# Informing Innovation Policy in South Africa

## What Indicators?


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# BACKGROUND

## Who is MISTRA?

- MISTRA conducts long-term, strategic policy research in a wide range of areas impacting on South Africa's development
- Three Faculties:
  - Political Economy (socio-economic issues)
  - Humanity (human thought encompassing history, arts and culture, ideology, etc.)
  - Knowledge Economy and Scientific Advancement (KESA)
- KESA deals not so much with the hard sciences
  - logics of natural sciences
  - relevance for social development
  - from discovery, invention and innovation, incubation, adaptation, to appropriation and quantitative analysis.
- Presentation informed by:
  - interaction with partners in the scientific community
  - discussions with ***the dst***

# BACKGROUND

## (MISTRA Research Approach)

- Currently undertaking 8 research projects
  - Intend to do 8 per year
  - 44 identified for five years
  - Reviewed annually in consultation with academic and policy community
- Informed by transdisciplinarity:
  - Examine issues within, across and beyond disciplines
  - Knowledge is indivisible
  - Major advances usually happen on the margins of academic disciplines
- 10 – 15 members per project team from various institutions
  - reflecting combination of disciplines
  - core project team and contracted researchers

# BACKGROUND

## (KESA Projects)

- Current KESA project:
  - *The Use and Displacement of Strategic Minerals: South Africa, PGM and Fuel Cell and Related Technologies*
  - Economic, scientific, educational and geo-political implications of the emergence of the hydrogen economy for South Africa

- Projects for 2012/13:
  - Pedagogy of Mathematics: is there a unifying logic?
  - History of SAn innovations – the trends, mature niche areas and managing transition from research to application and commercialisation
  - ICTs: the industry, the platform and the content – South Africa's development trajectory in relation to African case studies

# STI MEASUREMENT
## (Rationale)

- Accumulation shifting from physical capital to knowledge
- China transiting to knowledge economy to ensure long-run growth
  - Set contribution of science and technology advancement to GDP growth from 39% to over 60% by 2020
- Central to such strategies:
  - data collection
  - indicators monitoring
- Requires indicators that:
  - guide policy development
  - benchmarks to assess effectiveness of policy and its implementation

# STI MEASUREMENT

## (Some examples)

- OECD Patent Manual (1994)
  - deals with measurement of scientific and technological activities using patent data as science and technology indicators to inform collection of R&D statistics
- US National Science Foundation
  - use educational, bibliometrics, patent, trade in technology products, R&D expenditure analysis
  - produces a tome of some 600 pages published every two years
- Latin American countries
  - produce their own science and technology indicators
  - Science and technology indicators, Argentina
- While qualitative information critical
  - drill further down to quantitative indicators
  - identify criteria that lend themselves to quantitative evaluation

# STI MEASUREMENT

## (Challenges for SA)

- South Africa has base of measurement and analysis
  - Foundation for Research and Development (1993): Science and Technology Indicators
  - National Advisory Council on Innovation's indicators in annual reports
  - HSRC and StatsSA on expenditure in R&D
- Need to improve:
  - identification of quantitative indicators
  - rigour of process
  - StatsSA accreditation
  - timeliness of information
  - translation into M&E tool for policy review and enhancement

# STRENGTHENING CAPACITY

## (Context)

Yasser Tawfik of The Arab Science and Technology Foundation defines innovation as:

*"a process by which value is created for customers through public and private organisations that transform new knowledge and technologies into profitable products and services for national and global markets. A high rate of innovation in turn contributes to more intellectual capital, market creation, economic growth, job creation, wealth, and higher standard of living. And pay-back to the innovation cycle."*

[The future of innovation is as an ecosystem, published in *The Future of Innovation, by Bettina Von Stamm, Anna Trifilova*, 2009]

# STRENGTHENING CAPACITY

## (Approach)

- South Africa's approach:
  - informed by work already being undertaken in the country
  - challenge is one of integration
  - draw from the examples of best practice across the world
  - Should not seek to reinvent the wheel
  - Indicators should resonate with global practice, also to ensure comparability
  - Statistics SA should be integrally involved, to advise on all technical issues to do with data collection and analysis and to accredit the initiative

# STRENGTHENING CAPACITY

## (Take into account…)

- Technology inputs
- Innovation practices of enterprises
- Outputs of innovation process
- National impact
- The context in which innovation takes place
  - macroeconomic and public policy environments
  - infrastructure
  - national mind-set for innovation
- Dynamics in the nature of innovation
  - Globalisation
  - business models for managing innovation
  - adoption rates
  - strength of national IP system
  - protection and advancement of new discoveries

# STRENGTHENING CAPACITY

## (Some of the main indicators 1)

- Innovation input factors
  - R&D
  - Talent
  - Capital
  - Patents
  - Scientific publications
- Innovation process (implementation) factors
  - Number of innovation-based start-ups
  - Ideas in the pipeline
  - Product development cycle time
  - Management strategy/practices
  - Type of business model
  - Alliances and collaborations
  - Internationalisation of innovative activity
  - Barriers to commercialisation

# STRENGTHENING CAPACITY

## (Some of the main indicators 2)

- Innovation output factors
  - New products commercialised
  - Market penetration and growth
  - Cost reduction
  - Profits, revenues and value to customers.
- Economic impact factors
  - Employment
  - Productivity
  - Standard of living
  - Competitiveness and global market share.
- Macro-economic conditions
  - Fiscal/monetary environment
  - Interest rates
  - Global economic growth rates
  - Demographics

# STRENGTHENING CAPACITY

## (Some of the main indicators 3)

- Public policy conditions
  - R&D funding policy
  - Taxes
  - Intellectual property
  - Regulations
  - Standards
  - Market access policies
- Innovation infrastructure conditions
  - University research infrastructure
  - Labs
  - Capital markets
  - Energy and transportation systems
  - Regional clusters
- National mind-set
  - Public attitudes to science, cultural factors, and political issues related to innovation

# IMPORTANCE OF NATIONAL MIND-SET

- Involve students and young professionals to build a cadre of STI statisticians
- Regular publication, simplified for popular discourse
- Scarcity of, and competition for, resources in both the public and private spheres public understanding of why Science, Technology and Innovation is critical
- Public understanding of science ensures all of society promotes and defends scientific endeavours – fundamental for democracy

# CONCLUSION

At a roundtable discussion organised by MISTRA and SeTAR Centre, Dr Gauhar Raza makes the critical observation…

*"… the cognitive structure of a common citizen is constituted by two distinct spaces. The irrational and extra-scientific ideas occupy one part and the rational and scientific ideas reside in the other. The two coexist quite peacefully... In order to save and strengthen democracy, especially in culturally rich and varied countries (generally known as developing countries), constant engagement with science and thereby enlargement of scientific cognitive spaces is essential. A high level of technology and a low level of scientific temper is a threat to democracy, in any society."*

[Gauhar Raza, Head of Science Communication through Multi-media at the National Institute of Science Communication and Information Resources (NISCAIR), New Delhi *Engagement with Science: A Necessary Condition for the Survival of Democracy, 18 July 2011*]

# END