**The UNESCO Forum on Higher Education,
Research and Knowledge**

UNESCO
United Nations
Educational, Scientific and
Cultural Organization

WCHE
CMES 2009

## 2009 WORLD CONFERENCE ON HIGHER EDUCATION
**The New Dynamics of Higher Education and Research for
Societal Change and Development**
5-8 July 2009 (UNESCO, Paris)

THEMATIC SESSION: LEARNING, RESEARCH AND INNOVATION

PANEL IV: How to Develop and Sustain a Higher Education,
Research and Innovation System

**Tuesday 7 July (16h30 – 18h), Room IX**

COORDINATION:
The UNESCO Forum on Higher Education, Research and Knowledge

CHAIR
• Berit OLSSON (Sweden)
*Immediate Past Director Sida/Sarec,
Member of the UNESCO Forum Scientific Advisory Board*

PANELISTS
• Wail BENJELLOUN (Morocco)
*Dean,
Faculty of Science,
Mohammed V University*

• Jean GUINET (France)
*Head of the Country Review Unit,
Science, Technology and Industry Directorate
OECD, Paris*

• Mary-Louise KEARNEY (New Zealand)
*Director,
The UNESCO Forum for Higher Education, Research and Knowledge
Vice President, The Society for Research into Higher Education (SRHE)*

• Tony MARJORAM (Australia)
*Engineering Programme,
Natural Sciences Sector,
UNESCO*

• **Philippe K. MAWOKO (Congo)**
*Director for Innovation and Research*
*The New Partnership for African Development (NEPAD)*
*Pretoria, South Africa*

• **Johann MOUTON (South Africa)**
*Director,*
*Centre for Research on Science and Technology (CREST),*
*University of Stellenbosch*

• **Ritu SADANA (USA/India)**
*Division of Information, Evidence and Research,*
*World Health Organization (WHO),*
*Geneva*

• **Martin SCHAAPER (Canada)**
*Unesco Institute for Statistics,*
*Montreal,*

RAPPORTEUR
• **Rose Marie SALAZAR-CLEMEÑA (The Philippines)**
*University Fellow, Prof. of Counseling & Educational Psychology,*
*De la Salle University, Manila*

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## 1. INTRODUCTION

Within this WCHE thematic session, certain panels will address the close linkages between systems of higher education, research, science and technology and innovation (known as HERI). These integrated entities play a major role in knowledge management which drives the development   agenda at global, regional and national/local levels. They are concern high, middle and low income countries and are essential for the construction of a sound knowledge base for sustainable progress.  The panel entitles *How to Develop and Sustain a Higher Education, Research and Innovation System* discusses the core elements which form the basis for such systems and the models in place to measure HERI capacities in critical fields for development.

## 2. HOW TO DEVELOP AND SUSTAIN A HIGHER EDUCATION, RESEARCH AND INNOVATION SYSTEM

The UNESCO Forum on Higher Education, Research and Knowledge is a platform for researchers, established in 2001 as a follow-up initiative to the 1998 *World Conference on Higher Education* and the 1999 *World Science Conference*. Both these activities emphasized the need to place knowledge at the service of development.

The overall objective of the UNESCO Forum is to widen the understanding of systems and structures of higher education, sciences, research, innovation and knowledge with a particular focus on low income countries. While the build up and sustaining of HERI systems remain a challenge for all countries, the situation in low income countries warrants special attention.

The UNESCO Forum on Higher Education, Research and Knowledge convenes and gathers research into systems for Higher Education, Research and Innovation, for convenience abbreviated as "HERI systems". In addition to providing an arena for exchange among those to study such systems, and disseminating relevant findings, the Forum has commissioned an inventory of existing data on HERI systems. This has provided a unique set of material as well as a proposed template for further reviews.

Data relating to the Key indicators proposed by this Special Initiative could be found in most mid- and high-income countries, but were difficult to find in many low-income countries.

While there is an increasing concern for the HERI functions in all countries, many low income countries have yet to identify strategies for how to develop appropriate and affordable systems. Experience shows that research funding from government ministries, other local stakeholders as well as external (aid-) agencies tend to be directed to research topics of perceived urgency. At the same time, in many cases, the very basis for research may be fragile and fragmented.

As a previous panel this morning will address the effectiveness and the benefits to society of having an appropriate HERI system and a functioning research community, this discussion will address the more practical aspects of designing and sustaining a good basis for HERI.

Obviously, higher education is a necessary element, as it provides research training and develops the methodological basis in various disciplines. Still many low income countries lack strategies for concentrating resources into one or a few research universities able to graduate PhDs and few have dedicated budget lines for research.

While specific areas of study may be commissioned or given to consultants, researchers in many low income countries lack possibilities to apply for grants from a national (or regional) research council to pursue their lines of thoughts or hypotheses. They risk turning into consultants rather than independent researchers. There is also a lack of funding opportunities for innovative clusters and pilot studies. The bulk of external research funding is targeted to defined topics and goes to collaborative arrangements, where capacity enhancement is seen as an important, but secondary ambition. Thus contributions to building and sustaining the very basis for HERI risk being neglected.

## Expected Outcomes of the Debate

• To define key elements and structures in a basic system for HERI.

• To propose what policies and framework need to be defined by Governments.

• To suggest roles of other national stakeholders.

constructive format for contributions by other national stakeholders and provide critical data on research systems in developing countries.

• To suggest constructive format for contributions by other national stakeholders.

• To propose possible additions/changes to formats for assessing HERI-systems in countries with very early research development (such as many low income countries).

1. Which are the essential building blocks of a HERI system?
2. Which are the key institutions and organisations,
   - for research training;
   - for implementing research?
3. Which research funding avenues and mechanisms are essential?
4. What strategies would be open to low income countries, given their very limited financial resources?
5. Which key indicators need to be added in a monitoring system in order to capture changes in very early HERI systems?

# Bionotes of the participants

### CHAIR

### • Berit OLSSON (Sweden)
Until 2008, Berit Olsson was the Director of the Department for Research Cooperation, SAREC, at the Swedish International Development Cooperation Agency. She was responsible for formulating the Sida policy for university support in the early 90s and directed the current orientation of comprehensive support for the build up of a basis for research in line with national and institutional strategies. Before joining SAREC, she taught Endodontics at Lund University and was a visiting professor at the University of Connecticut. She wrote her PhD on Oral Health in Ethiopia and has carried out research in Mozambique and Sudan.

### RAPPORTEUR

### • Rose Marie SALAZAR-CLEMEÑA (The Philippines)
Rose Marie Salazar-Clemeña is a University Fellow and Full Professor of Counselling and Educational Psychology at De La Salle University in Manila (The Philippines). She holds a PhD in Psychology from the University of Minnesota (USA). Her research interests are mainly in teaching and learning in Higher Education, teacher training, and professional issues in counselling psychology. She is a former Dean of the DLSU College of Education and Executive Vice President of De La Salle-College of Saint Benilde. She is the Vice-Chair of the Asia-Pacific Scientific Committee and a member of the Interim Scientific Advisory Board of the UNESCO Forum on Higher Education, Research and Knowledge.

### PANELISTS

### • Wail BENJELLOUN (Morocco)
Wail Benjelloun holds a Ph.D. degree in Neuroscience from the State University of New York at Binghamton. He joined the Faculty of Science in Rabat in 1976, to found the first neuroscience laboratory in Morocco as well as the Moroccan Association of Neuroscience and the Society of African Neuroscientists (Nairobi), serving as member of the Governing Council of the International Brain Research Organization (Paris). He was the founding Vice President for Academic Affairs at Al Akhawayn, Morocco's first English-language university based on the American model from 1995 to 2000. He has chaired the national research support grant commission and been president of the Morocco-US bi-national Fulbright grant

commission. In 2005 he was named Dean of the Faculty of Science in Rabat, presiding since then over a comprehensive reform in curricula and research. Dr. Benjelloun has published extensively in neuroscience as well as on topics related to higher education strategies, research and innovation in Morocco and the region.

### • Jean GUINET (France)

Jean Guinet is Head of the Country Review Unit at the OECD Directorate for Science, Technology and Industry. His main interests are the contribution of technological change and innovation to economic performance, and the monitoring and assessment of science, technology and innovation policy of OECD Member and selected non-member countries. Over the last ten years he managed or made important contributions to many major OECD projects, notably: National innovation Systems; Technology, Productivity and Job Creation; the Growth Study; Industry-Science Relationships; Public Private Partnerships for Innovation; Evaluation of Publicly Funded Research; Globalisation of R&D. Currently he heads the programme of country reviews of innovation policies covering so far a number of OECD Member countries (e.g. Greece, Hungary, Korea, Luxembourg, Mexico, New Zealand, Norway, Switzerland, Turkey) as well as non-member countries (e.g. Chile, China, Russia, South Africa).

### • Mary-Louise KEARNEY (New Zealand)

Mary-Louise Kearney is Director of the Secretariat of the UNESCO Forum on Higher Education, Research and Knowledge. Ms Kearney holds degrees in Education: BA, MA and a Diploma in Teaching from Auckland University, New Zealand, and two doctorates (in Linguistics and in Education and Culture) from the Université de Paris III, Sorbonne Nouvelle. On joining UNESCO in 1985, Ms Kearney was responsible for university cooperation and partnerships in the Division of Higher Education of UNESCO. In 1998, she was in charge of the organization of the *World Conference on Higher Education (WCHE)*. In 2000, she was appointed Director of the Division for Relations with National Commissions and New Partnerships (ERC/NCP). Ms Kearney is a Senior Research Fellow in Higher Education at Oxford University, United Kingdom and the Vice President of Society for Research into Higher Education (SHRE). She has authored numerous publications and research papers on Higher Education.

### • Tony MARJORAM (Australia)

Tony Marjoram is a Programme Specialist and responsible for the Engineering Sciences Programme at the Basic and Engineering Science Division of the Science Sector of UNESCO. Prior to moving to UNESCO Paris he was responsible for engineering, technology and information technology programmes at the UNESCO Office, Jakarta - the regional office for science and technology in the Asia-Pacific region. Dr Marjoram has worked for UNESCO since 1993, before that he was a Senior Research Fellow at the University of Melbourne, and has also worked at the universities of the South Pacific and Manchester. He has a BSc in mechanical engineering, an MSc in science and technology policy and PhD focusing on technology for development.

### • Philippe K. MAWOKO (Congo)

Dr Mawoko is the Coordinator of the African Science, Technology & Innovation Indicators Programme and in responsible of the African Mathematical Institutes Network in the AU-NEPAD Office of Science and Technology (OST) based in Pretoria, South Africa. Prior to joining OST, Dr Mawoko worked as a Programme Manager in the NEPAD e-Africa Commission. Former Minister of Post and Telecommunications in the Democratic Republic of Congo (DRC), he led the initial

policy reform in the Post and Telecommunication sector in the DRC. He served as senior consultant, forecasting new telecommunication products and services, in the marketing division of Telkom South Africa and as a senior manager in charge of MIS in the electronic division of Nedbank South Africa. Dr Mawoko holds a PhD in Mathematics from the University of Salzburg in Austria. He lectured, over a decade, Mathematics and Statistics in several universities including the University of Zimbabwe in Harare, the University of Lesotho in Roma and the University of Kinshasa in DRC. He published in the area of random walks, and contributed in several market demand research projects.

## • Johann MOUTON (South Africa)

Johann Mouton is Director of the Centre for Research on Science and Technology and professor in the Department of Sociology and Social Anthropology at the University of Stellenbosch. He received his Doctorate in Philosophy at the Rand Afrikaans University in 1983. He is the author of 7 books on research methodology including *Understanding social research* (1996), *The practice of social research* (2002, with E. Babbie) and *How to succeed in your Masters and doctoral studies* (2001). He is Programme Director for the Masters and Doctoral programmes in Social Science Methods, the Masters and Doctoral programmes in Science and Technology Studies and for the Post-graduate diploma in Monitoring and Evaluation Methods at Stellenbosch University. He is on the editorial board of 5 international journals including the *International Journal of Research Methodology, Science and Public Policy and* Minerva. He has published more than 40 articles in peer reviewed journals, written more than 40 research and evaluation reports and given more than 100 papers at national and international conferences. He has received two prizes from the Academy for Science and Arts in South Africa including one for his contribution to interdisciplinarity in the social sciences in South Africa. His main research interests are science policy, higher education knowledge production, philosophy and methodology of social research and monitoring and evaluation studies.

## • Ritu SADANA (USA/India)

Ritu Sadana is a public health professional with more than 20 years of research, policy and management experience in low, middle and high income countries in public and private sectors. She currently leads the Equity Analysis and Research unit within the World Health Organization's headquarters in Geneva, Switzerland. Working with partners and collaborators around the world, this group focuses on monitoring and analyzing health equity within and across countries using policy-relevant indicators; on strengthening knowledge networks' , scientific collaborating centers' and civil society's capacities to build up evidence to improve equity and health; and on advancing global research agendas linking broader determinants of health and health equity. Most recently, Sadana contributed to the WHO Commission on Social Determinants of Health. Previously she coordinated the development of the WHO health systems strengthening strategy, development of tools to evaluate national health research policies and capacities relevant for low and middle income countries, and advances in methods to improve comparability of multi-dimensional profiles of health status. She has worked extensively in Cambodia, Central and Eastern Europe and the United States, and currently serves as an editorial adviser to the Bulletin of the World Health Organization. Trained in epidemiology, anthropology and economics, she holds a ScD from Harvard University and MSPH from University of California Los Angeles.

## • **Martin SCHAAPER** (Holland)

Martin Schaaper, a Dutch national, is Head of the Science and Technology Statistics Unit at the UNESCO Institute for Statistics, which is based in Montreal, Canada.

The S&T unit of UIS carries out a worldwide R&D survey every two years. The collected data are published on UIS' website, and are used in various publications, such as the UNESCO Science Report. A second line of work is carrying out capacity building and training activities in developing countries, with as objective to increase the availability and quality of science statistics in these countries. Developing methodologies is a third strand of work, usually in co-operation with other international and regional organizations such as the OECD, Eurostat and RICYT. One example is the development of an annex to the Frascati Manual on measuring R&D in developing countries. Another example is given by the joint OECD/Eurostat/UIS project on the Careers of Doctorate Holders.

Before joining the UIS, Martin Schaaper has worked for 8 years for the OECD, where he was responsible for the co-operation with non-OECD countries in the field of S&T and ICT statistics, and 6 six years for various small companies, which were working on a contract basis for Eurostat, working on a variety of statistics.

