

# GLOBAL CHANGE GRAND CHALLENGE

## ENVIRONMENTAL INNOVATION



Parliamentary Portfolio Committee

Dr Henry Roman

Director: Environmental Services & Technologies

9 March 2016



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA



# Presentation Outline

- Water RDI Roadmap
- Waste RDI Roadmap
- NDE-RSA
- Climate Change and the Green Economy

- Strategic Objective
  - To identify, grow and sustain a portfolio of high-potential science, technology and innovation capabilities for sustainable development and the greening of society and the economy
- ILO identified Water and Waste sectors as the quick wins in developing green jobs
- IDC / DBSA Green Jobs report identified Natural Resource Management as having the most potential for green jobs

# South Africa's Water Research, Development, and Innovation (RDI) Roadmap: 2015-2025

Water Research Commission  
Department of Science and Technology  
Department of Water and Sanitation

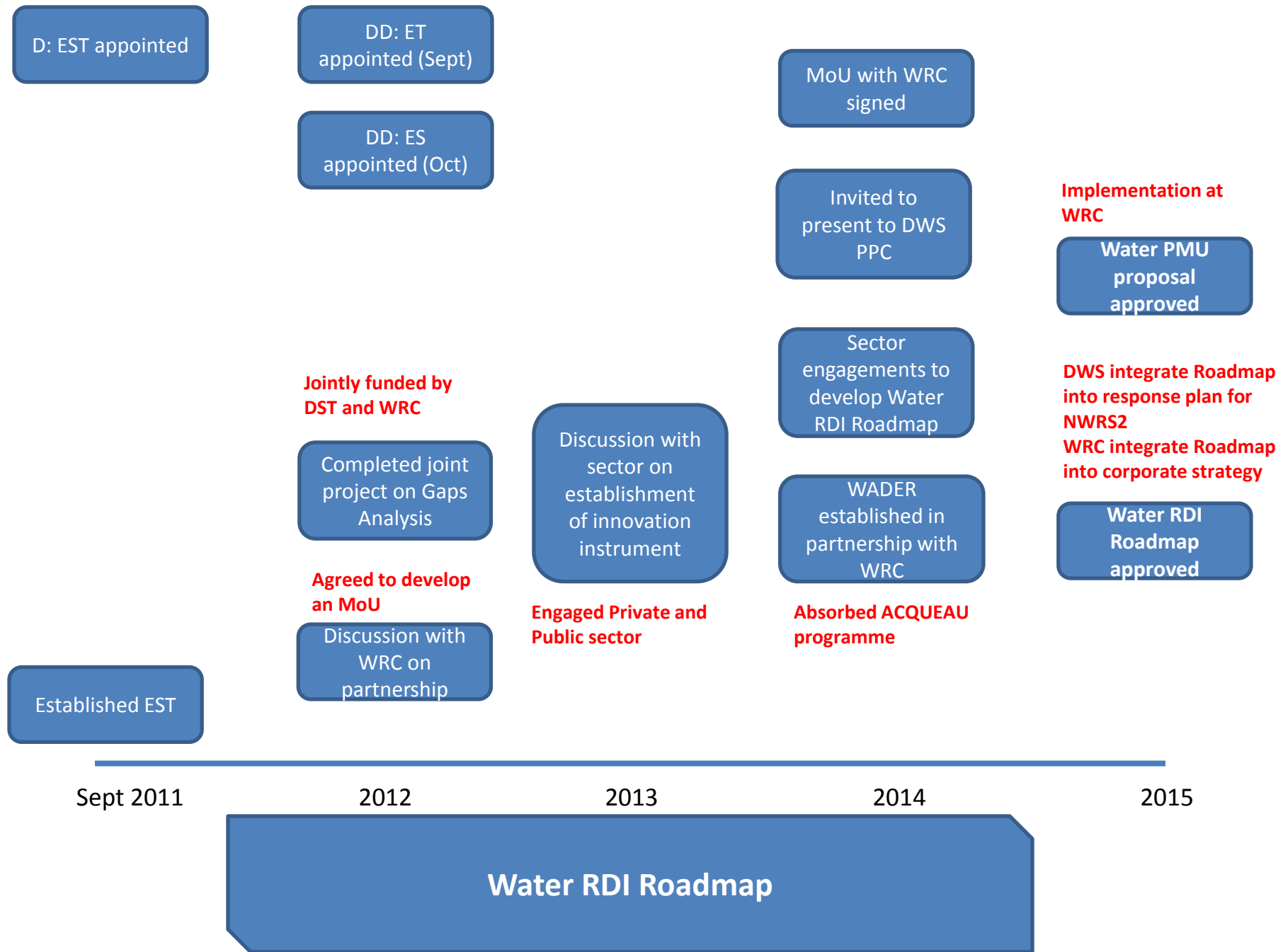
WRC Report No. 2305/1/15  
ISBN 978-1-4312-0683-4

