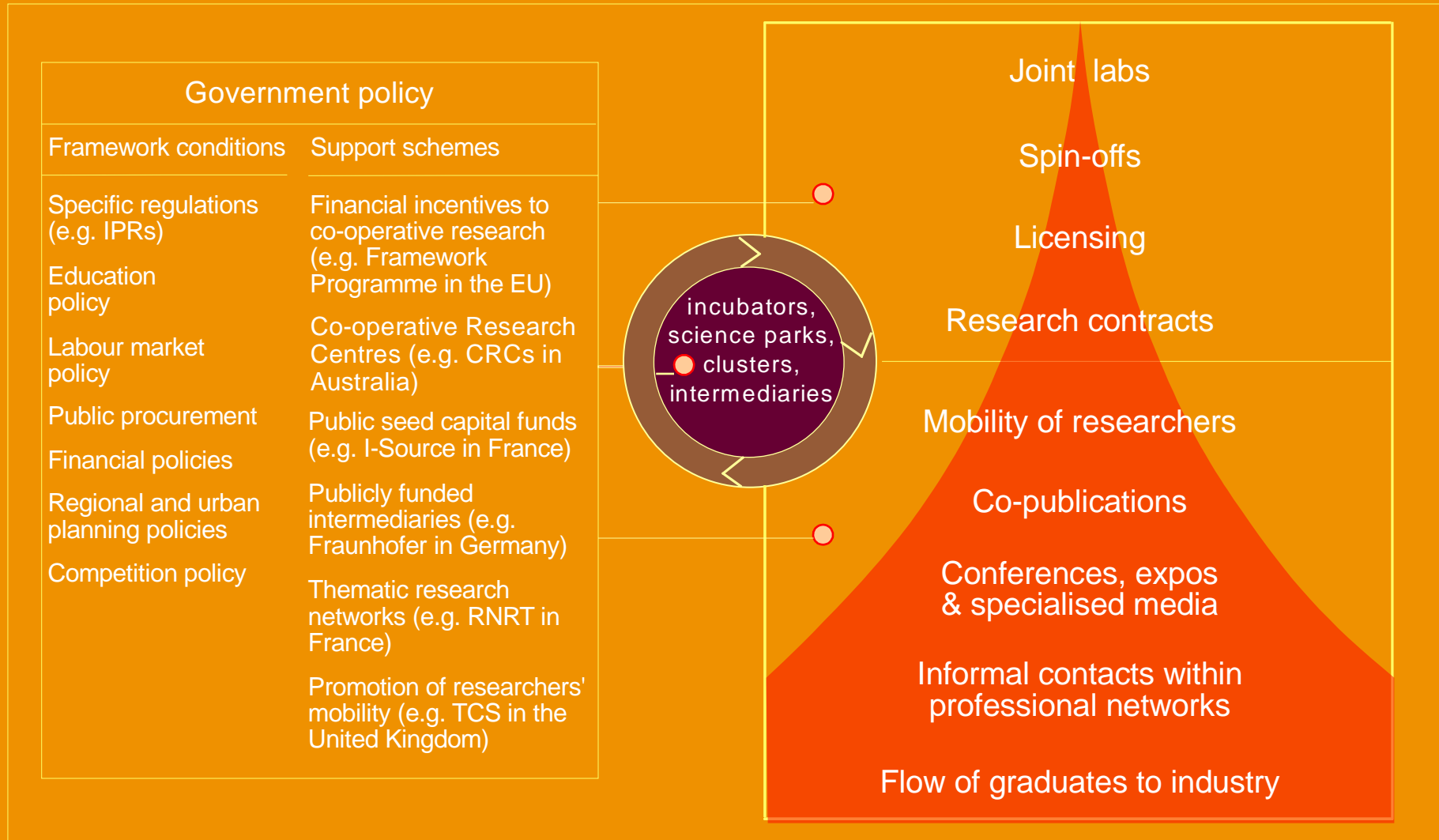


Innovation and Technology Policy

**Human-centered policy design and
implementation**

Formal mechanisms for Industry-Science Relationships: *the tip of an iceberg*



Nathan Rosenberg (2001):

“uncertainty in the realms of both science and technology ... have enormously important consequences and a main concern is how **organisations and incentives might be modified to accommodate these uncertainties.**”

Source: OECD(2001), “Social Sciences and Innovation”

Chris Freeman (2001):

“There is an irreducible uncertainty about future political, economic and market developments,technological innovations may actually increase it, since they add to the dimensions of general **business uncertainty**, the dimension of **technological uncertainty.**”

Source: SPRU (2001)

Background:

Addis Ababa Action Agenda (AAAA, 2015): the explicit recognition that **technology**, as much as **finance**, is essential to meet the universal **2030 SDG Agenda**.

A key illustration crucial to meeting SDGs :

the **transition towards renewable energy** will depend on further advances in wind, solar, and battery technologies.

