

# Changing the face of waste management through Research, Development and Innovation



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

**Prof Linda Godfrey** PhD (Eng) Pr Sci Nat  
Manager: Waste RDI Roadmap IU  
South Africa

# Highlights of the Waste RDI Roadmap 2015/16

## RESEARCH, DEVELOPMENT AND INNOVATION



**2** Industry-meets-  
Science workshops



**11**  
research and innovation  
grants awarded



**6**  
successful  
recipient research  
organisations

**8.4**  
MILLION  
RAND

invested in the  
national system  
of innovation



**27** applications  
for R&D and  
Innovation grants

**36** MILLION  
RAND



of R&D and  
innovation  
proposals  
received

Launched: SA Bioplastics Forum

# Highlights of the Waste RDI Roadmap 2015/16

## HUMAN CAPITAL DEVELOPMENT

**9** postgraduate  
scholarships  
awarded

**10** honours students  
completed their  
degree in waste  
management

**36** applications for  
postgraduate  
scholarships

## COMMUNICATION IMPACT

### POPULAR ARTICLES

**2** radio interviews  
**15** print articles  
highlighting  
the Waste RDI  
Roadmap



### TOP DOWNLOADED PUBLICATIONS

**2 447** Trends in waste management  
**1 148** South African Waste Sector Survey  
**1 083** The economic benefits of moving  
up the waste hierarchy  
**925** Current and required institutional  
mechanisms to support waste innovation  
**870** Waste management red meat abattoirs

### WEBSITE



**2 857** UNIQUE VISITORS  
**4 062** NUMBER OF VISITS  
**13 593** PAGES VISITED  
**17 737** DOCUMENT  
DOWNLOADS

### TOP 5 COUNTRIES ACCESSING THE WASTE RDI ROADMAP WEBSITE



[www.wasteroadmap.co.za](http://www.wasteroadmap.co.za)

# Outline of presentation

- What does a **Waste Research, Development and Innovation Roadmap** have to do with “*Changing the face of waste management*”?
- In this presentation we aim to highlight how the DST, together with key local and international partners, are supporting –
  - Human Capital Development (HCD)
  - Research and Development (R&D)
  - Innovation
- With the aim of **improving the management of waste** in South Africa

WasteCon  
**2016**



23<sup>rd</sup> Conference and Exhibition

# Background: A 10-Year Waste RDI Roadmap

- The 10-Year Waste Research Development and Innovation (RDI) Roadmap is an initiative of the South African Government, managed by the Department of Science and Technology (DST) in line with their mandate
- Aimed at providing **strategic direction**, a set of action-plans and an implementation framework
- To guide, plan, coordinate and manage South Africa's **portfolio investment**, for the next 10 years, in **six identified clusters** of waste and secondary resources research, development and innovation activity

