

# Innovation, informal economy and transformative change

**Erika Kraemer-Mbula**, PhD., Institute for Economic Research on Innovation (IERI)  
DST-NRF Centre of Excellence in Scientometrics, and Science, Technology and Innovation Policy  
(SciSTIP)  
South Africa

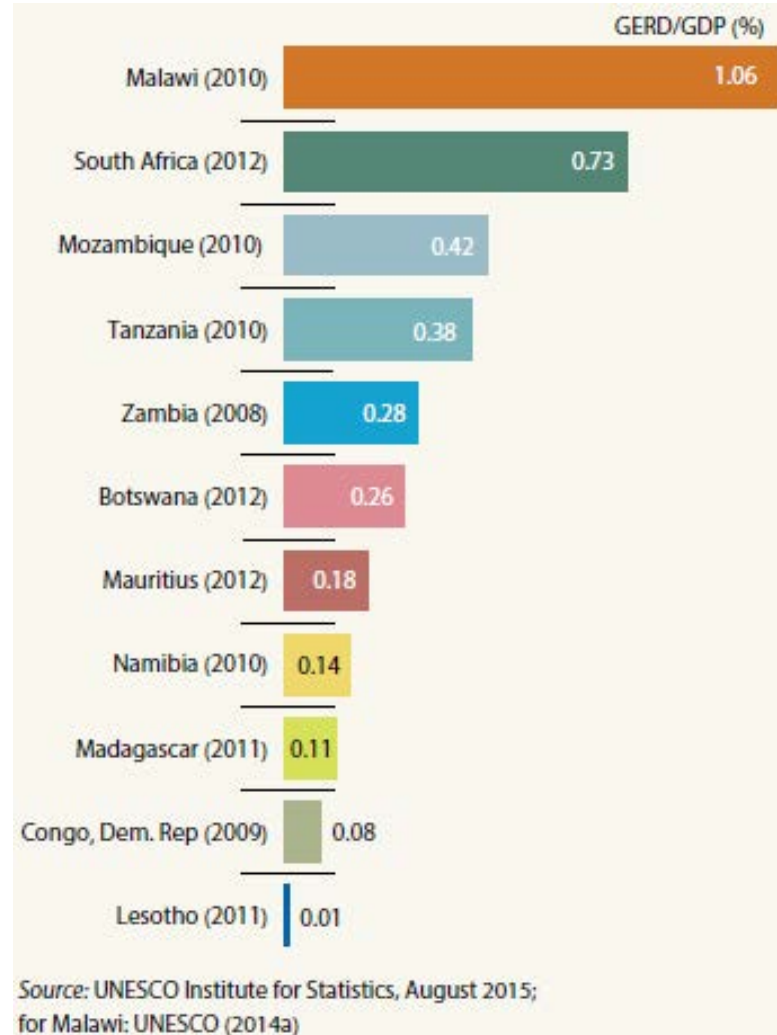
# Some initial thoughts

- Countries around the world have embarked on the promotion of innovation as a key strategic tool to achieve faster economic growth
- In emerging economies, policies inspired by prevailing approaches in more mature economies appear to be leading to wider inequalities if they are not steered towards distributive goals
- **Innovation policy in developing countries is harder...(?)**
  - Socio-economic challenges - opportunity costs of investing public money in innovation activities are higher than in more well-off countries – Efficient use of limited public resources becomes even more critical in poorer countries
  - Goals related to innovation policy are becoming increasingly more complex, linking innovation policies with goals related to socially inclusive development and environmental sustainability
- **Current trend: wider inequalities**
- **Transformative change: equitable and inclusive development**
- **We need transformative change to transcend ‘business-as-usual’ practices**

