

STI Policy in Africa: Domesticating the National System of Innovation



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Presented during the SPRU-Africa Engagement Week on STI
and Policy, 23 - 27 May 2016, Pretoria/Johannesburg,
South Africa

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- Part Three: Domesticating the NSI
- Conclusions and way forward



Felicitatation!

On Behalf of the ATPS Management and Board of Directors, I congratulate the SPRU team led by Prof. Johan Schot for this well-thought out engagement with African STI Policy Stakeholders. I regret my inability to be in this meeting in person due to logistical issues regarding entry into South Africa but hope to fully engage with the team on the agreed framework for future collaborations and partnerships.

Dr. Nicholas Ozor, ED, ATPS





PART ONE:

About the ATPS

About ATPS

ATPS is a Trans-disciplinary network of **researchers, policymakers, private sector actors**, and the **civil society actors** that promotes the generation, dissemination, use and mastery of science, technology and innovation (STI) for African development, environmental sustainability and global inclusion.



Our Focus

Improving the understanding and functioning of STI policy research and policymaking processes and systems to strengthen capabilities, social responses, and governance of STI-led sustainable development in Africa



Where we work

ATPS National Chapters & Focal Points



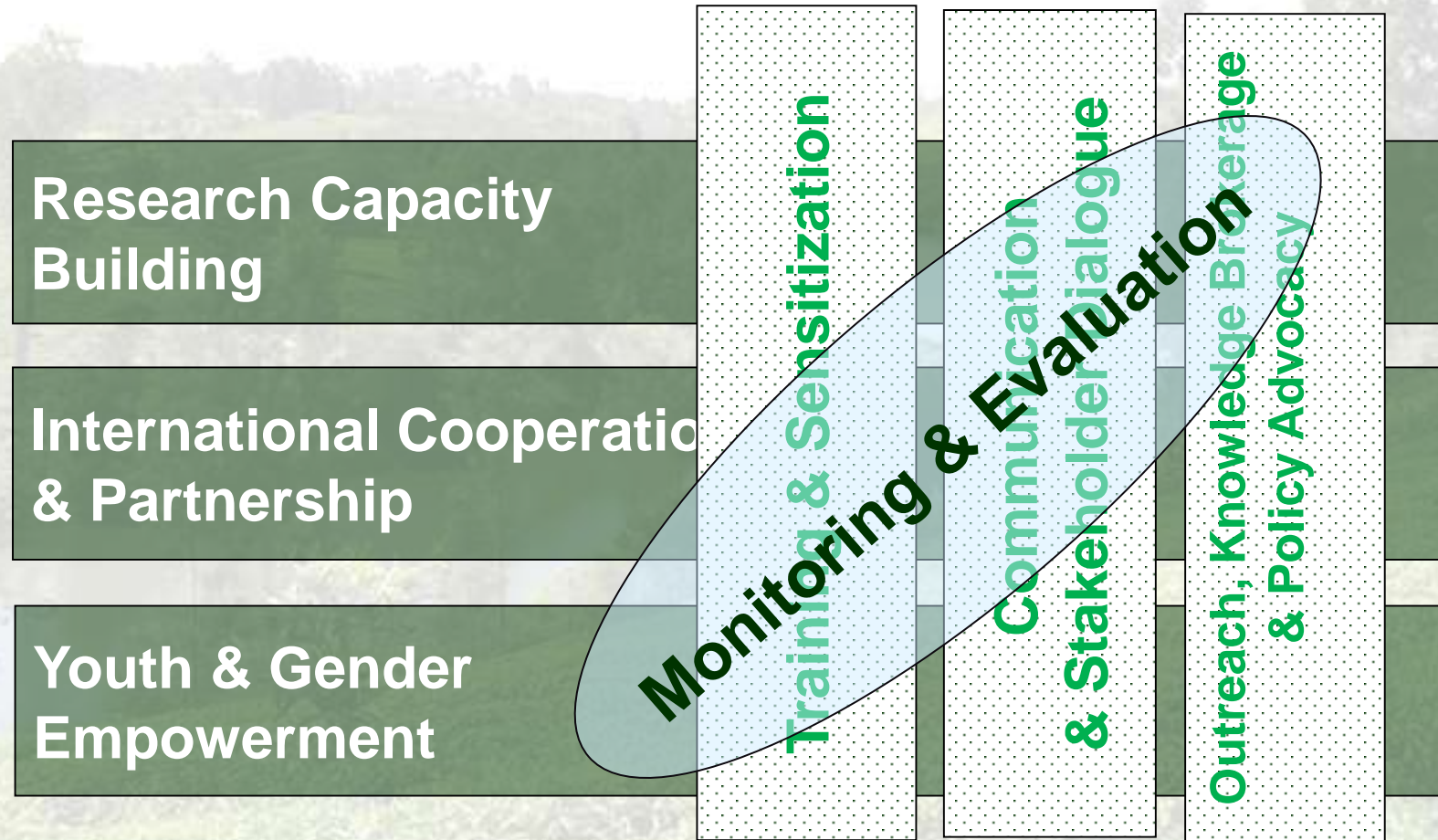
- **27 African countries and Diaspora Chapters in the UK, USA and Australia**
- **1500 network members spread in 51 countries and in 5 continents**

