUR UNDERSTANDING OF INNOVATION</b>	<b>2</b>
<b>2019/20 IN REVIEW</b>	<b>3</b>
<b>ABOUT CeSTII</b>	<b>4</b>
OUR VISION	4
OUR MISSION	4
OBJECTIVES	4
<b>ABBREVIATIONS &amp; ACRONYMS</b>	<b>5</b>
<b>INTERNATIONAL ADVISORY COMMITTEE</b>	<b>6</b>
CHAIR'S REFLECTION	6
ADVISORY COMMITTEE MEMBERS*	7
<b>DATA COMMITTEE</b>	<b>9</b>
<b>RESEARCH THEMES &amp; PROJECTS</b>	<b>10</b>
THEME 1: MEASURING R&D CAPACITY IN SOUTH AFRICA	10
THEME 2: MEASURING INNOVATION CAPACITY IN SOUTH AFRICAN FIRMS	12
THEME 3: NEW INDICATOR DEVELOPMENT	14
<b>CONFERENCES &amp; OUTPUTS</b>	<b>18</b>
<b>HSRC SEMINAR SERIES 2019/20</b>	<b>21</b>
<b>COLLABORATION &amp; NETWORKS</b>	<b>22</b>
AFRICAN RESEARCH AGENDA	22
VISITING RESEARCHER	22
HIGH-LEVEL FORA	23
KEY STAKEHOLDERS	24
<b>FEATURE</b>	<b>26</b>
<b>CeSTII IN THE MEDIA</b>	<b>30</b>
<b>OUR STAFF</b>	<b>31</b>
CAPACITY ENHANCEMENT	31
CeSTII WINS HSRC AWARDS	31
CeSTII 2019 TEAM AWAY DAY	31
GETTING TO KNOW CeSTII'S RESEARCH DIRECTOR	32
CeSTII HONORARY RESEARCH FELLOWS	34
TEAM CeSTII*	35

# STRETCHING OUR UNDERSTANDING OF INNOVATION



## **Prof. Crain Soudien**

Chief Executive Officer: Human Sciences Research Council

Throughout 2019/20, the Human Sciences Research Council prepared for a realignment of its organisational structure as part of the development of a new five-year strategic plan (2020-2025). The new strategic plan recommits the HSRC to addressing the challenges of poverty and inequality in South Africa, but with far greater focus and impact.

Out of the realignment process, the HSRC has emerged much more appropriately oriented in its structure to achieve its new strategic goals. Needless to say, the arrival of the global coronavirus pandemic in early 2020 has compelled the HSRC to adapt even further, to remain at the forefront of delivering quality social science that can make a difference in our people's lives.

In this context, the Centre for Science, Technology and Innovation Indicators (CeSTII) remains an absolutely vital part of the HSRC and broader government's institutional research capability. The surveys performed by the Centre in 2019/20 on behalf of the Department of Science and Innovation (DSI), which include the annual R&D Survey, the Business Innovation Survey, and a new Baseline Survey on Innovation in the Informal Sector, contribute to the national suite of data informing innovation policy-making at the highest levels of

government. The analytical work performed by Centre staff, using survey data, also contributes to strengthening national, continental and global policy discourse on the role of innovation in addressing our world's most urgent challenges.

Methodologically, the Centre is expanding the frontiers of participatory research on innovation, and training young researchers and managers to deliver research results according to stringent quality assurance processes. While this is an essential component of institutional capacity development, it is also work that is stretching our understanding of innovation in relation to our particular South African and southern contexts. I look forward to following the work of the Centre for Science, Technology and Innovation Indicators in 2020/21, and to seeing its contribution to the realisation of the new strategic vision of the HSRC.

# 2019/20

# IN REVIEW



**Dr Glenda Kruss**

Executive Head: CeSTII, Human Sciences Research Council

For the past three years, CeSTII has worked to conceptualise new research and extend the scope and analysis of the current STI surveys. Our aim? To develop measures and indicators that help our country's decision makers to understand how knowledge, technology and innovation is oriented to address poverty, inequality and unemployment, and to promote inclusive growth and development.

Our contention is that we need new STI measurement approaches that are appropriate to the developmental challenges of our location in South Africa, Africa and the global South, and aligned with the developmental goals of the African Union's Science, Technology and Innovation Strategy for Africa 2024 (STISA), and the UN's Sustainable Development Goals (SDGs).

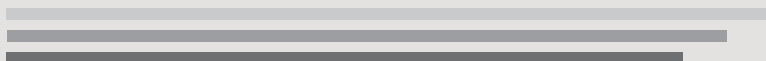
Recognising that the dominant innovation and economic models adopted from developed economies could widen inequality and exclude the majority from its benefits, there is growing policy support for a shift to emphasise STI for inclusive and sustainable socio-economic development, encapsulated in the DSI's White Paper of 2019.

Accordingly, in 2019/20, the CeSTII team partnered with research and policy organisations, to mine the rich database of longitudinal trend data on R&D and innovation, interrogating the data to address new developmental questions such as how much R&D is oriented to the green economy, or to health and well-being in South Africa. We also implemented a new baseline survey of innovation in agricultural

enterprises, a new measurement programme of innovation in informal enterprises, and completed a key project on the dynamic interactive capabilities of formal knowledge producers and three local communities in different South African provinces.

Innovation policies suited to the economic activities that prevail in South Africa need to be informed by a measurement programme that is designed to account for the country's unique histories and contexts. This requires not only the development of new methodologies to collect the necessary data, but it also requires that the collection be undertaken in a manner that includes local knowledge, opinions, and experience of the participants, and that does so in a participatory fashion.

Through this process of experimentation by CeSTII, a foundation is being laid to design new measures and indicators, and new processes to create these measures, to ensure the impact of STI on inclusive and sustainable development. In this respect, the CeSTII team can be proud of their path-breaking efforts and substantial achievements in 2019/20.



# ABOUT CeSTII

The Centre for Science, Technology and Innovation Indicators is a statistical and policy research unit located within the Human Sciences Research Council.



## OUR VISION

The Centre for Science, Technology and Innovation Indicators seeks to be a leading Centre for the measurement of science, technology and innovation, with a growing national, continental and global footprint, impact and reputation rooted in high-quality research evidence, strong networks of researchers, policy makers and practitioners, and the deployment of cutting-edge research technologies that improve the quality and quantity of output. The work of CeSTII is supported by an ethos of teamwork and inclusive diversity, shared learning, creativity, and a commitment to sustainability.



## OUR MISSION

To become the leader in the field of national surveys that underpin benchmarking, planning and reporting on R&D, innovation and technology transfer in South Africa. We adapt best practice international methodologies for measurement of science, technology and innovation (STI) indicators, within a framework of innovation for inclusive and sustainable socio-economic development.



## OBJECTIVES

- 1 Build the institutional capabilities of CeSTII researchers to achieve its mandate.
- 2 Undertake statistical surveys that support measurement and analysis of STI indicators in South Africa to national and international quality standards.
- 3 Contribute to and deepen analysis of STI indicators in relation to challenges of economic growth and inclusive development, through scientific publications, data-sharing, technical briefs and international benchmarking studies.
- 4 Contribute to data sharing, knowledge sharing and exchange with national, regional and global STI measurement and policy communities and other actors in the national system of innovation.
- 5 Lead a new research agenda to inform the design of measures and indicators that can support and promote a strategy of innovation for inclusive development, in line with the HSRC organisational research focus, Department of Science and Innovation's White Paper and towards national development goals.



# ABBREVIATIONS & ACRONYMS

<b>ACTS</b>	African Centre for Technology Studies	<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>ASTII</b>	African Science Technology and Innovation Indicators	<b>R&amp;D</b>	Research and Development
<b>BIS</b>	Business Innovation Survey	<b>REDCap</b>	Research Electronic Data Capture
<b>BRICS</b>	Brazil, Russia, India, China and South Africa	<b>RDSMS</b>	Research and Development Survey Management System
<b>BUSA</b>	Business Unity South Africa	<b>SA</b>	South Africa
<b>CCA</b>	Council of Canadian Academies	<b>SADC</b>	Southern African Development Community
<b>CENTRIM</b>	Centre for Research in Innovation Management	<b>SAHECEF</b>	South African Higher Education Community Engagement Forum
<b>CeSTII</b>	Centre for Science, Technology and Innovation Indicators	<b>SASQAF</b>	South African Statistical Quality Assessment Framework
<b>CINPE</b>	International Center of Economic Policies for Sustainable Development	<b>SciSTIP</b>	Scientometrics and Science, Technology and Innovation Policy, DST-NRF Centre of Excellence
<b>DSI</b>	Department of Science and Innovation	<b>SFSA</b>	Science Forum South Africa
<b>GERD</b>	Gross Domestic Expenditure on R&D	<b>SPRU</b>	Science and Policy Research Unit, University of Sussex
<b>HSRC</b>	Human Sciences Research Council	<b>Stats SA</b>	Statistics South Africa
<b>IERI</b>	Institute for Economic Research on Innovation	<b>STI</b>	Science, Technology and Innovation
<b>IFPRI</b>	International Food Policy Research Institute	<b>TUT</b>	Tshwane University of Technology
<b>NACETEM</b>	The National Centre for Technology Management	<b>UCT</b>	University of Cape Town
<b>NACI</b>	National Advisory Council on Innovation	<b>UJ</b>	University of Johannesburg
<b>NCRST</b>	National Commission on Research Science and Technology	<b>UN</b>	United Nations
<b>NEPAD</b>	New Partnership for Africa's Development	<b>WITS</b>	University of the Witwatersrand
<b>NESTI</b>	National Experts on Science and Technology Indicators, OECD		

# INTERNATIONAL ADVISORY COMMITTEE

**Prof. Fred Gault**

Advisory Committee Chair

An independent advisory committee, comprising experts from all over South Africa and globally, provides the Centre for Science, Technology and Innovation Indicators with advice on the conceptualisation and implementation of its research agenda.

