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Nanotechnology Governance: Essential Building Blocks

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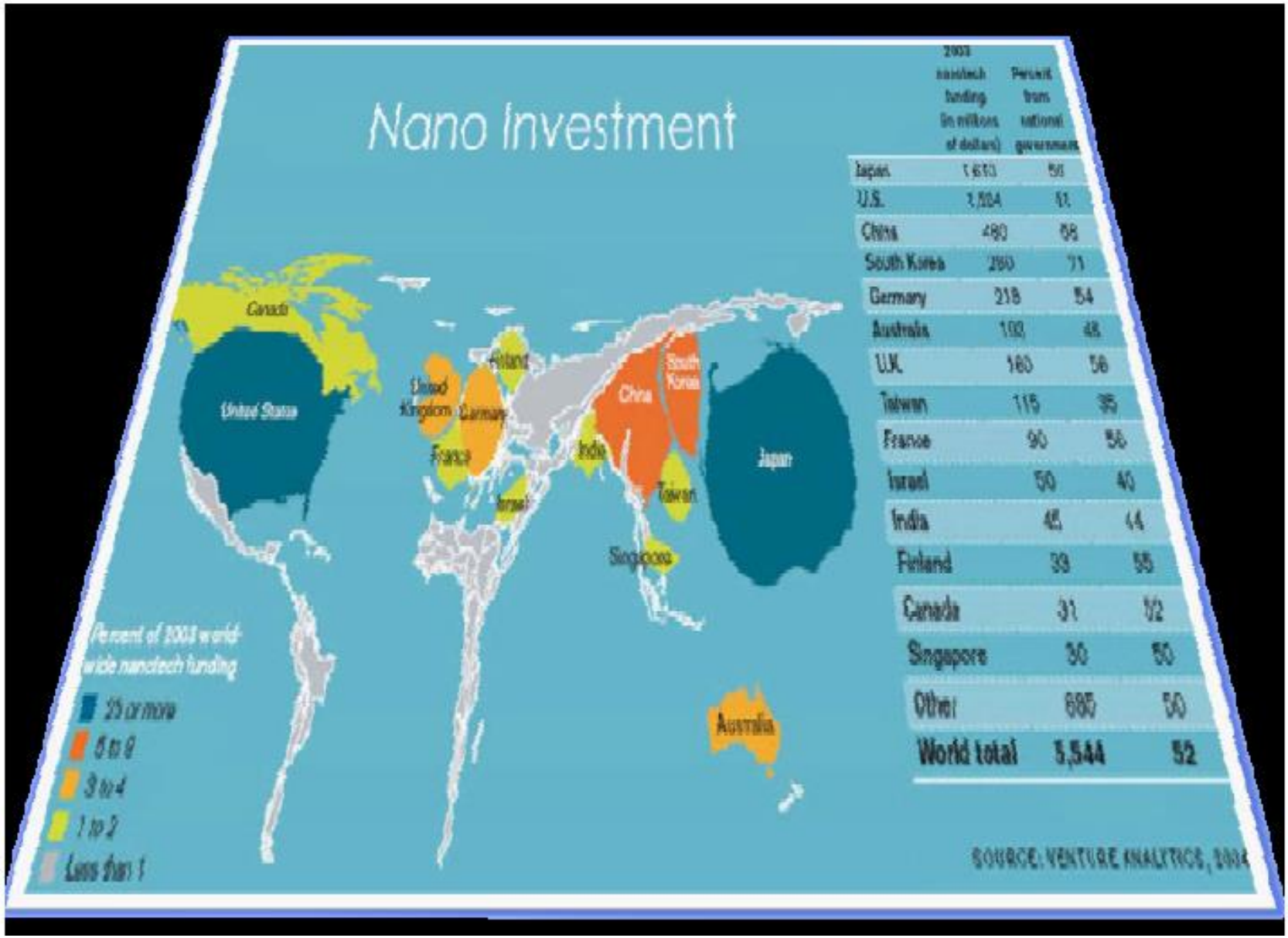
Date: 16 April 2015 (Lusaka, Zambia)

Can Africa fund/participate (in) nanosciences and nanotechnology applications (race) … as well as address associated risks adequately?? Or what is regarded as Africa in nano is a handful of countries….