ATPS Core Functions

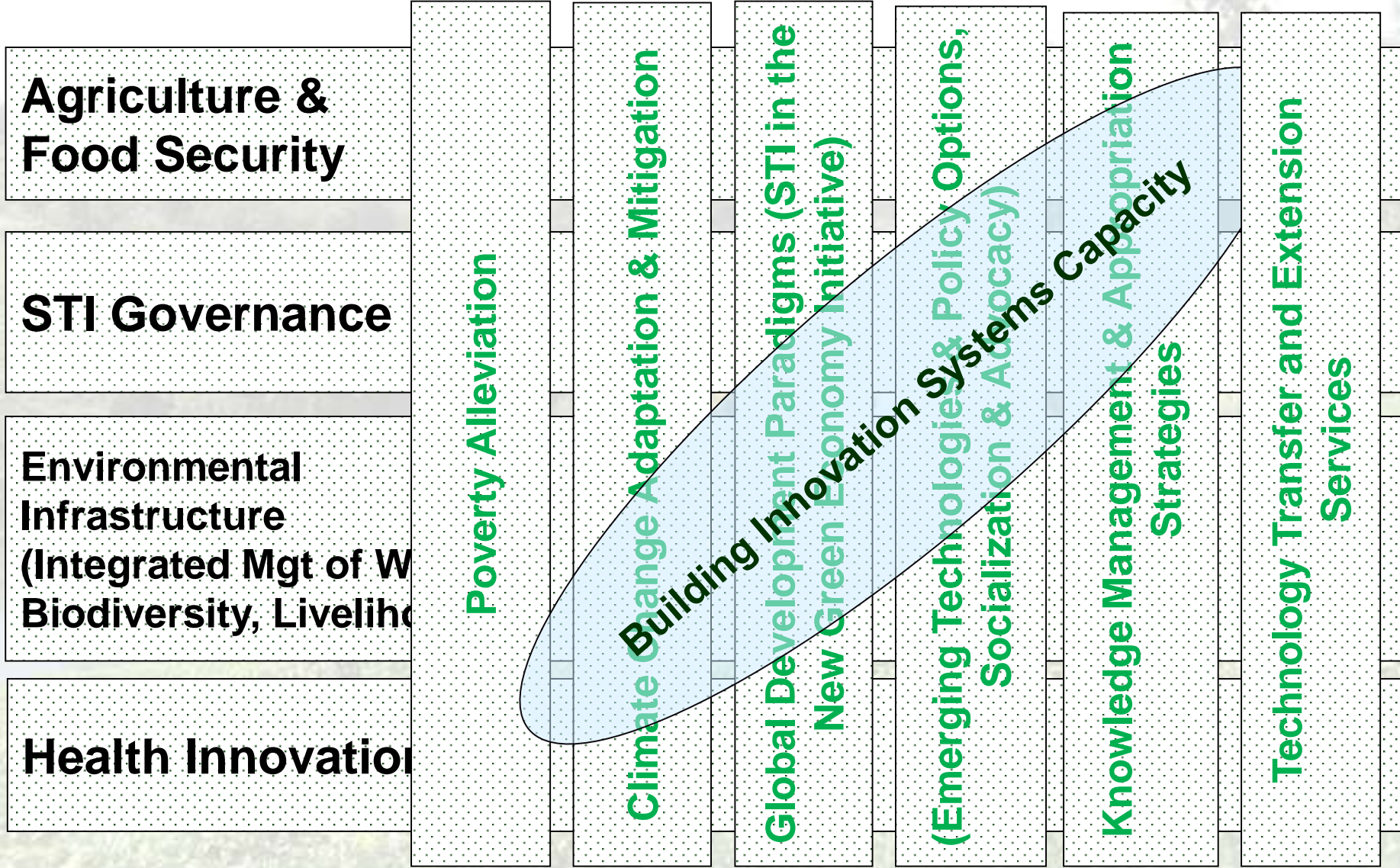
- **Knowledge Generation** (Research & Training);
- **Knowledge Brokerage** (Stakeholder Dialogue, Knowledge Circulation and Networking);
- **Knowledge Dissemination & Outreach** – (Publications, STI Journalism, Policy Advocacy);
- **Knowledge Valorization** – (Innovation Challenge Programs).