July 2015

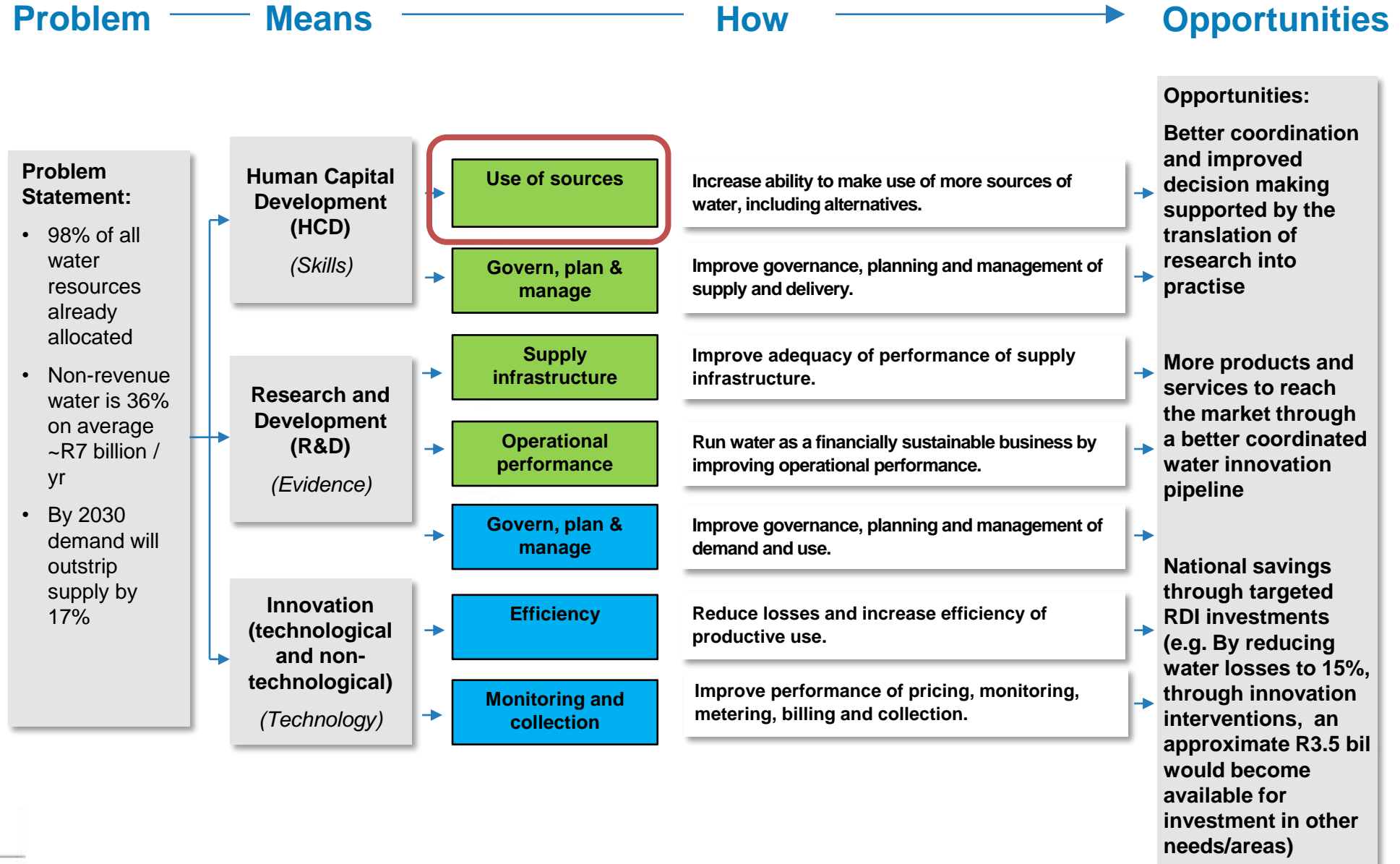


Science and Technology  
Water and Sanitation





# Strategically directing water RDI in support of impact



## Example: Cluster on Sources (Increase ability to make use of more sources of water, including alternatives)

	Immediate 2015	Short Term 2016-2018	Medium Term 2019-2021	Long term 2022 – 2024
Focus	<b>Explore:</b> Develop RP – defined research streams, objectives, plan. Aligned with NWRS2 and desalination strategy	<b>Research Programme</b>	<b>Centre of Excellence</b> for technologies associated with water recycling	Two <b>Professional Service Centres</b>
Objective	Scope the whole opportunity with customers and stakeholders <ul style="list-style-type: none"> <li>▶ Customers: Users</li> <li>▶ Mix and target mix over time – sources that are not waste</li> </ul>	<ul style="list-style-type: none"> <li>▶ Target particular sources that have higher potential</li> <li>▶ Accelerate process of making operational impact</li> <li>▶ Change the mix towards the ideal</li> </ul>		<ul style="list-style-type: none"> <li>▶ Provide effective technical assistance for regional water boards, WSAs and WSPs in decision-making about water sources and resource planning, technology selection, etc.</li> <li>▶ Support strategic supply-side decision-making (link to Supply GPM)</li> </ul>
Need	<b>Quantify Need</b> <ul style="list-style-type: none"> <li>▶ From the Reconciliation Strategy, frame requirement to identify and make use of alternative supplies for agriculture and public supply: management, technology</li> <li>▶ Define objective and requirement to increase use of treated effluent: management, technology</li> <li>▶ Define objective and requirement to increase and sustain levels of rainwater harvesting and efficiency of conservation methods.</li> </ul>	<b>Need</b> <ul style="list-style-type: none"> <li>▶ Produce up to date maps of rainfall and allocations - 2016</li> <li>▶ Develop Opportunities Map for each alternative source – precipitation, ground, waste and link to Planning and Management in Supply GPM</li> <li>▶ Assess industrial ecology of (7) industrial urban centres</li> </ul>	<b>Need</b> <ul style="list-style-type: none"> <li>▶ Continue monitoring for emerging pollutants and changes in sources of supply</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Professional Service Centre</b> provides technical assistance to municipalities (specifications, technical and professional advice, support with tender evaluation)</li> </ul>





# Water RDI Roadmap: Partnership

- Department of Water and Sanitation
  - Integrated into Ch14 of the NWRS2 (RDI Chapter)
  - Invited to the Water Sector Leadership Group – presented the Water RDI Roadmap
- Department of Environmental Affairs
  - Ntabelanga Catchment – Ecological Infrastructure
  - Joint planning on coordinating the Environmental Services area of research in South Africa – DEA NRM Chief Directorate
- Water Research Commission
  - Integrated Water RDI Roadmap into Corporate Strategy
  - Partnered on the WRC RDI Symposium – Water Tech Summit
  - Partnered on piloting WADER
- SALGA
  - Technology Accelerator Programme - WADER
- Randwater
  - Currently drafting a 3-way MoU between Randwater, WRC and DST
- EUREKA – ACQUEAU (EU Platform)
  - WRC has partnered with the DST to manage the South African contribution to projects that win the EUREKA label
  - 3 projects approved – 1 co-funded with Europe
  - All projects concern AMD treatment



# Human Capital Development

- Human Capital Development (Masters, Doctoral)
  - Water RDI Students

Total students	Male	Female	Black (broad definition)	White
14	5	9	7	7



- Established Biomicry Platform with Biomimicry SA in March 2015



- Projected to grow to 35 students in 2016/17

# Looking ahead 2016/17

- Establishment of the Water RDI PMU at the WRC
  - WRC will put in place the Water RDI PMU Manager
  - Develop a Water NSI partnership and tracking system
  - Prepare a joint MTEF bid to National Treasury with DWS
  - Set up collaborative RDI partnership with Australia
  - Develop a Consolidated Partnership and Co-funding Strategy