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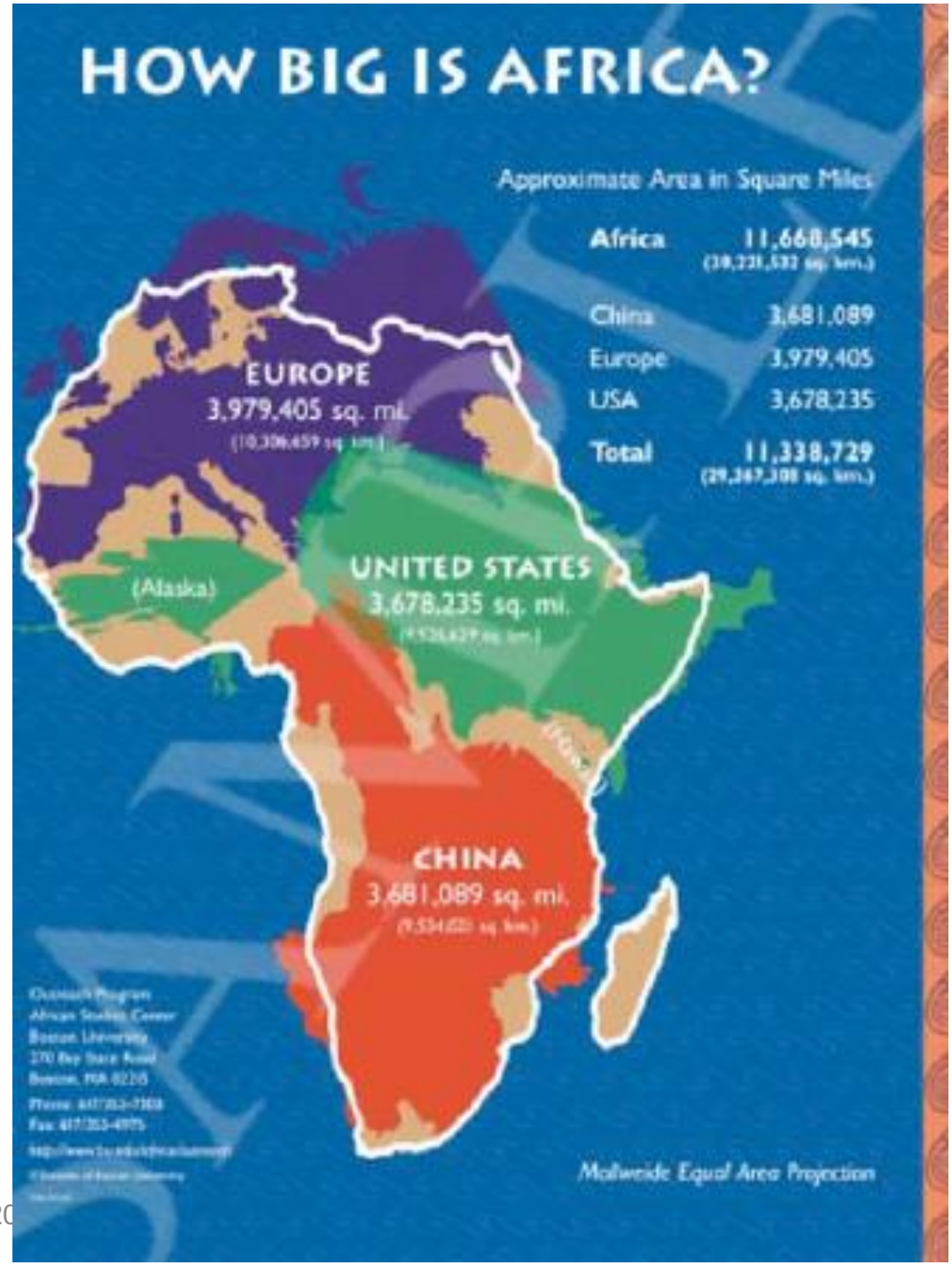

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[1] Governance: What is it?