## CHAIR'S REFLECTION

The CeSTII Advisory Committee consists of eight appointed members from six countries and the HSRC Deputy-Executive Director, responsible for CeSTII, **Dr Glenda Kruss**. The Committee met in May 2019 to review topics of importance to CeSTII and to provide independent advice.

The Minutes of the Committee recorded its advice which was available to the CeSTII staff.

Substantive topics discussed in 2019 included:

- The Business Innovation Survey and operational issues for the consideration of the Committee; and
- The Agri-business Innovation Survey.

Some topics were introduced for consideration in the longer term:

- The establishment of a CeSTII Data Committee in 2019 raised questions about the conditions for access to CeSTII data;
- The White Paper on Science and Technology had implications for CeSTII;
- The involvement of CeSTII with the Southern African Development Community (SADC) and its implications; and,
- The implication for CeSTII of government reorganisation especially the link with the Department of Science and Innovation (formerly the Department of Science and Technology).

In addition to the membership of the Committee, CeSTII staff participate actively in the meetings, making presentations, providing information to the Committee and responding to questions. The Department of Science and Innovation (DSI) is present as an observer, and one of the members of the Committee comes from the Secretariat of the National Advisory Council on Innovation (NACI). The presence of DSI and NACI ensures that matters relevant to CeSTII are shared with other agencies engaged in supporting science, technology and innovation activities.

The Committee, which works electronically, established its way of doing business in 2017 and in 2018. In 2019 the Committee considered how to renew its membership so that it could continue to provide relevant advice to CeSTII from different countries and disciplines within the domain of science, technology and innovation. Following discussion in 2018, members of the Committee were invited to consider their membership in 2019 so that two or three could be replaced in 2020. The objective was a renewal of a third of the membership each year to be implemented in 2020.

In summary, in 2019, the Committee focussed on the measurement challenges faced by CeSTII, and on the importance of involvement with SADC and communities of practice in South Africa.



## ADVISORY COMMITTEE MEMBERS\*



**Prof. Fred Gault (Chair)** is Professor Extraordinaire at the Tshwane University of Technology (TUT) in South Africa and a member of the TUT Institute for Economic Research on Innovation (IERI). He served

on the Council of Canadian Academies (CCA) Panel on the State of Science and Technology in Canada, the CCA Panel on the Socio-Economic Impacts of Innovation Investments, and the U.S. National Academy of Sciences Panel on Developing Science, Technology and Innovation Indicators for the Future. He is a Visiting Professor at the University of Johannesburg, DST/NRF/Newton Fund Trilateral Research Chair in Transformative Innovation, the 4<sup>th</sup> Industrial Revolution and Sustainable Development.



**Prof. Sunil Mani (Vice Chair)** is Director and Professor at the Centre for Development Studies (Trivandrum, Kerala, India) and is also Visiting Professor at the National Graduate Institute for Policy Studies (Tokyo, Japan).

He has been a visiting professor at Bocconi University (Italy), the University of Toulouse-Jean Jaurès (France) and the Indian Institute of Management (Calcutta). Sunil Mani also worked at the United Nations University – Merit (Maastricht) as a researcher and head of graduate studies. He specialises in the economics and policy studies of innovation, and one of his most recent publications is a book with Franco Malerba and Pamela Adams, *The Rise to Market Leadership: New Leading Firms From Emerging Countries (2017)*. Sunil Mani holds a PhD in Economics from Jawaharlal Nehru University (New Delhi), and has done post-doctoral research at the University of Oxford.



**Dr Petrus Letaba (MBA)** is Senior Specialist: STI Measurements and Evaluation at the National Advisory Council on Innovation (NACI) Secretariat. NACI is a statutory advisory body that advises the Minister

of Science and Technology, and through the Minister, the Cabinet. He has extensive experience in data and information management, policy analysis and technology management. He participates on several local and international expert committees on a wide range of issues such as science, technology and innovation policy analysis, and standards development.



**Dr Jeffrey Orozco** is Professor at the International Center of Economic Policies for Sustainable Development (CINPE) in the National University of Costa Rica. For several years, he has researched the economics of

innovation, trade and environment, and sustainable development. He also teaches in several Master's and PhD programmes. Since 2008, Jeffrey Orozco has coordinated the Innovation Survey in Costa Rica, through the Ministry of Science and Technology.

\* The Committee's secretariat is based at CeSTII and includes: Dr Glenda Kruss (CeSTII Executive Head), Gerard Ralphs (Programme Manager & Policy Analyst), and Vuyiseka Mpikwa (PA to the Executive Head).



**Prof. Erika Kraemer-Mbula** is Professor of Economics at the University of Johannesburg and holds the DST/NRF/Newton Fund Trilateral Research Chair in Transformative Innovation, the 4<sup>th</sup> Industrial Revolution

and Sustainable Development. Initially trained as an economist, she holds a Master's in Science and Technology Policy from the Science and Policy Research Unit (University of Sussex), and a doctorate in Development Studies from the University of Oxford. She specialises in science, technology and innovation policy analysis and innovation systems in connection to equitable and sustainable development. In the UK, Erika Kraemer-Mbula has held various research positions at the Centre for Research in Innovation Management (CENTRIM) and at the Science and Policy Research Unit (SPRU) at the University of Sussex. In South Africa, she has been Senior Lecturer at the Institute for Economic Research on Innovation (IERI) at Tshwane University of Technology. She has recently co-authored a book on *The Informal Economy in Developing Nations: Hidden Engine of Innovation?* published in 2016 by Cambridge University Press.



**Dr Pedro Mendi** is Associate Professor in the Department of Business, Universidad de Navarra. He holds a BA in Economics (1996) from Universidad de Navarra, and a PhD in Economics (2001)

from Northwestern University. He has been a faculty member at Universidad de Navarra, both at the School of Economics, where he is currently Vice Dean, as well as at the Navarra Center for International Development. His research focuses on the economics of innovation and technology transfer and on other selected topics in industrial organisation. His research has been published in journals such as *Journal of Economics and Management Strategy*, *Research Policy*, and *Technological Forecasting and Social Change*.



**Dr Susan Cozzens** is Professor Emerita in the School of Public Policy at the Georgia Institute of Technology. She most recently served as the Vice Provost for Graduate Education and Faculty Development for the campus.

Her research interests are in science, technology and innovation policies in developing countries, including issues of equity, equality and development. Cozzens is active internationally in developing methods for research assessment, and science and technology indicators. Cozzens served as Chair of Public Policy and was Associate Dean for Research in the Ivan Allen College of Liberal Arts. From 1995 through 1997, she was Director of the Office of Policy Support at the National Science Foundation, and before joining Tech, Cozzens spent 11 years on the faculty of Rensselaer Polytechnic Institute. Her PhD is in sociology from Columbia University (1985) and her bachelor's degree is in sociology from Michigan State University (1972, summa cum laude).



**Dr Ann Kingiri** is a science, technology and innovation researcher with a focus on inclusive and sustainable development in Africa. Ann Kingiri has held managerial positions in the public sector overseeing

administration matters as well as regulatory policy. She has also managed research portfolios and research grants in policy research settings. She has over 20 years of experience working with the public and private sectors, and with development partners in the area of development particularly targeting Africa. Currently, she is Senior Research Fellow at African Centre for Technology Studies (ACTS), a development policy think tank working to harness STI applications for sustainable development.

# DATA COMMITTEE



**Dr Yasser Buchana**  
Incoming Chairperson (2020/21)

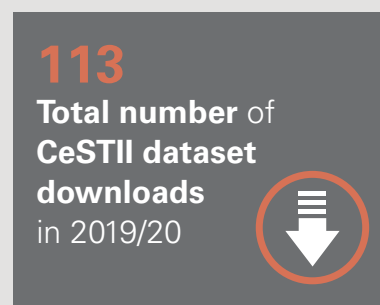
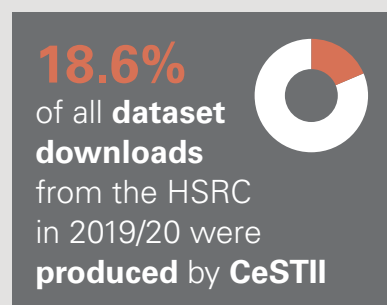
The Data Committee of the Centre for Science, Technology and Innovation Indicators performs a vital role in the processing of data requests from the general public.

We aim to ensure that the confidentiality of our respondents' information is protected at all times and, at the same time, ensure that the data we collect through our surveys is accessible for users with legitimate data requests.

In 2019/20, we responded to numerous requests for data, as well as worked toward the promotion of our public datasets through email marketing and at events organised or attended by the CeSTII team. We also strengthened our internal data team's capabilities to conduct data management, extraction and analysis support, as well as statistical analysis.

A year-on-year decline in the number of downloads was experienced in 2019/20, owing to a retraction period in 2019/20 for maintenance of the R&D Survey dataset specifically. However, I am pleased to report that all aggregated CeSTII datasets are now available for download from the HSRC's Research Data portal. For more advanced requests, I invite you to review our Public Data Access Protocol, and to follow the steps outlined there.

On behalf of the Committee, I would like to thank **Dr Neo Molotja** for stewarding the work of the CeSTII Data Committee in 2019/20.



Number of published errata:

	2018/19: <b>6</b>
	2019/20: <b>3</b>

Learn more:  
<http://www.hsrc.ac.za/en/departments/CeSTii/updates-and-errata>

You can contact the **Data Committee** by writing to [cestiidata@hsrc.ac.za](mailto:cestiidata@hsrc.ac.za) or [ybuchana@hsrc.ac.za](mailto:ybuchana@hsrc.ac.za).

# RESEARCH THEMES & PROJECTS

Projects in the Centre for Science, Technology and Innovation Indicators are divided into three thematic areas. This section showcases project work carried out in each theme in 2019/20.

## THEME 1: MEASURING R&D CAPACITY IN SOUTH AFRICA



**Dr Neo Molotja**  
Theme Leader

### SA R&D Survey

The South African National Survey on Research and Experimental Development (R&D Survey) is a flagship annual project for CeSTII, which it performs on behalf of the South African Department of Science and Innovation (DSI). Each year, we report the latest available data on R&D expenditure and personnel across five institutional sectors: higher education, science councils, government, business, and not-for-profit organisations.