&

**UNESCO FORUM ON HIGHER EDUCATION, RESEARCH AND KNOWLEDGE**

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**2009 World Conference on Higher Education:**

**The New Dynamics of Higher Education and Research for Societal Change and Development**

**Report Form *Theme III, Track 1***

***Learning, Research & Innovation***

Please complete form within 30 minutes of your session and e-mail to: e.helmeid@unesco.org

and copy to flash drive & bring to Secretariat Office for Heather Eggins

**Please observe the word limits in each section below.**

**Thank you.**

Session Title: <u>How to Develop and Sustain a Higher Education, Research and Innovation System</u>

Rapporteur:

      Name: <u>Rose Marie Salazar-Clemeña</u>     Organization: <u>De La Salle University</u>

      Country: <u>Philippines</u>          E-mail: <u>rose.marie.clemena@dlsu.edu.ph</u>

Speakers: Johann MOUTON (South Africa),  Ritu SADANA (WHO), Philippe K. MAWOKO (Congo), Jean GUINET (France), Tony MARJORAM (Australia), Wail BENJELLOUN (Morocco), Martin SCHAAPER (Holland), Mary-Louise KEARNEY (New Zealand), Berit OLSSON (Sweden; Chair)

Summary of major points introduced (200 words):
- Lessons learned from reviewing national research systems/data collection:
  - Use country mapping templates as <u>heuristic</u> devices to <u>guide</u> data-collection, analysis and reporting.
  - Balance goals with vision
  - Take a system's perspective
  - Document and assess performance
  - Debate process and impact widely
  - Work together for sustainable development
  - Build capacities and develop methodology
  - Provide training in methodology
- Developing and Sustaining Research Systems
  - Importance of networking to pool available resources
  - Need for appropriate partnerships (e.g., among universities, between public and private entities, with HERI-oriented bodies) and collaborative mechanisms (e.g., with international institutions, funding agencies)
  - The challenge of leveraging financial resources by improving incentives for local financial support and leveraging international contributions
- OECD Innovation Policy Review

- o Independent assessment; demand driven, largely financed by voluntary contributions
  - o Alignment of scope, timing, form of presentation etc. to strategic needs of the examined country
  - o Cooperation with other international organisations is key for the feasibility and success of this outreach strategy
- Innovation for development
  - o Innovation should be the driving force of research
  - o Research should be based on national development agenda
  - o Need to maintain and invest in higher education, research and innovation to help get out of current economic crisis
  - o Knowledge-based society/economy – based on education and research
  - o We need real "Political Will"
- Financing Research and Innovation
  - o The modus vivendi requires governments to make strategic decisions
  - o Financing research and innovation requires diversified measures ranging from strategic commitment to « spreading the burden » through partnership
  - o Encouraging investment in research and innovation requires demonstrated returns promoting socio-economic and human development
- Standard setting/ development of measures (for innovation and R & D)

Summary of general discussion (200 words):
- Type of assessment used: Data collected (whether rigid or soft, existing or new) should be able to show change. The problem is baseline data are incomplete in some countries; local capacity should be strengthened.
- What exactly is Innovation?  There is a need to identify possible indicators.
- Role of government:
  - o contribution in funding research
  - o facilitating framework for innovation
- We need to keep on collecting data; but data should not make us blind. Be open to multi-disciplinary, quantitative/qualitative approaches
- Link policy-makers and statistics
- Hard work and good research lead to Innovation
- Innovation is the driving force of research.

Brief sentence for the Conference Communiqué (25 words):
The elements of a research system require that government plays a major role in creating strategies, developing frameworks, and providing funding opportunities. There is a need to have core funding of select institutions in order to concentrate resources into a critical mass for research.  There should be research granting mechanisms in all countries so that researchers can pursue their research agenda. Targeted funding should be allotted to priority areas.  Core elements of research systems also require that data be collected (especially from low income countries), that mechanisms for peer review and ethical review be in place, and that intellectual property rights be protected.

# Key Questions:

1. Which are the essential building blocks of a HERI system?

2. Which are the key institutions/organizations
   - for research training?
   - for implementing research

3. Which research funding avenues and mechanisms are essential?

4. What strategies would be open to low income countries, given their very limited resources?

5. Which key indicators need to be added in a monitoring system and statistics  in order to capture changes in early HERI systems?

# Yes we can!

- *We can improve conditions for using and producing reseqrch for fair and sustainable development in <u>all</u> countries!*

- But we need to convince Governments and development cooperation partners to invest in proper conditions for research!

# A vital research community needs

- **Core funding of defined institutions**
  for research and research training

- **Open grants**
  for researcher generated proposals

- **Directed funding**
  for priority areas and innovation

- **Research cooperation opportunities**

**2009 World Conference on Higher Education:**
*New Dynamics of Health Education & Research for Societal Change &*
*Development -- Learning, research and innovation, Track 1*
**UNESCO, Paris, 5-8 July 2009**

**Parallel Session:**

**How to Develop and Sustain a Higher Education, Research
and Innovation System**

**Contribution:**

**Some reflections from WHO's Health Research System
Analysis Initiative +**

**Ritu Sadana ScD  (sadanar@who.int)**
**World Health Organization**
**Geneva**

www.tropika.net for health research systems analysis tool kit

# 1. Balance Goals with Vision

**More Research?**

**More Awards?**

**More Patents, More Trade?**

**Better Health Systems?**

**Better health?**
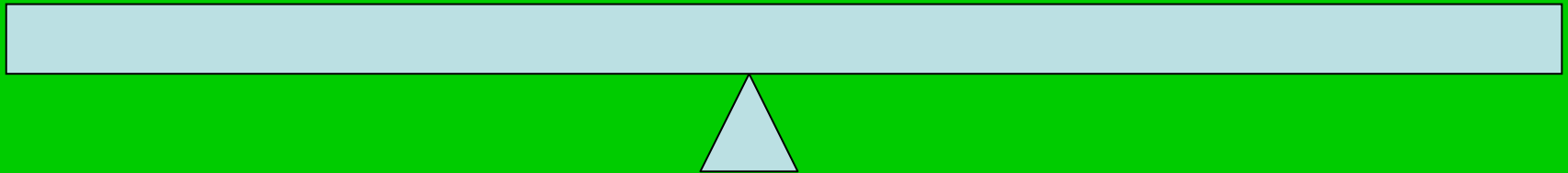
**More fairness?**

# 1. Balance Goals with Vision
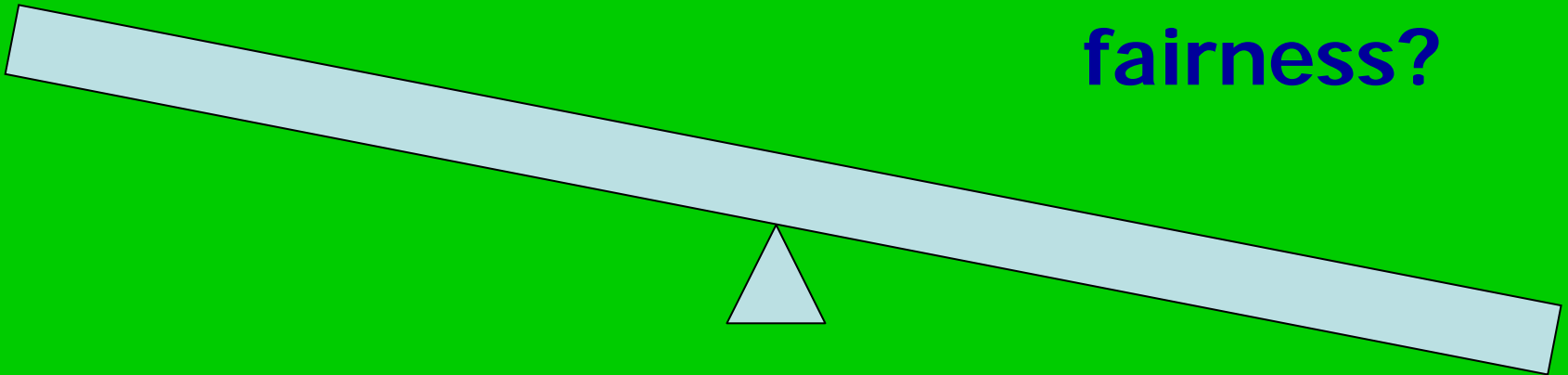
**More Research?**
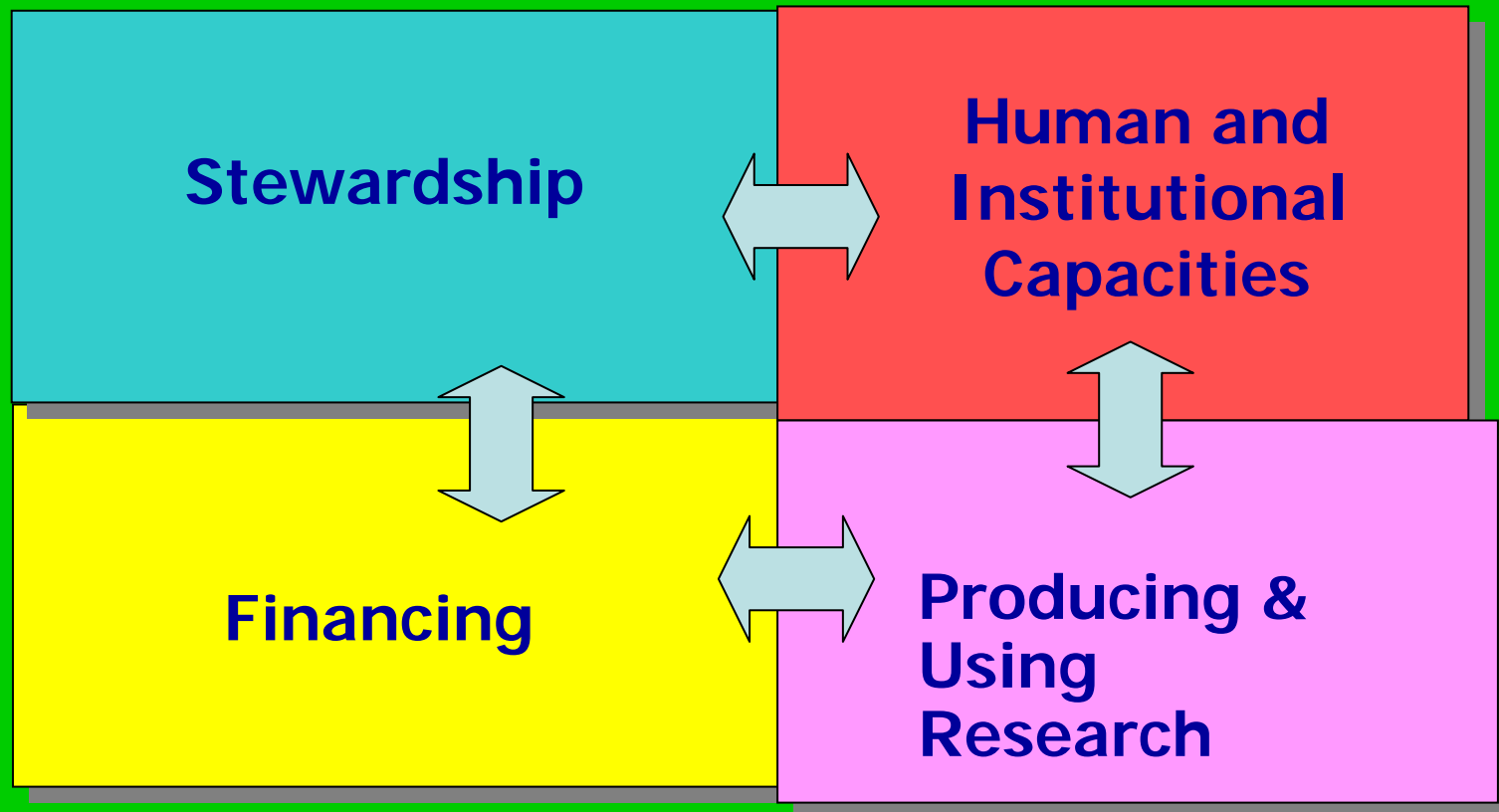
**More Awards?**

**More Patents, More Trade?**

**Better Health Systems?**

**Better health?**

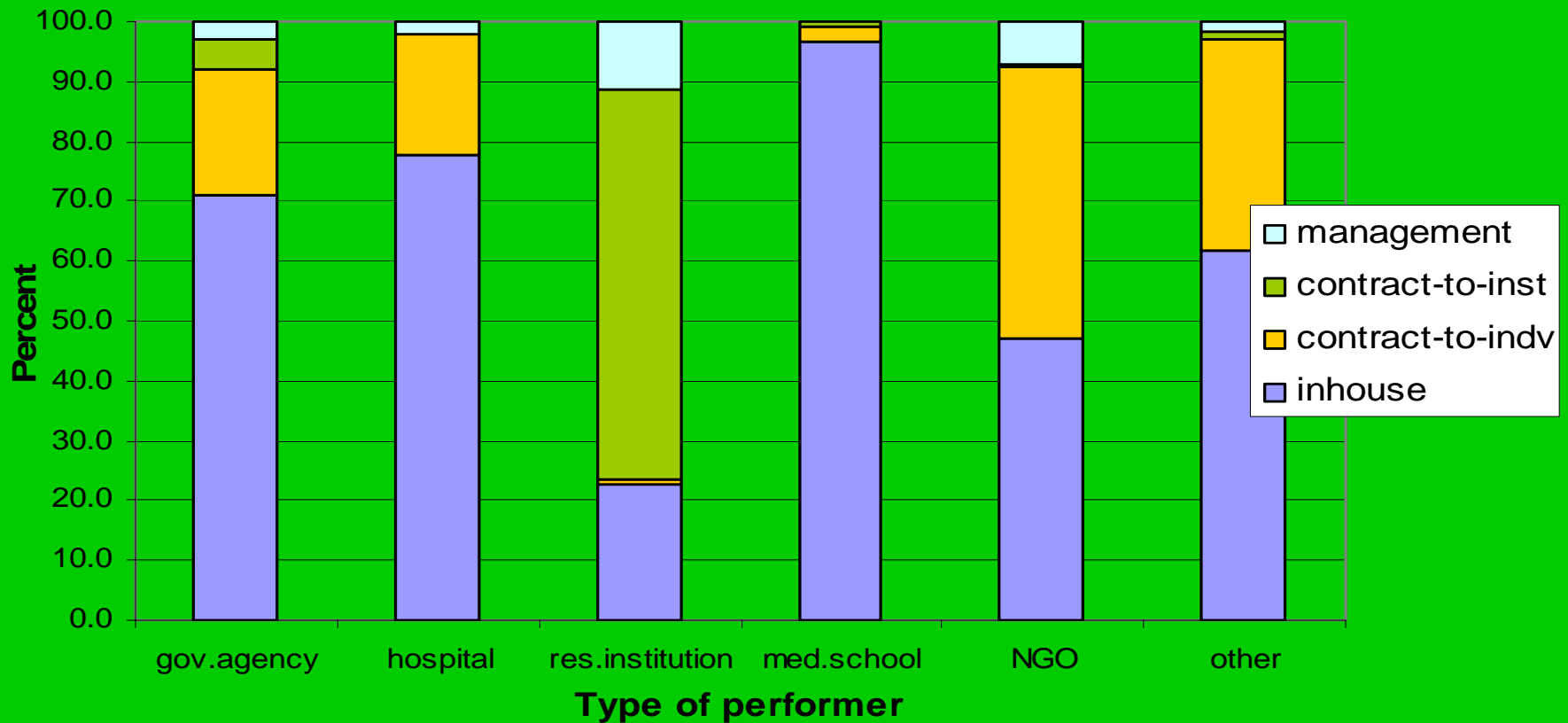**More fairness?**

# 2. Take a System's Perspective



Stewardship ↔ Human and Institutional Capacities

Financing ↕ (connected to Stewardship)