WasteCon  
**2016**

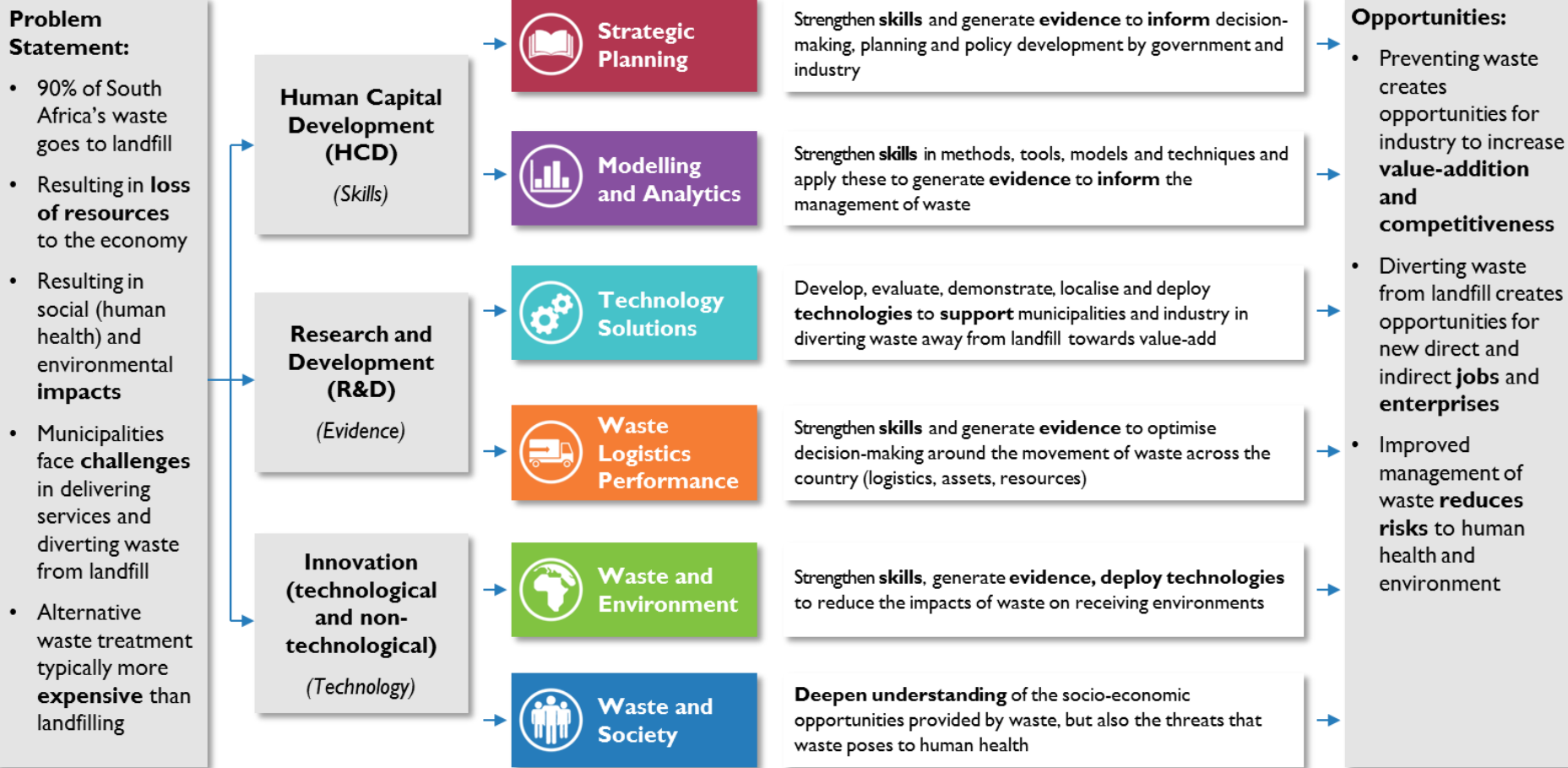
23<sup>rd</sup> Conference and Exhibition





# Background: A 10-Year Waste RDI Roadmap

Problem — Means — How — Opportunities



# Strengthening HCD in South Africa

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 graduated (2015)
    - Offered as a full-time (and now part-time) degree
  - **MSc** (Environmental Management with specialisation in Waste Management) (NWU)
    - Planned offering from 2017
  - **MSc Eng** (Waste Management) (new) (UKZN)
    - Approved by the University and SAQA and now with CHE for approval
    - Planned offering from 2017

**WasteCon**  
**2016**



23<sup>rd</sup> Conference and Exhibition

# Strengthening HCD in South Africa

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 **scholarships** in waste management
  - Open and Targeted Calls for Scholarships in 2015
    - Partnered with Plastics|SA on the targeted call
  - 36 applications were received (28 Masters and 8 Doctoral Scholarship applications)
  - 9 Post-graduate Scholarships awarded for 2016
  - Strong focus of planned post-graduate studies on “**Technology Solutions**” (Cluster) and “**Organic waste**” (Priority waste)
- Supporting **transformation** of the waste sector (female 56% of awarded scholarships) and (black 56% of awarded scholarships)

**WasteCon**  
**2016**

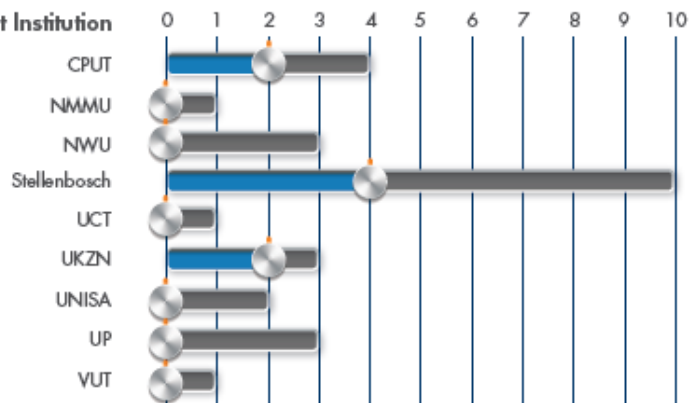
23<sup>rd</sup> Conference and Exhibition