The 2017/18 R&D Survey results were released by the Department of Science and Innovation on 24 October 2019 (Box 1).

Outputs from the project included the Survey's statistical report, main report, metadata report, evaluation report, and fact sheets for each of the five sectors.



[t.ly/l4Yj](https://t.ly/l4Yj)

### Box 1. Headline results from the 2017/18 survey

Gross Domestic Expenditure on R&D (GERD) increased in real terms, but is slowing down. At constant 2010 prices, GERD grew by 3.1% year-on-year to reach a level of R25.963 billion. This growth in GERD shows a declining trend since the maximum of 8.3% that was reached in 2014/15. In current values, GERD amounted to R38.725 billion in 2017/18.

The business sector remained the largest performer of R&D in 2017/18 (41.0% of GERD), followed by the higher education sector (33.6% of GERD), science councils (16.3% of GERD), government (6.0% of GERD) and not-for-profit organisations (3.1% of GERD).

In current Rand terms, expenditure on R&D by sector in 2017/18 was recorded as: business (R15.859 billion), higher education (R13.010 billion), science councils (R6.313 billion), government (R2.326 billion) and not-for-profit organisations (R1.216 billion).

Government provided the most funding for R&D in South Africa in 2017/18, notably R18.082 billion, representing 46.7% of total R&D funding. The business sector contributed R16.067 billion to R&D in South Africa, or 41.5% of total R&D funding. Foreign sources of R&D funding comprised R3.937 billion of total R&D funding or 10.2%.

Expenditure on applied research grew to comprise 53.3% of GERD in 2017/18 from its 2016/17 level of 47.8%. Expenditure on basic research proportionally decreased from 26.7% of GERD in 2016/17 to 26.4% in 2017/18. Percentage of GERD spent on experimental development decreased from 25.5% in 2016/17 to 20.3% in 2017/18.

In terms of R&D personnel, the total headcount grew by 5.3%, from 80 029 in 2016/17 to 84 262 in 2017/18.

[t.ly/xILI](https://t.ly/xILI)

## Enhancing Analytical Depth and Usage of the R&D Datasets

In 2019/20, our researchers produced a number of analytical outputs on thematic topics such as patterns of business R&D expenditure, and R&D in the context of human development. These add to a growing collection of outputs aimed at shaping current policy-level discussions within government, business and civil society fora.



## Survey Digitalisation

The R&D Survey Management System (RDSMS), developed by the Council for Scientific and Industrial Research (CSIR) working in collaboration with CeSTII, is utilised for the management of the R&D Survey, including fieldwork information management, data capture, and extraction. In 2019/20, work on the RDSMS included routine system maintenance as well as training of CeSTII researchers working on the R&D Survey to utilise the RDSMS in line with CeSTII business processes. The R&D Survey team also experimented with mock-up questionnaires in the REDCap platform, as a basis for an initial exploration of potential data interoperability challenges in the use of the RDSMS and REDCap.



## THEME 2: MEASURING INNOVATION CAPACITY IN SOUTH AFRICAN FIRMS



**Dr Moses Sithole**  
Theme Leader

### Business Innovation Survey, 2014-2016

With the completion of Business Innovation Survey, 2014-2016 data collection in late 2018, a key focus in 2019/20 was analysis of data, report writing, and preparation for dissemination of results. Key accomplishments, during this period, included development of the statistical tables and metadata report, as well as the completion of the Survey's statistical quality control process. Based on the South African Statistical Quality Assessment Framework (SASQAF), data quality control includes presentation to and approval of results by a Clearance Committee.

### Agricultural Business Innovation Survey, 2016-2018

In 2019/20, the CeSTII team completed fieldwork for a baseline survey of innovation in agricultural businesses (also see *Annual Review Report 2018/19*). Using a combination of online survey technology and questionnaires submitted via email, response times were shortened and the manual data capture burden was eased considerably. Sectoral stakeholders, including government departments and industry associations, joined discussions with the CeSTII report team, to share ideas for the analysis of data.

**BUSINESS INNOVATION SURVEY 2014 - 2016**  
FOR A MORE INNOVATIVE SOUTH AFRICA

<https://sabizinnovationsurvey.blog/>

**SOUTH AFRICAN AGRICULTURAL BUSINESS INNOVATION SURVEY 2016 - 2018**  
INCLUDING FARMING, FORESTRY AND FISHERIES

This survey collects information on your firm's innovations and innovation activities between 2016 and 2018 inclusive.

**YOUR UNIQUE COMPANY ID\*** (required field):

**ADDRESS:** If your address has changed, please update here.

Designation: \_\_\_\_\_  
Company: \_\_\_\_\_  
Address 1: \_\_\_\_\_  
Address 2: \_\_\_\_\_  
Address 3: \_\_\_\_\_  
Postal code: \_\_\_\_\_

Logos: HSRC, STATS SA

**SUID-AFRIKAANSE OPNAME OOR LANDBOU- EN VISSERIJ-INNOVASIE 2016 - 2018**  
BOERDERY, BOSBOU EN DIE VISSERSBEDRYF INGESLUIT

Hierdie opname sameel inligting in oor u firma se innovasie- en innovasieaktiwiteite tussen 2016 en 2018, inklusief.

**U Unieke Maatskappy ID\*** (verpligte veld):

**ADRES:** Indien u adres verander het, word dit hier bygewerk.

Amptswaard: \_\_\_\_\_  
Maatskappy: \_\_\_\_\_  
Adres 1: \_\_\_\_\_  
Adres 2: \_\_\_\_\_  
Adres 3: \_\_\_\_\_  
Postkode: \_\_\_\_\_

Logos: HSRC, STATS SA

## Enhancing the Analysis and Usage of Innovation Data

The analysis of South Africa’s innovation survey data sets is a vital component of CeSTII’s analytical work. A first highlight in 2019/20 was the development and presentation of a paper on the effect of absorptive capacity on innovation, using 2010-2012 innovation survey data. This work was shared at an HSRC seminar

as well as during an international science policy conference in Atlanta, USA. A second highlight was collaborative work with **Dr Abiodun Egbetokun** from Nigeria’s National Centre for Technology Management (NACETEM) on two country comparative fact sheets on innovation in manufacturing and services.



Participants in Cape Town at the HSRC Seminar Series presentation by Dr Yasser Buchana and Dr Moses Sithole on 5 November 2019. The seminar was moderated by CeSTII’s Dr Nazeem Mustapha. [Image credit: G Ralphs/HSRC]

**INNOVATION DATA:**  
NIGERIA & SOUTH AFRICA AT A GLANCE

**SERVICES**

Nigeria and South Africa are Africa’s largest economies, with a combined GDP that rivals those of all other African nations together. However, GDP growth rates in both countries have stalled in recent years, and major societal ills persist. As middle-income economies that have made a transition from primary industry to services-based growth, Nigeria and South Africa’s innovation performance should concern policy-makers.

As this Fact Sheet illustrates, while services firms in both countries use training and technology acquisition as key innovation strategies to improve the quantity and quality of their value propositions, Nigerian and South African firms face critical financial and other barriers to innovation.

FACT SHEET

[t.ly/oHRx](https://t.ly/oHRx)

**INNOVATION DATA:**  
NIGERIA & SOUTH AFRICA AT A GLANCE

**MANUFACTURING**

Nigeria and South Africa are Africa’s largest economies, with a combined GDP that rivals those of all other African nations together. However, GDP growth rates in both countries have stalled in recent years, and major societal ills persist. As middle-income economies that have made a transition from primary industry to services-based growth, Nigeria and South Africa’s innovation performance should concern policy-makers.

As this Fact Sheet illustrates, while firms in both countries use technology acquisition as the key innovation strategy to improve the quantity and quality of their value propositions, Nigerian and South African firms face critical financial and other barriers to innovation.

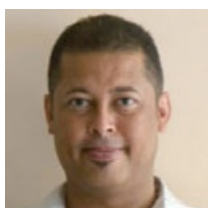
FACT SHEET

[t.ly/q837](https://t.ly/q837)





## THEME 3: NEW INDICATOR DEVELOPMENT



**Dr Nazeem Mustapha**  
Theme Leader

Our team produces cutting edge research on innovation in informal settings to inform the development of measures and indicators more suitable to the South African (and African) context, to complement our existing measures and indicators. Within this broad context, in 2019/20, CeSTII completed its work on a multi-site, funded project focussing on engagement and inclusive development. We also concluded the quantitative and qualitative data collection for our survey on innovation in the informal sector.

### **Engagement and Inclusive Development: Building the Interactive Capabilities of Universities and Science Councils**

Funded by the National Research Foundation's Community Engagement Programme (2017-2019), the project aimed to understand the conditions that facilitate and constrain 'communities' to work with universities, science councils, big science projects and other science institutions, and to use their knowledge resources to address their developmental needs. What capabilities do 'communities' require to seek out and use formal knowledge to innovate and improve their livelihoods? And how can 'we'—that is, universities, science institutions, government, civil society, community-based actors—support the building of such capabilities? The research attempted to go beyond exploring what exists, to build a picture of possibilities for engagement with more long-term benefit to the three local communities selected for the research: Carnarvon (Northern Cape), Philippi (Western Cape) and Cofimvaba (Eastern Cape).

The research process emphasised stakeholder engagement as a foundation, and ended in late 2019 with a set of stakeholder consultation meetings and interactive workshops, including photo-voice exhibitions.

Each event took the form of an interactive workshop that included panel discussions and presentations by academics and researchers, policymakers, NGO workers, formal and informal business owners, and other community-based actors. These workshops were designed to provide platforms for community-based actors to 'voice' their needs, opinions and experiences, and to put forward solutions.