Producing & Using Research ↕ (connected to Human and Institutional Capacities)

Financing ↔ Producing & Using Research
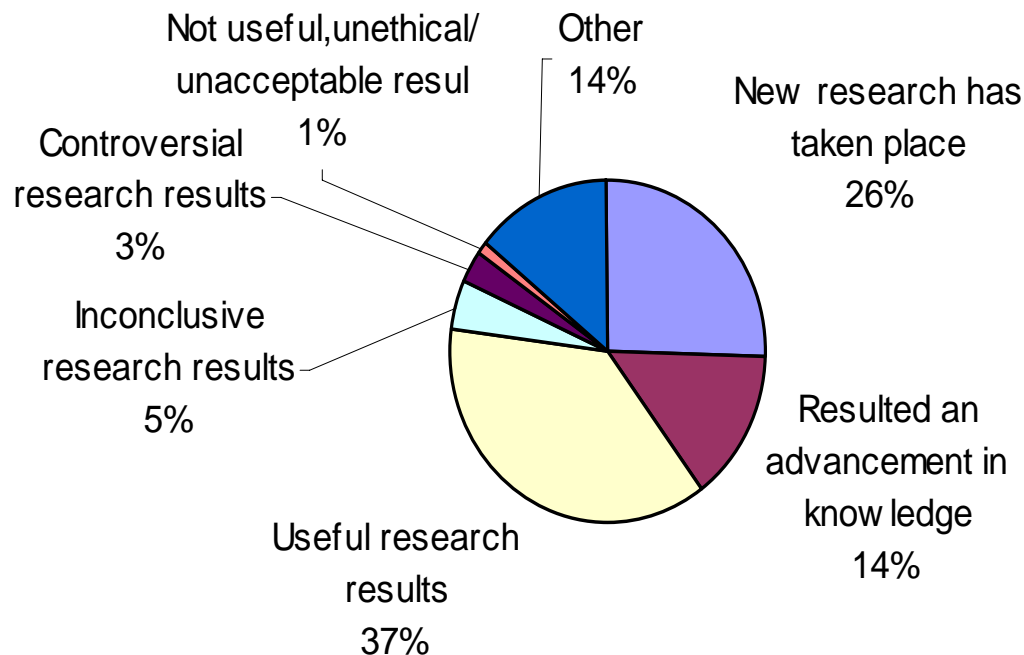
# 3. Document & Assess Performance



**Performer Expenditures by Expense Item:
African Health Research Performers Combined Expenditures
for the Years 2005 and 2006, By Type of Performer**

Legend:
- management
- contract-to-inst
- contract-to-indv
- inhouse

X-axis (Type of performer): gov.agency, hospital, res.institution, med.school, NGO, other

Y-axis: Percent (0.0 to 100.0)

**Source: WHO HRSA African survey of research institutions, 2008**

# 3. Document & Assess Performance



Performer Expenditures by Expense Item:
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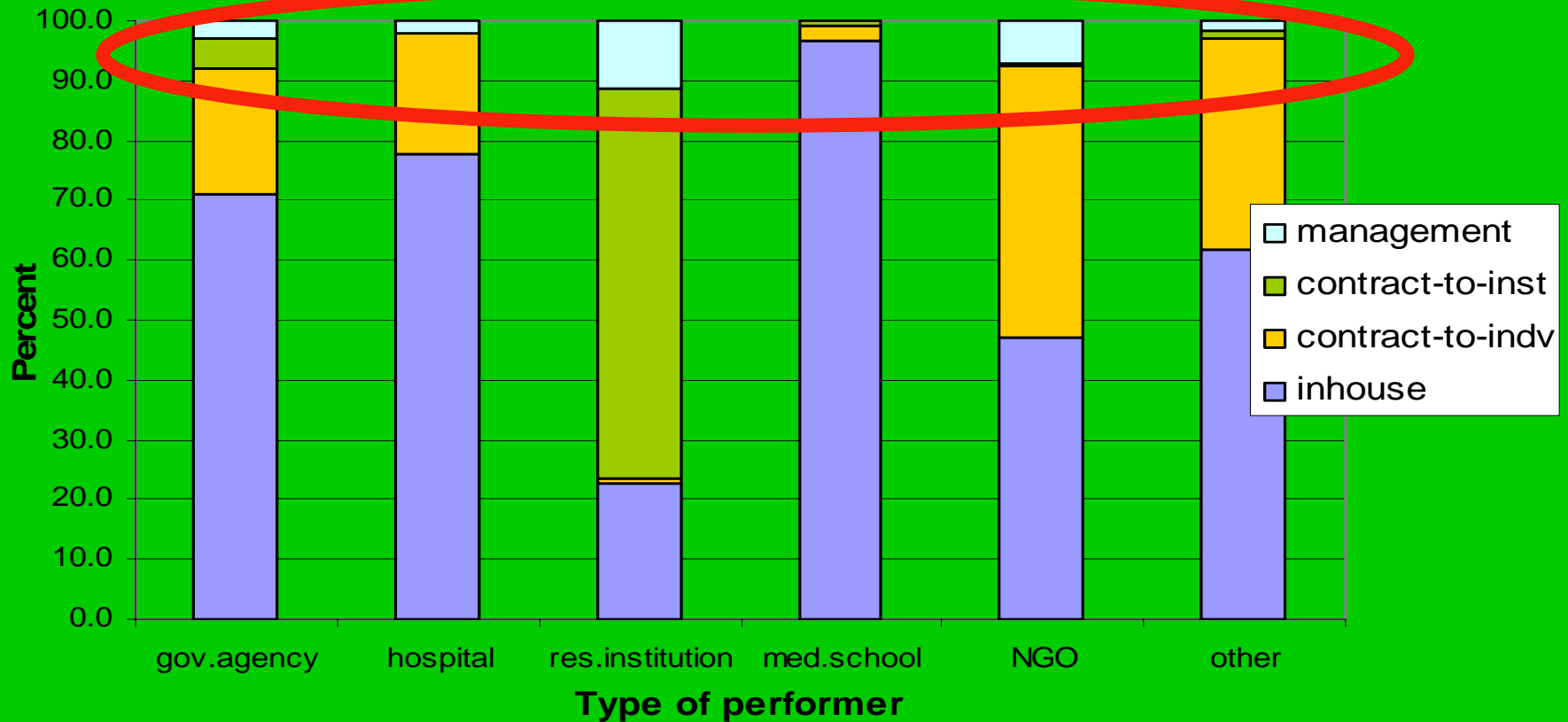
**Source: WHO HRSA African survey of research institutions, 2008**

# 4. Debate Process & Impact Widely

**Key messages from articles addressing health research, newspaper review in 13 countries (1,978 articles)**

Not useful, unethical/ unacceptable resul 1%

Controversial research results 3%

Inconclusive research results 5%

Other 14%

New research has taken place 26%

Resulted an advancement in knowledge 14%

Useful research results 37%

**Source: WHO HRSA Media Review 2005**

# 4. Debate Process & Impact Widely

| | | |
|---|---|---|
| **Institutional building** | **1950s-1960s** | **High income country models** |
| **Strengthening & development** | **1960s-1970s** | **From establishment to strengthening; training in high income countries** |
| **Develop management & administration** | **1970s** | **Target and reach neglected groups** |
| **Human resource development** | **1970s-1980s** | **Emergence of people-centered development; social sectors** |
| **New institutionalism** | **1980s-1990s** | **Shift from institutions to sectors (government, NGO, private); Shape national economic behavior Rise of networks and sustainability** |
| **Capacity development** | **1980s-1990s** | **Reassess technical cooperation notions; Local ownership and processes; Overall development approach** |
| **Capacity development & knowledge networks**<br>**Source: Blagescu and Young, 2006** | **2000s** | **Increased participation Continuous learning & adaptation Systems approaches, increased partner/donor coordination ICT - based knowledge networks** |

# 5. Work together for sustainable development

**Civil society, patient-, community-based organizations**

Demand transparency, innovation and relevance

**International and regional development partners**

Support institutions & program areas for the long-term, commit to relevance, ethical partnerships, and innovation that will improve equity

**Policy and decision makers**

Ensure coordination of priorities & increasing evidence-informed decisions, collaboration within & across countries, connect application & innovation that will improve equity

**Institution boards and directors**

Work towards mission, ensure transparency, safety, scientific & ethical practices, and merit based career development of all staff

**Researchers**

Engage, mentor & collaborate within institution, other disciplines & other countries; be honest, maintain independence & keep up to date

# 5. Work together for sustainable development

**Civil society, patient-, community-based organizations**

Demand transparency, innovation and relevance

**International and regional development partners**

Support institutions & program areas for the long-term, committed, consequential partnership an...

**Policy...**

En...
ev...
& a...
in...

**Institu...**

Work towards mission, ensure transparency, safety, scientific & ethical practices, and merit based career development of all staff

**Researchers**

Engage, mentor & collaborate within institution, other disciplines & other countries; be honest, maintain independence & keep up to date

THANK YOU!

MERCI!

# Reviewing national research systems: Notes on the country mapping template

*Dr. Johann Mouton, CREST, Stellenbosch*
*Dr. Roland Waast, IRD, Paris*

# Project deliverables

- ☐ Four regional compilations on country reviews:
  - ■ Africa compilation (17 countries)
  - ■ Arab compilation (13 countries)
  - ■ Latin American compilation (13 countries)
  - ■ Asia compilation (10 countries)

- ☐ Four regional reports
  - ■ African regional report
  - ■ Arab regional report
  - ■ Latin American regional report
  - ■ Asia regional report

- ☐ A consolidated bibliography + four regional bibliographies

- ☐ A final synthesis report

- ☐ A mapping template

# The template

# Some comments

• Templates are <u>heuristic</u> devices: i. e. they are frameworks (neither completely closed or open-ended) that <u>guide</u> data-collection, analysis and reporting
• They can be used slavishly and mechanistically OR reflexively and critically

| Indicator Tables | ← | TEMPLATE (Heuristic) | → | Open-ended Narrative |

| Structured Standardized (e.g. Frascati manual) | Free format |

# Elements of the template
## (Data or information types)

- ☐ **Research and knowledge indicators**

  *[These are standard quantitative measures that allow for statistical manipulation (e.g. construction of indices) and comparison across units of analysis]*

- ☐ **Descriptors**

  *[These are nominal measures (not standardized) that provide basic information of quantities of units of analysis – listings of these (also chronological) allow for trend and comparative analysis]*

  - ■ Chronological descriptors (establishment of institutions, societies and journals, release of policies and plans)
  - ■ Listing descriptors (lists of institutions, journals, societies, associations)
  - ■ Visual descriptors (organogram of governance of science, flow of knowledge products)

- ☐ **Narratives**

  *Sections of "thicker" textual descriptions and analyses that attempt to capture (historical, social, cultural) context and meaning of phenomena and are organized around themes, issues and topics*

# Structure of the template

- **CONTEXT**
  - General country context
  - History of science in the country
  - Governance of science in the country
  - Informal S&T structures

- **COMPONENTS**
  - R&D Performers
  - Human resources
  - Funding
  - Research Output
  - Co-operation agreements

- **DYNAMICS**
  - Tensions, dynamics and challenges.