ATPS Strategic Priorities 2013 - 2018



Research Priority Sectors





PART TWO:

STI POLICY IN AFRICA

Rationale for STI policy

- STI is a driving force behind recent economic revolution and transformations in many developed and emerging countries
- STI implicated in most of the current 17 Sustainable Development Goals (SDGs) and directly underpin the implementation of 14 of them
- STI policy creates enabling environment for R&D, private sector investment and good governance



Status of STI policies in Africa

- Most African countries have STI Policies or Act
- Few African countries have STI related policies/laws/act/regulations on Biotechnology, Biosafety, Intellectual Property Rights, etc.
- Few African countries have separate ministries of Science and Technology. Many others have S&T ministries subsumed under education or finance ministries



4 priority areas of STI capacity and research needs

- 1. Knowledge generation:** equipping research and academic institutions with state-of-the-art facilities for R&D
- 2. Knowledge acquisition:** interventions through education and training in STI at all levels



4 priority areas of STI capacity and research needs

- 3. Knowledge transfer:** using platforms such as technology hubs, science parks, incubation programs, etc.
- 4. Innovation culture:** inculcating an entrepreneurial, innovative culture at all levels of society, including business, the public sector, and universities.



Achievements in STI policy

- Integration of STI into National Development Plans;
- Development of Biotechnology policies, bio-safety frameworks and acts;
- Promotion of STI research programmes;
- Establishment of research centers of excellence, research universities and institutions;
- promotion of education and training in science and technology
- Establishment of separate ministries of STI in few African countries



Challenges to STI policy development and implementation in Africa

- Low level of investment in R&D
- Uncertainties in the operationalization of STI policy;
- Limited public, private partnerships in STI issues;
- Lack of awareness on the potentials of modern bio-innovation research outputs, its associated benefits and risks;
- Poor development and implementation of IP and Biosafety laws
- Overall lack of human capacity and resources
- Lack of a National System of Innovation



Strategies for Sustainable STI Policy implementation in Africa

- Strengthening the existing frameworks for effective implementation of the STI Policies
- Establishment of STI Hubs
- Establishment of Innovation Funds
- Capacity building/strengthening at all levels
- Value chain development through entrepreneurship and extension services
- Building a National System of Innovation (NSI)



PART THREE:

DOMESTICATING THE NSI IN AFRICA



Rationale

One way to estimate a country's innovation effort is to consider indices that combine the analysis of various innovation activities into one measure.

A commonly cited index of innovation performance is the global innovation index (GII). The 2015 GII contains 79 indicators that cover a variety of national innovation activities.



**GLOBAL INNOVATION INDEX
(AVERAGE)**

**Innovation Efficiency Ration
(Ratio)**

**Innovation Input
Sub-Index**

**Innovation Input
Sub-Index**

Institutions

Human
capital
reserach

Infrastructure

Market
sophistication

Business
Sophistication

Knowledge
and
technology
outputs

Creative
outputs

Political
Environment

Education

ICTs

Credits

Knowledge
workers

Knowledge
creation

Intangible
Assets

Regulatory
environment

Tertiary
Education

General
Infrastructure

Investment

Innovation
linkages

Innovation
Impacts

Creative goods
and services

Business
environment

Research
developement

Ecology

Trade &
competition

Knowledge
absorption

Knowledge
diffusion

Online
creativity

Understanding the NSI

- A country's technological capabilities are determined in part by the effectiveness of its National System of Innovation (NSI). NSI is the foundation for innovation in any technology area.
- It is a network of actors, institutional contexts and linkages that underlie national technological change (e.g. climate change technology).
- It is the “gardens within which the fertile soil is nurtured” (Ockwell and Byrne, 2014)



Composition of the NSI

1. **Actors:** Organizations that participate in technology development and transfer e.g. technology firms, universities and financiers
2. **Institutional context:** Norms, cultural practices & laws that shape actor efforts e.g. government policies that affect how the private sector invests in a particular sector
3. **Linkages:** Interactions and relations between the actors and the institutional context e.g. flows of information and knowledge, and collaboration between firms, universities and research institutes
4. **Roles:** the expectations from each of the actors in the NSI

Roles of NSI

- Provides the context within which all processes of technology development, transfer and uptake occur
- Identifies actors, institutions and linkages required to facilitate technological innovation
- Supports a country's efforts to enhance action on sectoral developments.
- Helps a country to meet other developmental challenges and add value to its national economy.