- **Governance: entails how actors through processes, conventions, and institutions determines:**
  - Identification of most critical needs/problems
  - How power is exercised to manage resources and interests
  - How important decisions are made and conflicts resolved
  - How interactions among and between key actors are organized and structured
  - How resources, skills and capabilities are developed and mobilized to reach desired outcomes, and
  - How diverse set of stakeholders are accorded participation in these processes

[2] Governance: why is it necessary?

- **Why is it necessary?**
  - Aids to optimize use of

  (i) Resources

  (ii) Skills, and

  (iii) capabilities to achieve higher specific goals, purposes, and/or ends

  - Offers permeable and flexible framework (boundaries) that facilitates communication and support achievement of higher goals

Stick…

Carrots…

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Governance deficits posed by nanotechnology: categories

- ***Environmental, health and safety deficits (EHS)*** – Are the risks of nanotech novel? Complex, uncertainties and ambiguous nature of data confounds the challenge
- ***Societal infrastructure deficits:*** single event approach for products – no life cycle or secondary effects evaluation – fragmented jurisdictions, complex legislative regulations, lack of harmonized national and international systems

=> **Need for anticipatory and corrective frameworks**

- **Challenges:**

(i) Diverse set of educational and knowledge dissemination mechanisms within countries and across countries (e.g. for products, waste management, etc.).

(ii) Overlaps from local to global levels of governance (3 SA)

(iii) Lack of budgets for nanotech risks (wait and see approach)

(iv) Use of nanotech for armoury (military)

(v) Questions on appropriateness of current nanotech applications appropriate to developing countries needs (e.g. water, food, energy, health)

(vi) Skewed power and control on promotion, implementation and consumers (affected countries by nanotech)

- **Suggestions/recommendations:**

(i) Adaptive management and collaborative governance

(ii) Strengthen coordination among various players (some regulate product (e.g. USA) and others processes (e.g. Europe)

(iii) Close communication gaps (scientists, regulators, decision/policy makers, media, industry etc.)

(iv) Set budgets to address nanotech risks, skills development to estimate real risks of nanotech

(v) Set appropriate nanotech applications relevant to the developing countries needs

(vi) Set infrastructure that aids all countries to harmonize measurements (regulations), etc.

(vii) Development and implementation of national, regional and global governance structures, etc. (under ISO, OECD, etc.)

- ***Social and political deficits:***

  (i) Policy coordination challenged by different mandates of departments w.r.t. nanotech

  (ii) Disproportional investments (needs vs. wants)

  (iii) Differences in regulations leads to none standardized product

  (iv) Likely to raise equity issues for certain applications e.g. in medicine (specific drugs for individuals),

  (v) Political and security risks which has implications to global/regional economic and military balance (with possibility for terrorism uses)

=> *Proactive approach to technological changes…*

- ***Risk communication deficits: many gaps in:***

(i) Communicating interdisciplinary research findings within different learnt communities (e.g. media, natural, technical, medical, ecological to social, humanities, etc.)

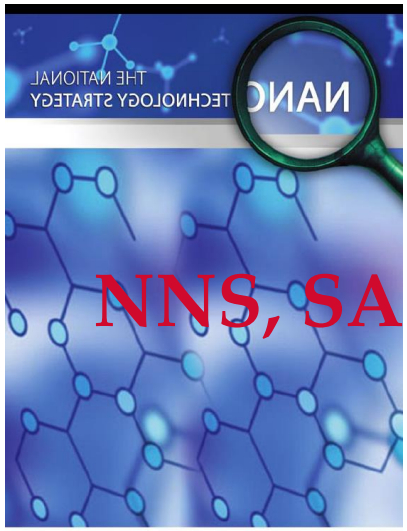
(ii) Communicating state of art (scientists and regulars) – speculations likely to cause disastrous outcomes

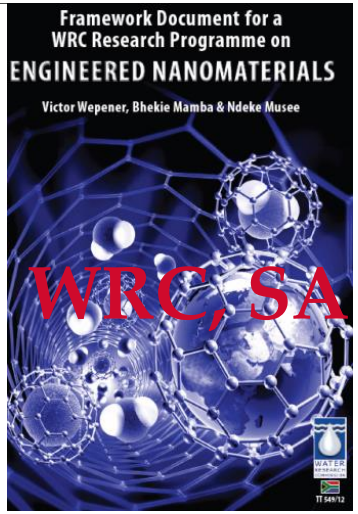
(iii) Communication between risk management agencies to the public w.r.t. regulation and control (likely to cause mistrusts) – what is being done and to be done needs to be clearly communicated (ineffective and insufficient… in most times)