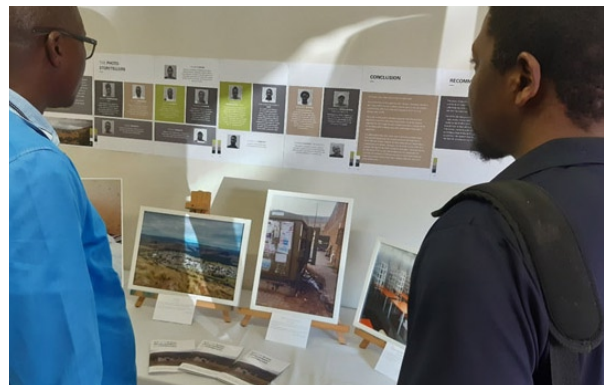


Boosting Carnarvon's hospitality sector: Role-players and opportunities, 4 November 2019 Kareeberg Library, Carnarvon, Northern Cape. [Image credit: HSRC]



Township Innovation Hubs: Opportunities for building local capabilities and opening up new trajectories, 14 November 2019, Solution Space Philippi, UCT Graduate School of Business. [Image credit: G. Ralphps/HSRC]

In 2019/20 the team also completed three case study reports reflecting on how universities and science institutes can contribute to building local capabilities, for production and innovation, to address development needs in their immediate surroundings. Working within a participatory research approach, the team co-produced a set of research outputs that included the photo-stories and specific recommendations of the community-based actors who participated in our photo-voice workshops. These booklets were distributed at the final project events held in November 2019. In each local setting, photo-voice exhibitions were handed over to a local stakeholder including the local library or school or township innovation hub where the photo-stories could continue to 'live'.



Enhancing the potential of ICT4D in the Eastern Cape: Role-players and opportunities, 26 November 2019, Radies BnB & Conference Centre, Cofimvaba, Eastern Cape. [Image credit: I. Petersen/HSRC]

 Research outputs and an in-depth description of the project is available via the project's web page: [t.ly/i0h1](https://t.ly/i0h1)



Xolisa Magawana won the 'Catalyst for Change' award at the 2019 Triple Helix International Conference, South Africa, 9-11 September 2019, based on a poster presentation co-authored with Il-haam Petersen. [Image credit: X. Magawana/HSRC]



Thelma Oppelt facilitated a session at the International Astronomical Union Symposia - Astronomy for Equity, Diversity and Inclusion, Japan, 12-15 November 2019, drawing on the Carnarvon photo-voice process. [Image credit: T. Petersen/HSRC]



Project leader, Il-haam Petersen, was invited to deliver a guest lecture at the launch of the University of the Free State's Common Good First Digital Storytelling lab, 10 May 2019, via Skype. [Image credit: D. Van Rooyen / UFS]



Participant at the photo-voice exhibition held on 14 November 2019 at Philippi Village. [Image credit: A. Erasmus/HSRC]

Contact the project's leader:  
**Dr Il-haam Petersen**  
 (ipetersen@hsrc.ac.za)



## Measuring Innovation in the Informal Sector

In 2019/20 CeSTII concluded fieldwork for its baseline survey in Mpumzuza (Sweetwaters), KwaZulu-Natal in collaboration with the HSRC's Centre for Community-based Research. Using cognitive testing and a set of workshops, the survey instrument was finalised and readied for administration. Locally employed fieldworkers were trained on cutting-edge digital technologies (REDCap) and data collection software (hand-held GPS devices). Fieldworkers collected data through face-to-face interviews with business owners, between April and July 2019.



Participants in the CeSTII digital storytelling workshop, held in Sweetwaters, KwaZulu-Natal in 2019. [Image credit: A. Erasmus/HSRC]

In May 2019, a digital storytelling workshop was hosted for 10 selected business owners in the Mpumzuza area. This was done in collaboration with **Rory Liedeman** of the Sustainable Livelihoods Foundation, over five days. The stories of seven informal business owners from Sweetwaters community showcased innovation and learning in the informal sector in a novel way, through the subjects' own illustrations and voices. The process created a space for bi-directional knowledge flows between the researchers and informal business owners, and the co-creation of understanding innovation suited to the local context.

In September and October 2019, the team conducted and concluded qualitative interviews with various stakeholders in the informal business value chain, as the basis for value chain mapping. Together with interviews with a range of stakeholders and digital storytelling, the project's fieldwork yielded a rich set of quantitative and qualitative data that the team has begun to analyse. Ultimately, the project will contribute new and essential evidence for policy-making on innovation in the informal sector.

Contact the project's leader:

**Dr Nazeem Mustapha**

(nmustapha@hsrc.ac.za)



In December 2019, the project team received an HSRC award for their collaboration with the HSRC's Centre for Community-based Research in Sweetwaters, which was key to completing the survey fieldwork on informal businesses in the local community. [Image credit: A. Erasmus/HSRC]



## Towards an Agenda for Measuring Innovation for Inclusive Development

Using international best practice models as a starting point, the CeSTII team has experimented with novel methodologies and digital technology to enable the inclusion of micro-enterprises at the local level and the collection of spatial data. In this way, CeSTII has developed new skills and expertise internally to respond to STI measurement challenges set out in the new White Paper on Science, Technology and Innovation. The Centre is also building expertise for conducting engaged research to ensure that our measures are suitable and to promote the participation of a wider range of stakeholders in the research process.

Within this context, the work of the CeSTII team is supported by strong collaborative linkages and, in 2019/20, the team collaborated internally with others in the HSRC and externally to broaden and deepen knowledge sharing and interactive learning. Considering the importance of the informal sector in sub-Saharan Africa, the team has begun to network and collaborate with other African countries in developing its work in the measurement of innovation in the informal sector.



# CONFERENCES & OUTPUTS

PRESENTER(S)	PAPER TITLE	CONFERENCE	DATE
Dr Il-haam Petersen	CO-LEARNING AND CO-CREATING USEFUL KNOWLEDGE WITH 'COMMUNITIES' IN MARGINALISED SETTINGS	2019 International SAHECEF Conference, Mbombela, Nelspruit	2-6 December 2019
Dr Glenda Kruss	KEYNOTE: THE ROLE OF UNIVERSITIES IN TRANSFORMATION AND SUSTAINABLE DEVELOPMENT IN AFRICA	4 <sup>th</sup> AfricaLics International Conference: Innovation and Transformative Capacities for Growth and Sustainable Development in Africa, Dar es Salaam, Tanzania	22-24 October 2019
Dr Glenda Kruss	TOWARDS AN INDICATOR OF R&D AND INCLUSIVE HUMAN DEVELOPMENT		
Dr Glenda Kruss	THE ROLE OF THE STATE IN SUPPORTING INNOVATION FOR INCLUSIVE TRANSFORMATION		
Dr Glenda Kruss	TRANSFORMATIVE INNOVATION POLICY		
Dr Kgabo Ramoroka, Dr Glenda Kruss & Dr Nazeem Mustapha	TOWARDS A MEASUREMENT PROGRAMME FOR INNOVATION TO SERVE THE DEVELOPMENTAL NEEDS OF SUB-SAHARAN AFRICA		
Dr Kgabo Ramoroka	THE PATTERNS OF INNOVATION PROCESS BY THE RURAL BASED ENTERPRISES: MAPPING RURAL INNOVATION VALUE CHAINS IN RURAL SOUTH AFRICA		
Dr Kgabo Ramoroka	STI: UNIVERSITY PERSPECTIVES		
Dr Kgabo Ramoroka	AGRICULTURAL INNOVATION SYSTEMS: IDENTIFYING INCLUSIVE AGRICULTURAL INNOVATION CONFIGURATIONS FOR GROWTH AND SUSTAINABLE DEVELOPMENT		
Dr Yasser Buchana (Post-doctoral Fellow)	EXPLORING THE INFLUENCE OF ABSORPTIVE CAPACITY OF NON-R&D INTENSIVE FIRMS ON INNOVATION PERFORMANCE: A SECTORAL ANALYSIS OF SOUTH AFRICAN MANUFACTURING AND SERVICES FIRMS	Atlanta Conference on Science and Innovation Policy, Georgia Tech Global Learning Centre, US	14-16 October 2019
Dr Yasser Buchana (Post-doctoral Fellow) & Dr Alexis Habiyaemye	CO-LEARNING AND INNOVATION DIFFUSION IN SOUTH AFRICAN UNIVERSITY COMMUNITY ENGAGEMENT PROJECTS		

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PRESENTER(S)	PAPER TITLE	CONFERENCE	DATE
Xolisa Magawana (PhD Intern) and Dr Il-Haam Petersen	INNOVATION IN THE GLOBAL SOUTH: UNDERSTANDING INNOVATION IN THE INFORMAL SECTOR USING A PARTICIPATORY RESEARCH METHODOLOGY		
Dr Glenda Kruss	FOURTH INDUSTRIAL REVOLUTION: WHOSE OPPORTUNITY? WHOSE THREAT?		
Dr Nazeem Mustapha & Gerard Ralphs	EFFECTIVENESS OF TECHNOLOGY TRANSFER IN PUBLIC RESEARCH INSTITUTIONS IN SOUTH AFRICA: A REVIEW OF NATIONAL SURVEY DATA USING THE REVISED CONTINGENT EFFECTIVENESS MODEL, AND IMPLICATIONS FOR FUTURE MEASUREMENT		
Dr Nazeem Mustapha, Dr Il-Haam Petersen & Dr Glenda Kruss	TOWARDS A MEASUREMENT PROGRAMME OF INNOVATION IN THE INFORMAL SECTOR IN AFRICA		
Dr Kgabo Ramoroka	RURAL AND AGRICULTURAL INNOVATION: AN ACTOR NETWORK PERSPECTIVE	Wits Business School Colloquium, Innovation for Social Purposes	5-7 October 2019
Xolisa Magawana (PhD Intern)	UNDERSTANDING HOW INNOVATION IS DEFINED IN THE INFORMAL SECTOR USING A PARTICIPATORY RESEARCH METHODOLOGY	Triple Helix Association International Conference, Cape Town	9-11 September 2019
Dr Yasser Buchana (Post-doctoral Fellow)	INNOVATION COLLABORATION MECHANISMS ENABLING INNOVATION PERFORMANCE IN A TRIPLE HELIX REGIONAL INNOVATION ECOSYSTEM: EVIDENCE FROM SOUTH AFRICA		
Dr Il-Haam Petersen	A CASE STUDY OF AN INNOVATION HUB SERVING SOME OF THE LARGEST TOWNSHIPS IN SOUTH AFRICA: INSIGHTS GAINED THROUGH PARTICIPATORY VISUAL METHODS		
Dr Glenda Kruss	TOWARDS NEW INDICATORS: MEASURING UNIVERSITIES' INTERACTION WITH EXTERNAL PARTNERS IN SOUTH AFRICA		

