



Natural
Sciences
Sector

UNESCO
science
for Sustainable Development

Innovation, Science & Technology : drivers for sustainable development?

Lidia Brito

Director

Science Policy and Capacity Building Division

UNESCO

l.brito@unesco.org

Presented on the occasion of the
International Conference on Entrepreneurship and Innovation: Making Things Work Better
Dubrovnik, Croatia, 23 May 2013

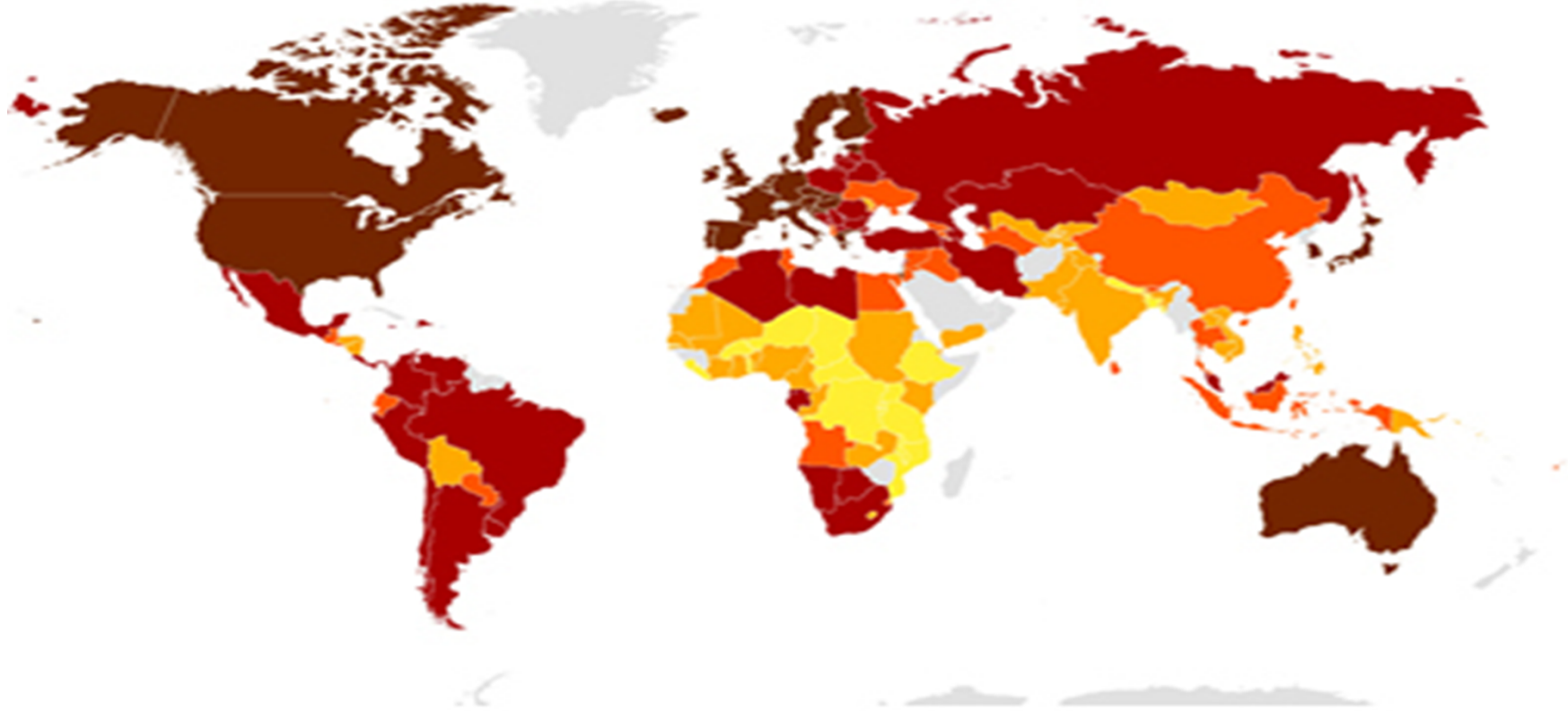


United Nations
Educational, Scientific and
Cultural Organization

Natural
Sciences
Sector

UNESCO

science
for Sustainable Development



Poverty map
GNI per capita
Atlas method
(Current US\$)

Source: World Bank 2009





The World Today

1. Local decisions-global impact- **Globalized**
2. Facing climate changes: unexpected and probability of more extreme events - **Uncertainty**
3. Population increase - **Pressure**
4. Global crisis: food, energy and financial - **Poverty**
5. Where knowledge and technology is more and more important- **Inequalities**



Natural
Sciences
Sector

UNESCO
science
for Sustainable Development

New realities need paradigm shift

- This rapid economic growth and increasing youth population pose challenges on already fragile environment, stressed basic needs and lifestyle
- Humanity will need more energy, water, nutritious food, create more jobs and opportunities and reduce poverty
- Investment in science technology and innovation is key especially to enhance food security, energy access, water, job creation and poverty reduction
- Capacity building and Skills development in STI is wise investment because it is vital to reduce unemployment, inequity, and poverty and increase economic growth
- Invest in eco-friendly infrastructure with maintenance schedule



United Nations
Educational, Scientific and
Cultural Organization

Natural
Sciences
Sector

UNESCO
science
for Sustainable Development

Possible interventions and existing initiatives

1. Promoting a culture of Innovation

- “Innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations” (OECD, 2005).
- Innovation is a critical factor for enhancing economic growth and competitiveness.
- Innovation is crucial for social cohesion, equality and poverty alleviation.
- UNESCO insists on the importance of grassroots innovation as an equally important source of solutions to meet the needs of developing countries.