(iv) Lagging of risk communication and technological advancement – ***a million dollar conundrum …***

1. Policy Framework: Defined Outcomes

- National Nanotechnology Strategy (DST)
- Nano Ethics Committee (DST)
- Nano HSE South Africa Research Platform (DST)
- Sector specific: water (WRC)





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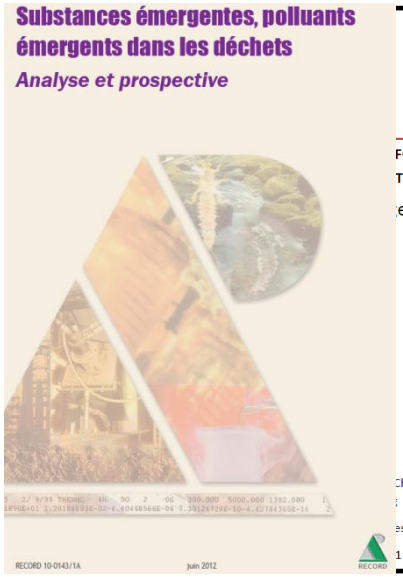

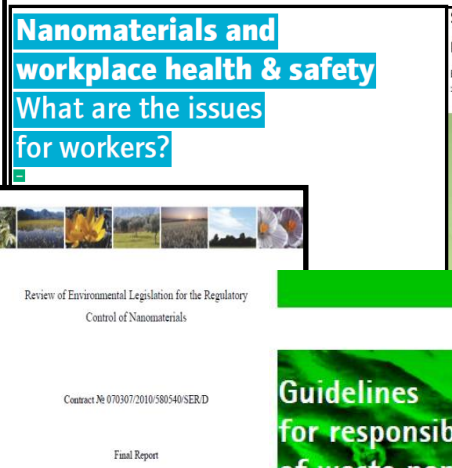

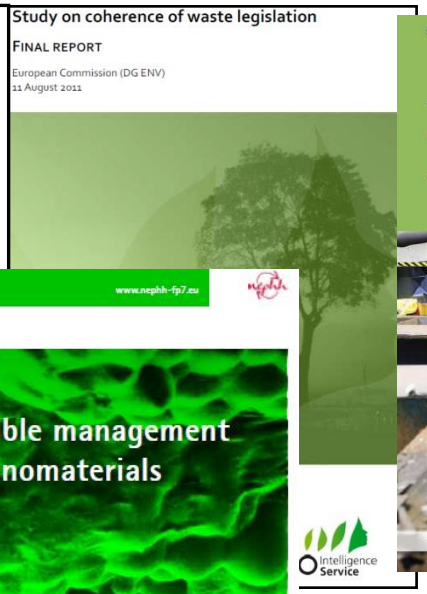

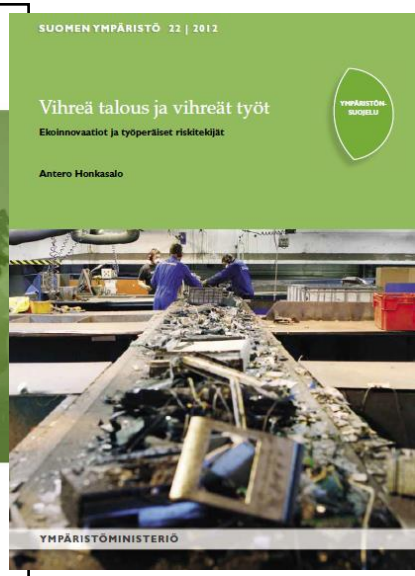

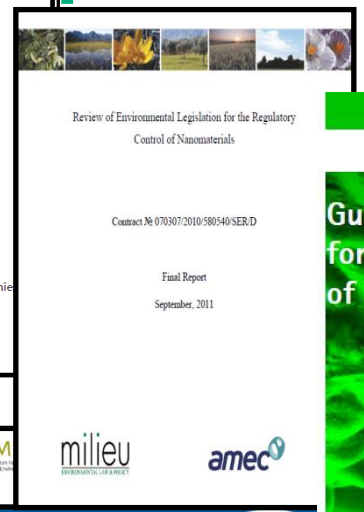