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PRESENTER(S)	PAPER TITLE	CONFERENCE	DATE
Dr Glenda Kruss	CATCHING UP, FALLING BEHIND: THE NEED TO BUILD UPGRADING COALITIONS FOR INNOVATION AND INCLUSIVE DEVELOPMENT IN SOUTH AFRICA	Workshop on Development Lock-ins, Traps and Catch-up: India, China, South Africa, South Korea and Latin America, Federal University of Minas Gerais, Belo Horizonte, Brazil	8-10 July 2019
Dr Glenda Kruss	SOCIAL INNOVATION INDICATORS IN SA: CHALLENGES AND ADVANCES	BRICS Policy Centre, Rio de Janeiro, Brazil	4 July 2019
Dr Glenda Kruss	MEASURING STI FOR INCLUSIVE AND SUSTAINABLE DEVELOPMENT IN SOUTH AFRICA	STI Measurement Seminar, REDESIST, Federal University of Rio de Janeiro, Brazil	2 July 2019
Theodore Sass, Nhlanhla Malaza (Master's Intern), Nozibele Gcora (PhD Intern), Dr Neo Molotja & Thembinkosi Zulu (Master's Intern)	R&D IN THE BUSINESS SECTOR	Trade & Industry Policy Strategies Forum: Innovation and Industrialisation, Johannesburg, South Africa	30-31 May 2019



Dr Glenda Kruss (HSRC) with Dr Ann Kingiri from the African Centre for Science and Technology Studies. [Image credit: G. Kruss/HSRC]



L-R: Dr Alexis Habiya (HSRC), Prof. Abdelkader Djeflat (AfricaLics Board Member), Dr Peter Taylor (HSRC) and Dr Glenda Kruss (HSRC). [Image credit: G. Kruss/HSRC]



The 4th AfricaLics International Conference took place at the University of Dar es Salaam, Tanzania, from 22-24 September 2019. [Image credit: G. Kruss/HSRC]



# HSRC SEMINAR SERIES 2019/20

The Human Sciences Research Council's seminar series is a key dissemination channel for HSRC research to reach target audiences in South Africa and beyond. Each programme of the HSRC contributes to the series by showcasing results of research at various points within the research cycle.

invitation

HSRC Seminar series in collaboration with The World Bank

## Envisaging skilled futures for South African youth

**Opening remarks:**  
 Paul Nomba Um, World Bank Country Director for South Africa, Namibia, Lesotho, Botswana, Swaziland, Zambia and Zimbabwe

**Presenters:**  
 Aleksandra Posarac, World Bank  
*The World Bank Human Capital Index as a tool for understanding the challenges*

Mike Rogan, Neil Aggett, Labour Studies Unit (NALSU), Rhodes University  
*What does new research tell us about young peoples' transitions to the workplace?*

Angelique Wildschut, National Student Financial Aid Scheme (NSFAS)  
*The changing nature of work and the demand for skills*

**Respondents:**  
 Tashmia Ismail-Saville, Youth Employment Services  
 Hersheela Narsee, Department of Higher Education

**Moderator:**  
 Dr Glenda Kruss, Centre for Science, Technology and Innovation Indicators (CeSTII) programme, HSRC

**Date:** Tuesday, 18 June 2019  
**Time:** 12h00 - 15:00  
**Venues:** Video conference in Pretoria, Cape Town and Durban | Livestream via Vidyo

Youth unemployment is a growing global phenomenon, but in South Africa, 55% of youth are likely to be unemployed. To shift these conditions requires coordinated action on multiple fronts. The dialogue aims to ignite a conversation to inform new strategies. It draws on recent research efforts to stimulate discussion. The HSRC has recently published two studies: the first focuses on how training and education play critical roles in helping young people escape poverty and unemployment; and the second, on how actors in the education field respond to the changing skills demands of the future. At the same time, the World Bank has undertaken a benchmarking exercise with a Human Capital Index, which quantifies the contribution of health and education to the productivity of the next generation of workers. For South Africa, it shows a significant gap between years spent in school and actual learning outcomes.

Three questions will guide the dialogue discussion:

- What is the amount of human capital that a child born today can expect to attain by age 18, given the risks of poor health and poor education that prevail in the country?
- How can we improve young people's transitions through post-school education and training, and into the labor market?
- What kind of skills planning, and development do we need for the future of South African youth?

**Kindly RSVP by 17 June 2019**

**Pretoria:** HSRC Video Conference Room, 3<sup>rd</sup> floor HSRC Library, 134 Pretorius Street, Pretoria.  
 Contact: Arlene Grossberg | T: (012) 802 2811 | E: agrossberg@hsrc.ac.za

**Cape Town:** HSRC Video Conference Room, Merchant House 116-118 Buitengracht Street, Cape Town.  
 Contact: Sharmeen Khan | T: (021) 466 7948 | E: skhan@hsrc.ac.za

**Durban:** HSRC Video Conference Room, The Atrium, 5<sup>th</sup> Floor, 430 Peter Mokaba Ridge, Berea, 4001.  
 Contact: Rdhwaan Khan | T: (031) 242 5400 | C: 083 788 2786 | E: Rkhan@hsrc.ac.za

The HSRC seminar series is funded by the Department of Science and Technology (DST). The views and opinions expressed therein as well as findings and statements of the seminar series do not necessarily represent the views of the DST.

[Vidyo Link: https://hsrc-vc.tenet.ac.za/R/ea.html?roomdirect.html&key=GGKDXI.hisDm5Mipk7fF3qU8](https://hsrc-vc.tenet.ac.za/R/ea.html?roomdirect.html&key=GGKDXI.hisDm5Mipk7fF3qU8)

Social science that makes a difference

## The influence of absorptive capacity of non-R&D intensive firms on innovation in South African manufacturing and services firms

**Date:** 5 November 2019  
**Time:** 12h30 – 14h00  
**Venues:** Video conference in Pretoria, Cape Town and KwaZulu-Natal Livestream by Vidyo

**Presenters:** Dr Yasser Buchana, Centre for Science, Technology and Innovation Indicators and Dr Moses Sithole, Research Director, Centre for Science, Technology and Innovation Indicators

**Chair:** Dr Nazeem Mustapha, Chief Research Specialist, Centre for Science, Technology and Innovation Indicators

Non-R&D intensive firms are firms that lack substantial investments in research and experimental development (R&D). The majority of firms in South Africa are in low-tech sectors, and do not use internal R&D as an innovation strategy. While more than 50% of firms report successful innovation outcomes, a large majority of these firms only invest less than 3% of their total sales back into intramural R&D. In developing countries, it is well-established that non-R&D intensive firms have played vital roles in sector value chains, contributing to economic growth and development.

Also well-established is that R&D intensive firms tend to possess significant stock of cumulative knowledge resulting from their R&D investments and, as a result, are more likely to have a higher absorptive capacity, benefiting their innovation capabilities. The ability to absorb, assimilate and replicate new knowledge acquired from external sources—also known as absorptive capacity—has become essential for firms to innovate. How firms acquire and assimilate external sources of knowledge to innovate is therefore a key empirical question.

This seminar reports on an econometric study using South African innovation data from CIS-type surveys to explore how absorptive capacity enables non-R&D intensive firms to produce successful innovation outcomes. In a context of declining expenditure on R&D in the business sector, this seminar will also surface policy questions for discussion with the target audience of economists, science and innovation policy stakeholders, and private sector actors, including industry associations.



**Kindly RSVP by 4 November 2019**

**Pretoria:** HSRC Video Conference Room, 3<sup>rd</sup> floor HSRC Library, 134 Pretorius Street, Pretoria.  
 Contact: Arlene Grossberg | T: (012) 802 2811 | E: agrossberg@hsrc.ac.za

**Cape Town:** HSRC Video Conference Room, Merchant House 116-118 Buitengracht Street, Cape Town.  
 Contact: Sharmeen Khan | T: (021) 466 7948 | E: skhan@hsrc.ac.za

**Durban:** HSRC Video Conference Room, The Atrium, 5<sup>th</sup> Floor, 430 Peter Mokaba Ridge, Berea, 4001.  
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[Vidyo Link: https://hsrc-vc.tenet.ac.za/R/ea.html?roomdirect.html&key=GGKDXI.hisDm5Mipk7fF3qU8](https://hsrc-vc.tenet.ac.za/R/ea.html?roomdirect.html&key=GGKDXI.hisDm5Mipk7fF3qU8)

Social science that makes a difference

## Envisaging skilled futures for South African youth – 18 June 2019

Presented by **Aleksandra Posarac**, World Bank, **Mike Rogan**, the Neil Aggett Labour Studies Unit (NALSU), Rhodes University, and **Angelique Wildschut**, National Student Financial Aid Scheme (NSFAS). Moderated by **Dr Glenda Kruss**, Deputy-Executive Director, CeSTII.

## The influence of absorptive capacity of non-R&D intensive firms on innovation in South African manufacturing and services firms – 5 November 2019

Presented by **Dr Yasser Buchana**, Post-Doctoral Fellow, CeSTII, and **Dr Moses Sithole**, Research Director, CeSTII.

# COLLABORATION & NETWORKS

The Centre for Science, Technology and Innovation Indicators interacted with a range of collaborators in the 2018/19 financial year. Our networks help us to deliver on our goals more efficiently and effectively. As a public research centre, we also want to share our expertise nationally, regionally and globally.