# A WASTE RESEARCH, DEVELOPMENT AND INNOVATION ROADMAP FOR SOUTH AFRICA (2015-2025)

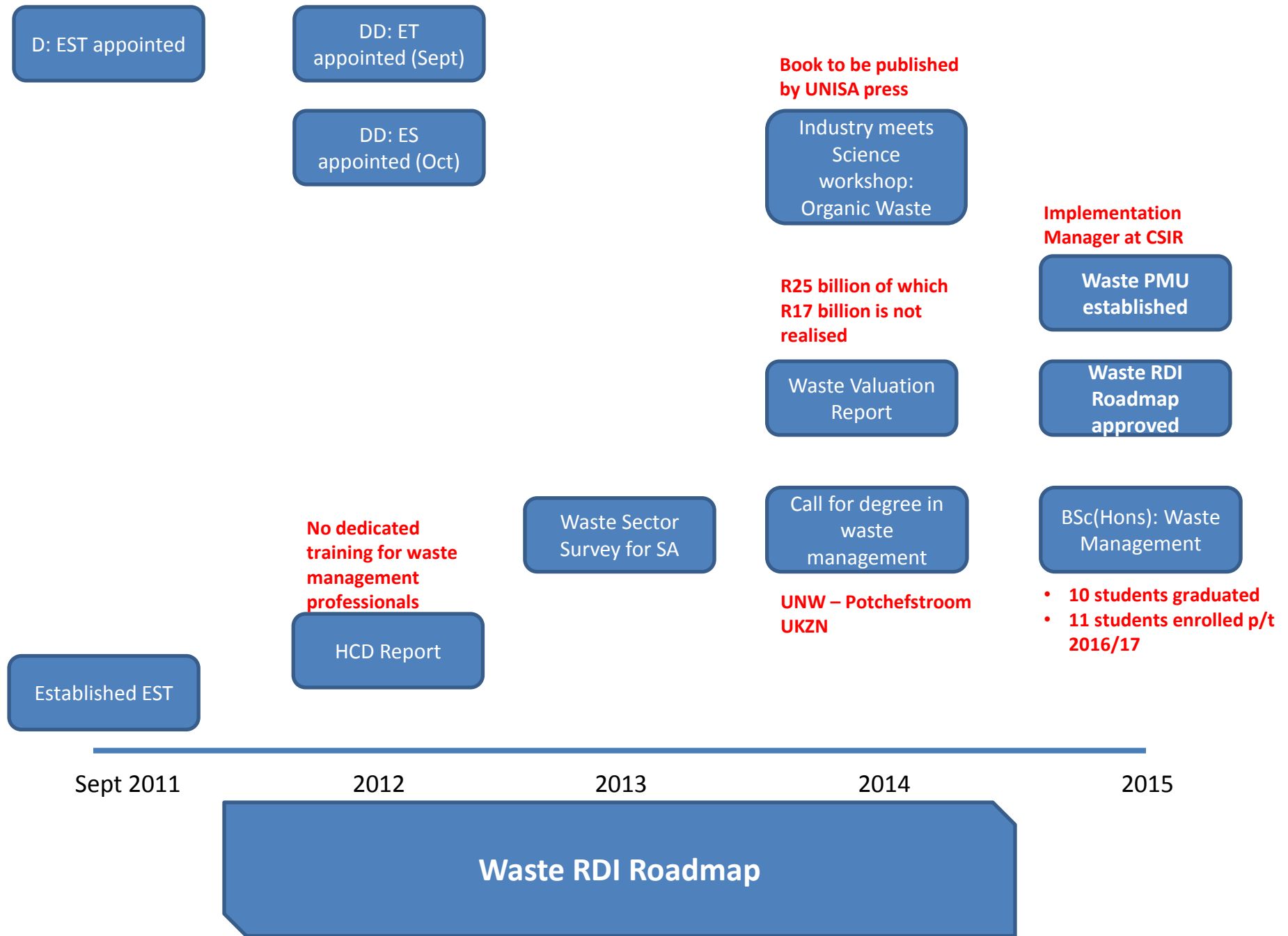
*Towards a secondary resources economy*



science  
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Science and Technology  
REPUBLIC OF SOUTH AFRICA







# The Need

- The correct management of waste and the diversion of waste away from landfill
  - Create opportunities to move secondary resources into a **local** secondary resources **economy**
  - And in so doing, create **environmental**, **social** and **economic** opportunities for South Africa
- In this lies significant **opportunity** and **need** for research, development and innovation (RDI) to –
  - Unlock **new solutions** for utilising “waste”
  - Inform **policy** development and implementation
  - Inform **technology** uptake
  - Inform decision-making through **sound evidence**

# The Need



- South Africa has embraced the principles of the **waste hierarchy** in policy and legislation
- But, it has been **slow to transition** up the waste hierarchy
  - South Africa landfills ~90% of all waste generated (2011)
  - A minimum of R17 billion worth of resources lost to the SA economy and a downstream manufacturing sector every year through disposal to landfill (2012)



# The approach

- The Waste RDI Roadmap is implemented in line with the DST's mandate "*to use **science** and **technology** to improve the country's economy, create employment and improve the quality of life of all citizens*" [Minister, 2014], and
- Is underpinned by the **three pillars** aligned with the mandate



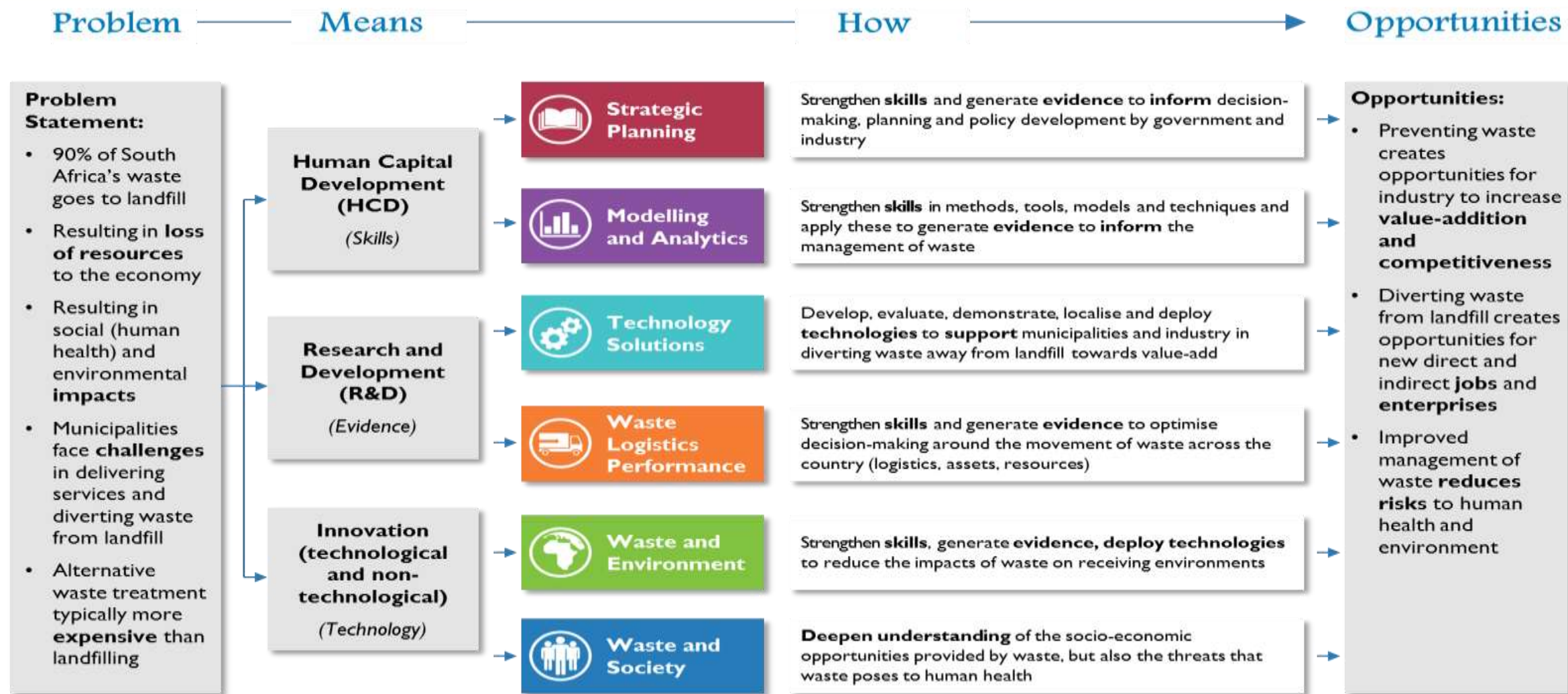


# The approach

- Developing the Roadmap together with the waste and recycling sector through –
  - Regional **stakeholder workshops** to prioritise the waste streams and goals
  - **Industry expert working groups** for each of the 5 priority waste streams
  - **Academic expert working groups** for each of the 6 clusters of the Roadmap