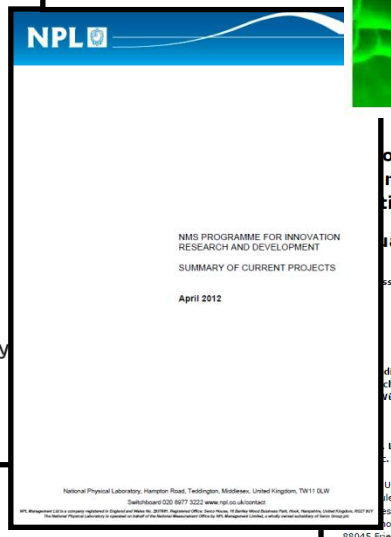

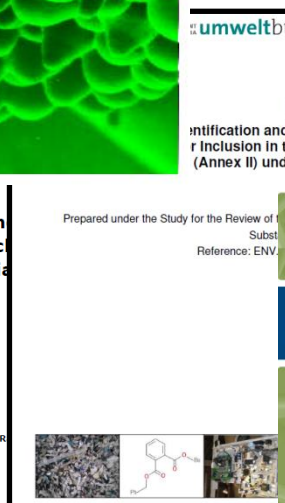

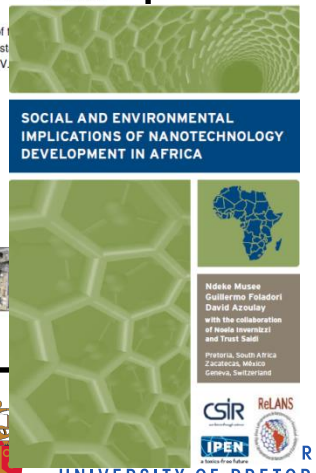

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2a. Research Collaborations: South Africa

- Tshwane University of Technology (2 MScs)
- University of Johannesburg (1MScs, 3 PhDs)
- University of Stellenbosch (1 PhD)
- MINTEK (Directed Research)
- CSIR (2 PhDs, 2 Postdocs, directed research

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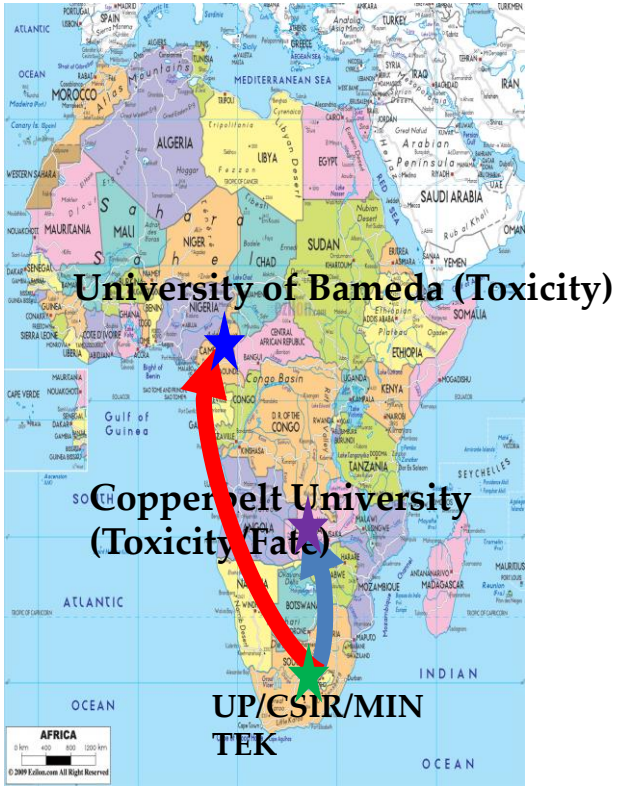
2b. Potential Collaborations: Africa?