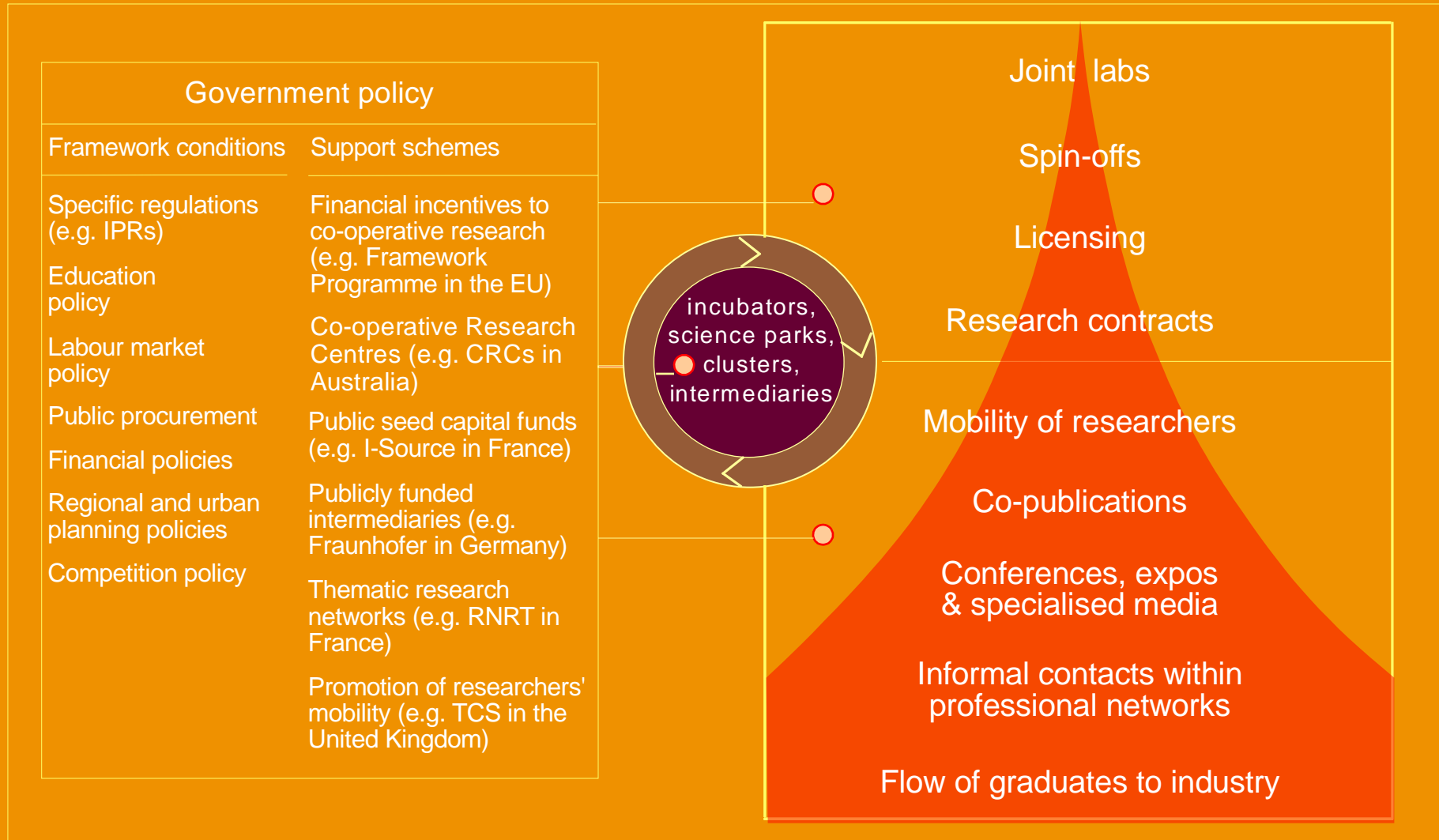
The argument *(as inspired on P. Conceição, Singapore, Sept 2017; UNDP)*:

...recognizing that technology does **not** determine our future, it is in our hands to **invest in science, technology and innovation, in all countries in the world** and **shape the policies and institutions** that can harness **technology for development**.

Implications:

The **investment in HR** and the engagement in “**knowledge as our common future**” cannot wait everywhere, it is not something that we can do in developing countries only after other, more urgent, priorities have been taken care off.