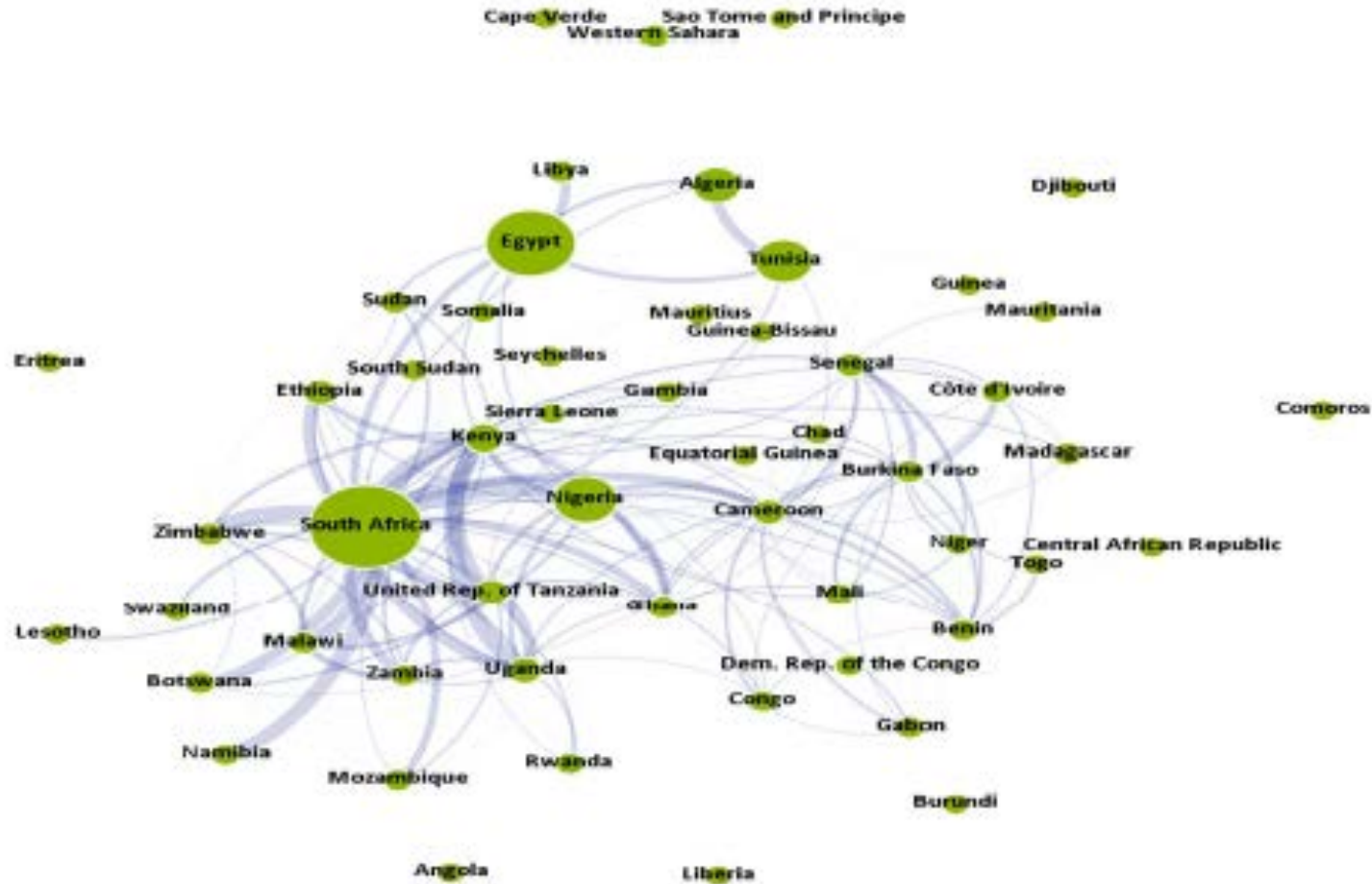
# South Africa's knowledge system

- Strong S&T performer in the continent (research activity, collaboration, patents, etc)
- Main destination for students in Africa – Southern African students are amongst the most mobile in the world.
- Great achievements in building skills (ST&I) – strong racial, class and gender bias
- Concentrated: A few 'islands of excellence' (few innovative leading businesses, research organizations and universities) – hosting the SKA, largest radio telescope – astronomy skills
- Traditional and indigenous knowledge systems disconnected from research/scientific knowledge systems

# GERD/GDP ratio in Southern Africa, 2012 or closest year



## Collaboration among the AU countries, 2005-2010



Source: computed by AOSTI with data from Scopus; AOSTI (2014)

## South Africa is a key research partner for most SADC countries

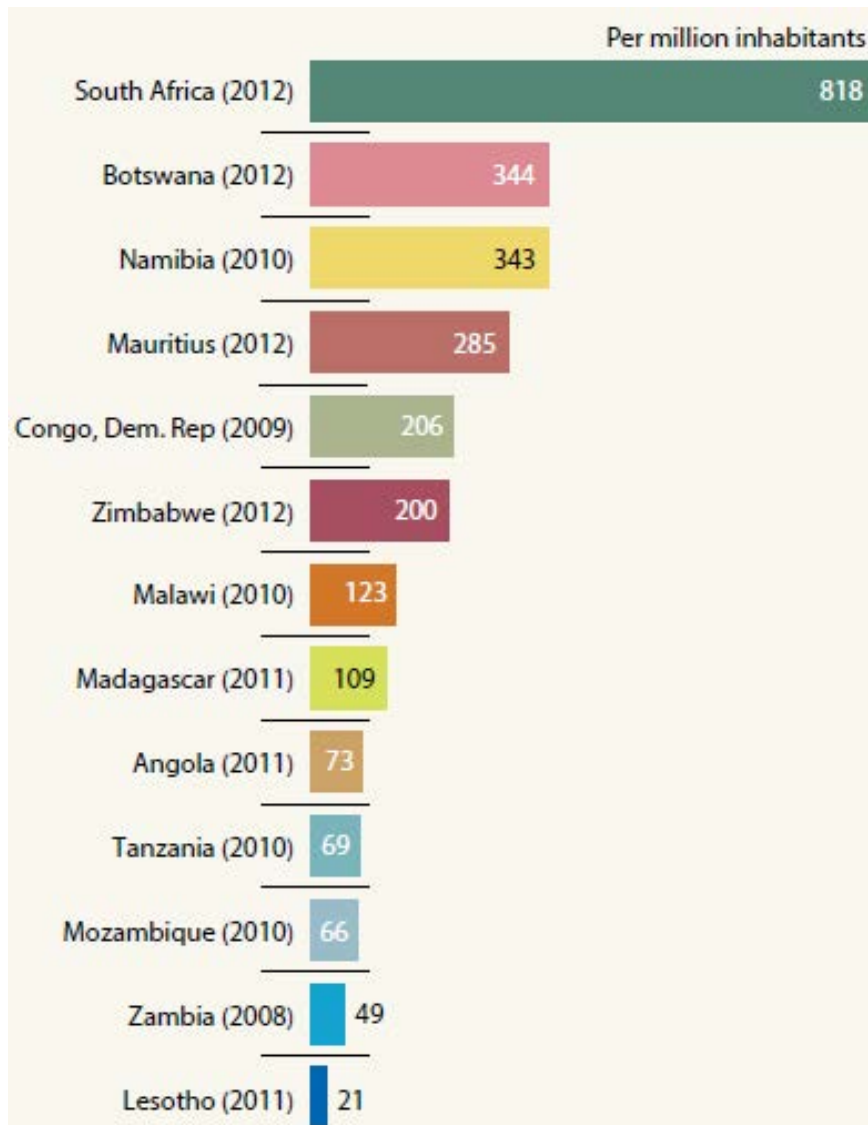
Main foreign partners, 2008–2014 (number of papers)