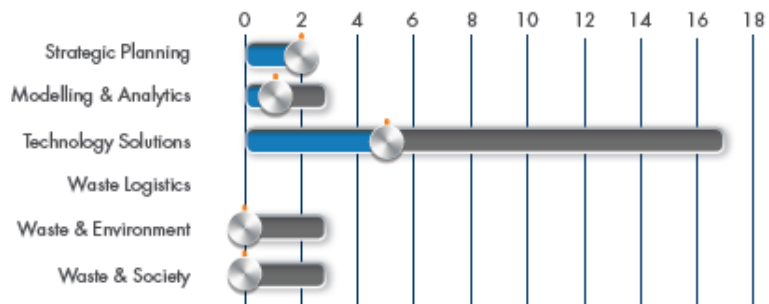


## Thematic Spread of Master's Applications and Awards

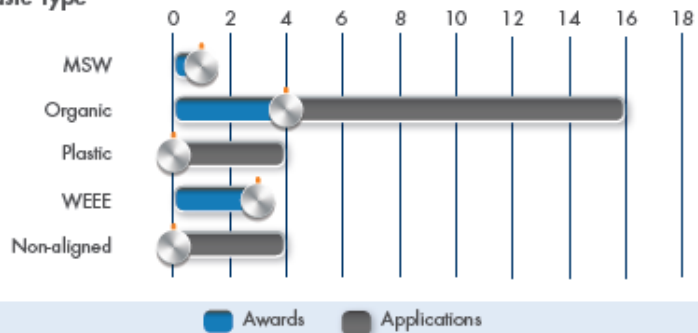
### By Host Institution



### By Cluster



### By Waste Type

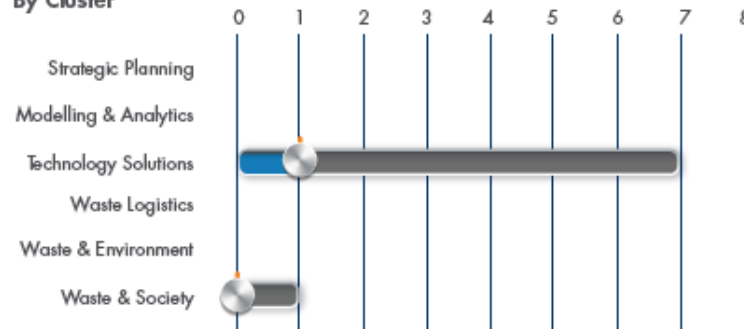


## Thematic Spread of Doctoral Applications and Awards

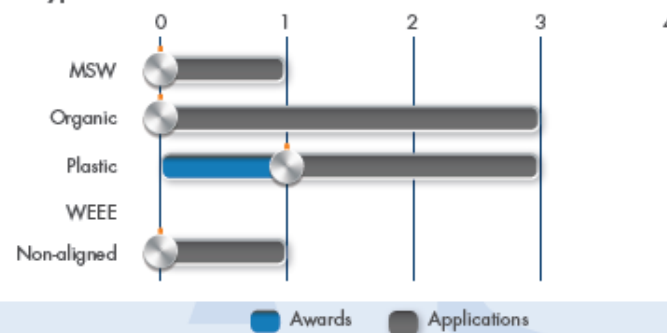
### By Host Institution



### By Cluster



### By Waste Type



# Strengthening R&D in South Africa

## 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
  - Strong focus of planned R&D on “**Technology Solutions**” (Cluster) and “**Organic waste**” (Priority waste)
- Consolidating existing R&D in South Africa
  - Planned DST Academic book series
  - First book in process on the beneficiation of **biomass and organic waste** in South Africa

WasteCon  
**2016**

23<sup>rd</sup> Conference and Exhibition



# Strengthening Innovation in South Africa

**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 Call** for upscaling technologies from TRL 3
  - 5 Grant Applications received
  - 1 Project awarded starting in 2016
- Targeted projects through **RFPs**
  - RFP issued on e-waste (WEEE) technology landscape mapping in South Africa
- Industry-meets-Science Workshop series
  - Aimed at strengthening RDI collaboration between industry and academia
    - **Bioplastics**
    - **WEEE**