# Waste RDI Roadmap for South Africa



# Implementing the Waste Roadmap

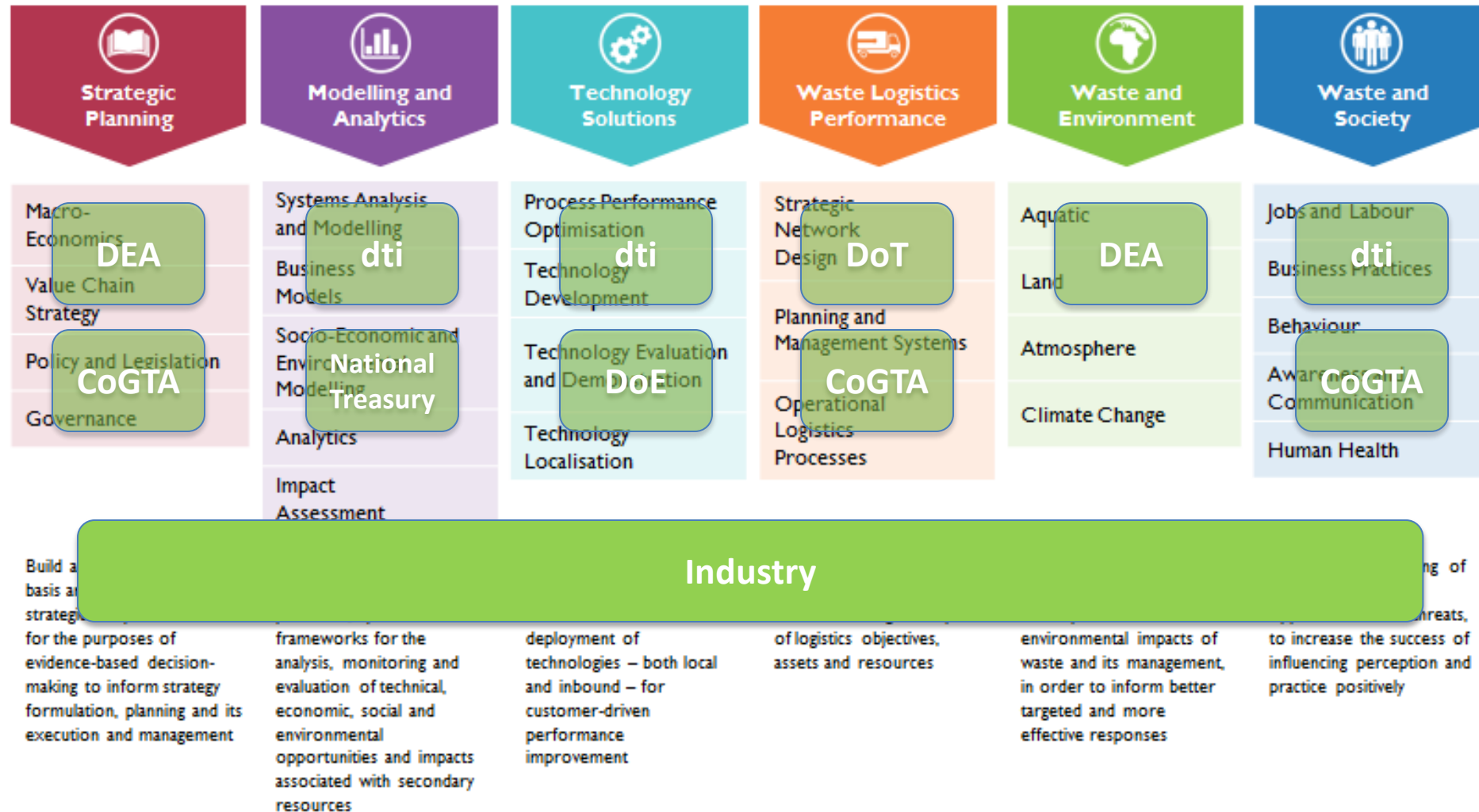
- The Waste RDI Roadmap was **approved** by DST Executive in November 2014
- The CSIR was appointed by the DST to **implement** the Waste RDI Roadmap from April 2015
- To drive **human capital development** (HCD), **research and development** (R&D) and **innovation**
  - In **partnership** with Government, Industry and Academia, and
  - Actively engage opportunities (local and international) for waste RDI **collaboration** and **co-investment**





# Process: Priority RDI focus areas

## RDI Clusters defined



# Reflecting on 2015/16 the first year

## Human Capital Development (HCD)

Providing a pipeline of skilled post-graduates into the waste and secondary resources sector with the skills to drive alternative waste treatment and to unlock opportunities

Increasing the supervisory capacity to mentor post-graduate (Honours, Masters, Doctoral and Post-Doc students)

- Post-graduate **degrees** in waste management
  - **BSc Honours** (Environmental Sciences with specialisation in Waste Management) (NWU)
    - First class of 10 students completed (2015)
  - **MSc Eng** (Waste Management) (new degree) (UKZN)
    - Approved by University in 2015 and submitted to CHE for approval
    - Planned offering from 2017
- Post-graduate **scholarships** in waste management
  - Call for Open and Targeted Scholarships in 2015
  - Partnering with Plastics|SA on the targeted call

# Reflecting on 2015/16 the first year

## Human Capital Development (HCD)

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Increasing the supervisory capacity to mentor post-graduate (Honours, Masters, Doctoral and Post-Doc students)

- Post-graduate **scholarships** in waste management
  - 28 Masters and 8 Doctoral Scholarship applications (36) were received
  - 9 Post-graduate Scholarships awarded for 2016
  - Number limited only by the funding available
  - Strong focus of planned studies on “**Technology Solutions**” (Cluster) and “**Organic waste**” (Priority waste)
  - Supporting **transformation** of the waste sector (black 56% of awarded scholarships) and (female 67% of awarded scholarships)

# Reflecting on 2015/16 the first year

## Waste Research & Development (R&D)

Supporting the generation of new scientific evidence, relevant to South Africa, that will inform policy, planning, decision-making

Supporting the development of new technology and of adapting technology to South Africa conditions through R&D

- Issued **Open R&D Calls** to Public Research Institutions in 2015
  - 22 Grant Applications received
  - 10 Projects awarded starting in 2016
  - Number limited only by the funding available
  - Strong focus of planned R&D on “**Technology Solutions**” (Cluster) and “**Organic waste**” (Priority waste)
- Consolidating existing R&D
  - Planned DST Academic book series
  - First book in process on the beneficiation of “**biomass and organic waste**” in South Africa



# Reflecting on 2015/16 the first year

**Waste  
Innovation**  
(technological  
and non-technological)

Driving technological and non-technological innovation to improve the management of waste in South Africa and to unlock the social, environmental and economic opportunities in resource recovery

Developing technological solutions unique to South African conditions

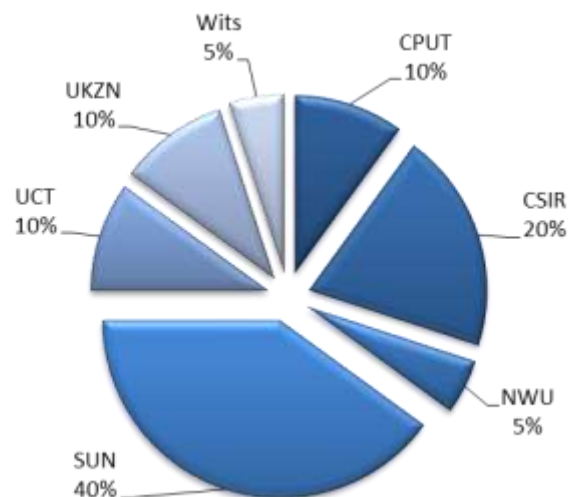
- Issued **Open Innovation Calls** for upscaling technologies from TRL 3
  - 5 Grant Applications received
  - 1 Project awarded starting in 2016
  - Number limited only by the funding available
- Targeted projects through **RFPs**
- Industry-meets-Science Workshop series
  - Strengthening collaboration between industry and academia
  - “**Biomass and organic waste**” (2014)
  - “**Bioplastics**” (2016)