# The template: CONTEXT

| Category | Description | Nature of data |
|---|---|---|
| **1. Contextualization of the science system within broader political, economic, educational and social systems** | This section contains a brief narrative description of the political and socio-economic "status" or "climate" of the country highlighting significant strengths, weaknesses and major events and developments. | *Historical narrative* |
| | In addition a set of uniform tables listing demographic (6), social (8), economic (4) and technological indicators (8). | *Statistical indicators* |
| **2. Some considerations about the History of science in the (country, region) under review and especially the development trajectory** | Date (decade) of establishment of first research institute (s), of first public university, Scientific journals, Academy of science and/or first professional societies, Ministry for science, research and/or higher education, Science policy documents | Descriptors (listing) |
| | Description of specific models of scientific organization and governance as influenced by colonial and other powers historically<br>Major periods in the institutionalization of science in country<br>Major events shaping the development of HE and science in country | Narrative |

# Template: CONTEXT

| 3. The governance of science in the country and available policies (especially S&T, R&D and HE) | List of science policy, research strategy and HE documents as well as formal reviews and commissions into HE and research in the country | Descriptors (listing in chronological order) |
|---|---|---|
| | Research and science priorities as identified in science policy documents | Narrative |
| | Diagrammatic representation of science governance | Visual descriptor |
| 4. Informal S&T structures (Academies, Associations, Journals) = Scientific Community) | National scientific journals<br>Scientific societies and associations<br>Academies of science | Descriptor (Listing) |
| | Status of main journals (still being published or not)<br>(Historical) description of information structures | Narrative |

# Template: COMPONENTS

| 5. *Knowledge and R&D performers (Establishments/ Institutions/ Universities/NGO's)* | Names of public universities, Names of private universities, Key university/college research centres, Key government funded research institutes/ centres, Key internationally funded research institutes/ centres Key private sector research facilities | Descriptor (listing) |
|---|---|---|
| | Description of strengths and weaknesses of the university system Modes of knowledge production undertaken in various sectors of the system | Narrative |
| 6. *S&T Human Resources (Description/s Statistics + The Profession of researcher: status, salaries, etc)* | Number of researchers/ scientists in country * gender Number of academics in HE institutions * gender Nr of academics by scientific field (6) * gender Nr of Graduate enrolments * field * gender Nr of M and D graduates by field of study (Natural/ Agric/ Engineering/ Health/Social/Humanities) | Indicators |
| | Profession and status of academics and knowledge workers Remuneration compared to other public professions Scientific mobility and brain drain challenges | Narrative |

# Template: COMPONENTS

| 7. Research Funding (Public or private; National and international; Trends) | R&D intensity (GERD/GDP)<br>Expenditure on R&D per researcher<br>Expenditure by sector<br>Source of funding (incl. overseas agencies) – actual values and proportions<br>Expenditure by scientific field (6) | Indicators |
| --- | --- | --- |
| | Role of government and other domestic agencies in funding research<br>Role of international donor and funding agencies in funding and steering research in the country | Narrative |
| 8. Research Output (post-graduates/ publications/ papers/ patents) | Total output in ISI-journals (by scientific field)<br>Total output in local journals (by field)<br>Nr of PG theses/dissertations<br>Nr of patents<br>Citation impact statistics | Indicators |
| | Description of specific policies (funding, incentive) and initiatives to encourage participation in innovation, technological learning, and research publications locally and internationally | Narrative |

# Template: COMPONENTS

| 9. Scientific co-operation and agreements | Nr of bilateral scientific agreements<br>Nr of multilateral and regional agreements<br>Nr of international agencies operating in country<br>Degree of scientific collaboration as measured through share of foreign co-authors of papers | Descriptors (Listing)<br><br>Indicators |
|---|---|---|
| | Main international and regional scientific partners | Narratives |
| | Main institutional collaborators | |
| | Domains and topics of scientific research | |

# Template: DYNAMICS

| 10. Tensions, dynamics & challenges | Social inscription of science | Narratives |
| --- | --- | --- |
| | The ethos's of science (values) | |
| | Science and the state/ contract | |
| | Legitimacy/ credibility/trust/ accountability | |
| | Controversies in science | |
| | Science and its publics | |
| | Usefulness of science? | |

# Thank you

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# 2009 World Conference on Higher Education UNESCO, Paris, 5-8 July 2009

The New Dynamics of Higher Education and Research for Societal Change and Development

Thematic Session: Learning, Research and Innovation
Panel IV: How to Develop and Sustain a Research System

Some thoughts on innovation for development, based on the OECD–UNESCO International Workshop
## "Innovation for Development: Converting Knowledge to Value"

*Dr Tony Marjoram*
*Senior Programme Specialist, Head of Engineering*
*Basic and Engineering Sciences Division*
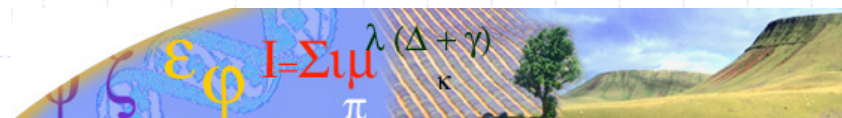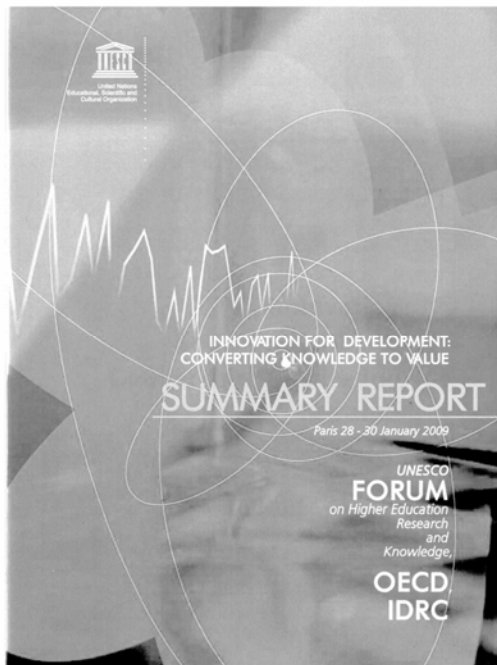
## The Workshop:

Revisited theory, conceptual frameworks, field experience
Explored the promotion of innovation in developing countries
Discussed action agendas and a way forward

Identified the following eight major interconnected themes:
  Innovation-driven development in an unsettled environment
    Heterogeneity (one size does not fit all, beware innovation systems)
      Cross-cutting nature of innovation
        Need for policy coherence
          Need to learn from other experience (lessons learnt!)
            Need to measure innovation activity in developing countries
              Need to focus at the local-level for grass roots innovation
                Need to generate/transfer local knowledge/technology

Prof J. Stanley Metcalfe, keynote presentation at Workshop:
"One of the main lessons of history is that innovation is the only
    sustainable route out of poverty"

United Nations
Educational, Scientific and
Cultural Organization
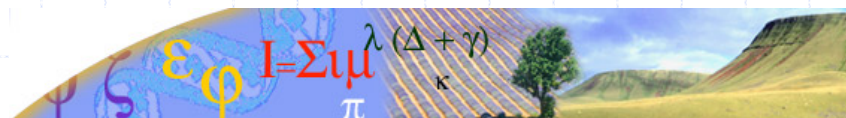
# Conclusions and recommendations for three stakeholder communities:

**1.      Policy-makers and decision-takers**
**2.      International community and donors, and**
**3.      Research and innovation communities**

**1.      For policy-makers and decision-takers**

Policy for innovation needs to take account of other policies
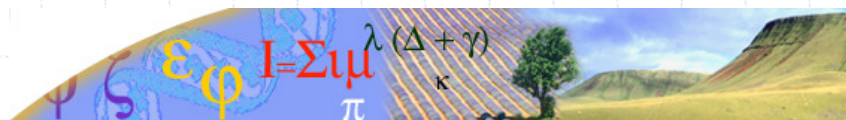Identify direction for innovation
Promoting innovation strategies that recognize value and impact
Targeting interventions toward:

   *Informal economy*
   *Building innovation competencies*

To facilitate the conditions in which innovation translates into value

## 2. For the international community and donors

Get innovation at the centre of the development agenda
Strengthen local partnerships and international linkages
Engage the foreign private sector with local entrepreneurs
Replace "knowledge transfer" by joint learning, knowledge sharing
Ensure the positive impact of the diffusion of foreign knowledge

## 3. For the research and innovation communities

Promote awareness of the value of innovation
Supported by evidence-based advocacy on innovation
Focus on developing case studies, as well as metrics
Need to involve users of innovation and technology
Facilitate shaping the direction and vision of innovation strategy
Foster transparency and engage stakeholders
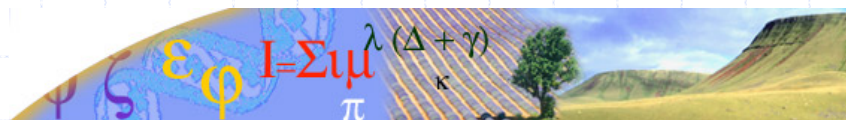
# Innovation action agenda to address these issues:

**Partnerships and networks**

Including "Networks of Excellence", to promote cooperation and sharing of information on innovation

**Studies and research indicators**

To provide evidence-based case studies of good practice, success stories, lessons learnt, factors promoting/impeding innovation
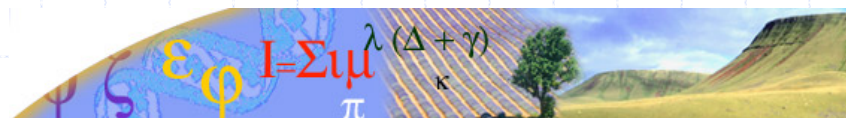
**Information publication and dissemination**

Sharing of information on innovation at practitioner, programme and policy levels, including case studies, guidelines, strategies etc

**Human and institutional capacity**

Capacity assessment and building required to promote innovation at practitioner, programme and policy levels

**Promotion of a wider awareness of innovation**

Required to get innovation more effectively onto the development agenda, into development plans, PRSPs and development process

$I = \Sigma \iota \mu^{\lambda}{}^{(\Delta + \gamma)}{}_{\kappa}$

UNESCO

United Nations
Educational, Scientific and
Cultural Organization

# Concluding thoughts
# Research–innovation: wealth from knowledge

Innovation

Should be the driving force of research (Prof Gassama-Dia)

Research

Should be based on national development agenda (MDGs, PRSPs)

Based on sound foundations in science and engineering

Problem-based learning for problem-solving societies?

Higher education weakened by Structural Adjustment Policies in 1980s

Need to maintain and invest in higher education, research and innovation to help get out of current economic crisis

Knowledge-based society/economy – based on education and research

Politicians will mention these things, but we need real "Political Will"
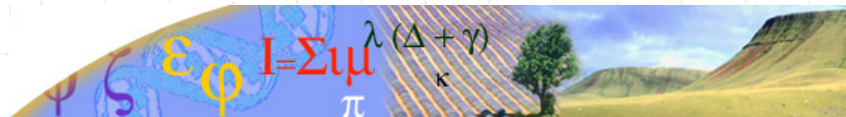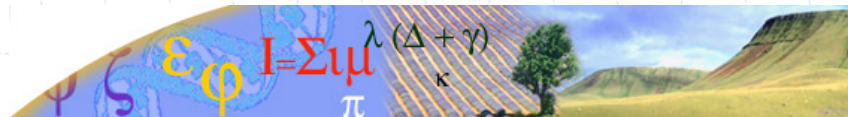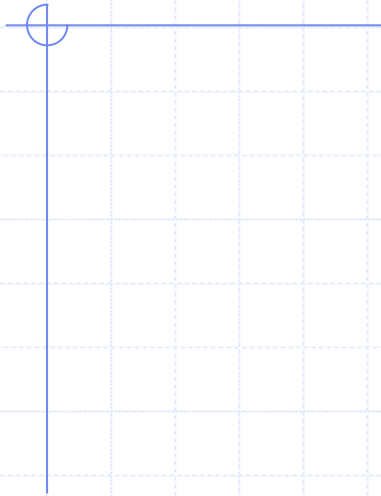
# Research on Higher Education

- Varied  backgrounds of these researchers

- Main aspects: HE policy, HE management , staff development

# Research on HERI Systems

- A meta-perspective

- An integrated research domain

- HERI research done by: government policy units, academia, stakeholders groups ( eg NGOs)

- Under-researched in MICs and LICs due to lack of capacity

# The UNESCO Forum on Higher Education, Research and Knowledge

**Partners with HERI-oriented bodies to assure the research/ policy nexus:  universities, research bodies, NGOs, IGOs**

(*The Forum Global Colloquium*)

**Identifies and  links HERI researchers in HICs, MICS and LICS**

*(The Forum Global and Regional Research Seminars)*

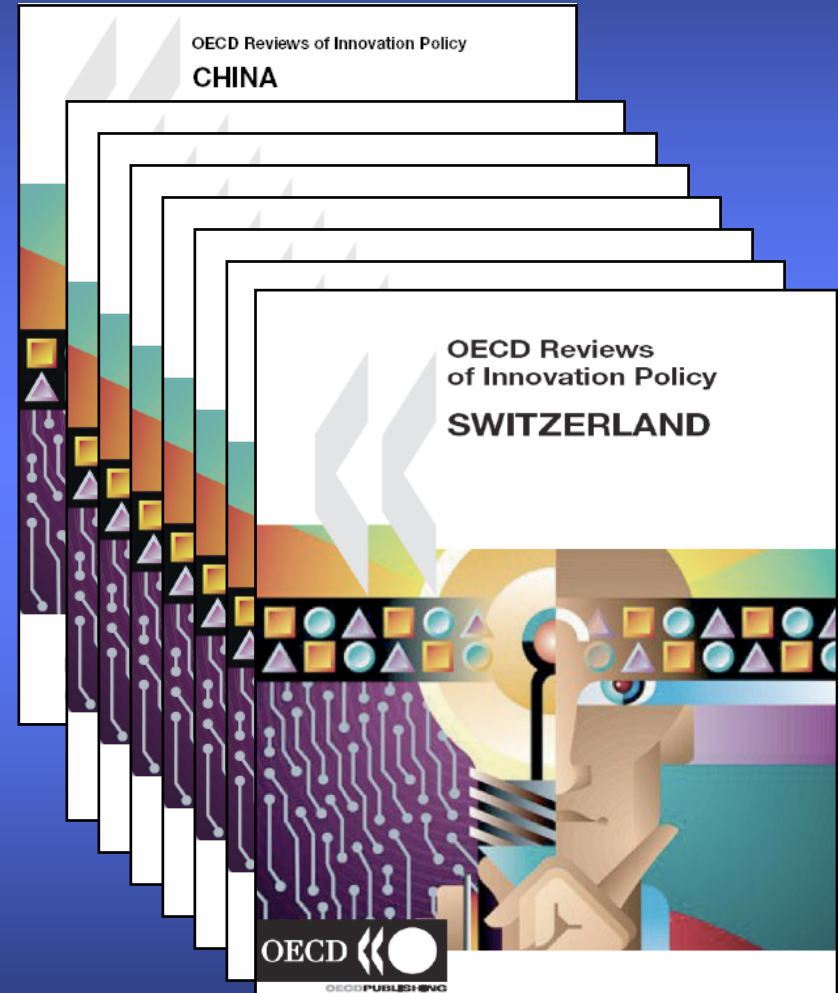# OECD Reviews of Innovation Policy

Jean Guinet

Head, Country Review Unit
OECD Directorate for Science, Technology and Industry

# OECD Reviews of Innovation Policies

- Completed and published:

  Luxembourg, Switzerland, New Zealand, South Africa, Chile, Norway, China, Hungary

- To be published shortly:

  Korea, Mexico, Greece

- Ongoing and under launch: Russia, Turkey, South East Asia S&T mapping

- Others requested or under discussion

# Changing innovation contexts and processes challenge existing policies

## The OECD Reviews of Innovation Policy help governments learn from international best practices to optimize their responses