	1st collaborator	2nd collaborator	3rd collaborator	4th collaborator	5th collaborator
Angola	Portugal (73)	USA (34)	Brazil (32)	UK (31)	Spain/France (26)
Botswana	USA (367)	South Africa (241)	UK(139)	Canada (58)	Germany (51)
Congo, Dem. Rep.	Belgium (286)	USA (189)	France (125)	UK (77)	Switzerland (65)
Lesotho	South Africa (56)	USA (34)	UK (13)	Switzerland (10)	Australia (8)
Madagascar	France (530)	USA (401)	UK (180)	Germany (143)	South Africa (78)
Malawi	USA (739)	UK (731)	South Africa (314)	Kenya /N.lands (129)	
Mauritius	UK (101)	USA (80)	France (44)	India (43)	South Africa (40)
Mozambique	USA (239)	Spain (193)	South Africa (155)	UK (138)	Portugal (113)
Namibia	South Africa (304)	USA (184)	Germany (177)	UK (161)	Australia (115)
Seychelles	UK (69)	USA (64)	Switzerland (52)	France (41)	Australia (31)
South Africa	USA (9 920)	UK (7 160)	Germany (4 089)	Australia (3 448)	France (3 445)
Swaziland	South Africa (104)	USA (59)	UK (45)	Switz./ Tanzania (12)	
Tanzania	USA (1 212)	UK (1 129)	Kenya (398)	Switzerland (359)	South Africa (350)
Zambia	USA (673)	UK (326)	South Africa (243)	Switzerland (101)	Kenya (100)
Zimbabwe	South Africa (526)	USA (395)	UK (371)	Netherlands (132)	Uganda (124)

Source: Thomson Reuters' Web of Science, Science Citation Index Expanded; data treatment by Science-Metrix



# Number of researchers



Source: UNESCO Institute for Statistics, April 2015

# SA Total Researchers per 1000 Employed (2001-2012)



Source: OECD (2015), Researchers (indicator). doi: 10.1787/20ddfb0f-en (Accessed on 02 April 2015)

Source: Mouton (2015)



# STI system in SA: addressing current challenges and readiness for the future

## • Current context

- **Extreme inequality**: SA one of the most unequal countries in the world. South Africa's income inequality increased from 0.57 in 2000 to around 0.7 in 2011 (WDI, 2013)
- **Endemic unemployment**: over 25% unemployment, 50% in the youth
- **Poverty**: 43% of the population on less than US\$ 2 a day. Proliferation of informal settlements, escalated from 1,066 in 2001 to 2,628 in 2010 (DHS, 2012)
- **Entrepreneurship**: between 12% -33% employment in informal economy; 60 % of micro enterprises are informal (FIAS, 2007)
- **Skills deficiencies**: in 2013, 829,000 jobs vacant for highly skilled workers, low level of enrolments in HE and poor matching of skills to the demands of the economy and region

## • Readiness for the future

- How ready is the South African STI system to address:
  - Current challenges of inequality
  - Future challenges such as: increasing pressure on ecological systems, sustainable modes of production, transition to “green(er)” industrialisation, information society, urbanization and African metropolis