**WasteCon  
2016**



23<sup>rd</sup> Conference and Exhibition

# Research projects supported under Roadmap



Lessons from **Waste Picker** Integration Initiatives – Development of evidence-based Guidelines  
[Dr M Samson, University of Witwatersrand, Johannesburg]



A decision-support tool for implementing municipal waste **separation at source** [A Nahman, CSIR NRE, Stellenbosch]



Beneficiation of **forestry biomass** waste streams  
[Prof B Sithole, CSIR NRE, Durban]



Valorisation of **waste chicken feathers**  
[Prof B Sithole, CSIR NRE, Durban]



23<sup>rd</sup> Conference and Exhibition

# Research projects supported under Roadmap



Sustainable utilization and conversion of post-harvest **agricultural waste** residues into value added materials  
[Dr M John, CSIR MSM, Port Elizabeth]



Value recovery from **solid confectionary waste**  
[Prof S Harrison, UCT, Cape Town]



Reactor design for industrial furfural production from **sugar cane** agricultural residues [Prof J Görgens, SUN, Stellenbosch]



Biogas and volatile fatty acids biorefinery by co-digestion of **fruit juice wastes** with lignocellulosic biomass  
[Prof J Görgens, SUN, Stellenbosch]

WasteCon  
2016



23<sup>rd</sup> Conference and Exhibition



# Research projects supported under Roadmap



Production of novel cellulose nanocomposites from **organic waste**  
[Dr A Chimphango, SUN, Stellenbosch]



Amino acid leaching of metals from **printed circuit board** waste  
[Dr C Dorfling , SUN, Stellenbosch]



Extraction of value from solid waste by **pyrolysis conversion**:  
Pilot scale optimisation [Prof J Görgens, SUN, Stellenbosch]  
(Innovation Project)

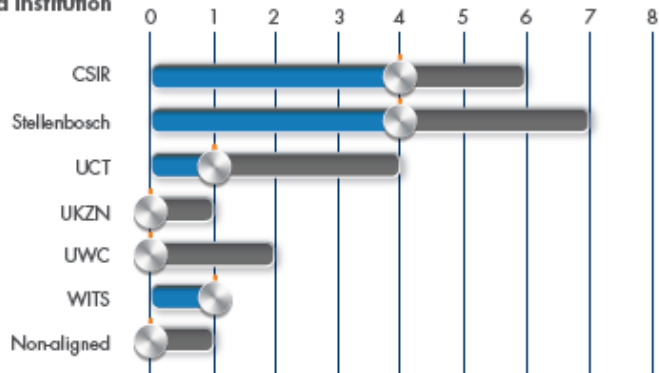
WasteCon  
2016



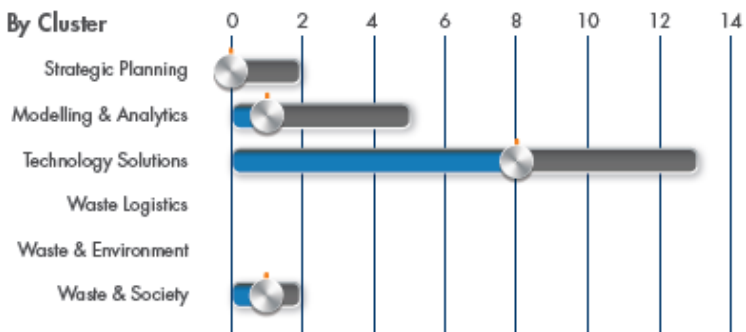
23<sup>rd</sup> Conference and Exhibition