- Expanding knowledge and new business models
  - ✓ Increasing multidisciplary scientific content of innovation
  - ✓ Importance of "soft" innovation for harnessing the benefits of R&D-based innovation, especially in the fast growing service sector
  - ✓ Changing business R&D strategies: Open Innovation Model
- Demand pull: Sustainability and new social needs
  - ✓ Demand for greener products and services
  - ✓ Ageing in richer countries and China
  - ✓ Socio-economic convergence/divergence (e.g. growth translates into decreasing poverty, but does not necessarily reduce inequality)
- Globalisation of innovation markets and inputs

Lead to

changes in

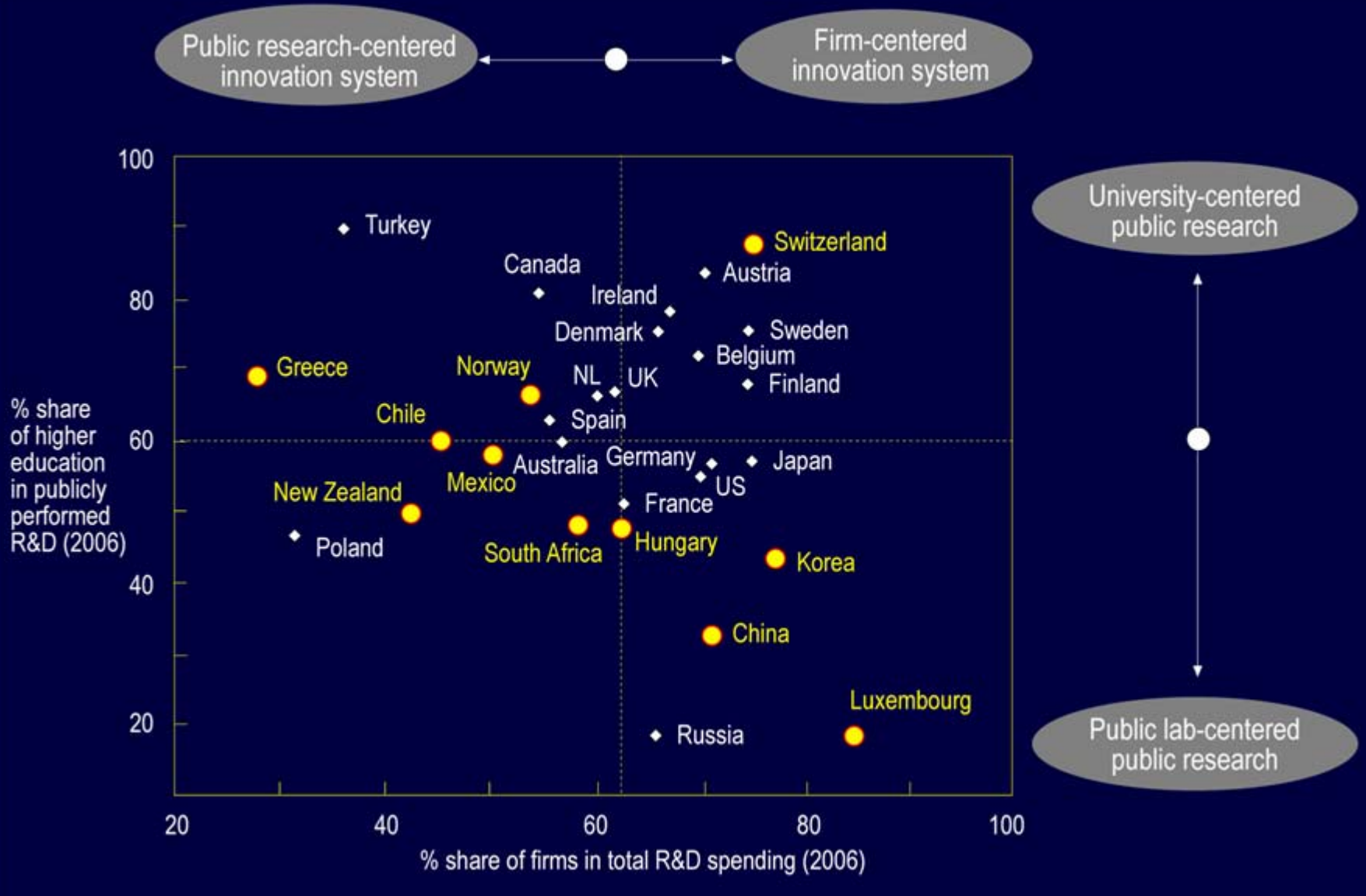The respective roles of the main actors in the innovation system, including Higher Education ①

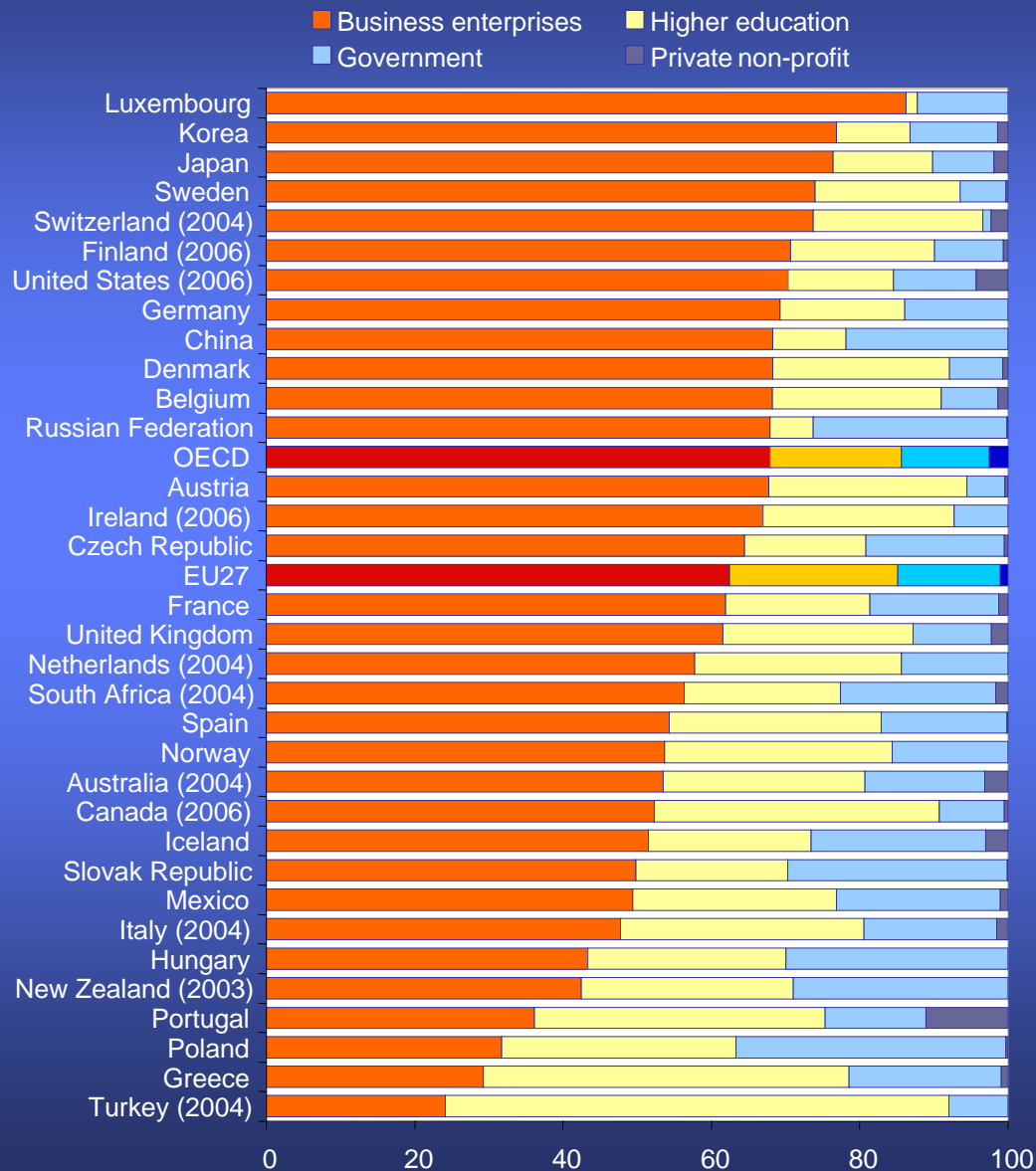- Public governance
- Policy mixes ②
- Policy instruments

# Archetypes of innovation systems

**1a**

# Efficient innovation systems are firm-centered

### Percent share of main actors in R&D performance, 2005

- Business enterprises
- Higher education
- Government
- Private non-profit

Luxembourg
Korea
Japan
Sweden
Switzerland (2004)
Finland (2006)
United States (2006)
Germany
China
Denmark
Belgium
Russian Federation
OECD
Austria
Ireland (2006)
Czech Republic
EU27
France
United Kingdom
Netherlands (2004)
South Africa (2004)
Spain
Norway
Australia (2004)
Canada (2006)
Iceland
Slovak Republic
Mexico
Italy (2004)
Hungary
New Zealand (2003)
Portugal
Poland
Greece
Turkey (2004)

0   20   40   60   80   100

# But public research retains a key role, although in need of clarification



**1b**

Use-inspired

Technical achievements

Pasteur    Edison

Mission-oriented

Market-oriented

Fundamental knowledge

Bohr

Curiosity-driven

In theory

In practice

APPLIED & DEVELOPMENT

PUBLIC RESEARCH INSTITUTES

FIRMS

Public-Private Partnerships

Public-Public Co-operation

BASIC

HIGHER EDUCATION

MISSION-ORIENTED    MARKET-ORIENTED

APPLIED & DEVELOPMENT

BASIC

MISSION-ORIENTED    MARKET-ORIENTED

Part of Public research organisations' output is no longer a "public good";
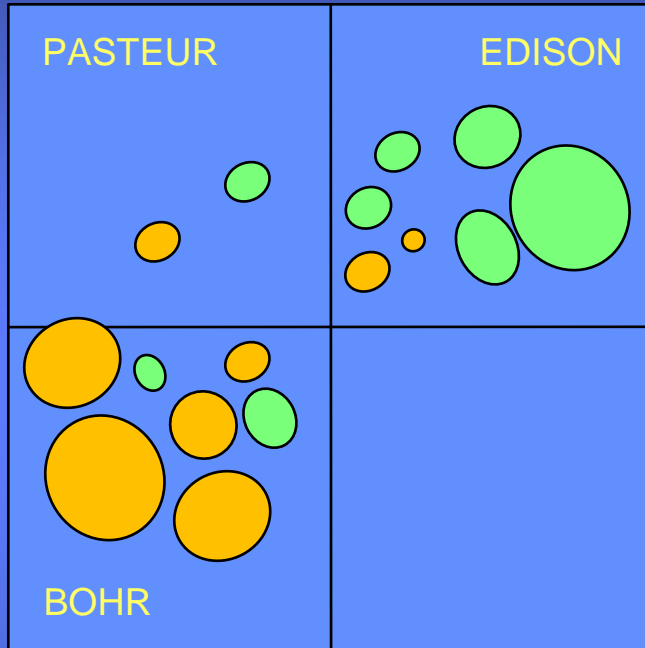drawing the border to and intensifying linkages with business has become major issue

**1c** Refocusing PROs towards "Pasteur's quadrant" should be a major objective

Use-inspired

PASTEUR          EDISON

BOHR
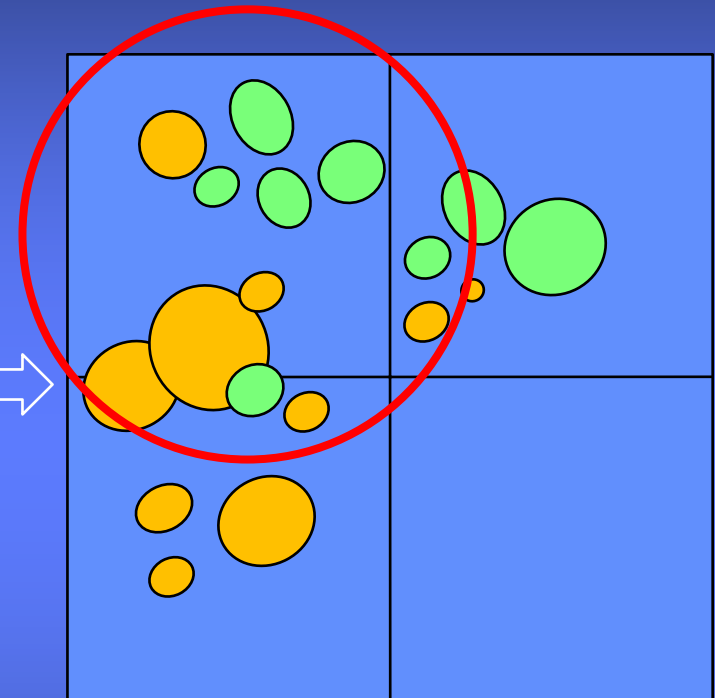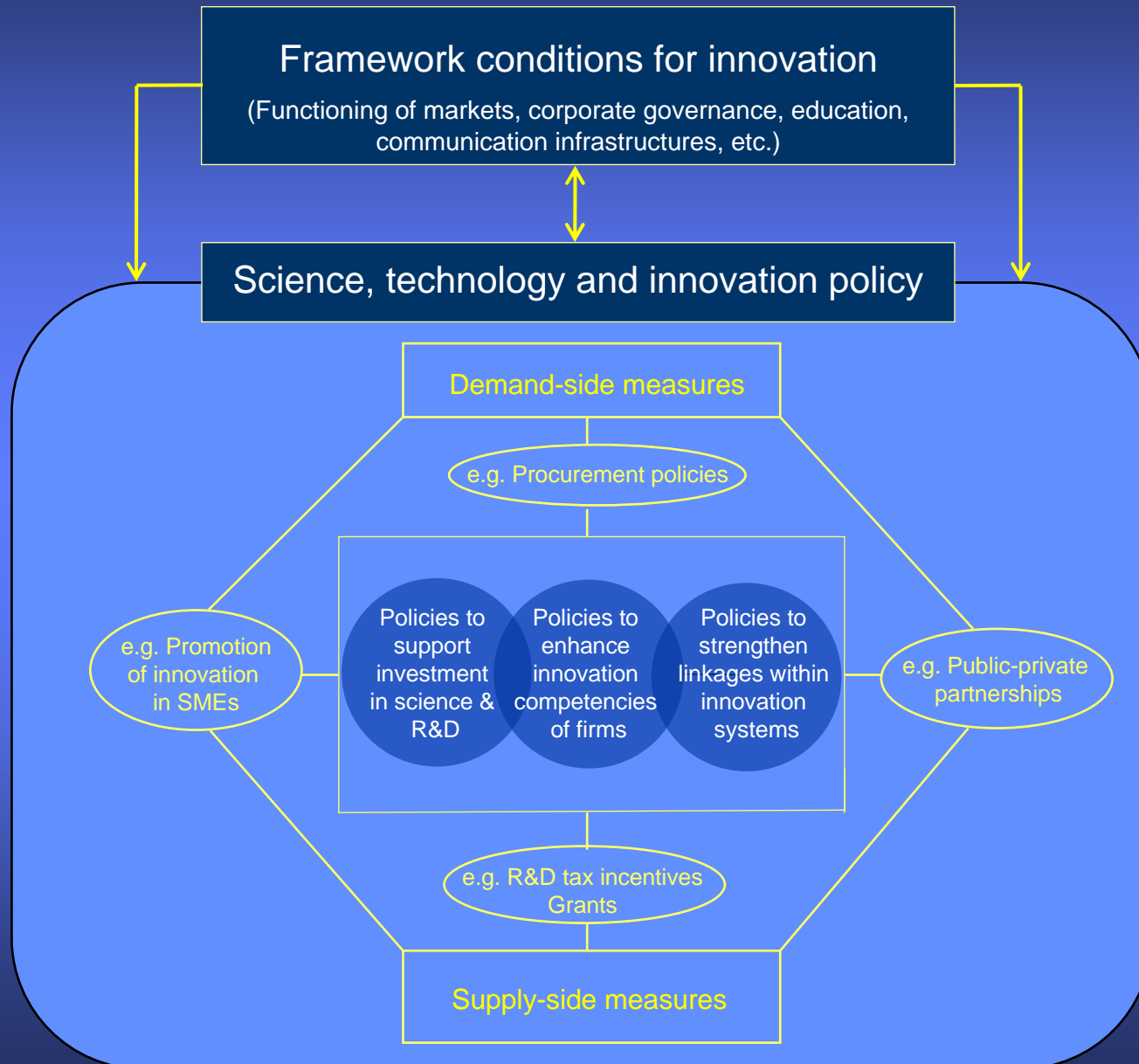
Curiosity-driven