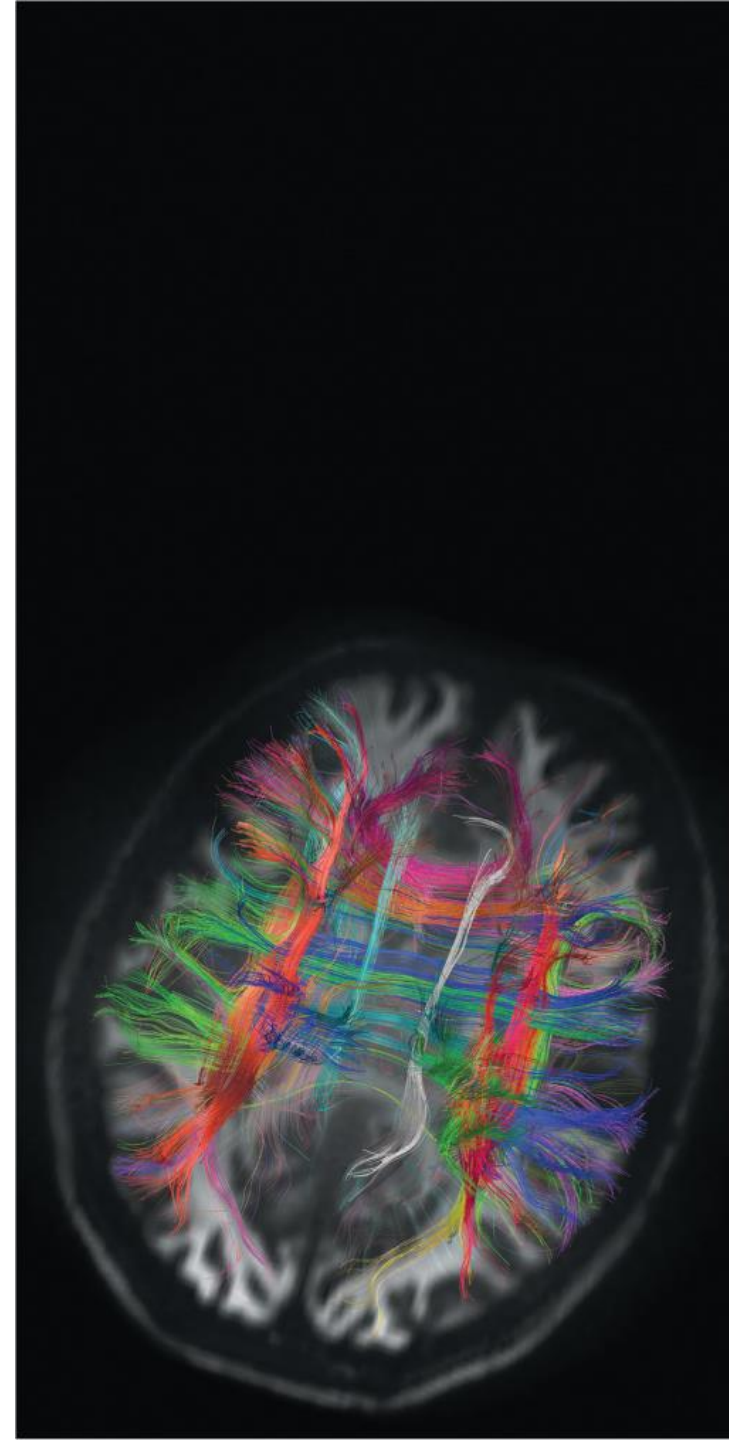
Formal mechanisms for Industry-Science Relationships: *the tip of an iceberg*



Connection, Connection, Connection...

Science, Vol 342, Novembre 2013

(source: Wedeen et al, Center for Biomedical Imaging,
Mass General Hospital, Boston, Mass, USA)



Case study 1: *The INESC TEC & THE INOVCity PROJECT*

InovGrid



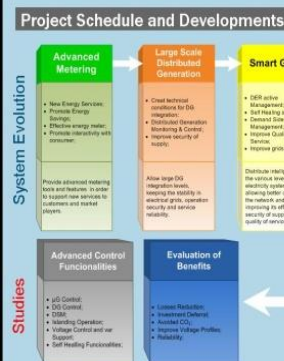
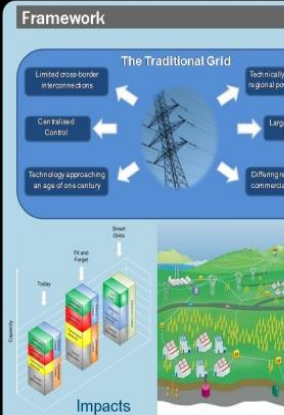
InovGrid
Programa Distribuição 2010

The project is promoted by the Portuguese DNO in co-operation with several partners:

edp **hc er**
EDINFOR a LogicaCMG company **efacec**

INESCPORTO **noLimits CONSULTING**

J. A. Peças Lopes Jorge Pereira Carlos Moreira
José Ruela * Cláudio Monteiro Nuno Gil
José Rui Ferreira Filipe Sousa * Carlos Pinho *
José Nuno Fidalgo Luís Seca André Madureira



Installation of **35 thousand smart meters** in Évora, together with the deployment of an advanced monitoring, management and control architecture of the electrical distribution grid.

The definition of the reference model and specifications was assigned to a **Portuguese R&D Lab – INESC TEC**.