- Are there collaborations within Africa?
- If not, can they be supported/established?
- **Challenges/opportunities…**
- **What can this meeting aid to foster collaborations in Africa?**

2c. Research collaborations: Global

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Partnerships on Nanoecotoxicology Research

National Research Foundation

CSIR our future through science

WATER RESEARCH COMMISSION

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

Funding Partners

Curtin University

UNIVERSITY OF JOHANNESBURG

CLEMSON UNIVERSITY

Tshwane University of Technology
We empower people

MINTEK

CSIR our future through science

University of Western Sydney
Bringing knowledge to life

Scientific Partners

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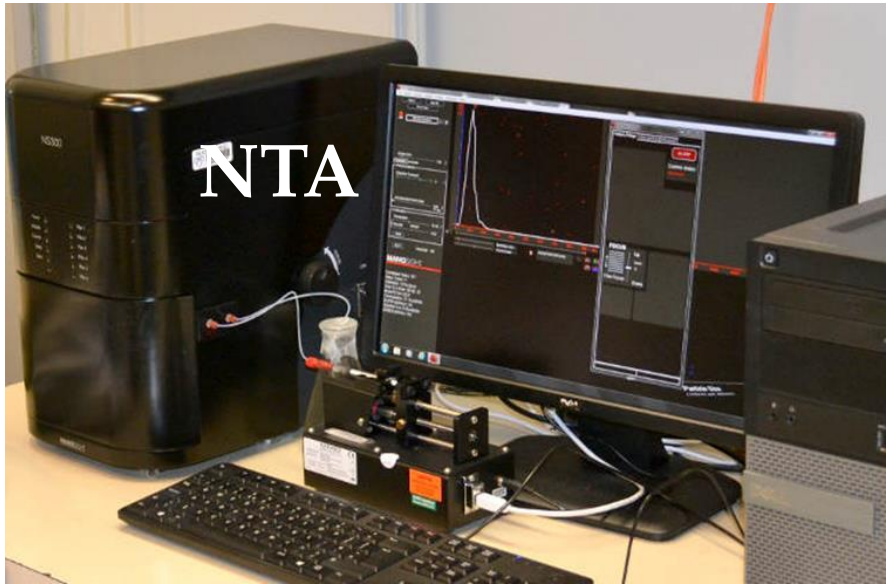
Infrastructure: essential for testing and limits setting



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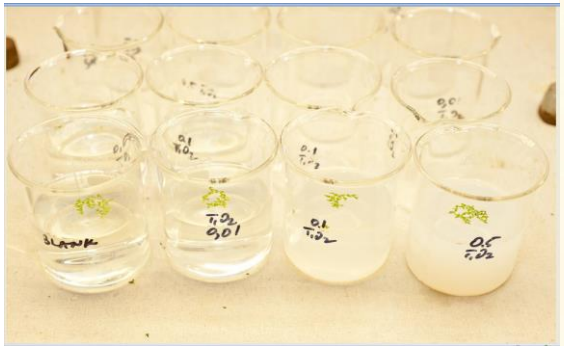


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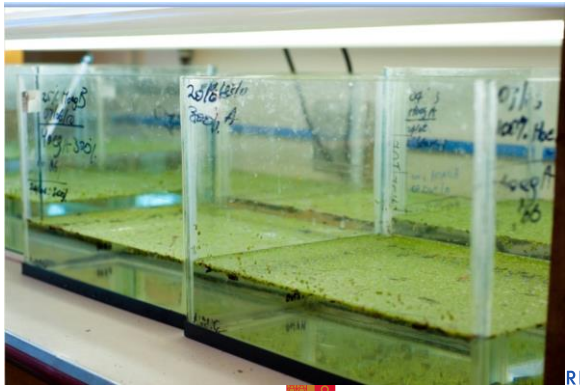


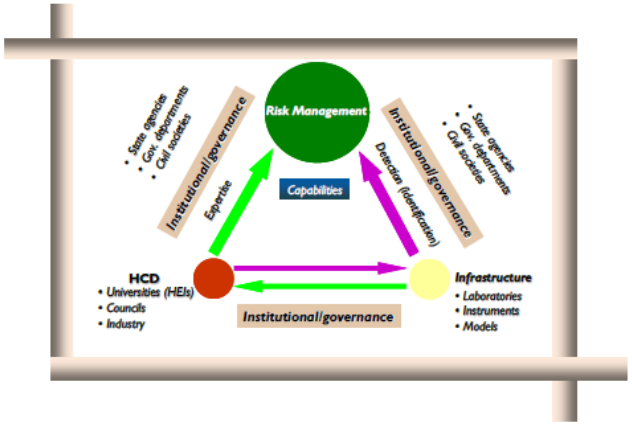
Stakeholders

Industry, Academia, Government, NGOs, Professional associations, Researchers, etc.