*Solar water bulb made from a plastic bottle, which disperses about 55 Watts of light. The bottle is filled with water that has been treated with ammonia to eliminate fungal growth. It is then sealed. The top half of the bottle protrudes through the roof, catching sunlight which the water then scatters around the room. A World of **SCIENCE**, Vol. 11, No. 2, April–June 2013*

Innovation issues in developing countries (1)

- ***Fragmented businesses:*** In general, developing countries have a heterogeneous economy with a large number of micro-enterprises operating in the informal sector. There are a number of foreign-based firms, which tend, to be disconnected from the rest of the economy.
- ***Inexistence of research centers or a very limited research facilities:***
 - the existing research facilities, such as university system poorly connected to local realities, particularly to labor market needs and opportunities;
 - lack of technological support services and infrastructure (metrology, quality control, standards, etc);
 - low levels of R&D in the business sector.
- ***Low educational levels:*** it is a significant barrier to the development and diffusion of innovation in these countries.

Innovation issues in developing countries (2)

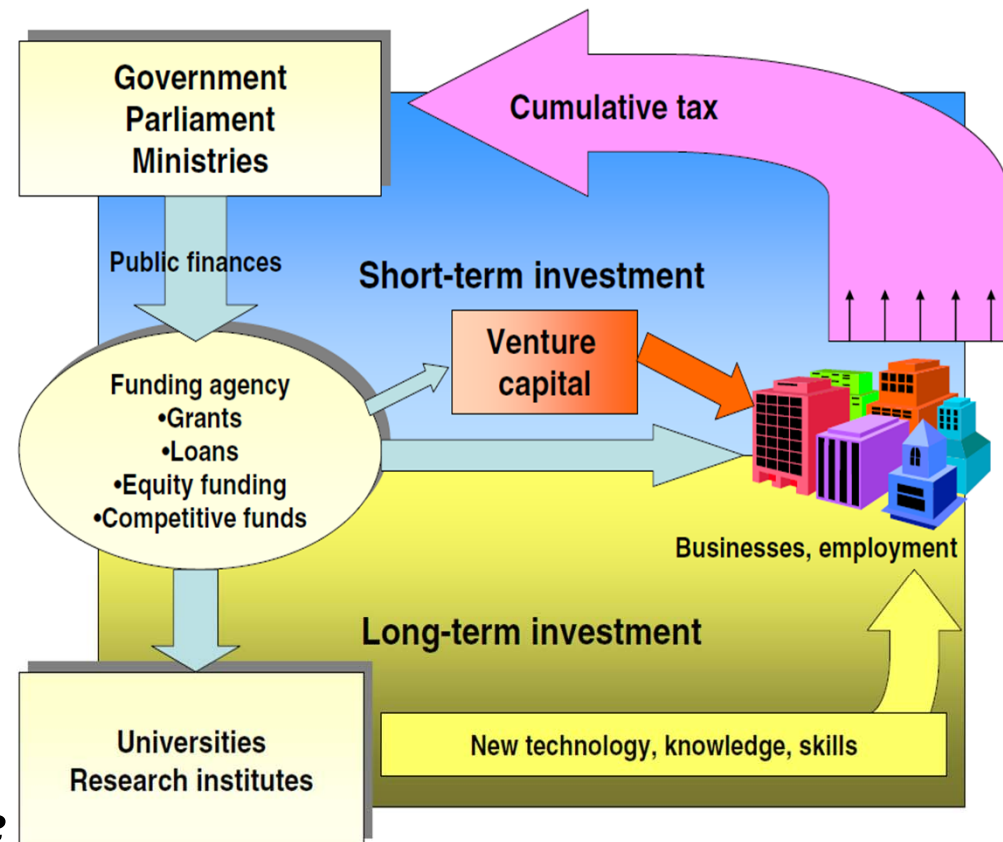
- ***Weak infrastructure***: There is the issue of a lack of telecommunication and transportation infrastructure;
- ***Poor system of governance***: A lack of financial transparency and bureaucratic red tape are the common problem in developing countries.
- ***Almost inexistent innovation policy***: There are only a very few developing countries that have innovation policies or strategies in place. If any, most of the innovation initiatives in developing countries are hi-tech oriented that do not meet the needs of the poor or the marginalized.

1.1 . Strong investment in research infrastructure and institutions

- Critical mass to develop alternative solutions
- More differentiated approaches, better adapted to local setting and development needs and priorities that may vary from one country to another
- Science and technology based Industries
- University-Industry Partnerships: triple helix concept
- Venture Capital

Research not about the poor, but research for the poor and with the poor?