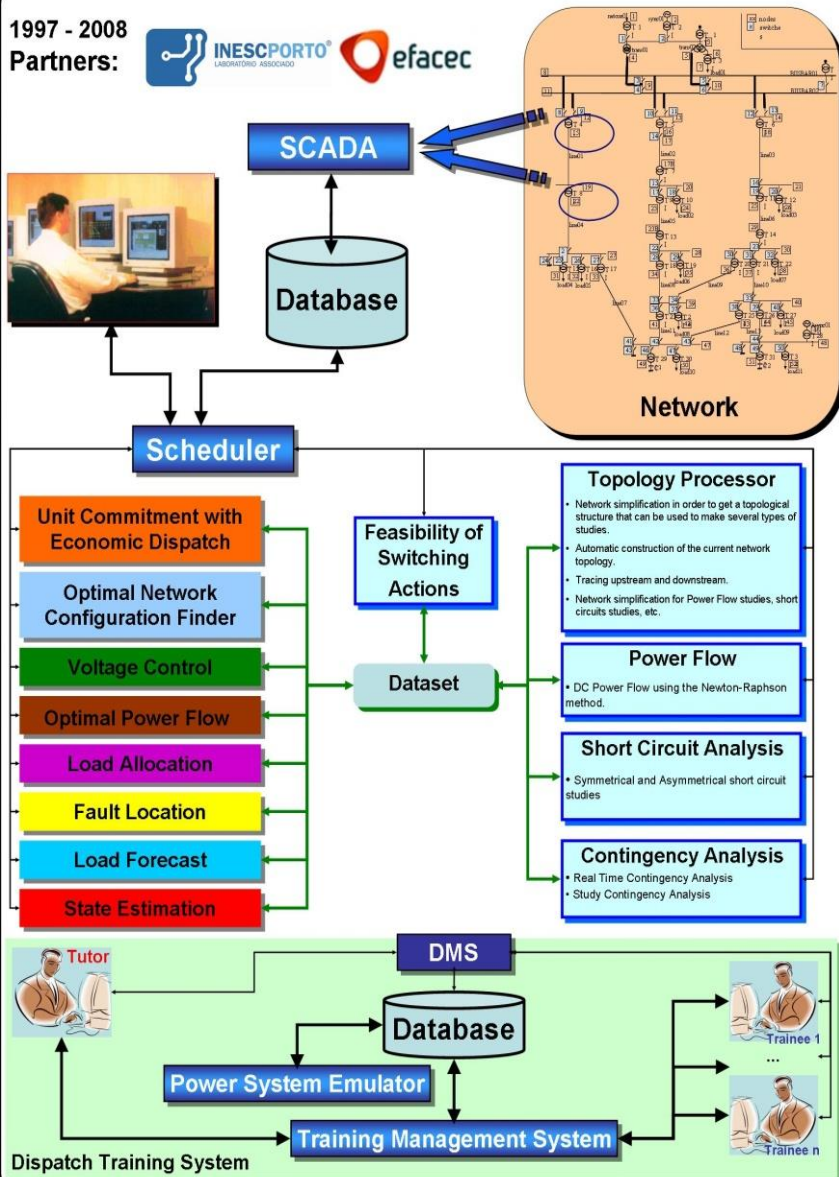
This involved dealing with smart meters, distribution transform concentrators, communication solutions, management and control.

Case study 2: ADMS/ EMS FOR EFACEC, ENGINEERED BY *INESC TEC*

Development of advanced modules for DMS
(Distribution Management Systems)



1997 - 2008
Partners:



Incorporation of R&D and know-how on:

- Advanced functionalities for DMS/EMS, on top of SCADAs, to manage large scale grid integration of renewable power sources
- Intelligent systems for electrical networks

The Guardian

Portugal runs for four days straight on renewable energy alone

Zero emission milestone reached as country is powered by just wind, solar and hydro-generated electricity for 107 hours

May 18, 2016

National Geographic: ENERGY

Portugal Ditched Fossil Fuel Power for 4 Days. Can We Go Longer?

Achieving a big scale-up of renewable energy will take more than building wind and solar power plants.

May 27, 2016

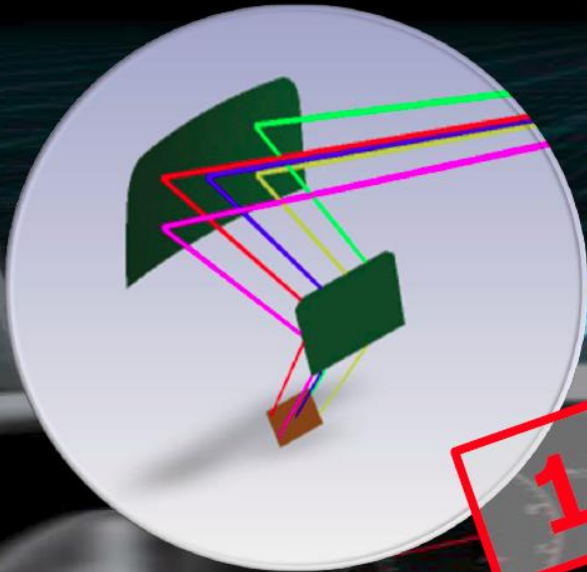
2016 world year record

Portugal: ***4 consecutive days fully powered by renewable energies***

A case study 3: “emerging auto parts”

New Processes

***Avoidance of
image distortion in
Head-Up Displays***



mobi.me agnostic and integrated platform for managing mobility in cities



Mobility management platform for cities that connects all types of mobility devices in real time, allowing the management and operation of several shared and on-demand mobility services (vehicles, bicycles and motorbikes) in an integrated way with other services and with public transport.