# Evolution of STI policy in South Africa

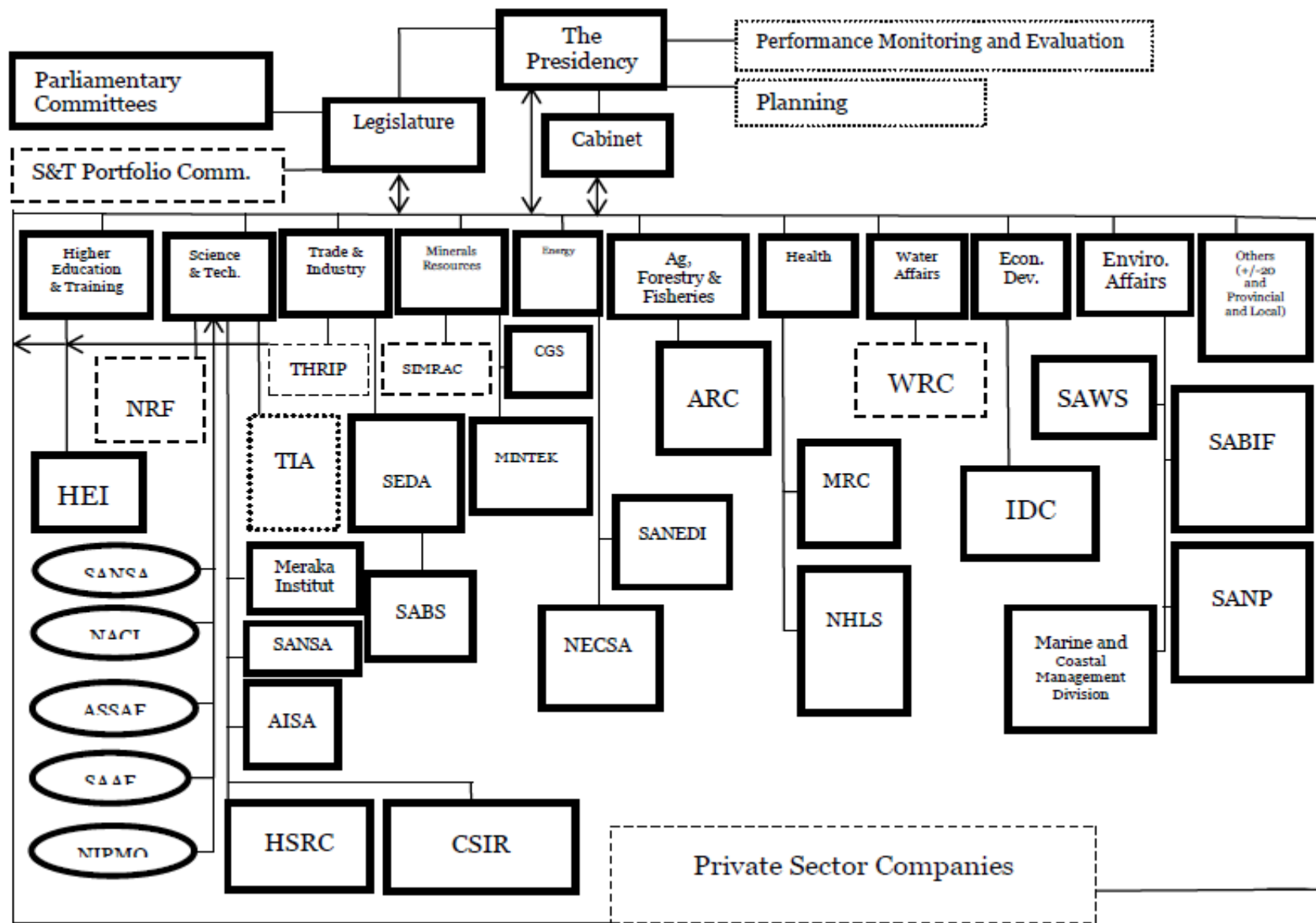
- Pre-1990s
  - First Science Council (CSIR) established in 1945
  - S&T system pre-1994 described as weak, fragmented and highly inequitable
  - S&T at the service of security needs of the apartheid regime
- Post- apartheid era
  - new economic and social imperatives re-focussed attention on the broader innovation system
  - Urgent need to redefine S&T priorities
  - In 1993 extensive review of S&T policies and institutions
  - 1994 first democratic elections
  - Creation of one ministry to manage STI (DACST)
  - 1996 – 199 : stage of policy formulation and legislation

# Main ST&I policy developments (i)

- 1996: The **White Paper** of Science and Technology entitled *“Preparing for the 21<sup>st</sup> century”*
  - Incorporated the notion of national system of innovation
  - establishes guidelines for the inclusion of additional stakeholders in the management of S&T.
- 1997: Establishment of the National Advisory Council on Innovation (NACI)
  - identification of research and development priorities, in consultation with provincial departments governments and interested parties, and their incorporation in the process of government funding of research and development

# Main ST&I policy developments (ii)

- 2002 - The National Research and Development Strategy
  - Objective of increasing private sector R&D
  - Clear objectives and targets (1% GDP in R&D)
- 2006 - The 10-year Innovation Plan
  - Five grand challenges( biotechnology, space science, energy security, climate change, and human & social dynamics)
- 2012 - Ministerial Review of the Science, Technology and Innovation Landscape
- 2013 - The National Development Plan
  - Identifies the important role of science, technology and innovation in achieving the country's longer-term vision
- Currently – a revision of the White paper in S&T is underway

