Portugal on the crosstalk of change

facing the shock of the new

manuel heitor
Homage to Blériot, 1914

Robert Delaunay
A new international organization: INL
The International Iberian Nanotechnology Laboratory
A new example: EXPERTISSUES European Institute of Excellence on Tissue Engineering and Regenerative Medicine

STENMATTERS
Bone/skin regenerative medicine
Variations on the number of total researchers
BUT, ...what is also changing elsewhere?
Which context for the “democratization of innovation”?

“Do Swing”, Ceiling Lamp, 1999
Thomas Bernstrand

...”a relaxing brake after a working day”
The emergence of “human centered systems”: the local context embeds a set of social capabilities that define the context under which knowledge and knowledge networks evolve...
Knowledge, networks and the social…

QUESTION: How far people, knowledge and ideas can foster the concentration of knowledge integrated communities as drivers of larger communities of users?

Which lessons learned from experiencing technology commercialization in Portugal?
The structure of the talk

1. Background
2. PEOPLE
3. KNOWLEDGE & IDEAS
4. INSTITUTIONS
5. Summary: New horizons…
Background

1. A large consensus: The accelerated rate of technical change has fostered an increasingly need to promote the capacity to learn!

2. This requires a better understanding of the institutional framework and the structure of incentives in R&D and higher education, as well as consider the substance of research/teaching/learning!

3. But this implies strengthening governance structures and institutional leadership, in a way that contributes to strengthen the social constituency for science and technology and a “learning society” ...
Regional disparities in OECD, 2005

Source: OECD Regions at a Glance, 2009
Our specific context:
The future of S&T in Europe

- Ambitious goals for the future of human resources for S&T in Europe: international competition for human resources for S&T will be increasingly difficult balanced brain circulation with the US (reverse brain drain!) positive growth rates of new graduates and PhD in Sc&Eng + increase the share of women balanced flow of qualified human resources from the rest of the world (attract and facilitate immigration!)

- Increase public funding for R&D (->1% GDP)
- Promote private investment in R&D (>2% GDP)
- Reform and Internationalise
- Develop world-class R&D network infrastructure
The International mobility of HRST

- Scale and complexity are increasing;
- Contribute to the creation and diffusion of knowledge (codified and tacit);
- Economic incentives, but also access to quality infrastructure and to leading research drive mobility;
- Beyond “brain drain/gain”: “brain circulation” stimulates knowledge flows and linkages;
- Direct evidence on the impact of mobility is weak!
2. PEOPLE: Systems of innovation and competence building

The social basis for knowledge and beyond:
…the emergence of human centered systems
Range of % of students enrolled in tertiary education
But the issue is also about the large differences in performance at leading reference levels.
We need to widen the social basis for knowledge activities, including higher education enrolment, and we need to strengthen the top of the research system leading to knowledge production at the highest level.

Numbers of graduates, on the one hand, and of PhD holders, on the other hand, remain still much below our ambitions.
Proposition 1

Graduate students matter!...and we need to foster the internationalization of our Research Universities

• **Scale** and **Diversity**…
  (access - new publics; institutions; incentives…)

• The “hidden” barriers:
  …the need to “open” students paths and choices!

• **Which economics for tertiary education?**
  How to raise *private* funding?
  …and how to guarantee a better share of *public* and *private* funding?
  Which share of *institutional* and *competitive* funding sources?

• More importantly, how far recent developments in global capital markets present the opportunity to *new financing possibilities*?
...WHAT can we learn?
BUT, the issue is:...**HOW** people learn?
“design studios” are important to provide adequate forms of interaction of users with adequate research environments
...HOW, HOW, HOW?
...HOW, HOW, HOW?
...HOW, HOW, HOW?
…HOW, HOW, HOW?
Proposition 2

“how people learn?” matters and require open networks and international, research-based learning systems

- We need to diversify under-graduate and graduate programs. Designing effective learning environments includes considering the goals for learning and goals for students (US’s National Academies effort on “How People Learn”, 2000).

- Understanding the relationship between Bologna reforms and the social and national contexts in which they take place and expanding the European policy dialogue in higher education to include more issues, remain significant challenges in the current process...

- Revisited research-based post-graduate programs increasingly require cooperation at an international level!
3. KNOWLEDGE & IDEAS: the social shaping of technology

Integrate R&D and joint international advanced education to attract HRST and foster brain circulation.
Scientific publications per million population (2006)

Source: EU key Figures 2008-2009; February, 2009
New PhDs concluded and new grants awarded in Portugal, 1990-2007
Proposition 3

We need to continuously foster **new opportunities** for curiosity-driven research and for **knowledge specialization**. But competition also matters!