Workshop April 2009 Speakers

Workshop April 2009 Delegates

Nano HSE HCD Workshop, 2013



First Human Capital Development Workshop for Nanotechnologies and Nanosciences Risk Assessment

August 13, 2013

Knowledge Commons, Building 50
CSIR Campus, Pretoria

Invited speakers:
Joseph Molapisi (DST), Pete Ashton (CSIR), Lucky Sikwhivhilu (MINTEK), Harrison Piennaar (CSIR), Valelie Naidoo (WRC)

Workshop organizing committee:
Ndeke Musee (CSIR), Melusi Thwala (CSIR) and Chantelle Macrow (CSIR)

CSIR our future through science · science & technology Department: Science and Technology REPUBLIC OF SOUTH AFRICA · WATER RESEARCH COMMISSION · NRF National Research Foundation

PhDs

MScs

Shaping Nano Discourse… the HSE aspects

Dedicated research funding can offer sustainable & fast progress via:

- Highly skilled staff (Do South Africa/Africa have them currently?);
- Brilliant students (Post-docs, PhDs, Masters, Honors, etc.);
- Knowledge transfer (Government, industry, NGOs, Regulators, etc.)
- Infrastructures (laboratories, specialized software, etc.)
- Instruments (microscopy, …);
- Multi-, inter-, and trans-disciplinary approach: lone rangers will have no impact in such high complex arena;
- Specialized curricula at Universities (none in many countries with economics in transition yet…);
- Open and honest partnership with multi-stakeholders… do rest of society understand our mission?

Stakeholders interactions/collaborations

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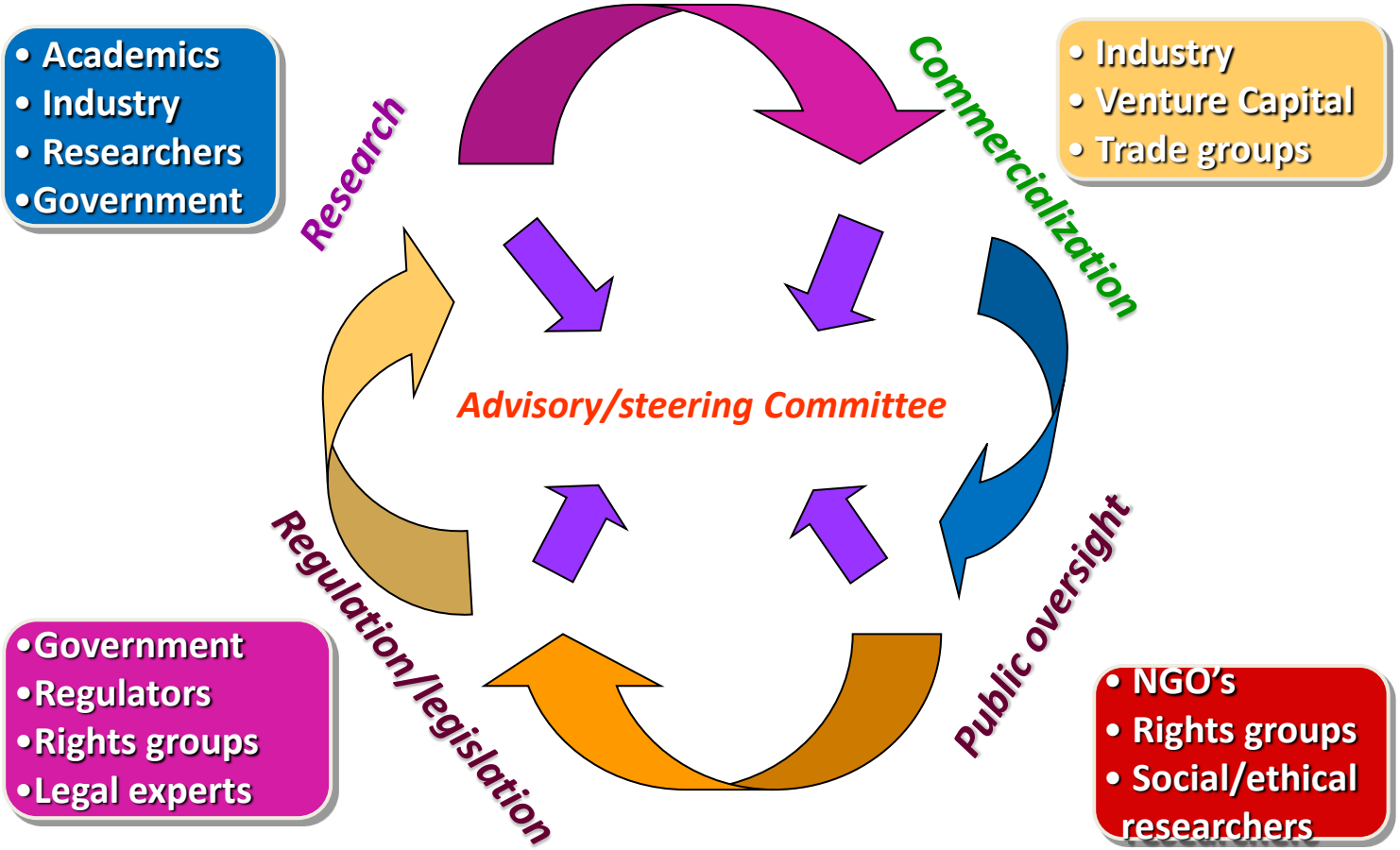
Stakeholder Participation