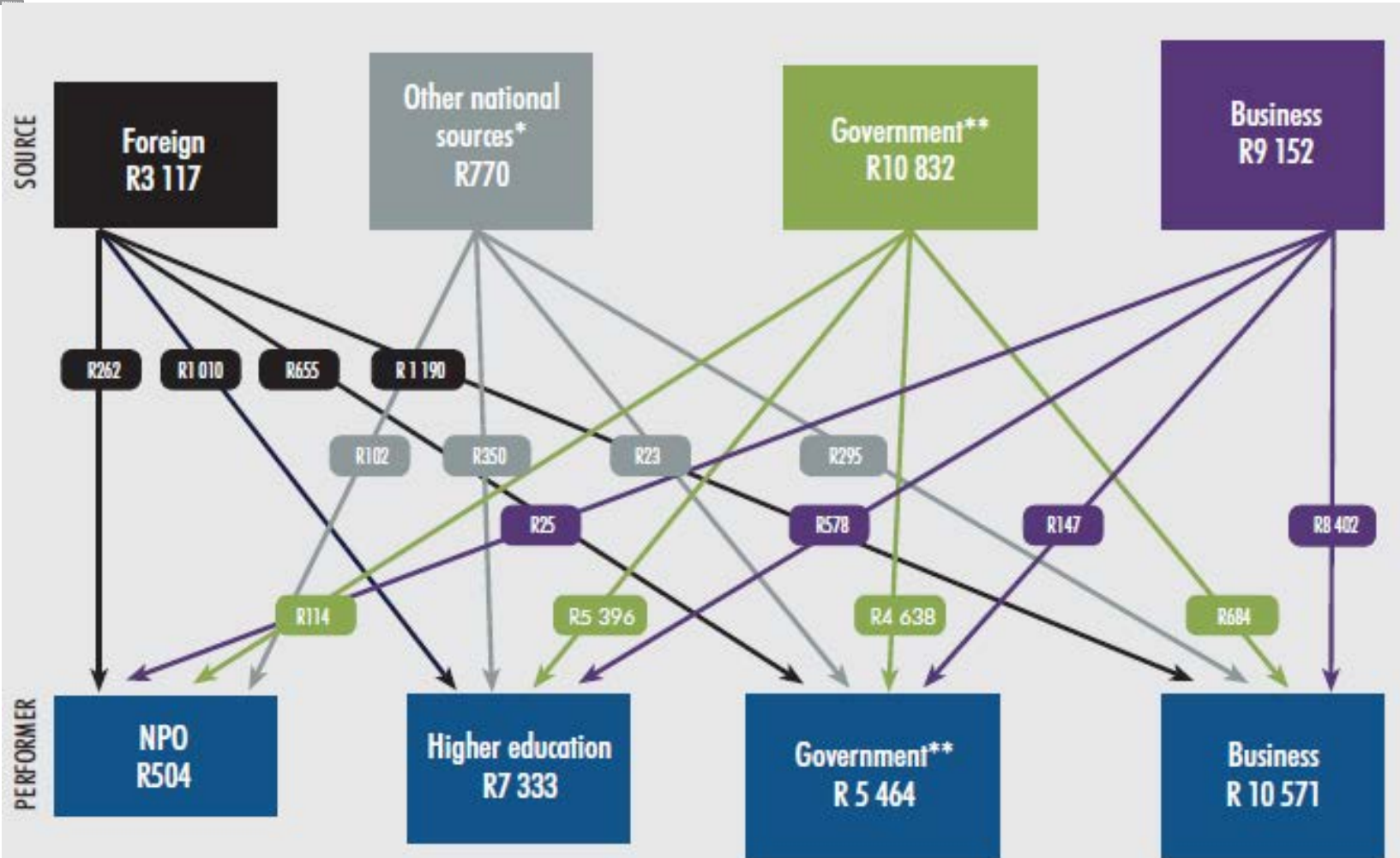


# Array of instruments

- The Innovation Fund – support for industrial innovation
- THRIP - Technology and Human Resources for Industry Programme
  - matches investment by industry in projects where researchers from HEIs and other research institutions serve as project leaders and students are trained through projects in industry.
- The R&D tax incentive programme, introduced in 2007 and amended in 2012
  - gives a 150% tax deduction for expenditure on eligible scientific or technological R&D undertaken by enterprises or individuals.
- The Support Programme for Industrial Innovation (SPII)
  - assists South African industry through competitive bidding on financial assistance for technology development after the basic research phase and through until pre-production of a prototype.
- The Youth Technology Innovation Fund (YTIF) introduced by TIA in 2012
  - Ages between 18-30 years. This scheme offers vouchers for young clients to access technology innovation support from approved service providers.
- Wide range of technology incubators Sectoral Innovation Fund



# Major sources of R&D funding (R million) 2012/13



# Is the SA STI system “equitable” and “inclusive”?

- **OECD Review (2007)**
- “South Africa’s NSI is making **insufficient contribution to poverty reduction and wider inclusion** in the mainstream economy”
- The **role of business** (particularly MSMEs) needs greater attention and has been inadequately included in the conceptualisation of the NSI.

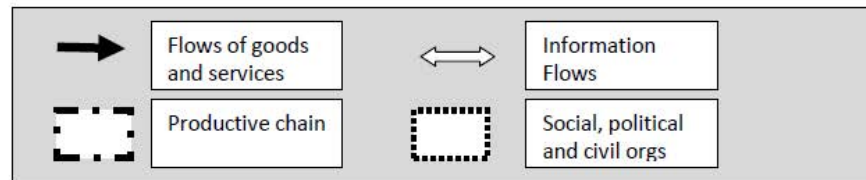
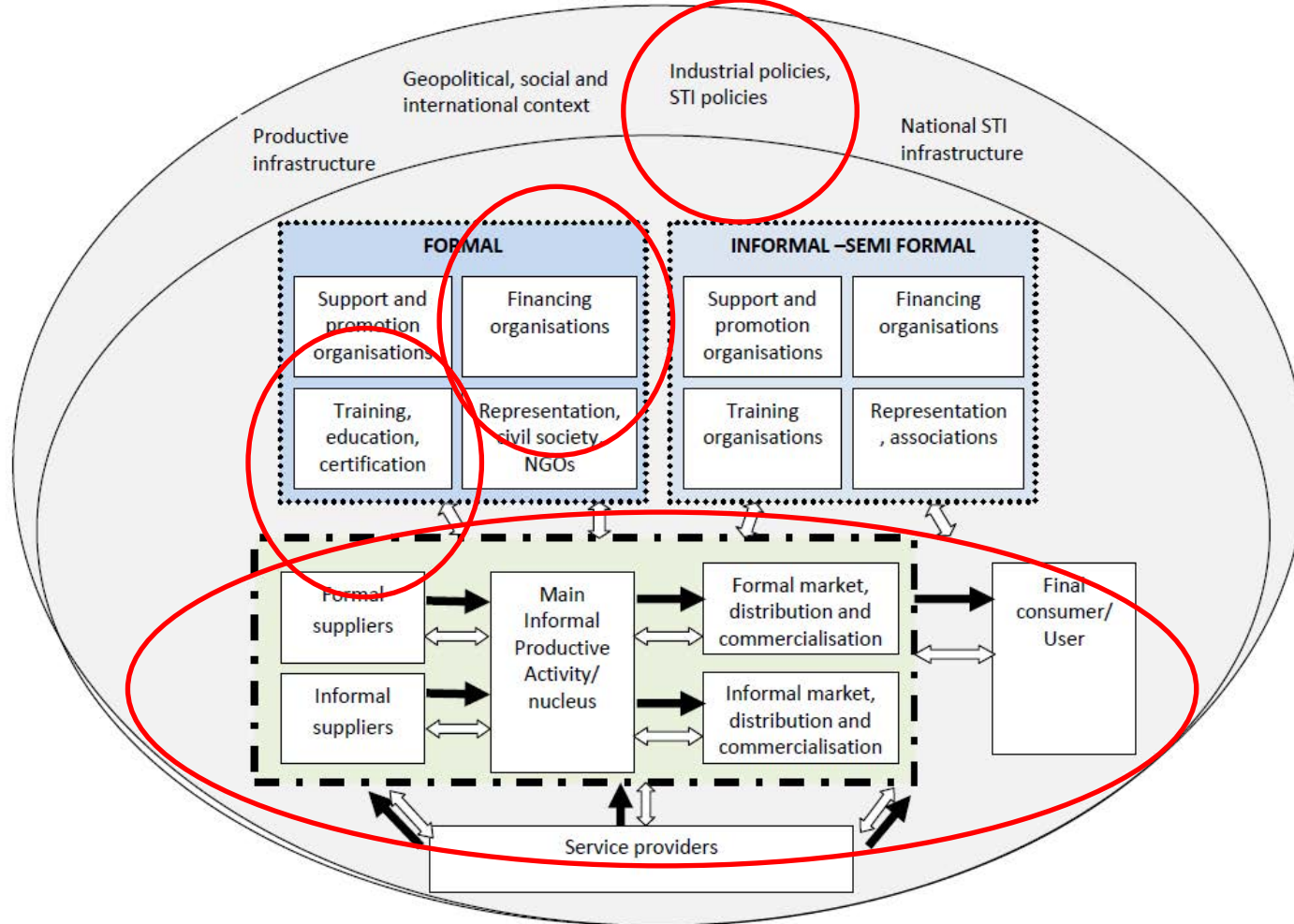
# SA Ministerial Review (2012)