THE CYCLE OF RETURN ON INCENTIVES IN FINLAND



1.2. Promoting firm-based innovation – Supporting the development of science parks and technology incubators

- In 1993, UNESCO launched the *University-Industry Science Partnership Programme* (UNISPAR). Its objective is to create synergy between research in universities and in the productive sector.
- Supporting science parks and technology business incubators by providing technical assistance, organizing capacity building activities and developing pilot projects.
- The ultimate goal is to develop national capacity in creating, nurturing and managing knowledge-based SMEs



1.3. Promoting inclusive innovation for sustainable development – Grassroots Innovation

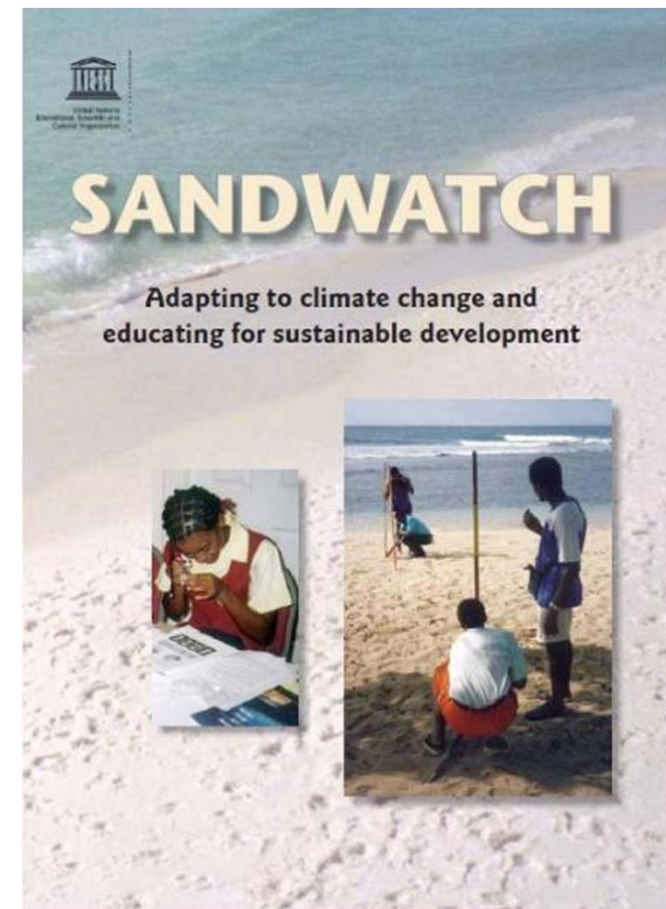
- Innovation can be a critical tool to deal with poverty and promote social inclusion.
- The current systems of innovation are not optimized for reducing poverty because they were designed primarily to achieve economic growth and improve competitiveness;
- A pro-poor innovation system is a multi-stakeholder social learning process that generates new knowledge, puts it to use, and expands the capabilities and opportunities of the poor;
- Inclusion of the poor in every step of innovation process is the key of success in the pro-poor innovation concept.

2. Science Education

Human Capital for Development:

- Provide access to education to harness the talents of young people and ensure safe and peaceful societies
- Curiosity and scientific mind
- Investment in Science teachers and school infrastructure
- Culture of Science in Society

Can we speak of Science for All?



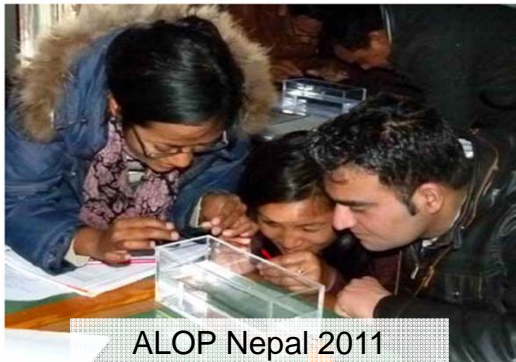
UNESCO's Capacity-Building in Physics as a Tool for Development

Active Learning in Optics and Photonics (ALOP)

- Annual workshop organised by UNESCO's International Basic Sciences Program in developing countries
- 'Training of Trainers' in hands-on Physics experiments
- Makes use of simple, inexpensive materials that can be fabricated locally

End Result

Since its commencement in 2004, there has been a significant increase in the number of teachers with a better understanding of science, and an even larger number of students who are better equipped with practical science knowledge.



Mathematics and Poverty Alleviation in Africa

Mathematical sciences can be harnessed as tools for the development of the world's most impoverished regions



Mathematics of the Planet Earth 2013 is an on-going initiative, under the patronage of UNESCO, pioneered by the International Mathematical Union (IMU), to increase mathematics knowledge among public and decision-makers, and to mobilize available resources (human and other) on its application in addressing world problems.

UNESCO's actions in the framework of the "Mathematics of Planet Earth 2013" focus on mathematics research and education in managing societal concerns:

- The management and **eradication of infectious diseases increasingly** relies on mathematical modelling and statistics.
- Sustainable management and exploitation of natural resources** is possible through reliable forecasting and modelling
- Secure data transfer through the **internet and mobile telecommunications** are dependent on efficient models and mathematical algorithms
- Desperately-needed solutions in the **supply of energy** in impoverished regions of the world are possible through innovations in physics and mathematics.