Highly heterogeneous stakeholder profile

Expectations/definitive actions

- Well defined research questions: What are the most relevant/immediate priority research themes/policy questions of greatest impact to Africa wr.t. nanosafety?;
- Network: Collaborations (national, regional, global), Sharing of infrastructure – an inventory of equipment available, Skills matrixes in organizations, etc…;
- Information sharing: Status quo on nanotechnology risk assessment research in developing countries, for example, current global viewpoint, raising of awareness among diverse stakeholders, risk communication, etc.;

Expectations/definitive actions…continued

- Broadly supported/agreed approach: Studentships, funding mechanisms (c, equipment sharing, evaluation/quality control/quality assurance of activities/research/policy formulations, and
- Roadmap blue print: An outline on the agreed implementation mechanisms and action plan for nanosafety - taking into account Africa's opportunities and challenges **(TALK IS CHEAP … THERE IS A LARGE BOTTOM TO FILL…)**

Inputs, outputs, and outcomes (defined timeline)

INPUTS

- Researchers
- Administrators/stakeholders
- Functional labs
- Collaborators and strategic partnerships (stakeholders)
- Students
- Funding
- Political will

ACTIVITIES

- Training/education
- Modeling
- Laboratory experiments
- Attending conferences
- Providing risk data to industry
- Developing manuals/guidelines
- Provision of expertise to public and private sectors
- Public awareness

OUTPUTS

- journal articles
- Presentations
- MScs degrees
- PhDs degrees
- Post docs
- Books/book chapters
- Policy/guidelines documents

OUTCOMES

- Knowledge transfer and skilled capacity
- Human capital transformation
- Data application in in shaping risk framework of ENMs in SA
- Establishment of ENMs assessment in SA
- Contributes to CSIR growth and impact strategy

IMPACT

- Adoption of findings in guidelines/policies nationally/internationally
- Design for safe nanotech products and applications
- Highly skilled expertise and standardization of products and nanowaste

Can Africa fund/participate (in) nanosciences and nanotechnology applications (race) … as well as address associated risks adequately?? Or what is regarded as Africa in nano is a handful of countries….

Acknowledgments

unitar

United Nations Institute for Training and Research

OECD

BETTER POLICIES FOR BETTER LIVES

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GRAZIE
CHUKRAN
ENKOSI
SIYABONGA
NDO-LIVHUWA
REA LEBOHA
BAIE DANKE
THANK YOU