INTEGRATION

Smart Services



Mobility services for different operators
Urban logistics
Traffic
Transport on demand
Fleets
Public transports
Parking
EV charging

mobi.me

+400.000 users around the world

10 countries

70 cities

Sustainability

New business models

CONNECTIVITY

Smart Products



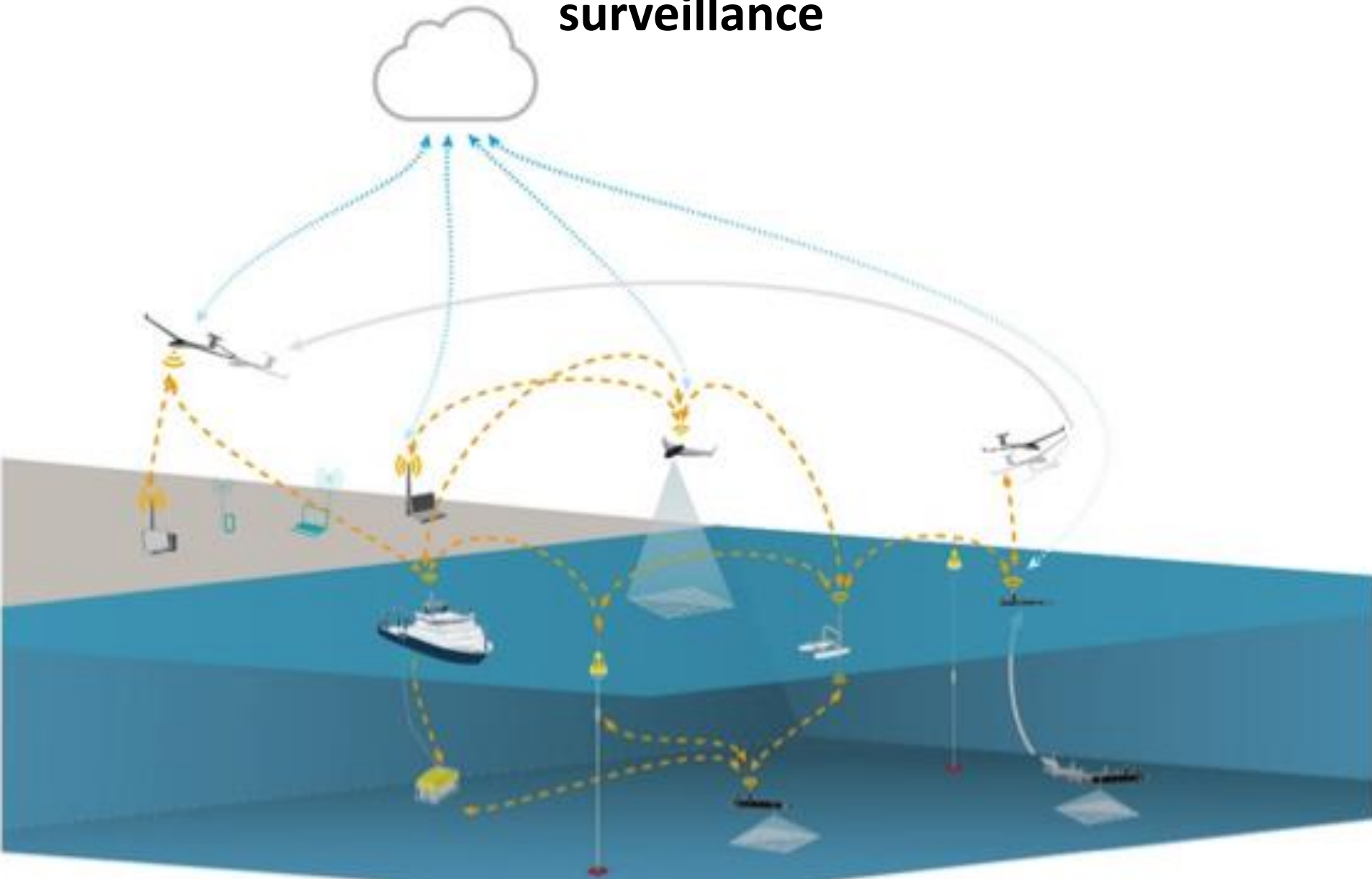
Connected and mobility Devices

A coin for sustainability

The real-time quantification of emissions saved, when moving from A-to-B, allows the creation of new business models based on transactions on saved emissions credits.



Case study 5: Seamless integration of networked autonomous platforms for ocean monitoring and surveillance



The hypothesis for policy action:

Science, its impact and the presence of innovation, result from a **cumulative, long-term, collective and uncertainty process**, involving an extensive division of labour, which requires massifying the training of human resources and qualifying the labour force in many economic sectors, in a way that depends on the structure of the economy

Public Policy is critical:

*but, is there room for a **common vision** of the future of S&I?*

Which myths?

Public vs Private

R&D vs Innovation

Higher Educ vs Vocational Training

...we live on times of increasing socialization of risks and the privatization of rewards

How can we effectively help debunking these myths and guarantee better policies?