3. Affordable Green Technology

- Technology for the poor
- New technologies, creative industries and innovative financing should be provided as incentives to extend and strengthen the basis of scientific knowledge and creativity
- Sustainable alternatives to existing development challenges

Capacity to acquire and produce new knowledge and technology



A nursery worker inspects rows of cypress and Senegalese mahogany trees in Ismailiya Governorate, within a National Tree Planting and Development of Peri-Urban Forestry project being executed by the Egyptian Ministry of Agriculture. A World of SCIENCE, Vol. 11, No. 2, April–June 2013

Biotechnology Contributing to Development

Biotechnology is recognized globally as a tool contributing to sustainable development

*Biotechnology policy plays a crucial role in tackling the most pressing global problems :
health, food security, water, climate change and energy*

UNESCO's International Basic Sciences Programme (IBSP) has had a considerable history in developing and implementing activities in biotechnology in collaboration with specialized partners

Biotechnology contributes to emerging areas, including genomics, bioinformatics, synthetic biology, and nanobiotechnology

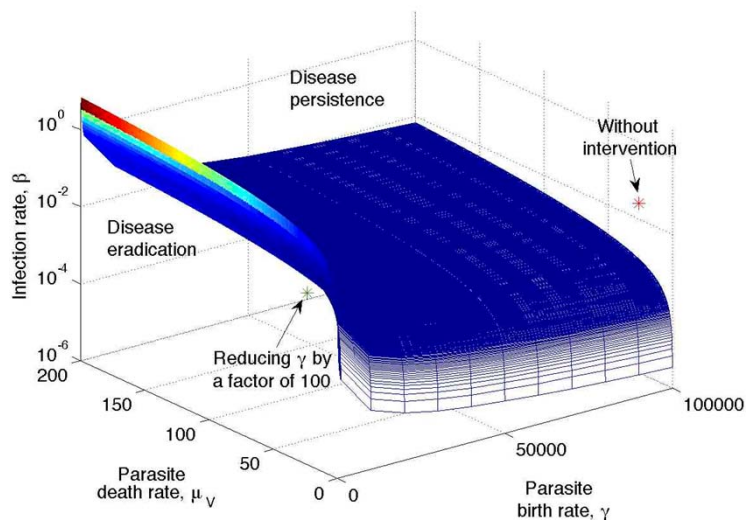
- Capacity building in Genomic and Bioinformatics (potential to improve food and agriculture productivity, healthcare, increase income and reduce poverty)



Using Mathematics to Eradicate Disease:

the need to induce policy-makers to utilize available mathematical assets

Example: Dracunculiasis, or Guinea Worm Disease



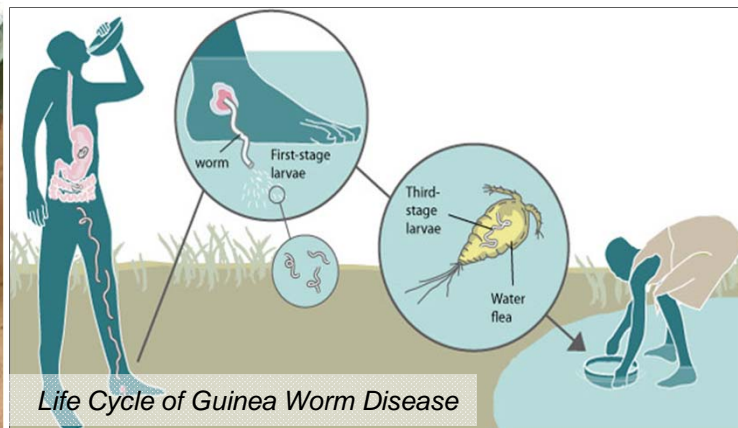
Mathematical model of infectious disease

- A neglected tropical disease caused by ingesting contaminated water.
- There is no cure or vaccine and the disease remains endemic in some of the poorest regions in Africa.
- Mathematical models have served a crucial role in understanding this disease and global permanent eradication is now in sight.
- Such models can be extended to the understanding of other diseases such as HIV/ AIDS.