# Reflecting on 2015/16 the first year

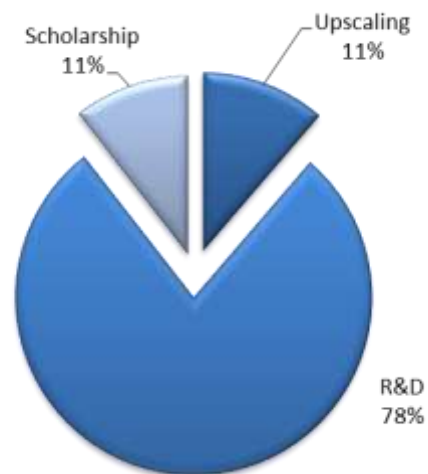


- Summary of all scholarships and grants awarded for 2016

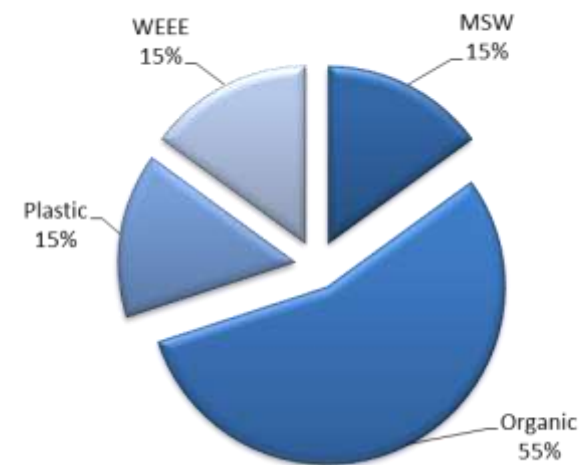
By institution



Financial investment by funding instrument



By waste stream



# Future activities



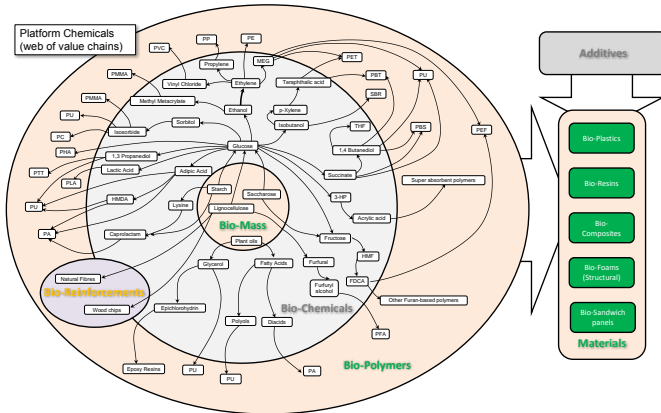
- Strengthening the **investment** in local waste R&D and innovation through e.g. country-to-country bilaterals, industry partnerships
- Increasing national **activity** in waste RDI through industry and government partnerships
- **Supporting** local government in the evaluation and demonstration of waste technologies
- Ongoing **Calls** for post-graduate scholarships, R&D and Innovation projects
- **Targeted RFPs** to gather evidence to support future activity under the Roadmap, e.g. WEEE
- Increasing waste **RDI collaboration** between South Africa and Africa, and other key international partners



# Future activities



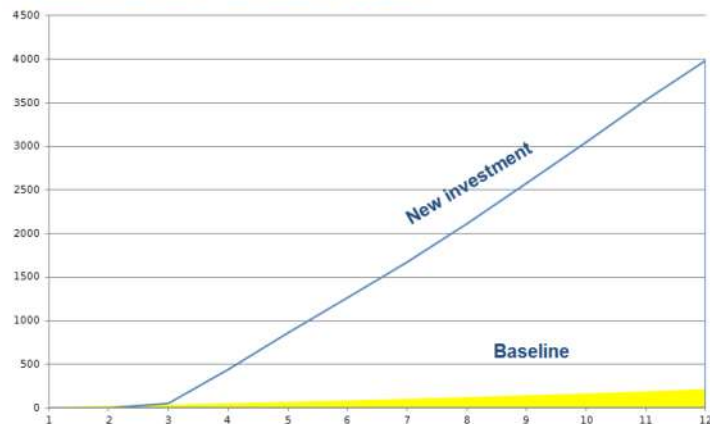
- Launch of the **South African Bioplastics Forum** by Plastics|SA in partnership with DST and the Waste RDI Roadmap Implementation Unit



- Launch of **South African Biorefinery Research Platform** by the DST in support of the Waste RDI Roadmap and Bio-Economy Strategy

# Potential risks to implementation

10-Year Investment – Cumulative, in ZARm



Annual RDI Investment, by Funding Source, in ZARm



- Developing **strategic partnerships** with Industry, Government and Academia that recognise the **value** of waste R&D and innovation
- Leveraging local and international **funding** together with the DST seed funding to ramp up activities
- Current local academic **capability**

# Climate Change and the Green Economy



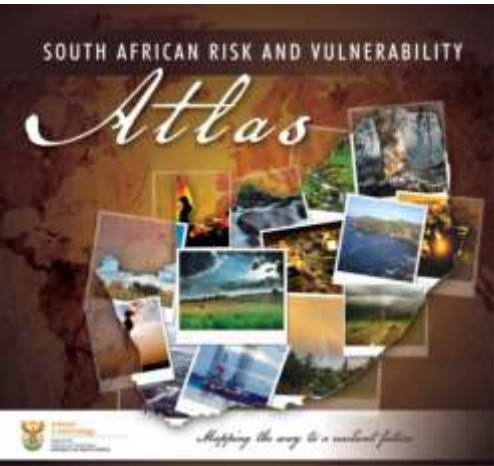


# Climate Change & Green Economy

- Represent DST on the IGCCC and NCCC
- Project managed on behalf of DEA the 'High Level Greenhouse Gas Mitigation Technology Implementation Plan'
- Together with the D: ESS contributed to the ToR for the update to the TNA with DEA
- NDE – RSA for the CTCN
  - 3 provincial workshops
  - 4 requests evaluated and 2 submitted to CTCN end November 2015
  - 1 Approved
  - Also engaged with business on CTCN
  - Co-organised a panel for the WSSF2015 on the energy crisis in South Africa and how partnership can overcome it

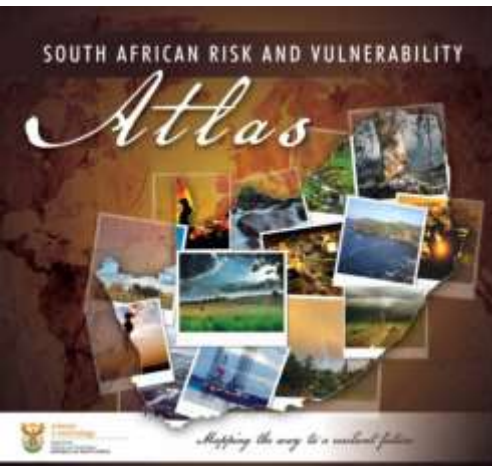


# South African Risk & Vulnerability Atlas - SARVA



- The portal allows easy access through advanced search functionalities to data on other platforms from different research institutes, such as SAEON and other DST Initiatives.
- While the portal is open to all stakeholders, it aims to equip decision-makers at national, provincial and local government as well as the NGOs and the private sector with information on impact and risk associated with global change
- The data is essential in planning for current and projected global and climate change impacts and assists decision makers in implementing adaptation strategies.