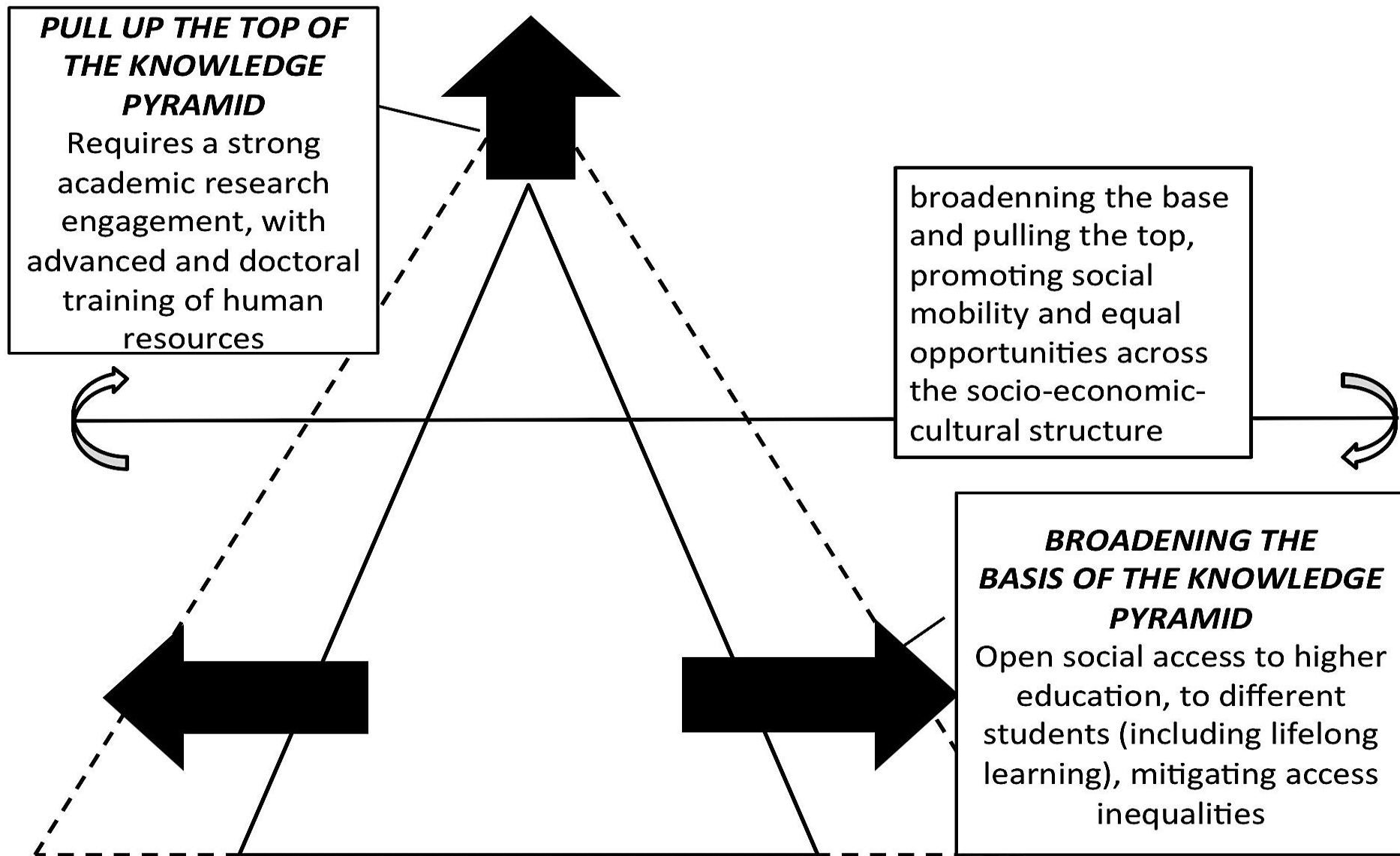
THE ENTREPRENEURIAL STATE



Debunking
Public vs. Private
Sector Myths



MARIANA MAZZUCATO



**PULL UP THE TOP OF
THE KNOWLEDGE
PYRAMID**

Requires a strong
academic research
engagement, with
advanced and doctoral
training of human
resources

Scientific employment
internationalize

broadenning the base
and pulling the top,
promoting social
mobility and equal
opportunities across
the socio-economic-
cultural structure