## AFRICAN RESEARCH AGENDA

### Supporting SADC STI Measurement Capacity



Dr Neo Molotja, Senior Research Specialist, has worked on the South African R&D Survey since the early 2000s. [Image credit: G. Ralphs/HSRC]

By invitation from the Department of Science and Innovation and the SADC Secretariat, CeSTII's **Dr Neo Molotja** and **Gerard Ralphs** presented lessons from South African STI measurement at a workshop for a group of SADC parliamentarians visiting South Africa in December 2019. Discussions with the parliamentarians were robust, including aspects of gender and STI as well as the challenges of running STI surveys.

In early 2020, **Dr Moses Sithole** and **Dr Glenda Kruss** delivered a training workshop on innovation measurement and indicators. The event was co-organised in terms of the partnership between CeSTII and Namibia's National Centre for Research, Science and Technology (NCRST).

## VISITING RESEARCHER

### Dr Abiodun Egbetokun, National Centre for Technology Management, Nigeria



CeSTII hosted Dr Abiodun Egbetokun of Nigeria's National Centre for Technology Management in May 2019. His research focuses on understanding the microeconomic factors that shape the emergence, evolution and economic impact of entrepreneurship and innovation [Image credit: A. Egbetokun]

Within the framework of the CeSTII-NACETEM memorandum of understanding, **Dr Abiodun Egbetokun** (Head of the Science Policy and Innovation Studies Department at the National Centre for Technology Management, Nigeria) spent the month of May 2019 at CeSTII. The fellowship was funded by the International Academies Programme (IAP). During this time, Dr Egbetokun worked with CeSTII staff on joint publications and other analytical outputs, including a set of comparative fact sheets on innovation data from South African and Nigerian surveys. Fact sheets are available on the CeSTII LinkedIn page and on the Business Innovation Survey blog.

 [t.ly/IVQx](https://t.ly/IVQx)

## HIGH-LEVEL FORA

### Public Lecture at Brazil's BRICS Policy Centre

A joint initiative of the City of Rio de Janeiro and the Pontifical Catholic University of Rio de Janeiro, hosted in collaboration with the BRICS Policy Centre, **Dr Glenda Kruss** delivered a public lecture in Rio de Janeiro, Brazil. The lecture, which took place on 4 July 2019, was entitled 'Social Innovation Indicators in South Africa: Challenges and Advances'.



[Image credit: BRICS Policy Centre/YouTube]

 A livestream recording can be viewed at [t.ly/20gc](https://t.ly/20gc)

DIALOGUES & CONSULTATIONS	DATE	CITY, COUNTRY	ATTENDED BY
Science Forum South Africa	4-6 December 2019	Pretoria, South Africa	Dr Neo Molotja Gerard Ralphs Stevens Mocheki Nhlanhla Malaza Anele Slater
SADC STI Systems Capacity Building Workshop	4 December 2019	Pretoria, South Africa	Dr Neo Molotja Gerard Ralphs
University of Johannesburg Policy Colloquium on Innovation and Inclusive Industrialisation	28-29 November 2019	Pretoria, South Africa	Gerard Ralphs
CREST/SciSTIP Seminar: Inclusive Innovation and Frugal Innovation in Africa	12 November 2019	Stellenbosch, South Africa	Dr Nazeem Mustapha
Learning Forum on Municipal Innovation & Maturity Index (MIMI)	24 October 2019	Cape Town, South Africa	Nicole Van Rheede
Transformative Innovation Policy Consortium Workshop	21-25 October 2019	Pretoria, South Africa	Dr Nazeem Mustapha
Policy Forum: Is the Western Cape Establishing a Regional Culture of Innovation Conducive to the Needs of Business?	10 September 2019	Cape Town, South Africa	Dr Glenda Kruss Dr Moses Sithole Dr Nazeem Mustapha Gerard Ralphs Dr Il-haam Petersen
Envisaging Skilled Futures for South African Youth	18 June 2019	Cape Town & Pretoria, South Africa	Dr Glenda Kruss
Journey Through Transformative Innovation Policy: Experimentation, Evaluation, Research and Capability Building	20-24 May 2019	Sussex, UK	Dr Il-haam Petersen

## KEY STAKEHOLDERS

STAKEHOLDER ORGANISATION	HOW CeSTII ENGAGES
<b>CORE PARTNERS</b>	
Department of Science and Innovation	<ul style="list-style-type: none"> <li>Work closely at the research-policy nexus to conduct the annual R&amp;D survey and bi-annual innovation survey and the production of official STI statistics in partnership with Statistics South Africa, the OECD and NESTI.</li> </ul>
National Advisory Council on Innovation	<ul style="list-style-type: none"> <li>Collaboration on research and advocacy, hosting the NACI indicators provincial roadshow, as well as a standing arrangement for regular data and outputs sharing, to contribute to the creation of a national STI portal.</li> </ul>
Statistics South Africa	<ul style="list-style-type: none"> <li>Ensuring compliance with SA Statistical Quality Framework through the R&amp;D Survey Clearance Committee, and provision of the Business Register and survey sample for the surveys and associated methodological support.</li> </ul>
<b>REGIONAL PARTNERSHIPS</b>	
African Union-NEPAD National Planning Commission	<ul style="list-style-type: none"> <li>Collaboration with the ASTII programme to provide training on STI indicators and in the writing of the African Innovation Outlook. Training network includes partnership with the African Observatory on Science, Technology and Innovation, and the UN Institute of Statistics.</li> <li>Provision of national R&amp;D and innovation data and indicators according to required templates.</li> </ul>
Southern African Development Community SADC Secretariat	<ul style="list-style-type: none"> <li>Technical expert advisers on the implementation of science, technology and innovation policies and indicators in the region.</li> </ul>
NACETEM, Nigeria	<ul style="list-style-type: none"> <li>Share expertise and co-author comparative papers on R&amp;D and innovation in SA and Nigeria.</li> </ul>
NCRST, Namibia	<ul style="list-style-type: none"> <li>Training, share expertise and co-author comparative papers on R&amp;D and innovation in SA and Namibia.</li> </ul>
<b>GLOBAL PARTNERSHIPS</b>	
OECD/NESTI	<ul style="list-style-type: none"> <li>Provision of national R&amp;D and innovation data and indicators according to required templates.</li> <li>Participation in discussions to revise and implement changes to Frascati and Oslo manuals.</li> </ul>
UNESCO	<ul style="list-style-type: none"> <li>Provision of national R&amp;D and innovation data and indicators according to required templates.</li> </ul>
REDESIST, Federal University of Rio de Janeiro, Brazil	<ul style="list-style-type: none"> <li>Research collaboration on local innovation and production systems, and innovation measurement.</li> </ul>

*Continues overleaf..*

STAKEHOLDER ORGANISATION	HOW CeSTII ENGAGES
<b>PROJECT-BASED COLLABORATIONS</b>	
Science Councils (Medical Research Council, Council for Scientific and Industrial Research and Agricultural Research Council)	<ul style="list-style-type: none"> <li>• Share expertise and co-author analytical papers drawing on R&amp;D and innovation datasets to address new questions.</li> </ul>
Bertha Centre in the Graduate School of Business at UCT	<ul style="list-style-type: none"> <li>• Collaboration on NRF project and training of master's students in social innovation.</li> </ul>
South African Higher Education Community Engagement Forum	<ul style="list-style-type: none"> <li>• Advocacy partner on NRF project, around community engagement, innovation and inclusive development.</li> </ul>
BRICS Research Centre, HSRC	<ul style="list-style-type: none"> <li>• Provision of national R&amp;D and innovation data and indicators according to required templates.</li> </ul>
Business Unity South Africa	<ul style="list-style-type: none"> <li>• Advocacy partner on BIS and R&amp;D surveys / STI measurement.</li> </ul>
Sustainable Livelihoods Foundation	<ul style="list-style-type: none"> <li>• Assist with digital storytelling, photo voice and place-based methodologies</li> </ul>
Trade and Industrial Policy Strategies	<ul style="list-style-type: none"> <li>• Green R&amp;D data and analysis.</li> </ul>
Transformative Innovation Policy Consortium	<ul style="list-style-type: none"> <li>• Evaluation of policy experiments in South Africa.</li> </ul>





# FEATURE: SHOWCASING THE 2019 SOUTH AFRICAN SCIENCE, TECHNOLOGY AND INNOVATION INDICATORS REPORT



Africa's first high tech film studio has recruited talented workers from surrounding low-income communities. [Image credit: Cape Town Film Studios]

In September 2019, the Centre for Science, Technology and Innovation Indicators worked closely with the Western Cape Provincial Government to convene a policy forum at InvestSA in Cape Town to discuss the results of the National Advisory Council on Innovation (NACI) annual STI indicators report. Adopting a provincial outlook, thought leaders from the private sector and decision-makers from the public sector gathered to discuss some of the key challenges for innovation in the Western Cape.

*By Dylan Kesler\**

In support of NACI's annual roadshow of dissemination events, CeSTII teamed with the Western Cape Provincial Government (WCPG) to explore national innovation data in the context of the regional system. Thematically, the 2014-2019 Western Cape Provincial Strategic Plan identified innovation as a key goal for development and, as such, the forum addressed a key evaluation question: Is the Western Cape establishing a regional culture of innovation conducive to the needs of business?

### A changing role for innovation

In setting the scene for the event, **Dr Mlungisi Cele**, NACI's acting chief executive officer, noted that the Western Cape is home to some of Africa's top universities. As a sprawling hub for research and development (R&D), the Western Cape attracts some of the top talent in the country and in the continent. This advantage in terms of brain power, institutional capacity and expertise served as an investment in facilitating a culture of innovation in the province, he argued.