Fundamental          Technical achievement

○ Universities    ● Public Research Institutes

- Large-scale national programmes in priority areas (top down)
- Public-private partnerships (bottom-up)
- Better recognition of user-driven research in evaluation
- Improve HRST mobility

# The scope of innovation policy

**2a**

**Framework conditions for innovation**
(Functioning of markets, corporate governance, education, communication infrastructures, etc.)

**Science, technology and innovation policy**

Demand-side measures

e.g. Procurement policies

e.g. Promotion of innovation in SMEs

Policies to support investment in science & R&D

Policies to enhance innovation competencies of firms

Policies to strengthen linkages within innovation systems

e.g. Public-private partnerships

e.g. R&D tax incentives Grants

Supply-side measures

# Policy mix: Balancing the main strategic objectives and demand-side *versus* supply-side measures

**2b**

Demand-side measures

Policies to support investment in science & R&D

Policies to enhance innovation competencies of firms

Policies to strengthen linkages within innovation systems

Supply-side measures

Demand-side measures

Policies to support investment in science & R&D

Policies to enhance innovation competencies of firms

Policies to strengthen linkages within innovation systems

Supply-side measures

- Improve incentives for science-industry relationships
- Foster demand for HRST in the business sector
- Foster innovation capacity building in SMEs
- Innovation-friendly procurement policy
- Lead markets, standards

# Features and methodology of the OECD Reviews

- Independent assessment; demand driven, largely financed by voluntary contributions

- Scope of the reviews:
  - ✓ Mandatory / core items
    - Innovation and economic performance
    - International benchmarking of innovation performance
    - Framework conditions for innovation
    - Promotion of business R&D and innovation
    - Industry-science relationships
    - Internationalisation of R&D
    - Human resources in science and technology (HRST)
    - Knowledge infrastructures
    - Governance of the innovation system, evaluation
  - ✓ Special emphasis, depending on the country being reviewed
    - e.g. the role / steering and funding of public research organisations, entrepreneurship and SMEs; sectoral case studies (including services); the regional dimension and the role of innovative clusters

- Alignment of scope, timing, form of presentation etc. to strategic needs of the examined country

# Conceptual approach
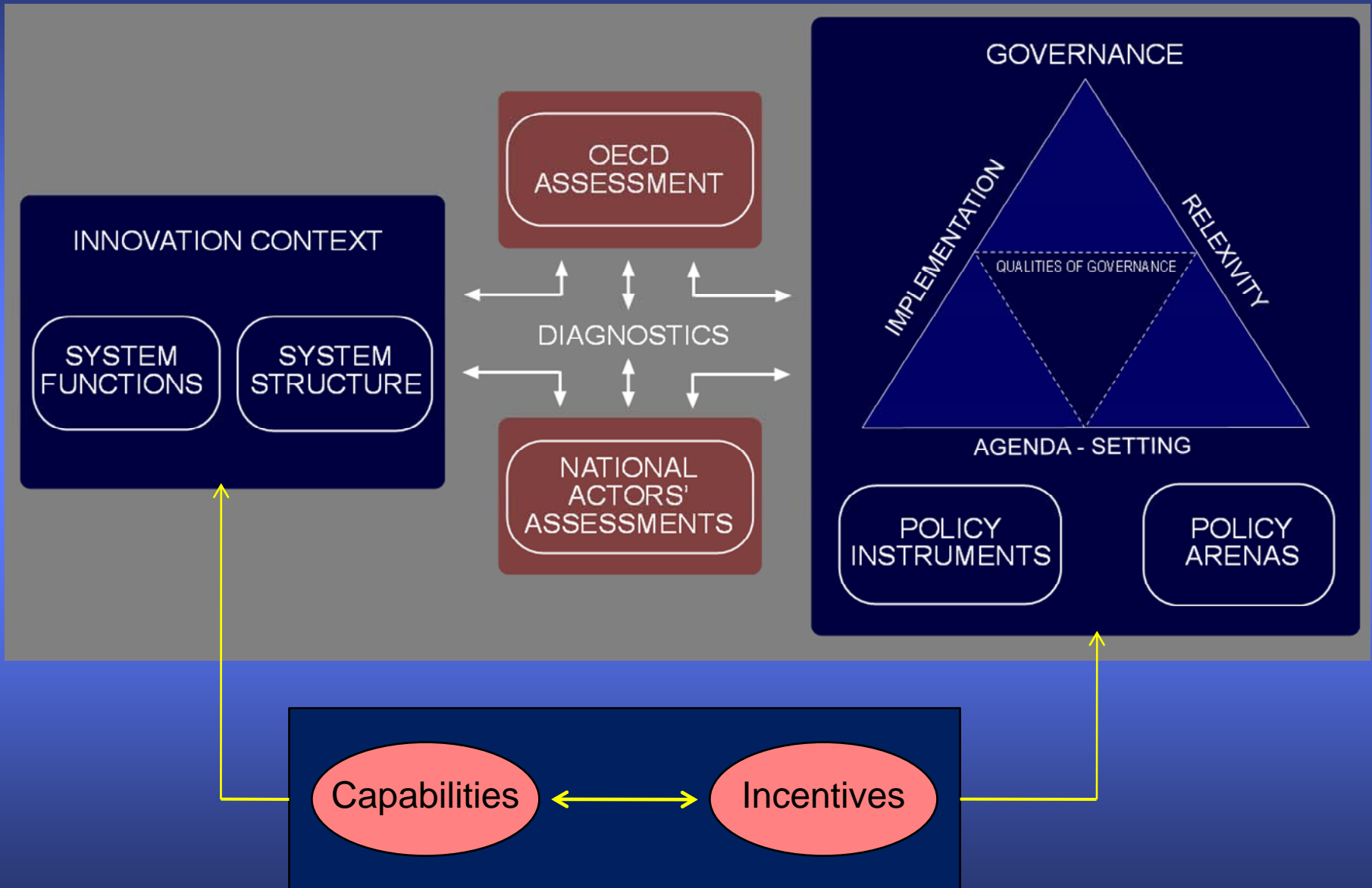
# INNOVATION SYSTEM

## INNOVATION CONTEXT

- (Changing) Nature of Innovation
- Ecology of Firms & Economic Structure
- Stage of Socio-Economic Development
- Infrastructure
  Transport, Telecoms, etc.
- Geographical and Resource Endowment
- Strategic Attention to and Framing of Innovation
- Framework Conditions
  Macroeconomic Stability, etc.
- Government
  Federal, Unitary State, etc.

## SYSTEM FUNCTIONS

- Facilitate Experimentation and Learning
- Knowledge Development
- Knowledge Diffusion
- Guide Direction of Search & Selection
- Market Formation
- Develop and Mobilise Resources

## SYSTEM STRUCTURE

- Actors
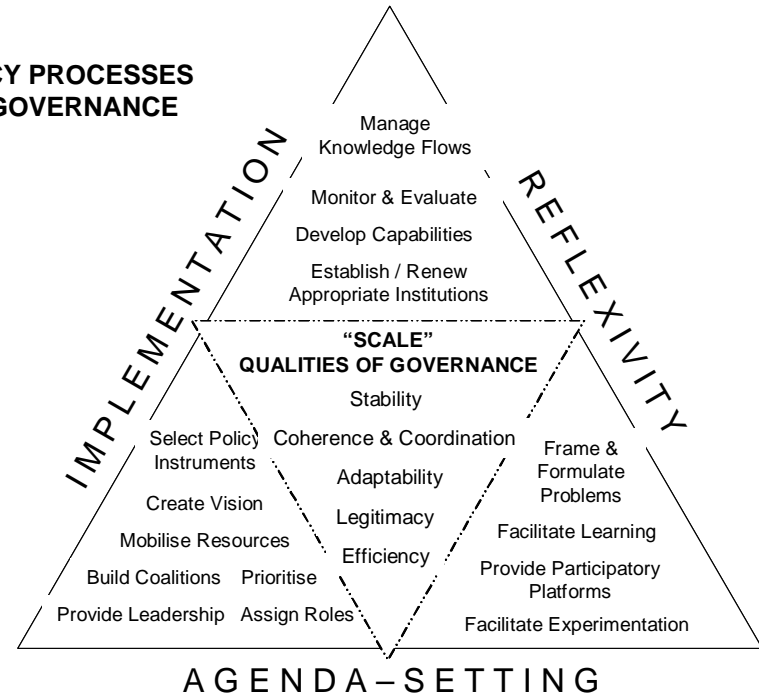  Roles, Capabilities, etc.
- Interactions
  Hierarchies, Markets & Networks
- Institutions
  incl. Norms, Values, Framework Conditions
- Types of Innovation
  Oslo Taxonomy

# POLICY ARENAS

## POLICY PROCESSES AND GOVERNANCE

IMPLEMENTATION — REFLEXIVITY

- Manage Knowledge Flows
- Monitor & Evaluate
- Develop Capabilities
- Establish / Renew Appropriate Institutions

### "SCALE" QUALITIES OF GOVERNANCE
- Stability
- Coherence & Coordination
- Adaptability
- Legitimacy
- Efficiency

- Select Policy Instruments
- Create Vision
- Mobilise Resources
- Build Coalitions
- Provide Leadership
- Prioritise
- Assign Roles

- Frame & Formulate Problems
- Facilitate Learning
- Provide Participatory Platforms
- Facilitate Experimentation

AGENDA – SETTING

## POLICY INSTRUMENTS: MIX AND SEQUENCING

### Financial
- Public R&D block grant & project funding
- R&D infrastructure
- Business grants & loans
- Tax incentives
- Venture & seed capital
- Public procurement & other demand stimulants
- Technology transfer incentives
- HE & vocational training funding
- R&D personnel mobility
- Public-private partnerships
- Incubate high-tech firm formation

### Regulatory
- IPR
- HEI & PRO legal status
- Competition
- Product markets
- Labour markets
- Trade & FDI
- Environment

### Soft
- Standards
- Network & Cluster building
- Information & brokerage

### Meta
- Benchmarking
- Strategic Intelligence

## ARENA STRUCTURE

- Policy Sub-System
  R&D, HE, SMEs, etc.
- Institutions
  Rules of the game, etc.
- Actors
  Roles, Preferences, etc.
- Interactions
  Principal-Agent, Network, Competitive

# Procedure for a standard review

- Agreement on Terms of Reference (TOR) between the OECD and a the representative Ministry / Public Agency of the examined country

- The reviewed country drafts a background paper

- The OECD Review team (Secretariat + consultant(s)) carries out a (one to two week) fact-finding mission in the examined country to interview the major stakeholders in the national innovation system

- The OECD Secretariat prepares a draft report including an overall assessment and recommendations

- Consultations with reviewed country

- Reporting to / peer-review in the OECD's Committee for Scientific and Technological Policy

- The report is published under the responsibility of the SG of the OECD

- The Review's findings and recommendations are presented at a special event organised by the examined country which typically involves high-level decision makers, stakeholders and media

- … a 6-12 month exercise in total

# Outlook

- Continuing strong demand for Innovation Policy Reviews, from OECD member and non-member countries

- Growing portfolio of countries examined, which allow now feedback to thematically oriented OECD work (a synthesis report is under preparation)

- Regarding non-member countries, priority is given to "enhanced engagement" countries (in addition to China and South Africa which have been already reviewed: Brazil, India, and Indonesia)

- But OECD values participation of other non-member countries, through a regional approach (e.g. the new project on South East Asia) and/or individual in-depth reviews

- Cooperation with other international organisations is key for the feasibility and success of this outreach strategy (in addition to UNESCO, cooperation has been initiated with the World Bank, EU, UNCTAD, and IADB)

# Thank you for your attention

Contact:

jean.guinet@oecd.org

Web Resource:

www.oecd.org/sti/innovation/reviews

# Financing research and innovation

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Faculty of Science

Rabat

# The venture capital model: investor comfort

- Investors (in Africa: governments) like to see returns on their investment [Economy]
- Investors seek to optimize their contribution [min investment for max gain]
- Investors like to spread (dilute) risk through partnerships [min risk for max gain]
- Investors like to maintain control over the product [priority areas, planned economies]

- Project carriers (researchers) need degrees of freedom to allow for flexibility and innovation

- An intelligent modus vivendi must be developed to ensure adequate financing of research and inovation