All pictures provided by Carter Center



Guinea Worm



Life Cycle of Guinea Worm Disease

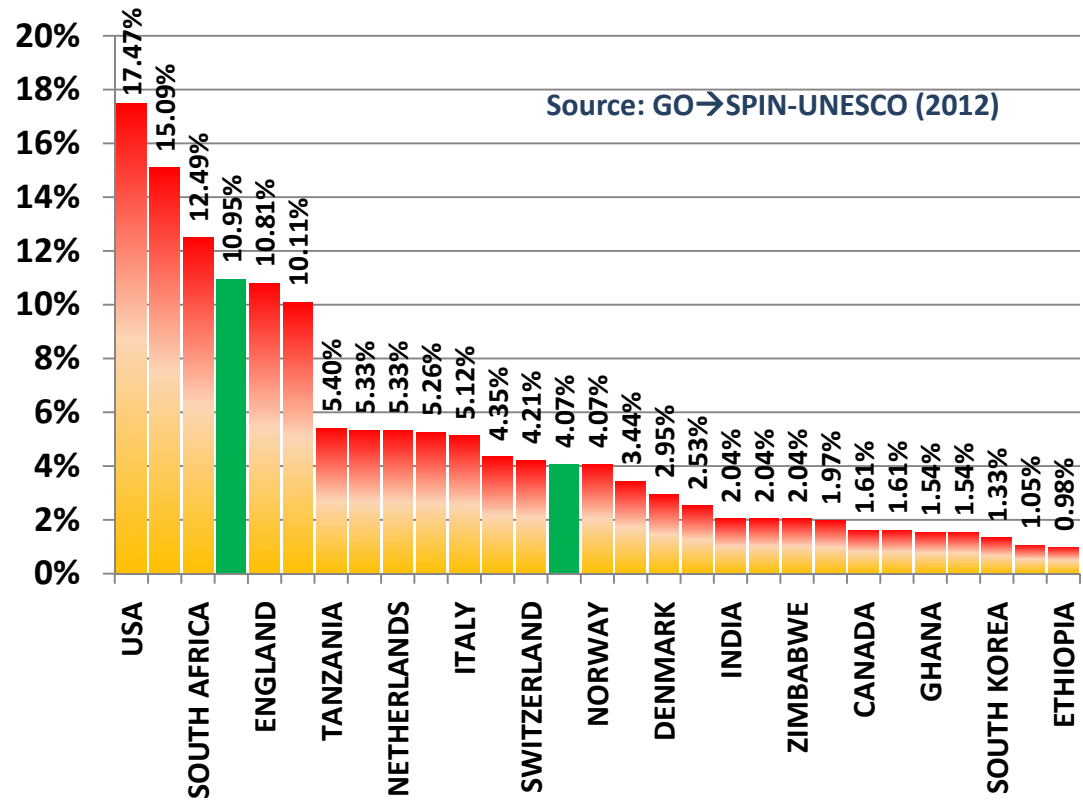


4. International Cooperation: across scales

- Local challenges, global solutions and vice-versa;
- Different perspectives and more capacity;
- Developmental focus
- Co-design and co-production

***Networks of Excellence
linking Research Centers
across regions?***

Mozambique: Co-publication patterns (1973-2011)