- The state's investment on innovation has been **biased towards “big science”** and inadequate focus had been placed on requirements for meeting the social development priorities
- The role of **social innovation** in the NSI is under-conceptualised and under-developed;
- Supply-side thinking was prevalent and this contributed to continuing poor responses to market and social demand.

DST (2012)

# Inclusive Development

- “Inclusive development is a **process** of **structural change** which gives voice and power to the concerns and aspirations of otherwise **excluded** groups. It **redistributes** the incomes generated in both the formal and informal sectors in favour of these groups, and it allows them to **shape the future of society** in interaction with other stakeholder groups”



Effectiveness (implementation) of policies, depends on the involvement of a broad range of actors besides those formally in charge

- Innovation policy mix – as composed by **policy subsystems**
  - Set of state and non-state, national and international actors and institutions that shape policies focused on a particular policy area in a particular jurisdiction at a particular time (Howlett and Ramesh, 2003; Rhodes, 2006)
  - **Guided by existing interests:** the policy subsystem is a space where relevant actors discuss policy uses and persuade and bargain in pursuit of their interests.
  - **The ‘core’ and the ‘margins’:** actors who are intimately involved in a policy process and others who are only marginally so”
    - Core: actors who participate more frequently and more directly are often described as belonging to ‘interest networks’
    - Margins; actors involved to a lesser extent -- ‘discourse communities’
  - Composition varies by country, by policy domain and over time
  - The nature of their relationships will shape the content of public policy



# Taxonomy of Interactive Learning Spaces

	Reactive interactive learning space (problem-solving)	Proactive interactive learning space (policy/strategy development)
Exclusive interactive learning space (narrow foresight, forecast tradition).	1. Experts solve problem without (broad) inclusion and interaction.	2. Experts and forecasting tools predict and plan for the future (which is value neutral) without (broad) inclusion and interaction.
Inclusive interactive learning space (broad foresight, system perspective).	3. Problem-solving involving stakeholders affected.	4. Identify desirable future via inclusive policy-development process.

# Innovation Policy Tools for Inclusive Development (1)

- Science, technology and innovation are major factors in the generation of economic and social change
- The design and implementation of inclusive innovation policies can help achieve more equitable, sustainable and inclusive development
- Incorporating social goals in STI policies requires consideration of the characteristics of people living in poverty, how they live and what they need in order to improve their livelihoods

UNCTAD (2014)

# Innovation Policy Tools for Inclusive Development (2)

- To improve the effectiveness of those policies, it is important to **deploy well-articulated goals, objectives and strategies on how to promote and carry out inclusive innovation in countries.**
- It is thus necessary that inclusive innovation programmes be designed using an integrated approach that features not only the agents involved in the implementation of such programmes but also their beneficiaries.