# Research and development financing in Africa
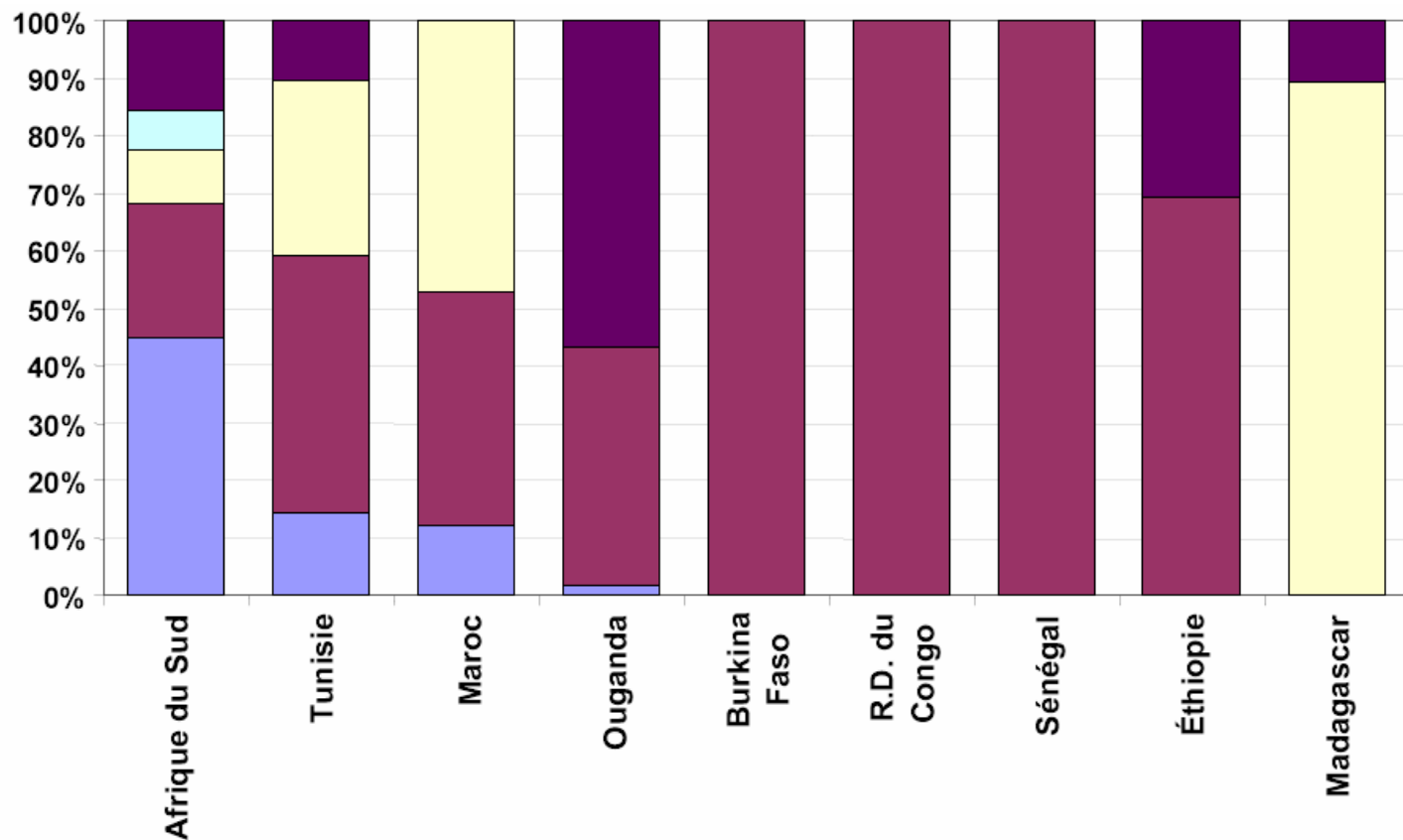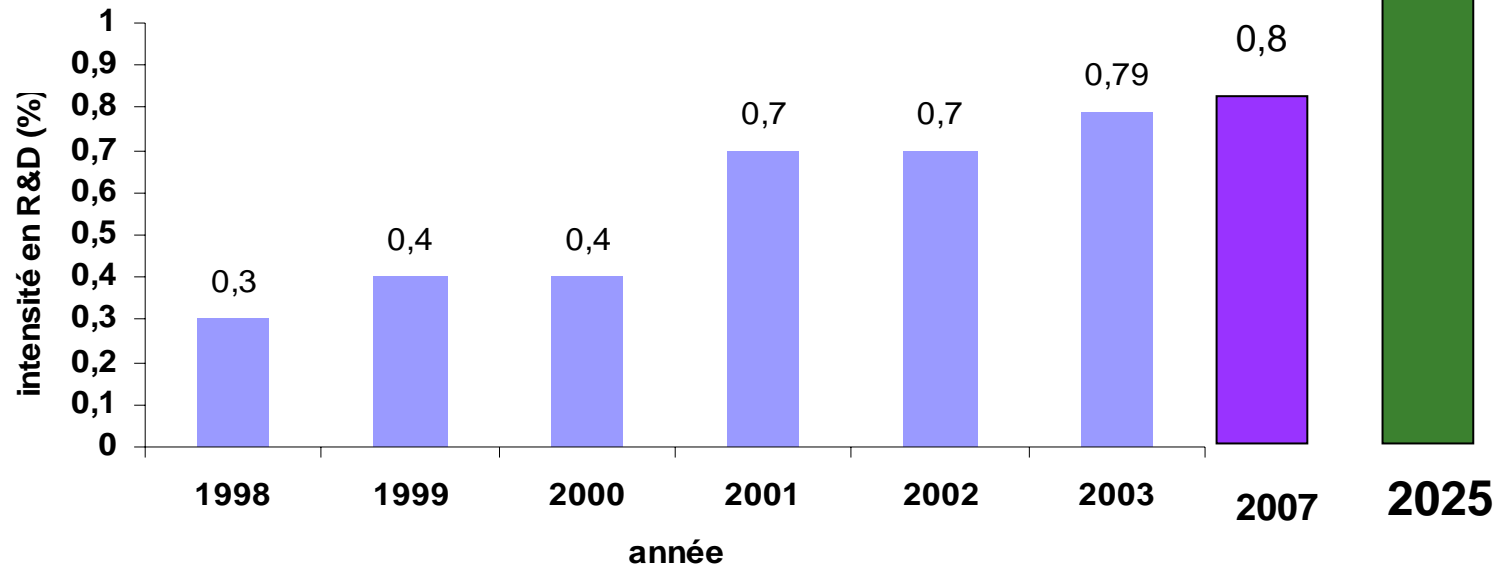
The modus vivendi requires governments to make strategic decisions

# % GNP devoted to research (Morocco)

# 2009 Research budget commitment (Morocco)

- Emergency Research Fund:    $ 23 Million
- Investment:                          $   8 Million
- Research fund                      $   3 Million
- Telecom research support     $   6 Million

# *National Fund for the Support of Scientific Research and technological development in ICT*

- ❑ 50% participation in financing R&D projects, up to one million dirhams (~$125,000) per project.

- ❑ Project eligibility determined by a national commission of IT specialists named by the Prime Minister's office.

- ❑ Fund is spécific to R&D projects managed in tandem by Companies + University / Engineering schools
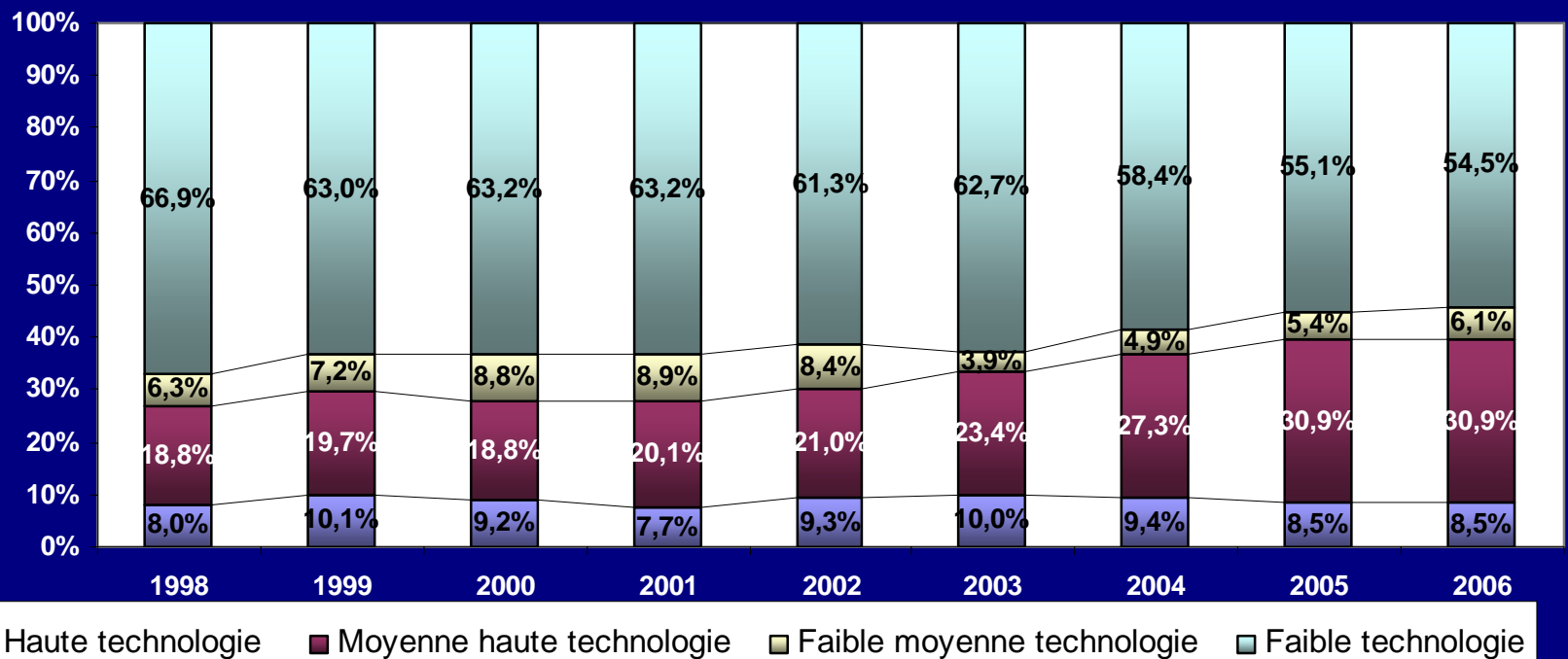
\*

The investment must lead to returns

# Technology in Moroccan exports



| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|
| Faible technologie | 66,9% | 63,0% | 63,2% | 63,2% | 61,3% | 62,7% | 58,4% | 55,1% | 54,5% |
| Faible moyenne technologie | 6,3% | 7,2% | 8,8% | 8,9% | 8,4% | 3,9% | 4,9% | 5,4% | 6,1% |
| Moyenne haute technologie | 18,8% | 19,7% | 18,8% | 20,1% | 21,0% | 23,4% | 27,3% | 30,9% | 30,9% |
| Haute technologie | 8,0% | 10,1% | 9,2% | 7,7% | 9,3% | 10,0% | 9,4% | 8,5% | 8,5% |

■ Haute technologie  ■ Moyenne haute technologie  □ Faible moyenne technologie  □ Faible technologie

The investment must be optimized (selective)

# National Scientific Research Center: Associated university laboratories program



Répartition des candidatures déposées et retenues par université
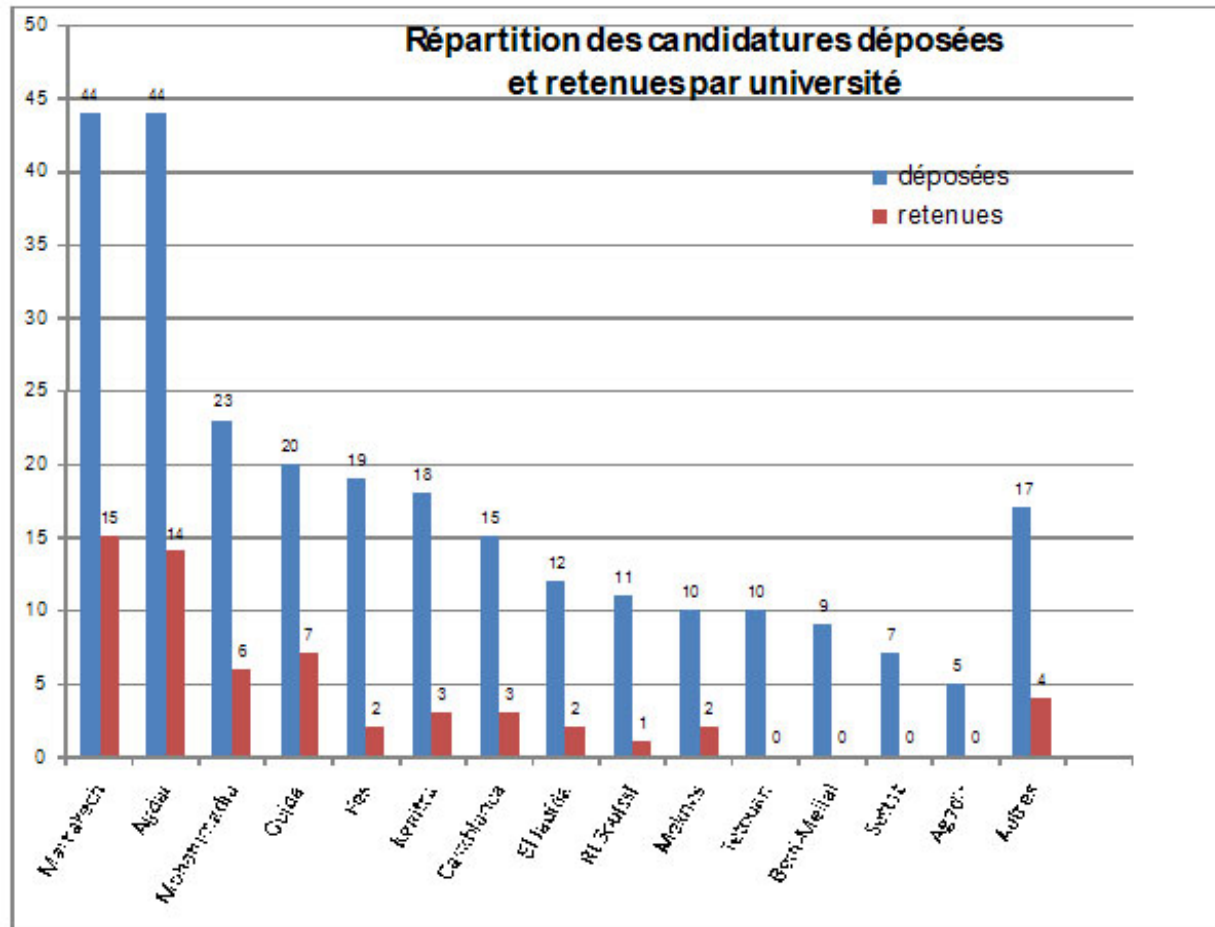
# National Scientific ResearchCenter:
## Common services

- **MaGRID** National computing network
- **IMIST** National documentation service:  Elsevier
- **UATRS** Chemical and environmental analyses laboratories
- **MARWAN** all-university Internet network

*

spreading risk

# PPP public-private partnerships

Intel Corporation :

- **Partnership with Ministry of Education**: Généralization if ICT in public schools : training of teachers/ computer grants (Classmate PC) and laboratory training for students

Microsoft :

- Partnership with the government : Economic development, Modernization of the administration and Human development through modernization of the educational sector (education centers, pedagogical support through Microsoft academies in Universities)

IBM Morocco

- Partnership with Ministry of Industry and Technology ''Global innovation initiative'' : innovation, R&D and the development of competencies through an 'Innovation center'' and a ''Technical exploration center'': First IBM centers in Africa , Overall budget : 5 millions dh (~ $625,000).