## Thematic Spread of R&D Grant Applications and Awards

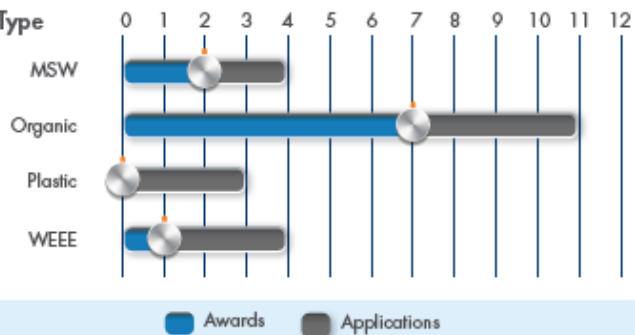
### By Lead Institution



### By Cluster



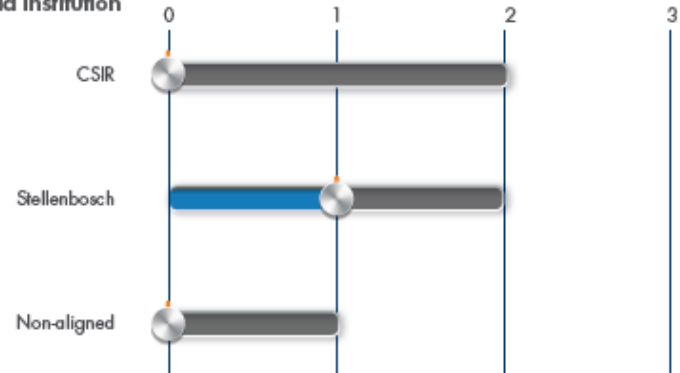
### By Waste Type



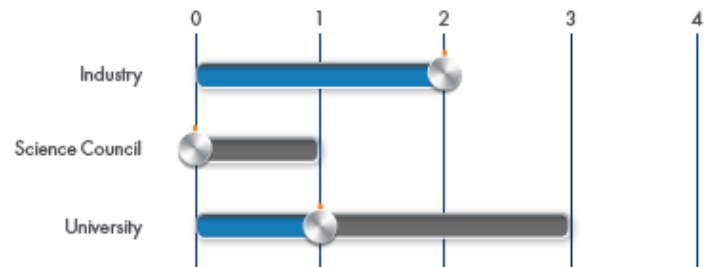
■ Awards ■ Applications

## Thematic Spread of Innovation Grant Applications and Awards

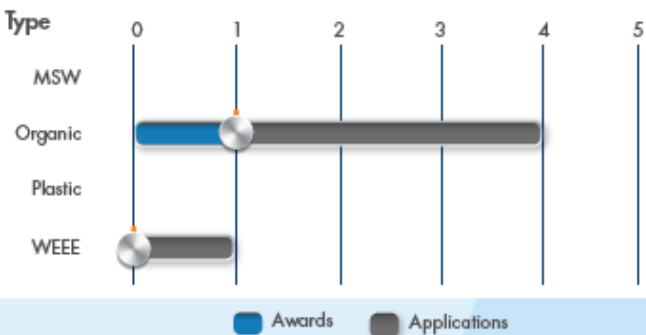
### By Lead Institution



### By Partner Institution



### By Waste Type



■ Awards ■ Applications

# Strengthening waste RDI in South Africa

- The **South African Bioplastics Forum** was launched by Plastics|SA, in partnership with the CSIR and the DST, at the Bioplastics Industry-meets-Science workshop held in Durban in January 2016.
- The aim of this forum is to **support the growth of the bioplastics economy** in South Africa.



23<sup>rd</sup> Conference and Exhibition

# Strengthening waste RDI in South Africa

- Partnerships (local and international) are key to strengthening waste RDI in South Africa – in improving the management of waste, and the increased diversion of waste from landfill
  - **Government** (national, provincial and local)
    - Evidence to support decision-making, policy development and implementation
  - **Business**
    - Supporting the sector through evidence and skills to drive waste into alternative waste treatment solutions and increased value recovery
    - Ensuring RDI is relevant to addressing the challenges facing the sector
  - **Academia** (Universities and Science Councils)
    - Undertaking the waste RDI in support of the Roadmap