UNCTAD (2014)

# Implications for innovation policy – from Frame 2 to Frame 3

## Innovation policy approaches

Policies to develop the **research system**

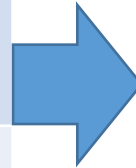
Policies to **support overall investment in innovation**

Policies to **stimulate public demand for innovative solutions** and products

Policies to **enhance innovation competencies** in firms

Policies to **strengthen linkages within innovation systems**

Policies for **knowledge appropriation**



Potential to transform it into direct/ indirect positive effect on innovation in the informal economy

Barriers to achieve that potential

Possible practical avenues

Innovation policy approaches	Impact on innovation in the informal economy	
	Current	Potential
<b>Policies to develop the research system</b>	<ul style="list-style-type: none"> <li>● <b>Indirect negative.</b> Concentration of government support on highly skilled people in public research organisations. Widening gap</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Positive.</b> Participatory research. Socially relevant research involving informal actors</li> </ul>
Examples of instruments	Targets	Barriers to achieve potential
Supporting research infrastructures (e.g. labs) Establishment of research centres & big science infrastructures Basic science research Applied research Internationalisation of research Career advancement	<ul style="list-style-type: none"> <li>● <b>Young researchers (PhD)</b></li> <li>● <b>Senior researchers</b></li> <li>● <b>Research groups</b></li> <li>● <b>Research consortia</b></li> </ul>	<ul style="list-style-type: none"> <li>● Incentive systems</li> </ul>

# Avenue(s) for change?

- **Change incentive structures in research organisations** – promotion systems and performance based on community engagement and community relevance
  - Promotion of action-based research
  - Socially-engaged research



Innovation policy approaches	Impact on innovation in the informal economy	
	Current	Potential
<b>Policies to support overall investment in innovation</b>	<ul style="list-style-type: none"> <li>• <b>Indirect negative.</b> Concentration of innovation funding support on formal enterprises. Widening gap</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Positive.</b> Allowing non-registered firms to access funding mechanisms?</li> </ul>
Examples of instruments	Targets	<b>Barriers to achieve potential</b>
<b>Direct grants to R&amp;D (R&amp;D subsidies)</b> <b>R&amp;D tax incentives</b> <b>Grants to innovation</b> <b>Innovation voucher</b>	<ul style="list-style-type: none"> <li>• <b>R&amp;D performing firms</b></li> <li>• <b>Innovative formal firms (small, medium and large enterprises)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Require registration and paying taxes</li> </ul>

# Avenue(s) for change?

- Grants and subsidies to innovate -- are oriented to innovative firms, generally formal SMMEs, where firms apply for funding to either (a) improve their products, processes and services or (b) do testing, piloting or pre-commercial validation of the technological component of an innovative project.
- Extend the “Creative credits” (Bakhshi *et al.* [2011](#)) – an innovation voucher program designed to foster new innovative partnerships between SMMEs and creative service providers. Creative service providers may not be restricted to formal enterprises but could also include those in the informal economy.

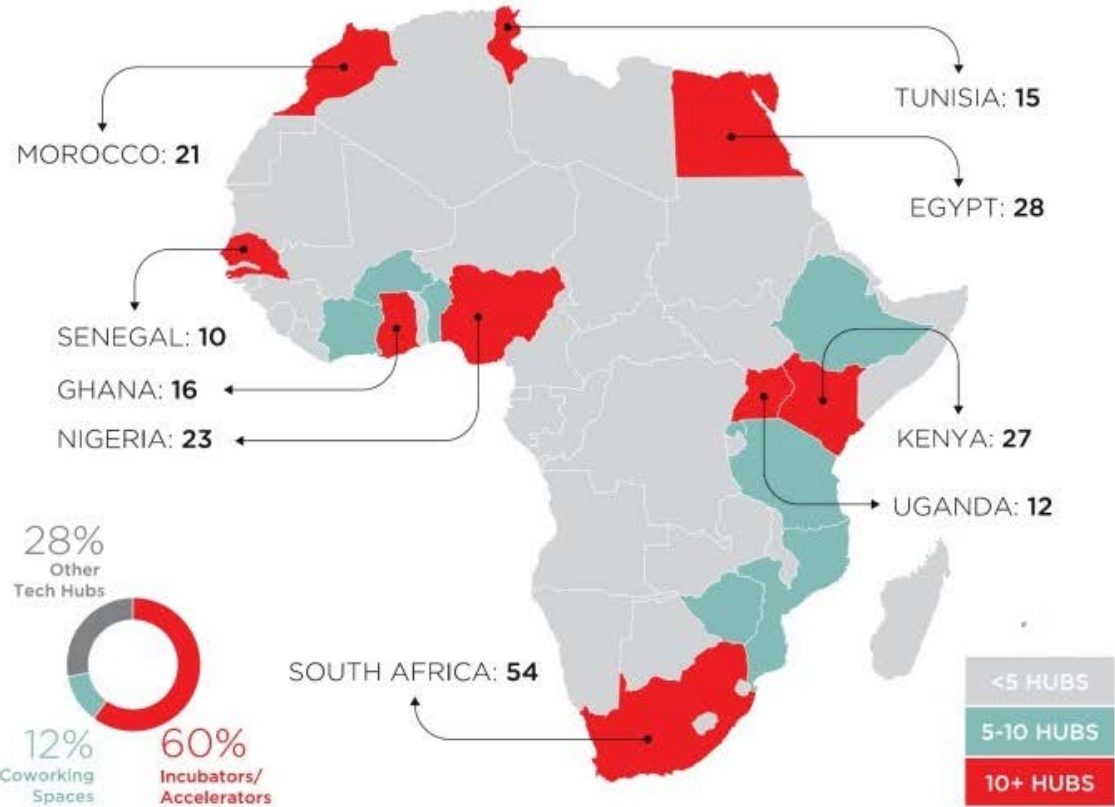
Innovation policy approaches	Impact on innovation in the informal economy	
	Current	Potential
<p><b>Policies to stimulate public demand for innovative solutions and products</b></p>	<ul style="list-style-type: none"> <li>• <b>Indirect negative.</b> Concentration of opportunities in formal enterprises. Widening gap</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Positive.</b> Collaboration between formal and informal enterprises. Expanding value chains Stimulating purchase of innovative products in informal settlements</li> </ul>
Examples of instruments	Targets	<b>Barriers to achieve potential</b>
<ul style="list-style-type: none"> <li>• <b>Public procurement of STI</b></li> <li>• <b>Subsidies and tax incentives to consumers that purchase new products resulting from innovation.</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Formal firms (innovative and non-innovative)</b></li> <li>• <b>Tax-paying consumers</b></li> </ul>	<ul style="list-style-type: none"> <li>• Lack of bridges/ linkages: Formal firms reluctant to collaborate with informal</li> <li>• Difficulties in reaching out to consumer in informal</li> </ul>