Dr Mlungisi Cele provided a welcome address. [Image credit: S. Mocheki/HSRC]

Senior specialist in science and technology indicators at NACI, **Dr Petrus Letaba**, provided an expansive overview of NACI's 2019 STI indicators report. The Western Cape is second to Gauteng in their contribution to R&D expenditure nationally, at 23.3% of gross domestic expenditure on R&D, reported Letaba. He also addressed how, beyond economic growth, analysis of innovation is becoming increasingly orientated to addressing human and social challenges:

“ From the policy point of view, globally, the conversation is shifting, even locally in South Africa, to say, we now need to appreciate that improvement of quality of life and well-being are as important as wealth creation and economic growth. We need to establish the nature of the relationship between innovation and improved quality of life and well-being.”

– Dr Petrus Letaba

### Progress and stumbling blocks for business

The first of two panel discussions was arranged to highlight critical needs in the Western Cape provincial innovation system. Facilitated by **Tim Harris**, CEO of Wesgro, a panel of five trailblazers in the Western Cape's private sector reflected on the enablers and constraints regarding innovation in the province.

#### BUSINESS PANELLISTS

- Clive Charlton** – Amazon Web Services
- Ryan Ravens** – CEO, Accelerate Cape Town
- Hein Koen** – Co-founder, Flickswitch
- Francois Malan** – Savant Fund Manager
- Nico Dekker** – CEO, Cape Town Film Studios



Business panellists and facilitator, Tim Harris. [Image credit: S. Mocheki/HSRC]



The speakers highlighted the wealth of talent available in the Western Cape and how universities help business innovation. For example, **Clive Charlton** from Amazon Web Services remarked that it was the local talent in the Western Cape that established a home for the company.

“ I was thinking about why Amazon Web Services started here [in Cape Town] and why we’ve stayed here and continued to grow... First of all, the talent is **here**. ”  
– Clive Charlton

Similarly, chief executive officer of Cape Town Film Studios, **Nico Dekker**, reflected on how experts suggested that the company should employ specialists and scientists from Germany, France, England and the United States to custom-build the first high-tech studio on African soil. However, believing in latent local potential, the Studios recruited eager workers from low-income areas such as Khayelitsha, Eerste Rivier, Macassar and Blue Downs to carry out highly specialised set-building and production projects.

“ The studio itself had a very tough start... Today, those same countries are asking us, sometimes, for a bit of advice on certain things... The creative ability of our people is strong but it does need a different mindset. ”  
– Nico Dekker

Panellists stressed that unemployment and employability remain critical issues for businesses nationwide. Equally, the era of automation and artificial intelligence, termed the Fourth Industrial Revolution (4IR), is transforming the economy. Indeed, business is faster and more sophisticated than ever before.

“ With the world and consumer behaviour changing so rapidly, the lack of innovation and understanding and ability to adapt by our corporates is becoming a significant challenge. ”

– Ryan Ravens

**Francois Malan**, investment fund manager at Savant, stressed the value of nurturing innovation opportunities in their early stages of development:

“ Many people say that there are not enough opportunities, or that the opportunities available are not investable... If you spend time developing those opportunities, they do become fundable opportunities at a later stage, but it takes time and effort to grow them into that. ”

– Francois Malan

These rapid changes are of critical importance, given that the local economy already suffers from high unemployment.

## Role(s) for government?

Featuring government officials, a second panel explored what is being done, both provincially and at city-level, to build regional innovation systems. This panel was facilitated by CeSTII Executive Head, **Dr Glenda Kruss**.

### LOCAL AND PROVINCIAL GOVERNMENT PANELLISTS

**Tristan Görgens** – Acting Director for Human Development: Policy & Strategy Unit, Department of the Premier

**Olivia Dyers** – Director, Digital Economy, Department of Economic Development and Tourism

**Bridgette Morris** – Manager: Innovation & Operational Effectiveness, City of Cape Town



Government panellists and facilitator, Dr Glenda Kruss. [Image credit: S. Mocheki/HSRC]

Government panellists spoke about the importance of understanding the business ecosystem and working within it. A consensus view among panellists was that the role of government is to enable infrastructure as a mechanism to stimulate and support innovation.

A key struggle faced by smaller departments, as explained by Olivia Dyers from the WCPG's Department of Economic Development and Tourism, was that budgets are small and there remain key skills gaps. In this context, she argued, the key to success is collaboration.

“ In order to scale and reach impact we have to collaborate... We have to be innovative.”

– Olivia Dyers

A concern shared by both panels, however, is the effect of the 4IR on the jobs and livelihoods of millions of South Africans. However, with help from both the private and public sectors, the wealth of talent in the Western Cape has the potential to shake up the economy and bring great returns on investment.

“ Innovation is the most important thing, in my view, to save this economy.”

– Dr Pieter van Heyningen

## Way forward

In his closing remarks, **Prof. Crain Soudien**, CEO of the HSRC, reflected on the challenges faced in the Western Cape through a national lens. He said:

“ We are confronted with the real challenges of how you build a democracy. How you make a space like this a space in which all of us can live as full citizens in full equality. It's an extraordinary challenge. This is what this exercise is all about... How do we come to develop a future here in which all of our people can feel a sense of not only belonging, but also commitment?”

– Prof. Crain Soudien

Businesses and government do not exist in separate vacuums. By bringing leaders from both the private and public sectors to the table, this event highlighted the importance of collaboration and partnership – that working together is essential for innovation, and innovation is essential for progress and a better future for the Western Cape.



Prof. Crain Soudien delivered closing remarks. [Image credit: S. Mocheki/HSRC]

\* Dylan Kesler, a CeSTII intern in 2020, is a BSocSc(PPE) graduate from the University of Cape Town.

# CeSTII IN THE MEDIA

The Centre for Science, Technology and Innovation Indicators works actively to promote its research through a dedicated outreach strategy. We respond to calls from the media for comment, but also position our research findings for public consumption through opinion editorials.

HEADLINE	DATE	PUBLICATION	LINK (WHERE AVAILABLE)
SA's spend on R&D on the rise, but slowly	22 November 2019	Sunday World	<a href="https://t.ly/qvzO">t.ly/qvzO</a>
SA's R&D expenditure climbs to R38bn	4 November 2019	ITWeb	<a href="https://t.ly/8po0">t.ly/8po0</a>
South Africa announces intermediate R&D spending target	26 September 2019	Research Professional	<a href="https://t.ly/lgU8">t.ly/lgU8</a>
Digital Storytelling (DST) and training with HSRC-CeSTII, KZN	27 June 2019	Sustainable Livelihoods Foundation	<a href="https://t.ly/4u5l">t.ly/4u5l</a>
Informal sector will harness tech potential	6 April 2019	IOL	<a href="https://t.ly/J3RP">t.ly/J3RP</a>

# OUR STAFF

## CAPACITY ENHANCEMENT

Training of CeSTII staff is a key component of our core business and integral to the broader HSRC mandate. The HSRC's Master's and PhD internship programme aims to provide an environment in which trainees can receive the necessary support to ensure that they are well capacitated for their professional and career growth, as researchers in the South African national system of innovation.

### CeSTII Trainees in 2019/20

- **Yasser Buchana**, Post-doctoral Fellow, completed a PhD Degree at University of Cape Town in 2018
- **Nhlanhla Malaza**, Master's Intern, completed a Master's Degree at University of KwaZulu-Natal in 2019
- **Anele Slater**, Master's Intern, completed a Master's Degree at Wits Business School in 2019
- **Xolisa Magawana**, PhD Intern, enrolled for a PhD Degree at University of South Africa
- **Nicole van Rheede**, PhD Intern, enrolled for a PhD Degree at the University of Cape Town
- **Nozibele Gcora**, PhD Intern, enrolled for a PhD Degree at the University of Cape Town
- **Juliet Mokoelle**, Master's Intern, enrolled for a Master's Degree at Stellenbosch University
- **Viwe Sigenu**, Master's Intern, enrolled for a Master's Degree at Stellenbosch University

### DST/NRF Intern

- **Stevens Mocheki**

## CeSTII 2019 TEAM AWAY DAY

The CeSTII team gathered in December 2019 at the Green Point Urban Park, Cape Town, for a joint strategic planning session and end-of-year celebration.



[Image credit: G. Ralphs/HSRC]

## CeSTII WINS HSRC AWARDS

The CeSTII team bagged a number of awards at the 2019 HSRC Awards ceremony, including:

- **Dr Glenda Kruss**, HSRC CEO Award
- **Maria Maluleke** and **Vuyiseka Mpikwa**, Service Excellence Awards
- **Dr Nazeem Mustapha**, **Dr Il-haam Petersen**, **Xolisa Magawana**, **Nicole van Rheede** and **Juliet Mokoelle**, Ubuntu Teamwork Award



Dr Glenda Kruss receives the HSRC CEO Award. [Image credit: A. Erasmus/HSRC]



Nicole van Rheede and Juliet Mokoelle of the CeSTII team worked on the measurement of innovation in the informal sector. [Image credit: A. Erasmus/HSRC]

## GETTING TO KNOW CeSTII'S RESEARCH DIRECTOR



In December 2018, **Dr Moses M. Sithole** was appointed to the role of Research Director within the Centre for Science, Technology and Innovation Indicators. In this interview, he reflects on his career progression and current responsibilities.

### **You are a mathematical statistician by training. How did you arrive at this combination of expertise? How does this training help you to perform the role of CeSTII Research Director?**

I discovered at an early age not only that I loved mathematics, but I was also very good at it. I leveraged this by turning mathematics into one of my hobbies, and this drove me to always play with mathematically-inclined objects, read similar material, as well as think of mathematical ideas while sitting down, walking, or laying down to take a rest. Some of these ideas continue to invade my brain in the form of dreams while I sleep!

When I got to high school, I thought I wanted to be a pilot, and shared this dream with my then mathematics teacher David Gordon (now Bioinformatics Specialist at the University of Washington). He frankly told me that I would be wasting my 'mathematical talent' if I did not pursue the subject further. I listened to this advice and pursued mathematics and later statistics at university in Swaziland, Australia and the UK. During my first job as a biometrician at the Agricultural Faculty of the University of Swaziland, I was required to further my tertiary studies in statistics. I chose mathematical statistics, as I had a very strong mathematical orientation and hence wanted to simultaneously enjoy both subjects. Indeed, my mathematics training helps me better understand the theoretical foundations of statistics and why statistical data behaves in a certain way.