A major scientific initiative



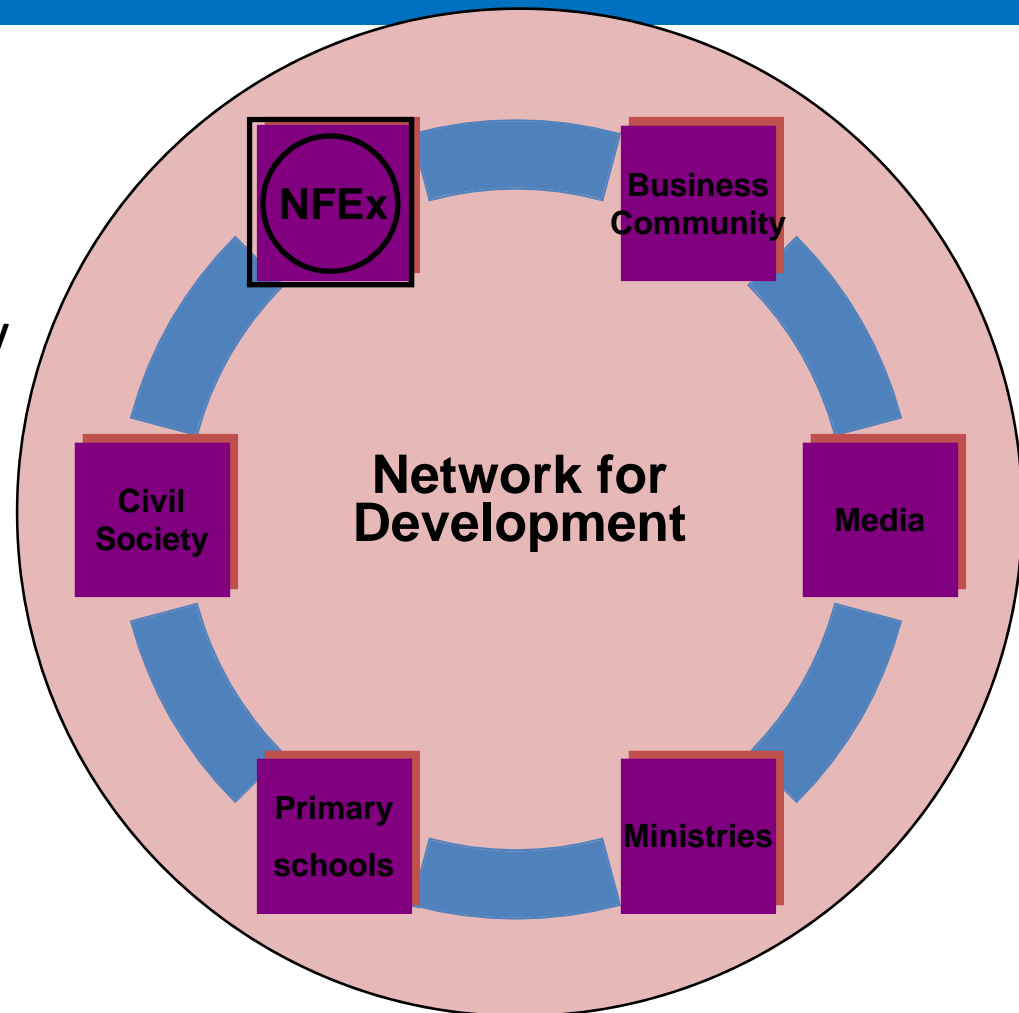
photos: www.dawide.com

Future Earth: A new contract between science
and society

5. Sound and participatory STI Governance

- Several stakeholders involved in decision making: Science for Society and society for Science: strong Science-Policy interface
- Governments, Parliaments, industry and civil society

***Networks for sustainable
Development?***





United Nations
Educational, Scientific and
Cultural Organization

Natural
Sciences
Sector

UNESCO
science
for Sustainable Development

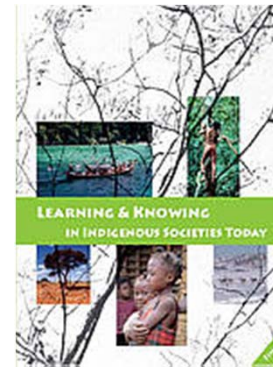


SCIENCE AND
PARLIAMENT

**UNESCO's initiative to strengthen capacities
in science legislation by building bridges
between scientific communities, parliaments,
media and civil society**

6. Science communication and a culture of Science

- Science communication through Science Museums and Centers
- World Science Day: Celebration of Science for Peace and Development
- Science Prizes



UNESCO –
LINKS

Local and Indigenous Knowledge Systems interdisciplinary initiative that works to protect language, education, resource management, biodiversity, social interactions, ritual and spirituality of rural and indigenous peoples



United Nations
Educational, Scientific and
Cultural Organization

Natural
Sciences
Sector

UNESCO
science
for Sustainable Development



L' OREAL –
UNESCO FWIS

**The programme supports
women who move science forward
and distinguishes them by prestigious annual
distinctions and by helping them to pursue
their career.**



United Nations
Educational, Scientific and
Cultural Organization

Natural
Sciences
Sector

UNESCO
science
for Sustainable Development

7. Improving STI Monitoring and Foresight System

7.1. New initiatives on building a multi-dimensional, comprehensive and policy-relevant picture of STI

- Measuring STI is fundamental for the formulation of national STI strategies
UNESCO Science Report
- The absence of relevant indicators is a major obstacle for the design and implementation of science and STI policies, especially in developing countries.
- To tackle this challenge, UNESCO has recently launched:
 - *Science, Technology and Innovation Global Assessment Programme (STIGAP)*
 - *Global Observatory on Science, Technology and Innovation Policy Instruments (GOSPIN).*



7.2. STI Foresight

- Foresight is important to support government and industry with the information and analysis required for timely decisions and strategic planning.
- It allows for more robust policies and sharper precision in prioritization of R&D activities.
- Most developed countries are already leveraging on foresight to chart their national development.
- UNESCO is encouraging all Member States to develop foresight capacities, as part of their STI monitoring and evaluation system.