# South African Risk & Vulnerability Atlas - SARVA



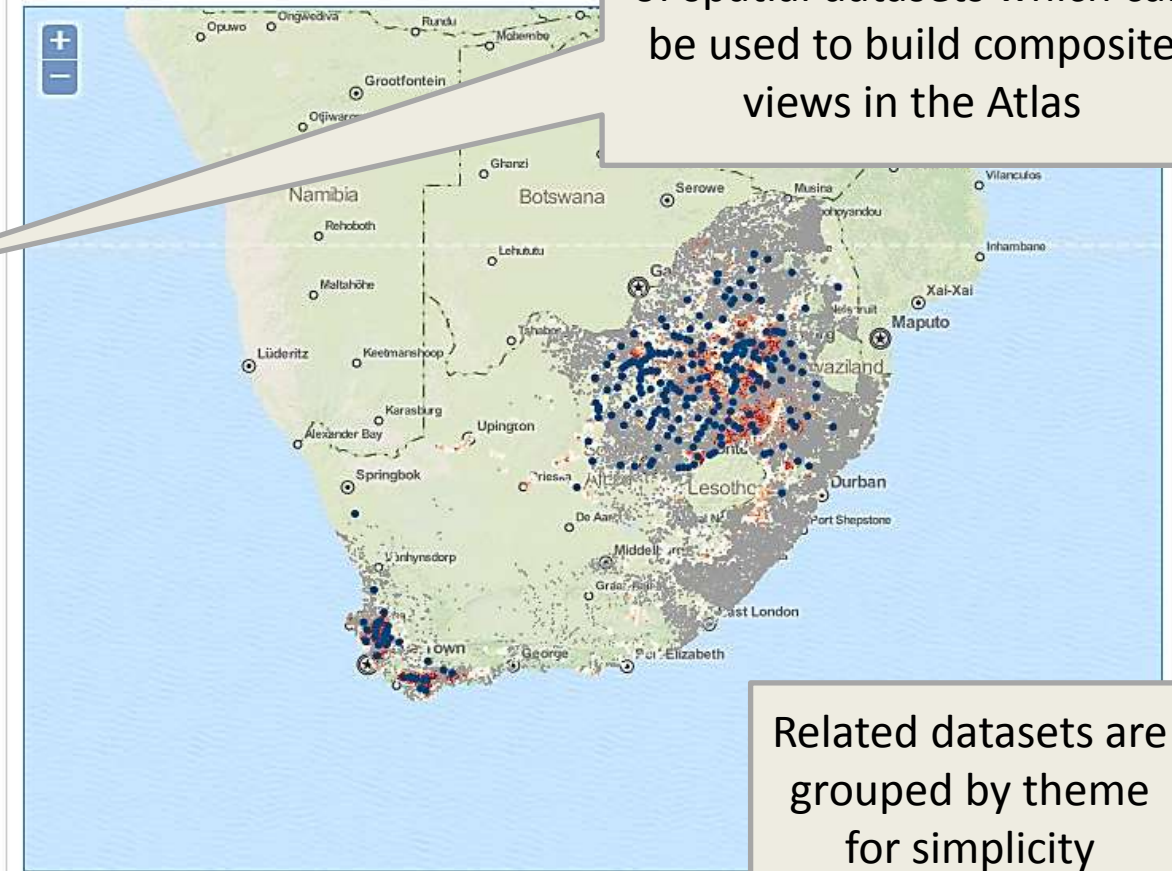
**Contents**

**General**

- ▶ Extent of Cropland
- ▼ Cropland per Planning Zone (%)
  - 0.0000 - 20.0018
  - 20.0018 - 40.0037
  - 40.0037 - 60.0055
  - 60.0055 - 80.0073
  - 80.0073 - 100.0092
- ▶ Summer Rainfall Crops
- ▶ Winter Rainfall Crops
- ▶ Type of Agriculture
- ▼ Subsistence Farming
- ▶ Degraded Land
- ▼ Silo Locations

Map

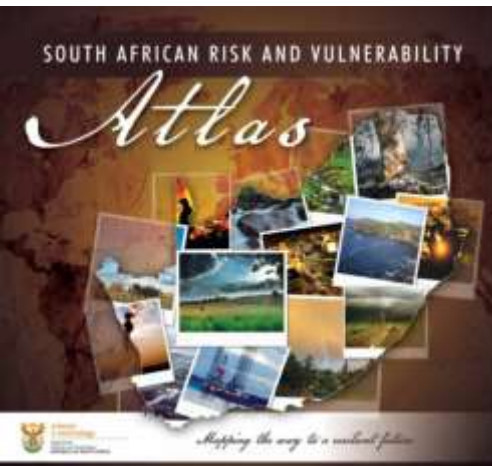
Document



SARVA provides a collection of spatial datasets which can be used to build composite views in the Atlas

Related datasets are grouped by theme for simplicity

# South African Risk & Vulnerability Atlas - SARVA



**Contents**

**General**

- Extent of Cropland
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- Silo Locations

**Sugar Producing Crops**

**Starch-based Crops**

**Oil Producing Crops**

**Map** | **Document**

**THEME: PURPOSELY CULTIVATED CROPS**

**Extent of Crop Cultivation in South Africa**

**Legend**

- FAO Cropland
- Provinces

**Author(s): FAO**  
**Date: 2008**

Detailed metadata descriptions are also available for each layer in the Atlas

Metadata descriptions include information such as: Author(s), publication date, abstract, keywords, etc.





## Introduction to Services and the NDE - RSA

[www.ctc-n.org](http://www.ctc-n.org)



United Nations  
Framework Convention on  
Climate Change



# CTCN Mandate, Services and Structure



The CTCN's mission is "Stimulating technology cooperation and enhancing the **development and transfer of technologies** to developing country Parties at their request"