CISCO

- Partnership with Ministry of Higher Education to establish certification academies in Moroccan universities

# First National Innovation Summit
## 9 June 2009

**9 contracts signed:**

- Ministry of Industry and Technology
- Ministry of Higher Education
- National Association of Moroccan Entrepreneurs
- Mohammed V University – Agdal, Rabat
- Cadi Ayyad University, Marrakesh
- Hassan II University, Mohammedia
- National Center for Agricultural Research
- Moroccan Association for Innovation in Science and Research
- Center for Agroalimentary Technology
- Office for Industrial and Commercial Property
- Patent and Nomenclature Office (Spain)
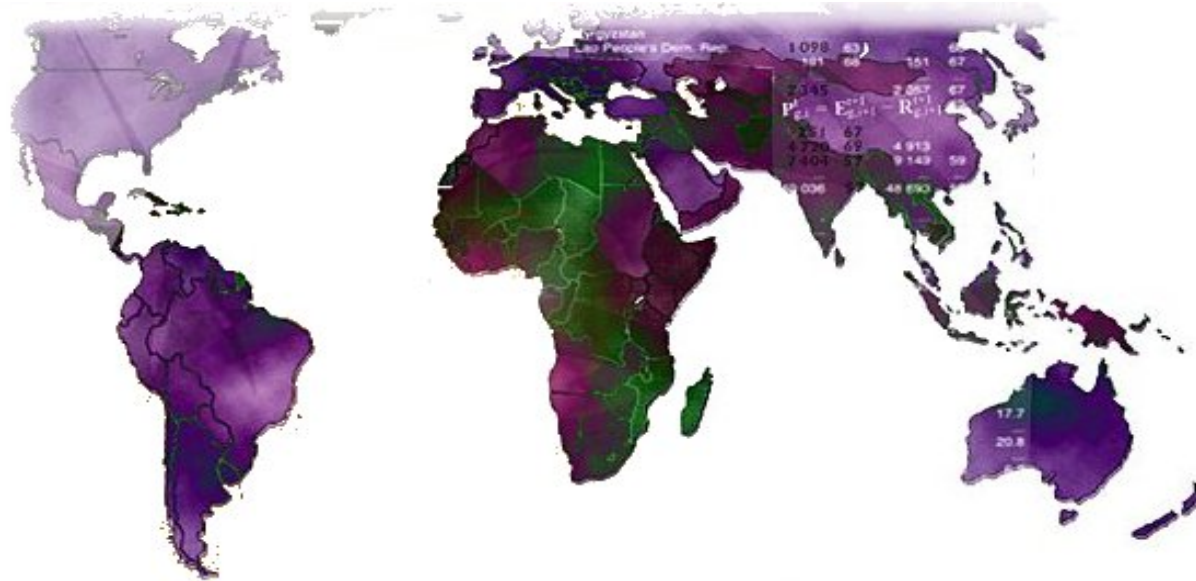- Sophia Antipolis Foundation (France)
- IBM (USA)                                                    **

# Conclusions

- Financing research and innovation requires diversified measures ranging from strategic commitment to « spreading the burden » through partnership

- Encouraging investment in research and innovation requires demonstrated returns promoting socio-economic and human development
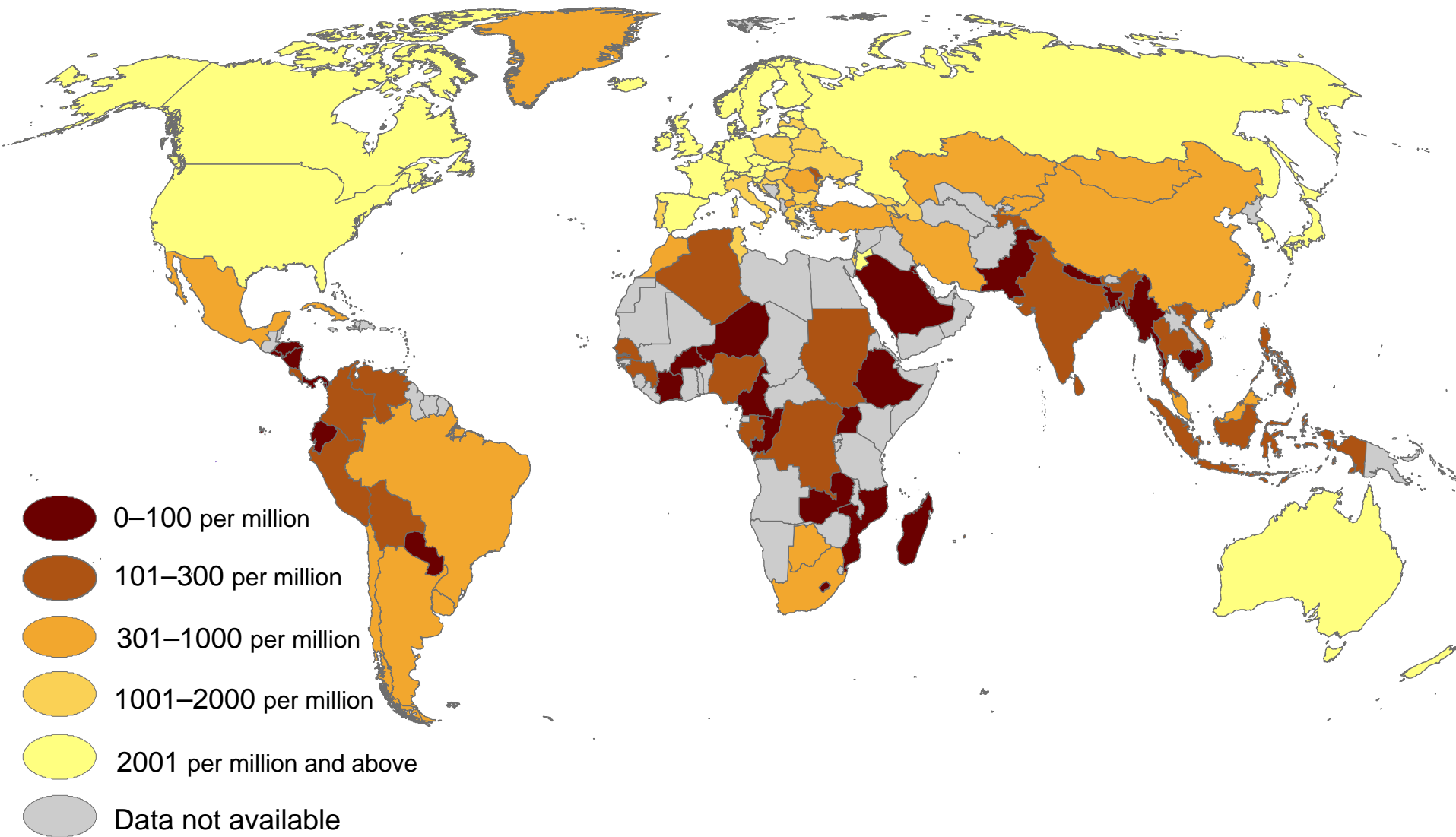
# S&T data for policy making

*The New Dynamics of Higher Education and Research for Societal Change and Development*
*Panel at WCHE*
*Martin Schaaper*
*Paris, France*
*7 July 2009*

## Official S&T data source for:

- **UN Statistical Division**: UN Statistical Year Book

- **UNDP**: Human Development Report

- **World Bank**: World Development Indicators

- **UNESCO** Reports:
    - UNESCO Science Report
    - UNESCO World Report - Towards Knowledge Societies
    - International Report on S&T and Gender

# How many researchers are there? Researchers per million inhabitants, 2005 or latest available year



**Legend:**
- 0–100 per million
- 101–300 per million
- 301–1000 per million
- 1001–2000 per million
- 2001 per million and above
- Data not available

# Lines of action

- S&T Survey operation and data guardianship

- Training in S&T statistics: Workshops & other training activities

- Standard setting and methodological developments

- Analysis & Publications
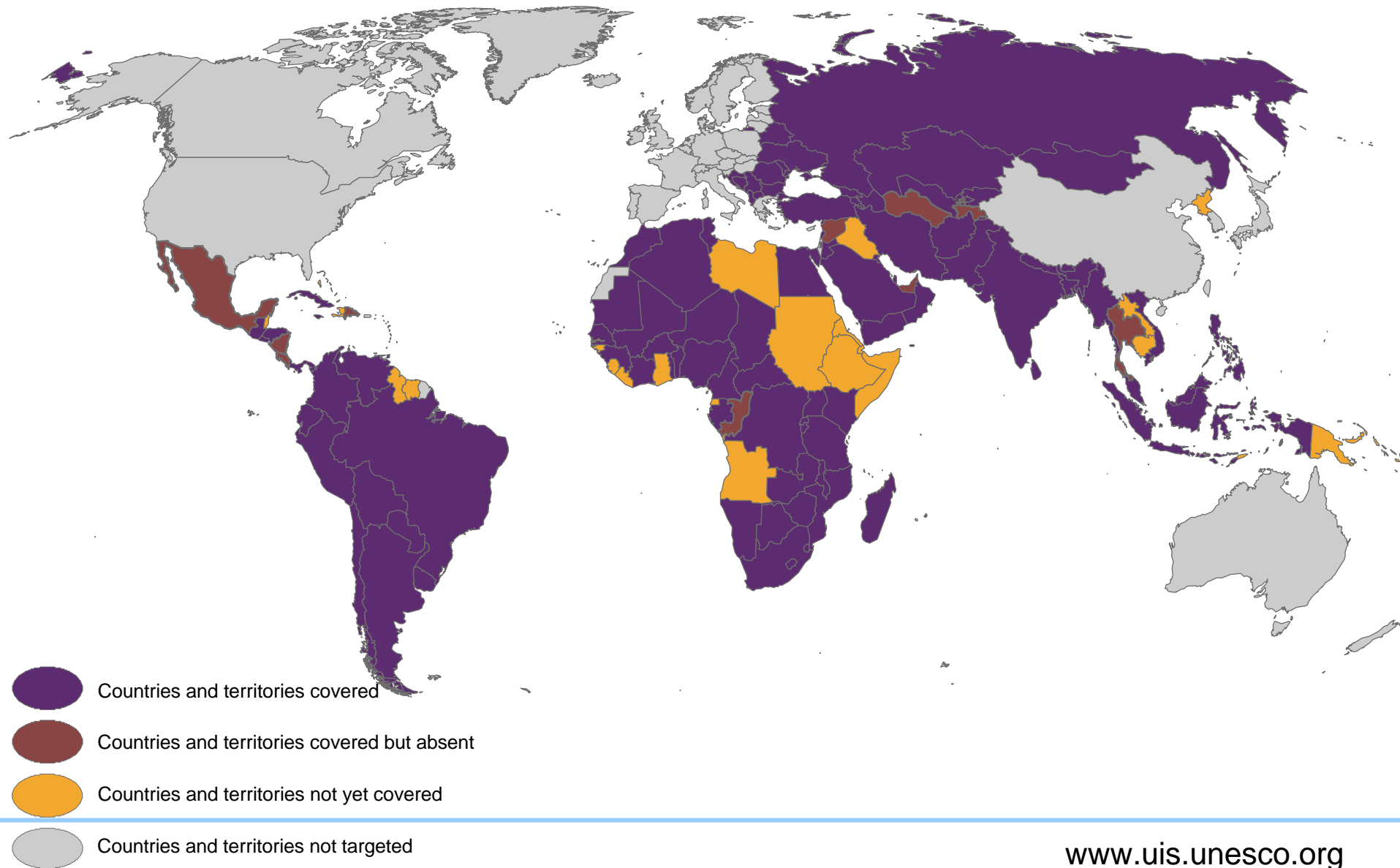
- Collaborations & Partnerships

# S&T Survey operation and data guardianship

- **Global Survey on Statistics of Science & Technology**: Biennially – 3$^{rd}$ round has been launched in June 2008. Data will be published in August 2009.

- Global Database on S&T Statistics

- Data dissemination: on the UIS website and through contributions to other agencies.

- In cooperation with OECD, Eurostat and RICYT

# Standard setting/Methodological developments:

- Careers of Doctoral Holders – CDH

- Measuring Innovation in Developing countries: Annex to the Oslo Manual (2005).

- Measuring R&D in Developing countries: Annex to the Frascati Manual (2008-2010).

# Countries and territories that have participated in UNESCO S&T Statistics workshops 2005-8

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Countries and territories covered

Countries and territories covered but absent

Countries and territories not yet covered

Countries and territories not targeted

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# Collaborations / Partnerships

- UNESCO HQs
- World Bank
- Eurostat
- AU
- ADB
- ATPS
- ISDB
- EU-Medibtikar
- IDRC (Canada)
- IRD (France)

- UNESCO offices worldwide
- OECD
- RICYT (Latin America)
- ALECSO
- Arab Academy of Science
- ISESCO
- Inter-Academy Council
- INRS (Quebec, Canada)
- ASEAN

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