Estimating NSI capacity

Two ways:

1. Technology innovation inputs (i.e. a country's efforts to stimulate innovation)
 - Key indicator = Research, Development & Demonstration
2. Technology innovation outputs and outcomes (i.e. the outcomes of these efforts)
 - Key indicators = Patents, publications, etc.

Domesticating NSI in Africa will require:

- Strengthening a range of actors based on countries priorities and aspirations
- Enhancing the institutional context in which they operate
- Catalyzing the linkages between actors and the institutional context
- Redefining role expectations of each actor in the innovation system.

3 Actions for NSI Domestication

ACTION 1: Start with Fundamentals

ACTION 2: Focus on Specific Climate Technologies

ACTION 3: Develop National Strategic Capabilities

ACTION 1: Start with Fundamentals

- Examine the key policy actions that will successfully transform an NSI
 - Policies that build a strong technical higher education and training system are key as they serve as a research base and a training ground for skilled **actors**
 - For **institutional** context, the focus is on creating a general enabling environment e.g. stable macro-economic conditions, facilitating competition and entrepreneurship, and building demand for market
 - Strengthen **linkages** between key actors, such as those between firms, universities, research institutes, quality or productivity organizations and technology transfer

ACTION 2: Focus on Specific Technologies

- Strengthen NSI using a focused approach, by prioritizing specific sectors and technologies e.g. renewable energy etc. and identify the stages of the technology cycle that might require most support
- Even for a given technology, different actors, institutional contexts and linkages may come into play at different stages of the technology cycle.

ACTION 2: Focus on Specific Technologies contd.

- ***At the research stage***
 - **Actors** such as universities and research laboratories play a central role while government agencies provide policy action and direction, and play the largest role in funding
 - The **institutional** context is focused on providing an environment that nourishes research, invention, experimentation and the transfer of knowledge and know-how.
 - **Linkages** are centred on exchanging scientific and technical information and financing opportunities

ACTION 2: Focus on Specific Technologies contd.

- *At the development stage*
 - the private sector becomes the key **actor**. They may also engage in demonstrating the technology in order to test it and obtain user feedback. At this stage, funds from private-sector entities or risk-capital providers are more relevant.
 - Important **linkages** here include public–private partnerships, which may support the transition from applied research to technology demonstration.

ACTION 2: Focus on Specific Technologies contd.

- *At the Commercialization stage*
 - Private-sector entities are again the central **actors**.
 - Governments can be critical in defining and shaping the **institutional** context that creates markets and demand through appropriate policies and regulations, e.g. tariff conditions in solar technologies in Kenya and Ghana.
 - Different kinds of **linkages** are important here, such as those between manufacturing firms, financiers, users and governments

ACTION 3: Develop National Strategic Capabilities

Focus should be on building the capacity of national actors so that they have the ability to develop priorities based on a country's development needs.

It also involves developing the countries' ability to:

- i. identify roadmaps to meet these priorities
- ii. identify the innovation gaps to be addressed for the countries to successfully progress on these road maps
- iii. coordinate activities across the innovation cycle.

Conclusion 1

- Most African countries have National STI policies including biotechnology policies, IP policies, biosafety policies, and biosafety frameworks.
- Governments' recognition of the role of STI in development agenda of Africa countries is an important step towards the realization of economic transformations and sustainable development



Conclusion 2

- The successful implementation of the STI policies and frameworks will rely heavily on the commitment of government and stakeholders
- A developing country can strengthen its NSI with a concerted national strategy, sustained policy efforts at the national level and effective international support



Way forward – Strengthening of NSI

Technology stage	Strategic analysis and coordination	Basic and applied research	Technology devpt & demonstration	Market-focused products/delivery	Commercialization	Large scale diffusion
Strengthening of NSI	<ul style="list-style-type: none"> -Develop priorities -Identify needs, local capabilities and resources -Identify implementation pathways and innovation gaps -Coordinates activities across innovation cycles 	Build scientific research capabilities	<ul style="list-style-type: none"> • Build scientific, engineering and design capabilities • Understand users and marketers and the linkages between the two 		<ul style="list-style-type: none"> • Build manufacturing capabilities • Create early markets • Mitigate risks for early adopters 	<ul style="list-style-type: none"> -Refine the business model -Encourage large-scale development -Develop policy review and feedback systems

Thank You

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