## Services:

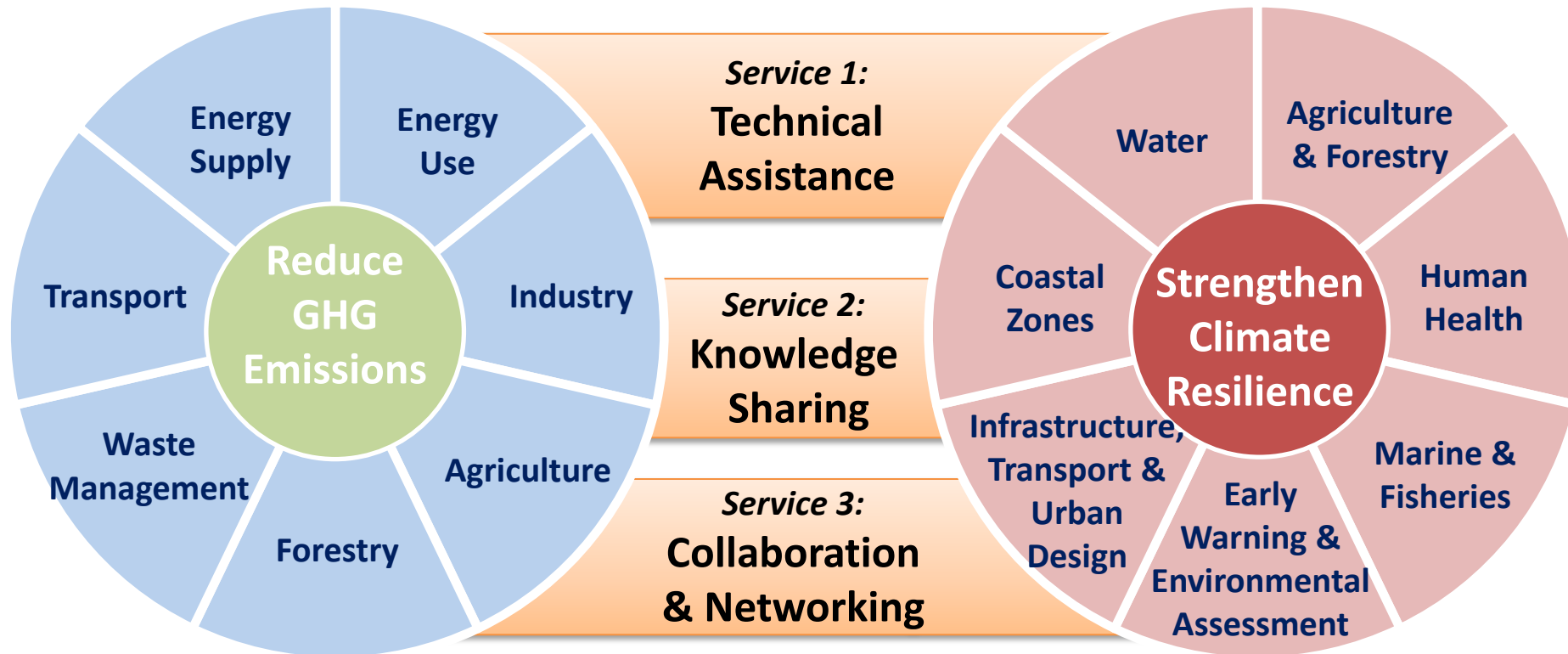
1. Technical assistance to developing countries
2. Knowledge sharing and training
3. Fostering collaboration on climate technologies (including linking climate technology projects with financing opportunities)

## Structure:

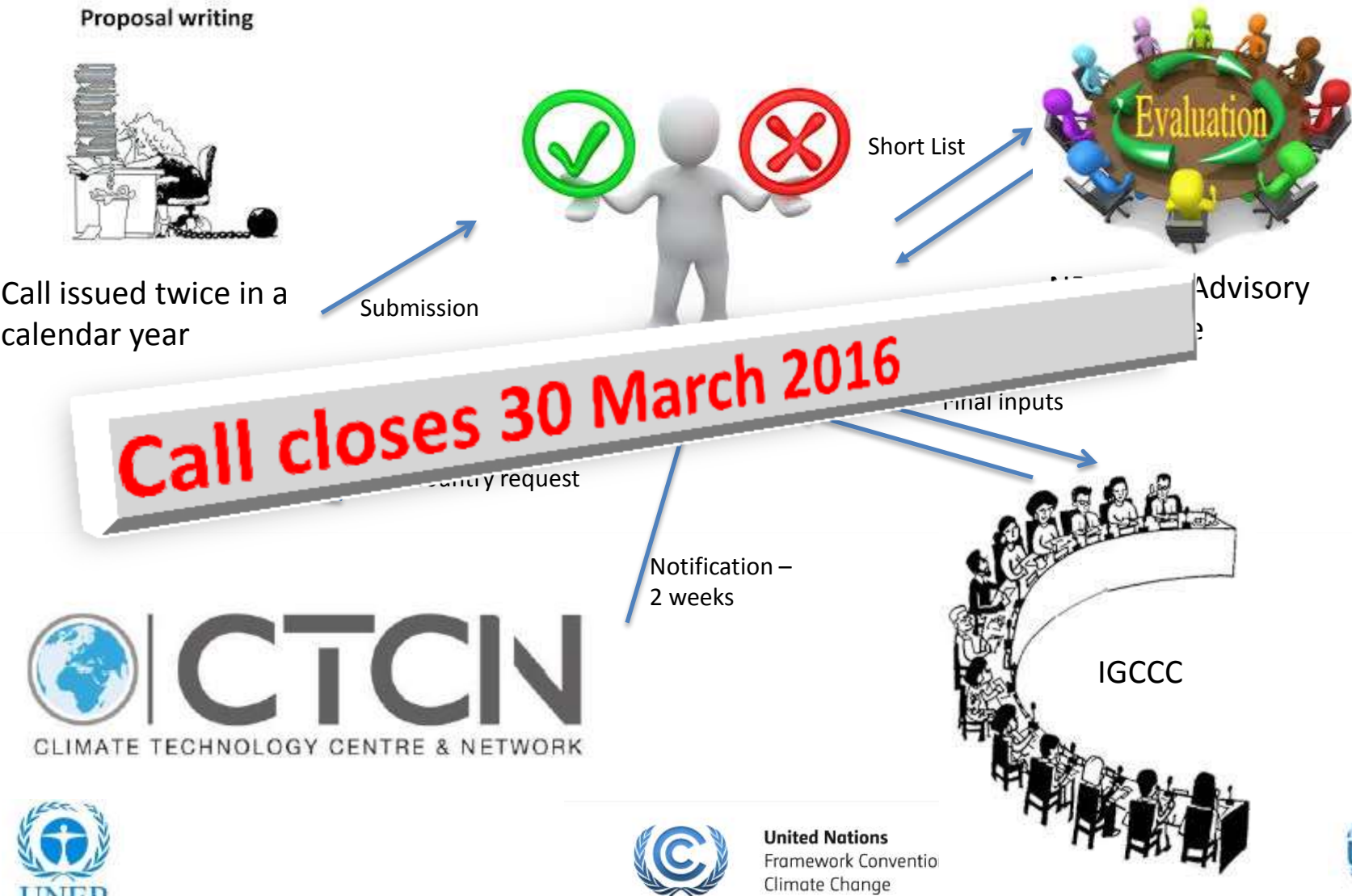
CTCN is hosted by UNEP in collaboration with UNIDO and supported by 11 partner institutions with expertise in climate technologies