Within CeSTII, I use my mathematical statistics skills to understand patterns and trends of data as well as study and understand relationships between science, technology and innovation (STI) indicators and characteristics of enterprises, not-for-profit organisations, government departments and public institutions, to generate policy-relevant research outputs. This is

particularly helpful in providing academic leadership in my role as CeSTII Research Director.

### **How does a typical day in office unfold for you?**

My role as Research Director requires that I provide academic leadership in CeSTII through projects, publications, capacity building, and fundraising. It also requires that I provide management support to my teams.

My typical day actually starts the night before with a review of my calendar diary, to incorporate meetings or seminars into a plan. At the start of the day, I call each colleague under my line management, to review progress on their work, get an idea of their work for the day, and find out how I can assist them with their work and well-being. Each of the projects I oversee have weekly meetings to review progress and plan the way forward. I then sit down and execute the remaining activities in my daily plan. This includes guiding project teams in executing projects/surveys, and also writing client reports, research briefs, policy briefs, fact sheets and journal articles. I particularly support the CeSTII Executive Head to build writing skills for junior colleagues within CeSTII. At the end of the week, each of the colleagues under my line management completes a weekly progress report on activity to compile into a single report.

### **How do you manage to publish research, present at conferences, and direct the research of CeSTII?**

I normally reserve late afternoons when everything is quiet to write in a calm environment. In some cases, I brainstorm with a particular mentee or co-author with



whom I am writing. In other cases, I add my comments on written work for the author or co-author to consider.

As I write, I look for gaps (including small gaps) in the literature, which my ideas will hopefully fill. I also constantly seek suitable journals interested in topical discussions and debates in the literature into which the research problems I am trying to solve or address best fit. Then I target those journals to submit my articles. I plan my publications by building a publication pipeline, with one or two publications at the drafting stage, while others have been submitted to journals and others are getting published.

### **South Africa's measurement of science, technology and innovation (STI) has grown in scale and scope since the early 1990s. Looking ahead, what is your vision for STI measurement in South Africa and Africa?**

In 2015, the late Kofi Annan said "governing without data is like driving without a dashboard". There is abundant evidence, particularly in OECD and other developed countries, that STI significantly contributes to economic development. These countries have monitored their progress in this regard since the 1960s, by measuring their investments in R&D and innovation using the Frascati and Oslo manuals, respectively.

South Africa has done the same, and started measuring its R&D investment in the 1960s and business innovation from the 1990s. The African Union and its New Partnership for Africa's Development (NEPAD) through its African Science, Technology and Innovation Indicators (ASTII) initiative began supporting and coordinating the measurement of R&D and business innovation in Africa during the 2000s, starting with 19 participating member states including South Africa. The data are compiled and published in the *African Innovation Outlook*, with the third and latest edition published in 2019. Given the changes in STI over time, such as the advancement and increased use of digital technologies, its measurement must also change, to be aligned to the new technologies for the corresponding data to correctly depict the STI landscape. For this reason, the OECD has periodically revised the so-called Frascati and Oslo manuals over the years, with the seventh and latest edition of the *Frascati Manual* published in 2015, and the fourth



[Image credit: S. Khan/HSRC]

and latest edition of the *Oslo Manual* published in 2018. Therefore, looking into the future, I see the measurement of STI continuing to change, to adapt to the new and advanced technologies as well as other new measurement requirements. The advancement and development of new technologies will, in part, be accelerated by challenges that the world faces, such as the current COVID-19 pandemic and climate change.

In addition to these global challenges, South Africa, Africa, Latin America and developing countries also face other developmental challenges. These include socio-economic challenges, such as poverty, high unemployment rates, food insecurity and inequalities. Developing countries typically have agriculture, SMEs and the informal sector playing significant roles in their economies, and STI plays an important role in these sectors and its measurement also becomes important. At CeSTII, we are currently experimenting with measuring innovation in the agriculture and informal sectors, by adapting the OECD Oslo methodology and methodologies developed and tested in Colombia and Brazil, respectively. I see the measurement of innovation in agriculture and the informal sectors growing and being taken up by other countries in Africa and Latin America.

To contact **Dr Moses M. Sithole**,  
write to: [msithole@hsrc.ac.za](mailto:msithole@hsrc.ac.za)



## CeSTII HONORARY RESEARCH FELLOWS

**Dr Oluseye O. Jegede**



Dr Oluseye O. Jegede is an Honorary Research Associate at the Centre for Science, Technology and Innovation Indicators. He was African Research Fellow with CeSTII between 2018 and 2019. Dr Jegede is a Research Fellow at the African Institute for Science Policy and Innovation (AISPI), Obafemi Awolowo University (OAU), Ile-Ife, Nigeria.

Dr Jegede bagged his PhD in Technology Management (R&D and Innovation Management option) in 2015. His main areas of research include innovation management, entrepreneurial ecosystem, small business management and economic geography. Dr Jegede has published numerous articles on innovation management, entrepreneurship, technology policy, innovation systems and regional development in different international journals. He has also made a large number of presentations in different countries across all continents of the world. He is reviewer to several international journals and Co-editor of a book entitled *Firm-Level Innovation in Africa: overcoming limits and constraints* published by Routledge. He is an Associate Editor with the African Journal of Science, Technology, Innovation and Development (AJSTID) published by Taylor and Francis Group, UK.

Currently, Dr Jegede is also a member of the Scientific Board of the Global Network for the Economics of Learning, Innovation and Competence Building Systems (GlobeLICS), a pioneer member of the African Network for the Economics of Learning Innovation and Competence Building System (AfricaLICS) and Head of Research Committee of the Nigerian network for the Economics of Learning, Innovation and Competence Building Systems (NigeriaLICS).

**Dr Isabel Bortagaray**



Isabel Bortagaray holds a PhD in Public Policy – Science and Technology Policy from the Georgia Institute of Technology (US). Her expertise is in the field of innovation, science and technology policy, institutions and technological capabilities in developing countries. She is currently working at the Institute on Sustainable Development, Innovation and Social Inclusion (IDIIS), University of the Republic. Previous experience includes an evaluation of sectoral industrial plans and consortia implemented in Uruguay as a fundamental ingredient of the national industrial policy. Between 2010 and 2013 Bortagaray worked as a Senior Program Officer at the International Development Research Center – Canada, for the Latin America and the Caribbean Regional Office. In that context, Bortagaray was responsible for the program on Innovation for Inclusive Development. Before joining IDRC in 2010, Bortagaray spent some time at the Higher Council of Scientific Research (CSIC) in Spain as a postdoc. Furthermore, she has worked at the University of the Republic in Uruguay (UdeLar), promoting a research program on University-Society/Productive Sector linkages. She is a research associate at the Technology Policy and Assessment Center (TPAC), at the Georgia Institute of Technology. In 2004 she was awarded a dissertation grant from the National Science Foundation, and in 2000 she was awarded a Fulbright scholarship for her PhD studies. She is currently based at *Instituto de Desarrollo Sostenible, Innovación e Inclusión Social* at UdelaR.

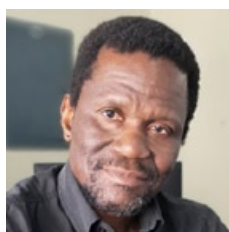


## TEAM CeSTII\*

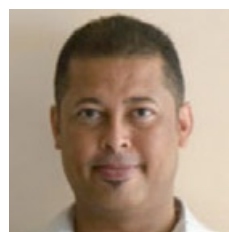
\*April 2019 – March 2020



**Dr Glenda Kruss**  
Deputy-Executive Director



**Dr Moses Sithole**  
Research Director



**Dr Nazeem Mustapha**  
Chief Research Specialist



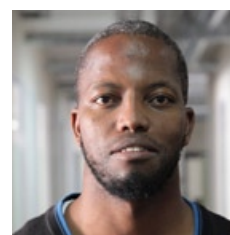
**Dr Neo Molotja**  
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**Dr Il-Haam Petersen**  
Senior Research  
Specialist



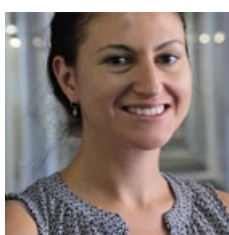
**Dr Yasser Buchana**  
Post-Doctoral Fellow



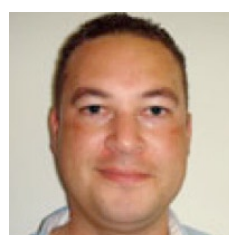
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**Atoko Kasongo**  
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**Amy Kahn**  
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**Mario Clayford**  
Senior Researcher

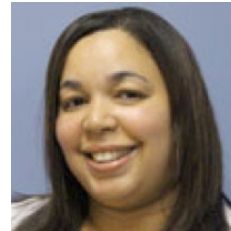




**Jerry Mathekga**  
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**Cheryl Moses**  
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**Audrey Mahlaela**  
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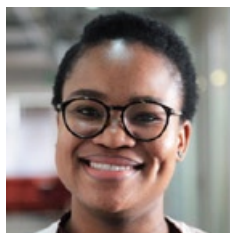
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**Juliet Mokoete**  
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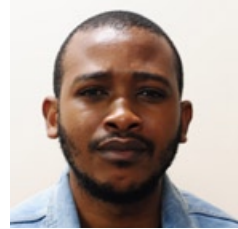
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**Lindiwe Binda**  
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**Sibusiso Innocent Ziqubu**  
Data Analyst



**Curtis Bailey**  
Data Analyst



**Natasha Saunders**  
Fieldwork Manager



**Gerard Ralphs**  
Programme Manager  
& Policy Analyst



**Maria Maluleke**  
Financial Administrator



**Ziniswa Hlakula**  
Administrator



**Vuyiseka Mpikwa**  
PA to the Deputy-  
Executive Director



**Mieta Klaasen**  
Office Cleaner



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