- **The nature of science as a complex whole** (John Ziman, 1968, 1978, 2000), ...and “**science is social**”, referring to “the whole network of social and epistemic practices where scientific beliefs actually emerge and are sustained”.

- **The “hidden” barriers**:
  - **gender**: how to foster women engagement in S&T?
  - the **appropriation** of S&T culture by society.

- key elements of **history** (namely, US…) are those of **diversity of policies** and increasing “**institutional specialization**” and of the clarification of the unique roles of the **private and public incentives** to support science and technology, S&T
An evolving experiment: **new institutional partnerships?**

1963: Harvard Business School IESE Business School (University of Navarra)

1998: The **Singapore - MIT Alliance**

1999: The **Cambridge - MIT Institute (CMI)**

2000: **Malaysia - MIT Biotechnology Partnership Programme**

2002: **CMU, Carnegie Mellon - Athens Information Networking Institute**

2005: **MIT - Zaragoza – International Logistics Program**

2005: **CMU, Carnegie Mellon CyLab Japan Inf. Technology – Information Security Program**

2006: **MIT - Portugal Program – Engineering Systems**

**CMU - Portugal Program – Information and Communication Technologies Institute**

**UT Austin – Portugal Program – CoLab on Emerging Technologies**
UTEN: University Technology Enterprise Network

• A network of +/- 30 technology transfer offices, across Portuguese Universities and R&D Centres, together with IC2 Institute;
• Aimed to create and foster a "body of knowledge" in international technology transfer and commercialization;
• 3 main activities:
  – People: "On-job" training of experts, with international internships
  – Networking: series of specialized workshops;
  – Commercialization: identification of new ventures and access to new markets
The Future of Science and Technology
in Europe and in the Americas

Is there room for a common vision of the future of S&T in Europe and the Americas?

Such a future would require to:

• Multiply transatlantic, global R&D and HE networks
• Develop international R&D organisations and programmes
• Invent jointly new economic drivers
• Diversify and combine funding sources
• Promote the transatlantic debate for new research agendas

However, new shaping factors (political, economic) and very new shaping actors shall be needed in order to change
Proposition 4

We need to foster effective international consortia and large international organizations to preserve the integrity of the research environment, at the same time we need to promote dynamic and responsive institutions.

• Key questions:
  Economic competition – omitting information as a competition tool;
  Proprietary knowledge – ignoring and “depleting” the science commons hindering the fostering of new knowledge;
  …multiple objectives should not be pursued at the cost of compromising learning and research environments for students.

• Raising the level of autonomy of Research and knowledge Organizations should be a key objectives of sector reforms across different countries in recent years: getting to “entrepreneurial institutions”? 
4. INSTITUTIONS: experimentation in social networks

Modernize the institutional context of Research Universities together with systems linkages and international ventures in S&T
Example: Opening-up Tertiary Education in Portugal

Some key measures and results (2006-2008): **Legal Reform**

- The New Legal Regime of Higher Education Institutions (RJIES)
  - Diversity of governance systems and increased autonomy
  - Setting up Governing Boards with external participation
  - Possibility of independent legal status for public institutions: namely as public foundations
  - Establishment of consortia among institutions
  - Recognition of research centres as part of University management framework.

- The creation of conditions to foster the national and international mobility of students and graduates
  - New Regulations on Arrangements for Changes of Study Programmes, Transfers and Return to Higher Education
  - New legal framework for the recognition of foreign degrees, which simplifies the system for recognizing foreign degrees in Portugal.
Proposition 5

Accelerate reform of university and research consortia, together with their internationalization, by strengthening external societal links and “system linkages”

• To cope with such a variety of demands and with a continuously changing environment, we all know that the international research landscape needs to be diversified.
• new leaderships for our institutions: attention should be given to the need to promote an international market of excellence for university and research leaders, as also a critical path to attract our best researchers to take the lead of our universities.
• the public understanding of S&T and of the role TEIs on scientific and technical development

…Creating “new” reinforced institutions that will gain societal trust!
Our summary:
Beyond “commonplaces” in science policy and technology commercialization…

People, knowledge and ideas MATTER to build the “social fabric” able to foster the concentration of knowledge integrated communities as drivers of larger communities of users!

The trend in developed economies towards increasing private investment in science and technology, REQUIRE public and private strategies in modern societies fostering a non-hierarchical integration of formal policies and informal system linkages towards knowledge-driven societies

Fostering enhanced societal trust on science and knowledge networks, through revisited institutions with open boundaries and international knowledge networks fostering “brain circulation”