**Diversify institutions,
strengthening diversified missions**

More “intermediaries”: **collaborative Labs,
strengthening networks**

More employment

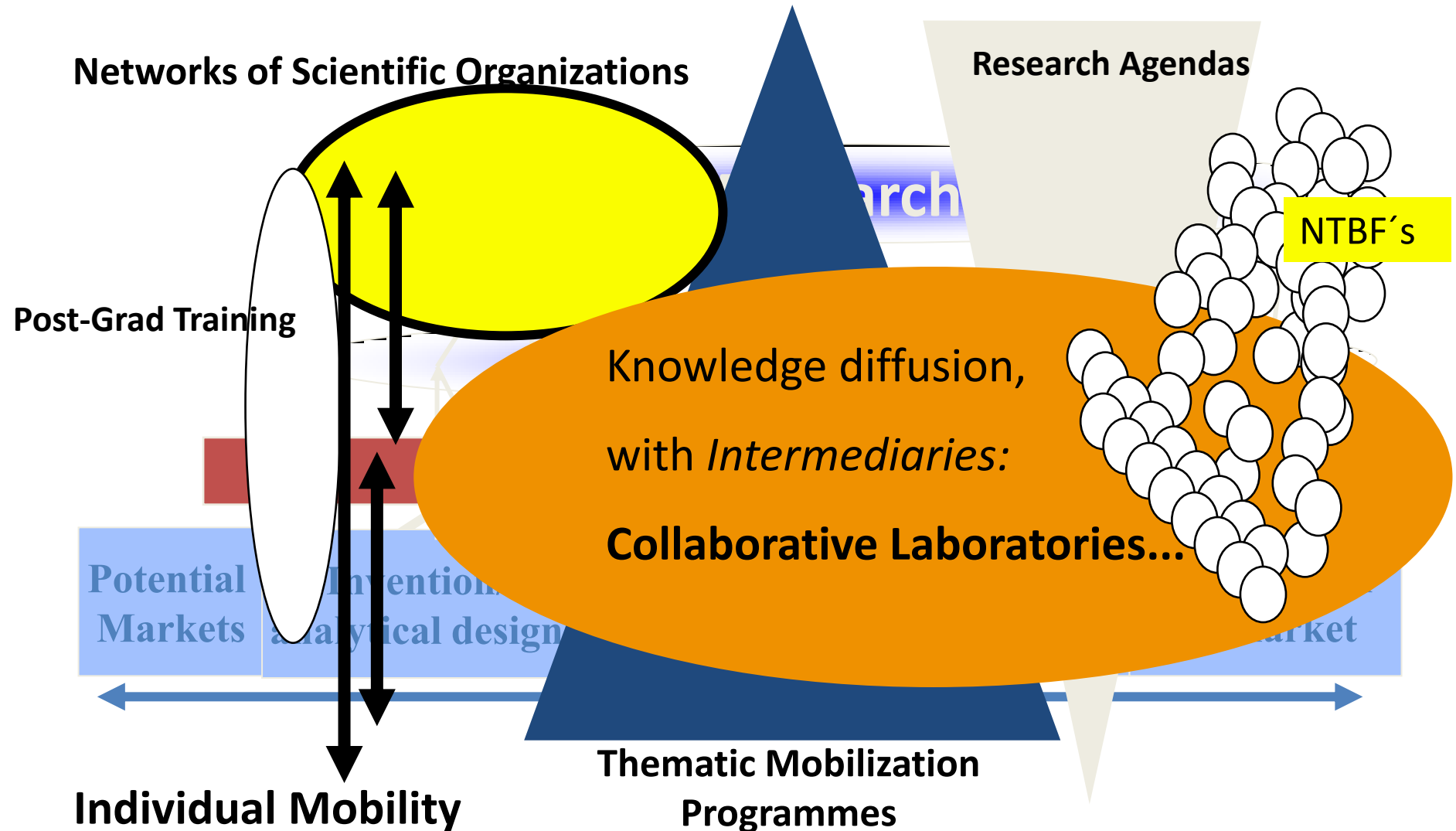
**BROADENING THE
BASIS OF THE KNOWLEDGE
PYRAMID**

Open social access to higher
education, to different
students (including lifelong
learning), mitigating access
inequalities

More scientific culture
More public participation

Open Innovation and competence building:

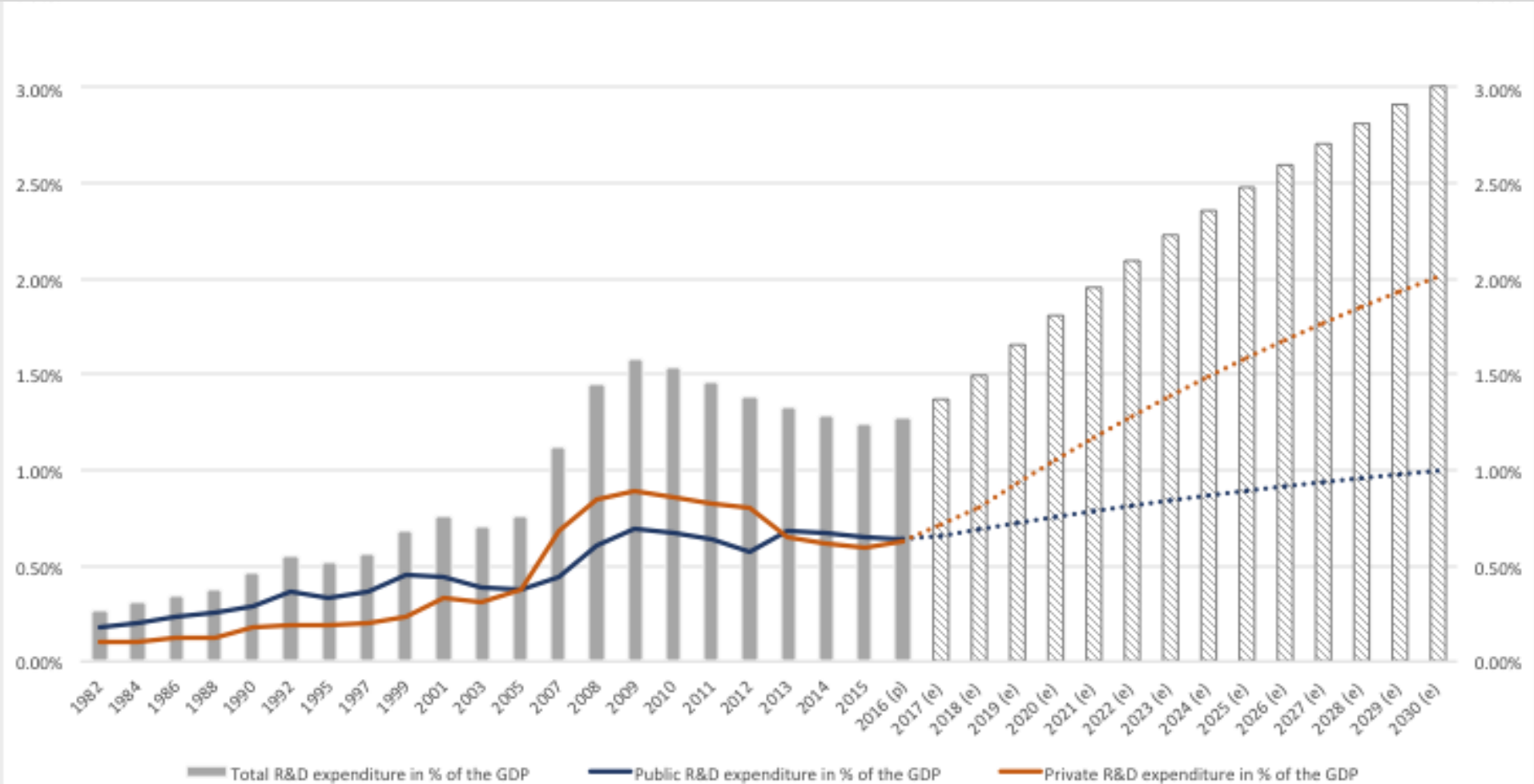
With increasingly diversified skills, institutions and incentives