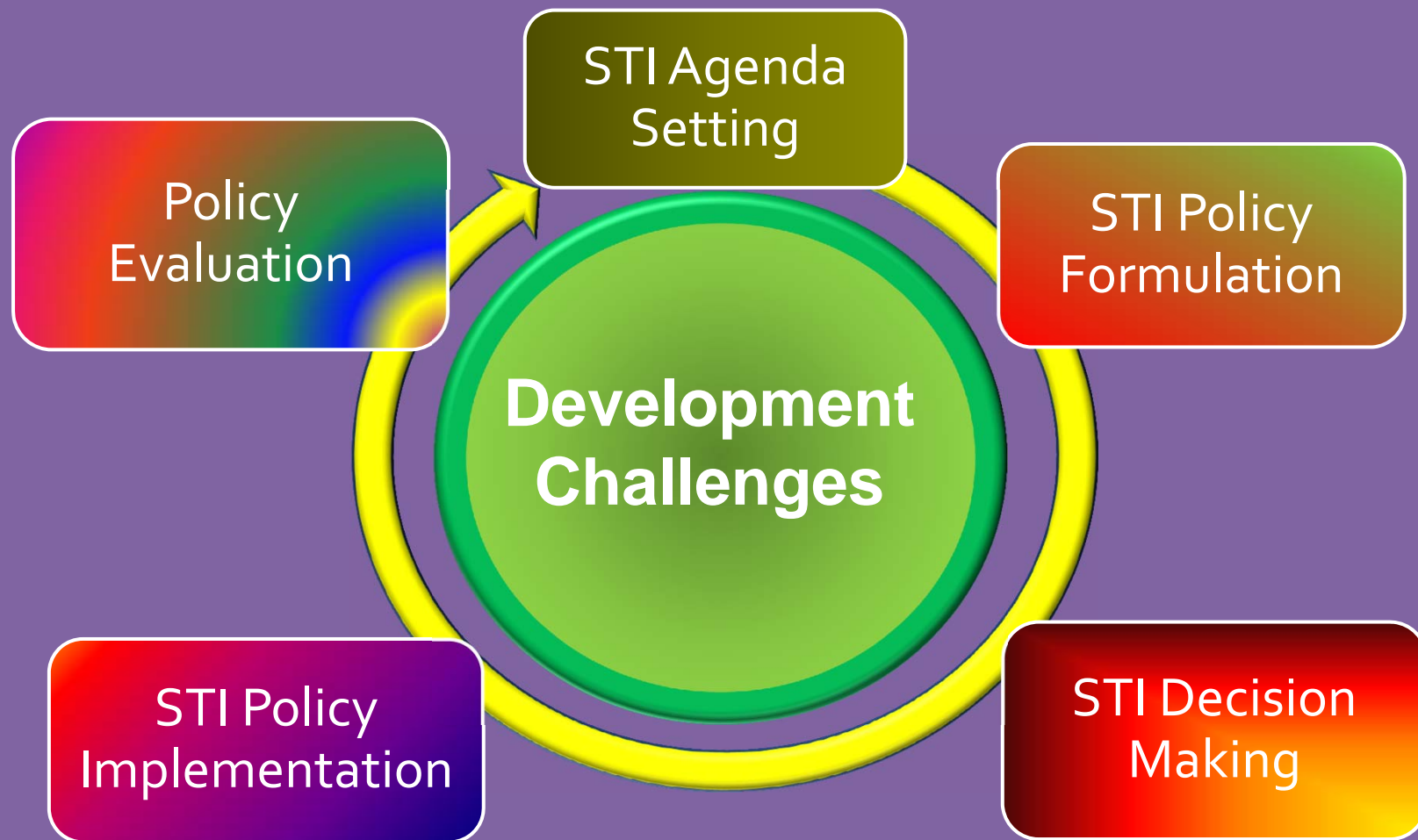
United Nations
Educational, Scientific and
Cultural Organization