# Avenue(s) for change?

- Incentives to collaborate
  - South Africa, the main policy frameworks driving the development and innovation agenda (such as the Ten-Year Innovation Plan and the National Development Plan) make explicit mention of the role of procurement to stimulate innovation – no specific instruments designed
  - In Kenya, explicit incentives are directed at encouraging formal suppliers to collaborate with informal enterprises in public procurement

Innovation policy approaches	Impact on innovation in the informal economy	
	Current	Potential
<b>Policies to enhance innovation competencies in firms</b>	<ul style="list-style-type: none"> <li>• <b>Indirect negative.</b> Concentration of support in formal enterprises. Widening gap</li> </ul>	<ul style="list-style-type: none"> <li>• <b>positive.</b> Co-creation innovation hubs, inclusive of formal and informal</li> </ul>
Examples of instruments	Targets	<b>Barriers to achieve potential</b>
<ul style="list-style-type: none"> <li>• <b>Innovation awards/prizes</b></li> <li>• <b>Technology development support, incubators, science parks</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Formal firms (innovative and non-innovative)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Lack of visibility of informal sector innovations</li> <li>• Need for registration to be accepted in a traditional technology incubator or science park</li> </ul>

# 314 ACTIVE\* TECH HUBS IN 93 CITIES IN 42 COUNTRIES



<p><b>50%</b></p>	<p><b>5 Countries</b> South Africa, Kenya, Nigeria, Egypt and Morocco totalise 50% of the tech hubs in Africa</p>	<p><b>4.3 years old</b> Average age of tech hubs is 4.3 years old (average launch date: 2012)</p>	<p><b>13% of Tech hubs</b> 13% of tech hubs have partnerships with mobile operators. Orange, MTN and Vodafone are the most represented</p>
	<p><b>49% of Tech hubs</b> 49% of tech hubs have partnerships with non telecom corporations. Microsoft, Google and Ashoka are the most represented</p>	<p><b>1.5 millions followers</b> Tech hubs Facebook pages have more than 1.5 million followers</p>	<p><b>600 thousand followers</b> Tech hubs Twitter pages totalise more than 600 thousand followers</p>

# Avenue(s) for change?

- Develop a database of informal innovation (example of Honey Bee in India)
- Awards to informal entrepreneurs – in India given at the house of the President once a year
- Broaden up the concept of a science park and technology incubators to co-creation or third generation innovation hubs – that include social goals

Innovation policy approaches	Impact on innovation in the informal economy	
	Current	Potential
<b>Policies for knowledge appropriation</b>	<ul style="list-style-type: none"> <li>• <b>Indirect negative.</b> Concentration of knowledge in formal enterprises. Impediment to knowledge dissemination. Widening gap</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Positive.</b> Broadening knowledge appropriation frameworks. Improved access to informal economy actors</li> </ul>
Examples of instruments	Targets	<b>Barriers to achieve potential</b>
<ul style="list-style-type: none"> <li>• <b>Support services for copyright, trademarks, industrial designs, patents</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Formal innovative firms (small, medium and large)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Lack of awareness, don't fit dynamics of informal businesses, high costs</li> </ul>



# Avenue(s) for change?

- Some suggest lower costs for acquiring and enforcing rights; limited or no registration requirements; weaker rights with a more limited duration of protection; and reduced barriers to licensing or to the use of the protected idea by other entrepreneurs. In particular, a utility model-type system with a lower registration threshold, a correspondingly weaker set of rights and lower costs is being promoted in this context (Basheer 2008).
- Others suggest promoting open innovation and avoiding knowledge appropriation altogether

# Some reflections

- In the context of developing countries, current modes of STI policy are leading to further exclusions (directly or indirectly)
- What kind of transformative change can bring a focus of the informal economy
- Important to pay attention to the distributive effects of innovation policies – involves several policy-subsystems: redefining the core and the margins
- Important to pay attention to creating space for inclusion of beneficiaries in the design of innovation policy instruments – issues around articulation of needs and policy learning



**ieri**

*Institute for Economic  
Research on Innovation*

TSHWANE UNIVERSITY OF TECHNOLOGY

**SciSTIP**

DST-NRF Centre of Excellence in  
Scientometrics and Science,  
Technology and Innovation Policy

Thank you

[erika@ieri.org.za](mailto:erika@ieri.org.za)



# South Africa's main features

- **Economic systems**

- Strong presence in Africa – second largest economy; 25% of Africa's GDP, large investor in Africa
- Diverse productive base but still reliant on natural resources – mining main export
- The first and the second economy - Informal economy – estimations between 20 and 47% of the labour force

- **Social systems**

- Multicultural & diverse society – 11 official languages
- High and growing inequality – 0.63 one of highest Gini in the world. Disparities transcend income.
- Endemic unemployment - 24.3% and youth 50%