The TARGET: GERD - *towards European convergence*

(source: OCDE)

Achieve a level of **overall R&D investment of 3% by 2030**, with a relative share of 1/3 public and 2/3 business expenditure, corresponding to achieve an overall R&D investment of 1.8% of GDP by 2020 (while 1.3% in 2016)



**Any knowledge is necessarily personal
and social...**



“indwelling” : ...learn by experiencing?

Polanyi (1966, 1969)

A new culture of learning? ...Becoming!



People learn how to embrace change, collaboratively, through
knowing, making and playing

Thomas and Brown (2010,¹⁹2011)

Which implications?

1. institutional

2. spatial/local

3. international

The higher education campus plays a central role in the cultural, economic and social development of the city.



The city and the *campus* as “learning environments”?

But, always in International exchanges...



Source: Britt, (200&) Partial map of the Internet based on the January 15, 2005 data.
http://upload.wikimedia.org/wikipedia/commons/d/d2/Internet_map_1024.jpg



But, always in International exchanges...



Source: Britt, (200&) Partial map of the Internet based on the January 15, 2005 data.
http://upload.wikimedia.org/wikipedia/commons/d/d2/Internet_map_1024.jpg

International Consortia - *typologies*

| Main focus | Sample example |
|---|--|
| Creation of campuses abroad | Sino-Danish Center for Education & Research, Beijing European University Centre at Peking University Songdo Global University, South Korea |
| Collaboration in the creation of a new university and campus | Singapore University of Technology and Design (SUTD, with MIT) Masdar Institute of Science and Technology (with MIT) Skolkovo Institute of Science and Technology (Skolkovo Tech with MIT) |
| Research collaboration and offering of degrees in association | British University of Dubai Utrecht Network Portugal-US universities (MIT; Harvard Med. School, Carnegie Mellon; Univ. Texas Austin) |
| Collaboration and mobility in R&D programs | IARU Alliance Worldwide Universities Network Matariki Network of Universities British Universities Iraq Consortium |
| Bilateral agreements among institutions – joint degrees | Cluster Universitas 21 IDEA League |
| Collaboration oriented towards technology commercialization | University Technology Enterprise Network, UTEN - Portugal Skolkovo Institute of Science and Technology (Skolkovo Tech with MIT) |

Portugal: PARTNERSHIPS FOR THE FUTURE

a distinctive feature, as launched in 2006

MIT Portugal

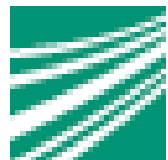
Information and Communication Technologies Institute

Carnegie Mellon | PORTUGAL

UT Austin | Portugal

INTERNATIONAL COLLABORATORY FOR EMERGING TECHNOLOGIES, CoLab

**HARVARD MEDICAL SCHOOL
- PORTUGAL PROGRAM**
IN TRANSLATIONAL RESEARCH AND INFORMATION



Fraunhofer
PORTUGAL



UTEN Portugal
University Technology Enterprise Network

INL

Spain-Portugal

The new paradigms for knowledge-based societies require **human-centered policies**, together with the ***collective action* of institutions** and a system approach to research and higher education, through *complex relational frameworks*: **institutional, spatial and international/global**

Innovation must be considered a collective and cumulative process

Why Science and Innovation?

Francisco Díaz Carreño, 1890

“Posición probable del globo antes del diluvio”

Museo del Prado

The future requires addressing two key emerging issues everywhere:

- **EXTERNAL – multilateral:**
 - Multiply **global R&D and HE networks**
 - Develop **international R&D organisations** and programmes
 - Promote the international **debate for new research** agendas
- **INTERNAL:**
 - Better understanding of “**policy mix**”:
 - Exploration and exploitation
 - Extended BERD across small, medium and large companies
 - The key role of local productive arrangements for global markets
 - Invent jointly new economic drivers
 - Diversify and combine funding sources

Public Policy is critical:

*but, is there room for a **common vision** of the future of S&I?*