# CTCN Services and Intended Impacts

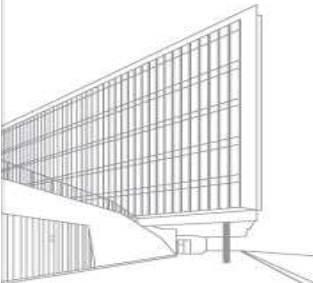
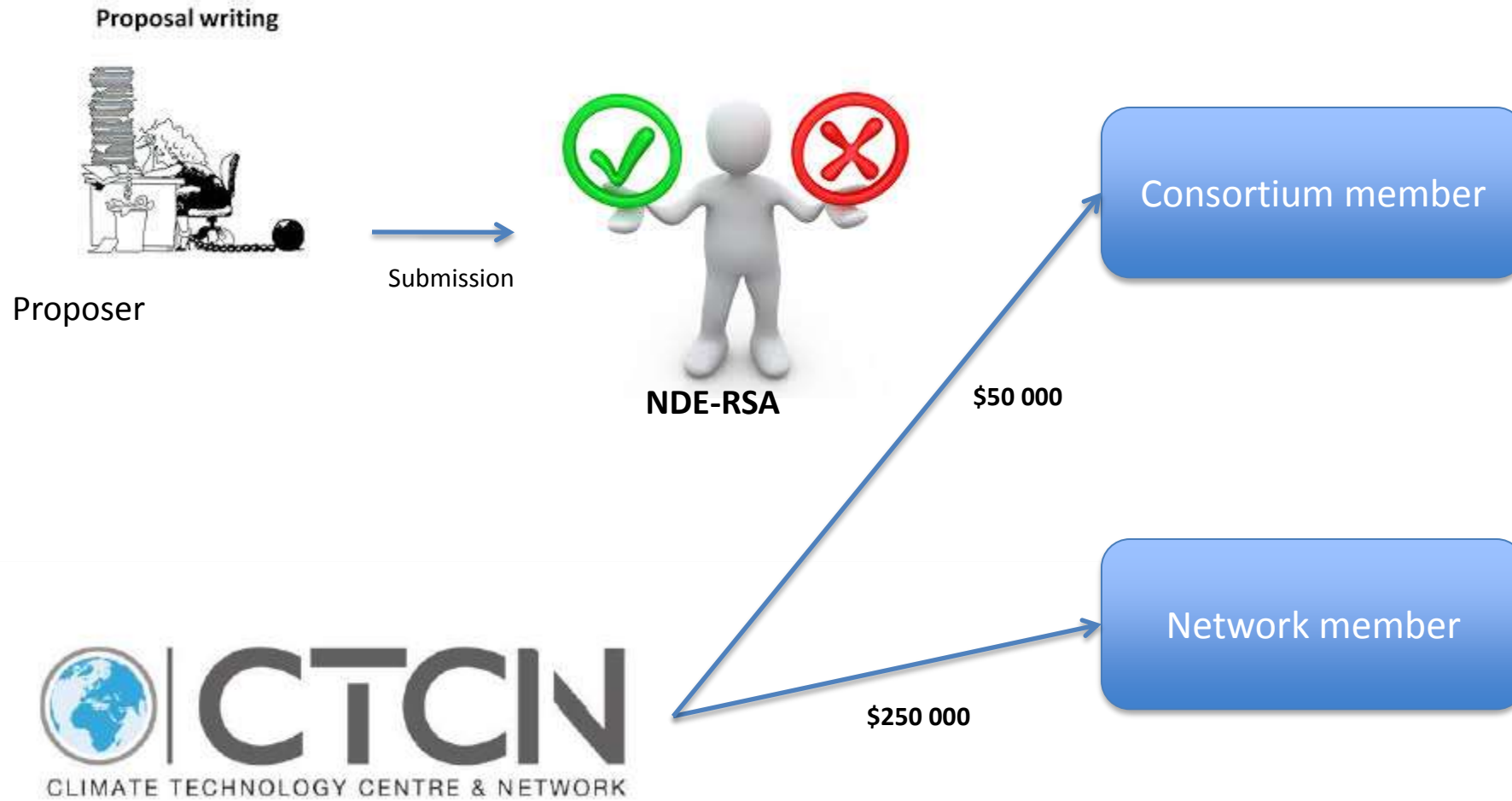


# Submission Process





# Flow of money





NDE – RSA:

Henry Roman

[Henry.roman@dst.gov.za](mailto:Henry.roman@dst.gov.za)

012 843 6434

*Alternate*

Magamase Mange

[Magamase.mange@dst.gov.za](mailto:Magamase.mange@dst.gov.za)

012 843 6417

For more information, please visit:

<http://ctc-n.org>

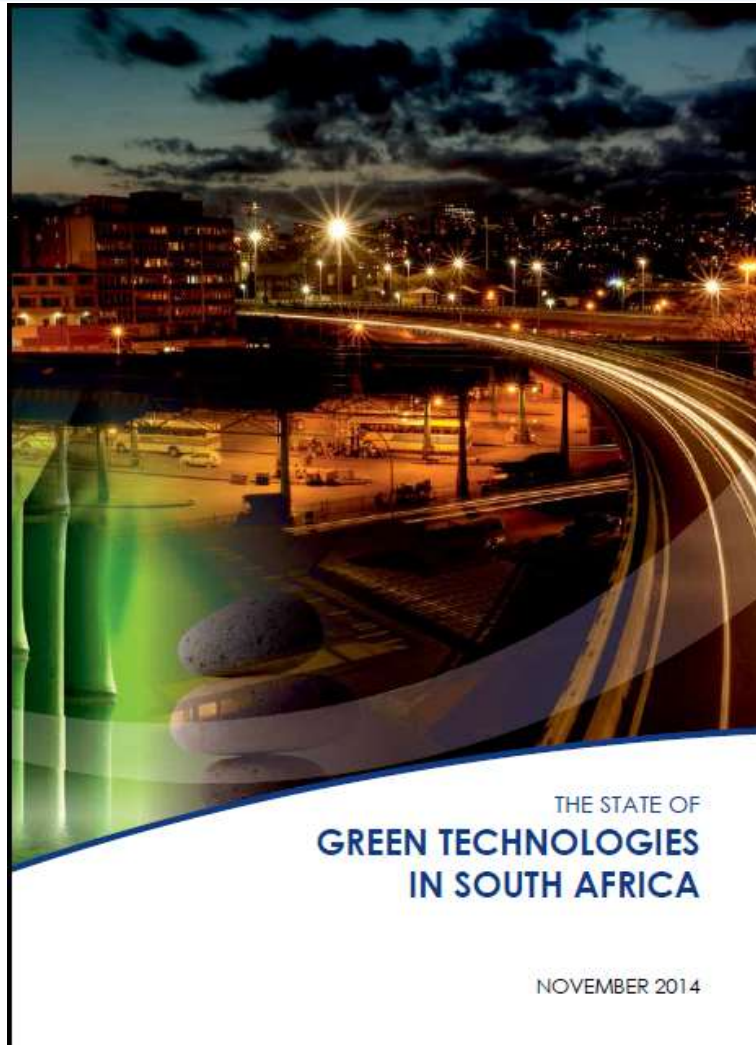




# The State of Green Technologies Report for South Africa - ASSAf

The aim of this study was to review green technologies available in South Africa, identify gaps in the availability of these technologies and to make recommendations to promote the growth of green technologies in the country.

# The State of Green Technologies Report for South Africa - ASSAf



- Key recommendations:
  - Policy Certainty & Policy coherence
  - Implementor and Developer Roles
  - Creation of an Entrepreneurial State
  - Skills transfer and innovation capacity
  - Focus on the Market
  - Alignment to SAs development needs
  - Development of Indicators
  - Green Technology Hubs
  - Systematic Evaluations of Failed or Discontinued Projects
- Report has been used in Japan by JICA and academics – requested copies to be sent

# Baseline for Green Economy R&D investments as of 2011 - Draft

ESTABLISHING A BASELINE FOR GREEN  
ECONOMY RESEARCH AND DEVELOPMENT  
INVESTMENTS AS OF JANUARY 2011

Georgina Ryan  
Gaylor Montmasson-Clair  
Gillian Chigumira  
Thabani Madlala

February 2016



- First of its kind in SA
- Used the annual R&D Survey data – best data source available
- Base year 2010/11
  - Total expenditure = R4.8 – R5.3 billion
  - 26% of GERD increased to 28% of GERD in 2012/13
- The project developed a rationale and methodological approach for working through the concept of Green R&D
  - No international benchmark could be found