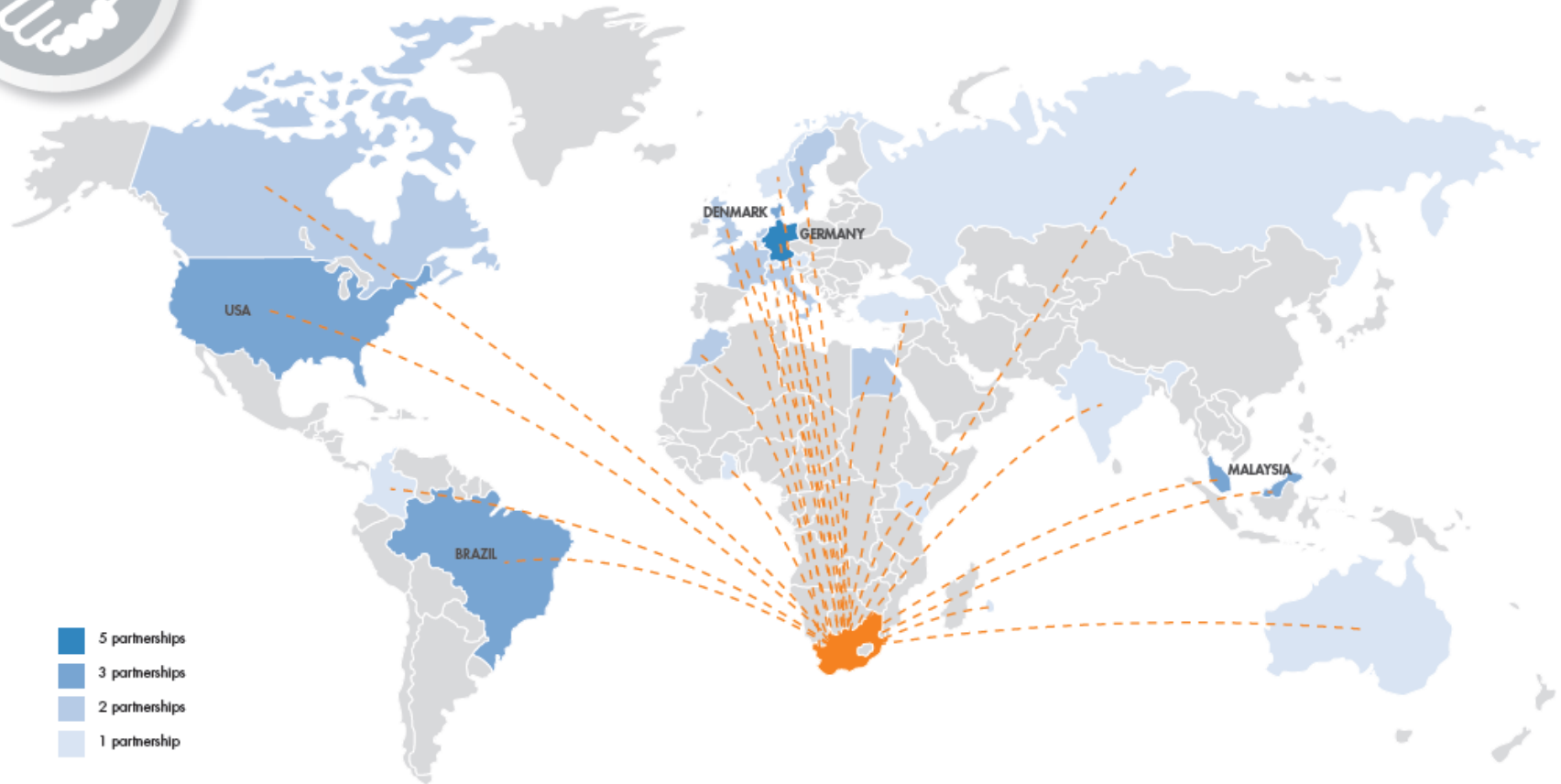


23<sup>rd</sup> Conference and Exhibition

# Strengthening waste RDI in South Africa

## PARTNERSHIPS

Existing international waste RDI partnerships, reflecting all country partnerships and the top 5 partnerships by number of research projects



A partnership between government departments allows us to achieve the goals set out in national policy, while addressing issues of environmental protection, economic development, and technological and social innovation in a more holistic and integrated manner



# Conclusions

- Progress to date, and the response from the sector, has been very **encouraging**
- While funding has been limited, significant **impact** has already been achieved in a short timeframe
- The focus for 2016/17 will be on –
  - Continuing to **monitor** the research under the scholarship and grant programmes, to ensure delivery of high quality R&D
  - To call for **new funding** support for waste RDI in the sector
  - Continue to **strengthen partnerships** with key public and private sector stakeholders

WasteCon  
**2016**

23<sup>rd</sup> Conference and Exhibition



# Thank you for your attention

WasteCon  
2016



## Any questions



# CSIR

*our future through science*



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

**Prof Linda Godfrey** PhD (Eng) Pr Sci Nat

Manager: Waste RDI Roadmap IU  
South Africa

Email: [LGodfrey@csir.co.za](mailto:LGodfrey@csir.co.za)