Natural
Sciences
Sector

UNESCO

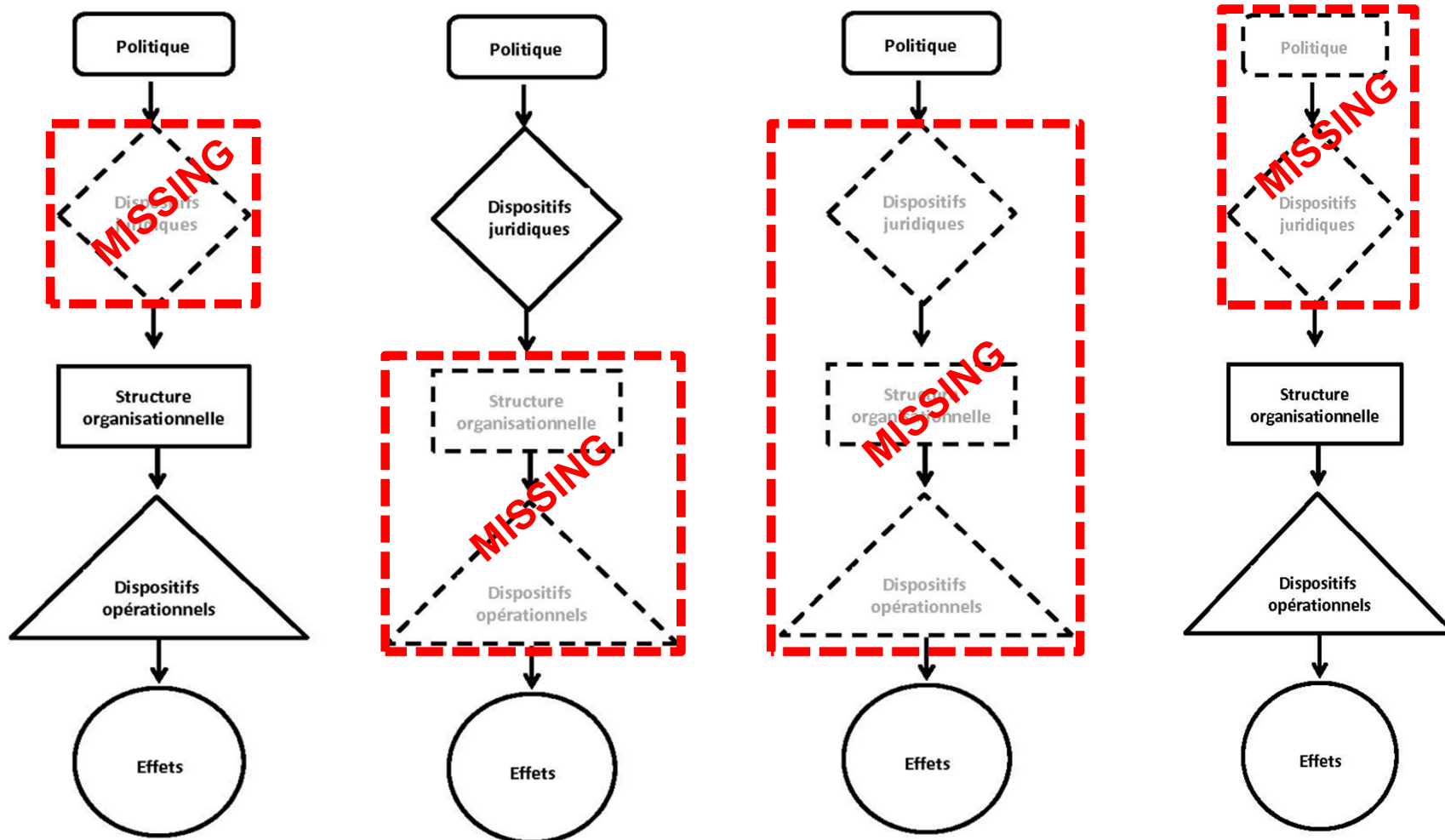
science

It is all about sound STI policies

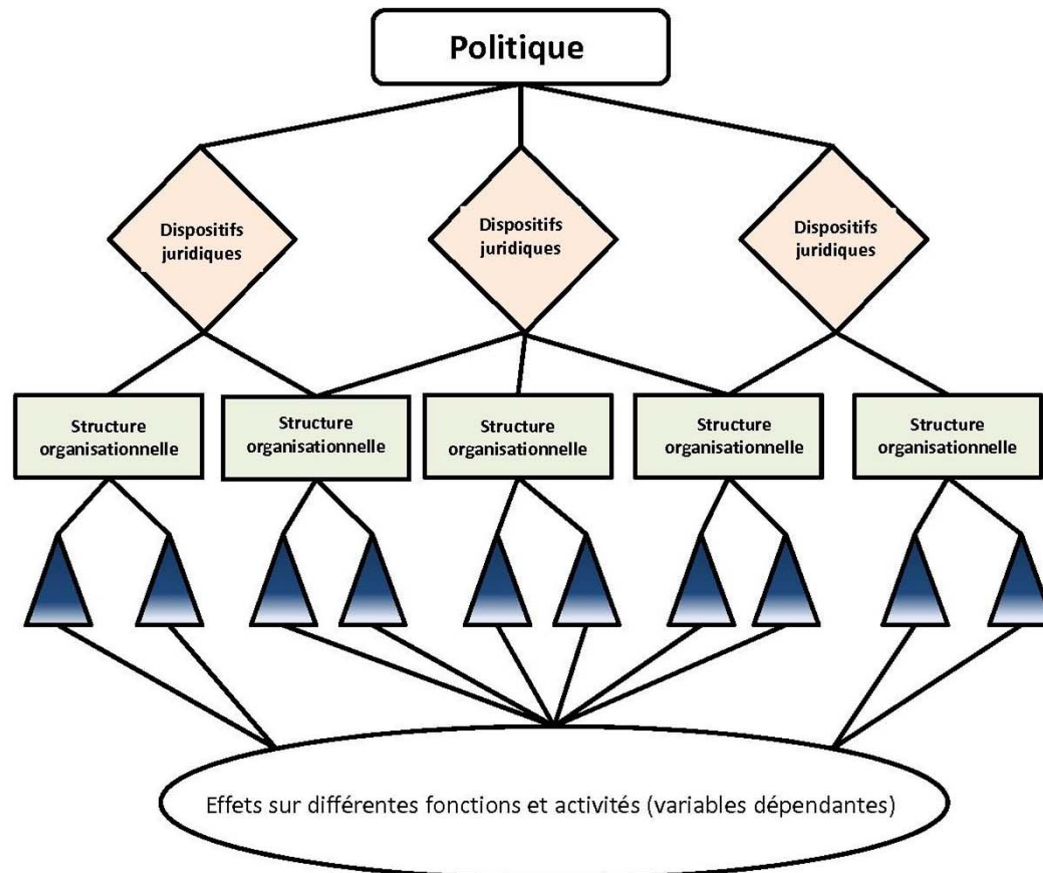


STI policies and their link to *SUSTAINABLE DEVELOPMENT*: transversal and structural?

Pathologies of instruments: policy implementation



Golden Rule for the implementation of SETI



Policy or National Multiannual PI

Legal devices (for different sectors)

Organizational structures
(@ different national ministries)

Operational policy instruments
(organized in a coherent way to generate synergies in order to obtain a particular long-term effect)



United Nations
Educational, Scientific and
Cultural Organization

Natural
Sciences
Sector

UNESCO
science
for Sustainable Development

Strategic and visionary Leadership



Final Remarks

- Whatever STI we invest in today must look beyond 2020 where **agility** is more important than **strength**
- Knowledge alone is not a definer of value but its ability to turn knowledge into **intelligence and creativity**. **INNOVATION** is key.
- Invest in STI in response to huge demand for food, water, health, bio- and nanotechnology propelled by indigenous knowledge has potential to create new jobs and reduce poverty
- Harness STI to create and recreate human capital which has the agility and innovative power to see beyond 2020 through networking, collaboration, cooperation and partnerships.



United Nations
Educational, Scientific and
Cultural Organization

Natural
Sciences
Sector

UNESCO
science
for Sustainable Development

Thank you