

**1st Workshop of the  
ESF MO Forum on Evaluation:  
Indicators of Internationalisation**

**Stockholm 10-11 May 2010**

**Indicators for the evaluation of the  
internationalisation of the public research  
agencies: evidences from the literature**

**Emanuela Reale**

**CERIS-CNR [e.reale@ceris.cnr.it](mailto:e.reale@ceris.cnr.it)**

# Content

- Overall picture of PROs
- Internationalisation as emerging pattern
- Evaluation concern
- The proposed approach of positioning indicators
- A possible way forward

# Public Research Organizations (PROs)

- One of the key component of the R&D systems with a different weight within the European countries
- Different institutional configuration of PROs: public, semi-public, private-privatised centres, (Eurolabs, 2002)
- They are organizations which provide research and development, technology and innovation services to enterprise, governments and other clients (EURAB, 2005)
- Heterogeneity is the rule between and across countries

# Variety of PROs mission

- *Policy-oriented institutions* (assisting government for decision making in sectors such as health, energy, environment, defence, transport, etc.) like the EPICs in France or Government Research Units in Italy
- *Industry-oriented institutions*, devoted to translate knowledge into useful application, to create linkages between basic research results and applied research, to develop cooperation with industry (like TNO in the Netherlands and SINTEF in Norway)
- *Academic-oriented institutions*, operating through labs, on both basic and applied research domains, in close connection with Universities, like CNR and INFN in Italy, EPTS in France

# PROs classifications

- Public or private status
- Funding criteria
- *Functionalities*
- Technologies covered
- Type of knowledge produced
- Service functions in innovation processes

# Variety of PROs functionalities

- Oecd, 2009 (evidences from 10 EU countries + Canada, Japan, Russia, New Zealand and Chile)
  - Supporting growth and productivity of firms\*
  - Research of benefit to society
  - Policy-relevant research\*
  - Supporting regions
  - Linking science and business
  - Promoting/transferring knowledge\*
  - Supporting top quality research
  - Supporting human capital education
  - Assisting SMEs°
  - Promoting industry collaborations°
  - Repository of skills and knowledge°
  - Promoting women's participation in research°

# Internationalization of research

- Intrinsic characteristic of the research effort affecting all the scientific disciplines with different rate and pace (trade off between internationalization as epistemic value and its effectiveness)
- Growing phenomenon due to the globalization of economies, the enlargement of competition for good researchers and research funds, the need to improve reputation and visibility at the knowledge frontier (quality indicator)
- Changing meaning: from internationalisation of researchers and research groups to embedment of institutions and individuals in international networks, capability to attract foreigners (researchers, clients), and to localize research activities abroad (researchers and units)
- European Framework Programmes, the Lisbon strategy, and the European Research Area are factors pushing toward internationalization

# Internationalization of research

- Gornitzka et al. (2003) distinguished between:
  - *Internationalisation*, nation-state centred concept related to the borders of nation-state becoming less important
  - *Denationalisation*, hollowing up of the nation-state
  - *Transnationalisation*, importance of transnational actors
  - *Globalisation*, increasing interconnection of the world economies
  - *Regionalisation*, regional decentralisation process
  - *Europeanization*, internationalisation within Europe



# Reasons for PROs internationalisation

- Georghiou (1998) direct and indirect benefits:
  - Joining high quality level research activities
  - Getting access to additional sources of funding
  - Enhancing reputation and visibility
  - Broadening the scope of the research agenda and networking
- Different patterns of internationalisation between PROs and the firms sector
  - Culture and incentives are different (publishing vs commercialising)
  - Ways of internationalisation (collaborations and co-publishing, funding from abroad vs foreign direct investment)

# Two patterns of internationalisation

- **Traditional pattern** Gornitzka et al. (2003)
  - Autonomous initiatives of individuals and of corporate research institutions more important than government policy initiatives
  - Weak institutionalisation, although LSF initiatives
- **Emerging pattern**
  - “Institutionalised, market-controlled, technology-dominated, rule-driven process”
  - Cooperation and competition at the different government levels as drivers of internationalisation
  - Influence of supra-national institutions
  - Dominance of the economic rationale for public support to R&D

# Patterns of internationalisation for PROs

- PROs would show different patterns of internationalisation according to (Bergen and Hofer, 2008):
  - Academic or business orientation of PROs
  - Their proximity to national policy (national investment)
  - The level of autonomy (room of manoeuvre)
  - The national funding structure and the presence of incentives toward internationalisation
  - The positioning of PROs within the NIS
  - “infant stage of internationalisation” in PROs still focused on academic collaboration-type (informal relationships, co-authorship, mobility)

# Indicators for evaluation

- Based on
  - conceptual framework coming from STI studies (i.e. linear model, NSI),
  - definitions and normative understanding of the underlying reality (Barré, 2001)
  - Indicators support policy makers providing a synthetic representation of the reality, not a complete and objective description of the reality (proxy)
- Indicators should be:
  - Designed for answering specific evaluation questions (relevance)
  - Built upon a conceptual model of the reality (definitions, state-of-the-art, delimitation of the elements to be measured)
  - Feasible in terms of data quality and availability (cost and time)
  - Transparent in terms of capability of users to understand background and limitations affecting indicators

# Classes of indicators

- *Descriptors* just describe some aspects of reality without leading to further interpretation
  - distribution of project proposals by country
  - counts of publications by institutionsare just descriptive information on where proposals and patents come from, without any attempt to use them to track underlying phenomena.
- *Indicators* are constructs which explicitly build the connection between some quantities and not observable properties
  - Citation statistics as indicators of research quality
  - Patent statistics and R&D investment as indicators of innovation

# A possible way forward

- The work of the MO Forum starts from the acknowledgment of the **importance of internationalisation** for PROs, and the need to improve information and knowledge about its characteristic for evaluation purposes.
- Internationalisation is affected by the differences of the **discipline**, and by the institutional **mission and objectives** of PROs as established at national level.
- Distinguishing between **internationalisation** and **Europeanization** is another important choice, which implies to have a specific look at changes that can be to some extent related to the policies developed at European level

# Circumscribing the perimeter

- to deal with organizations that are autonomous entities, with a budget and the capability to set strategies;
- the PROs primary goal is to perform research, although they can also perform other functionalities (i.e. they can commercialise research results, being involved in consortia and societies with firms);
- funding agencies can be included in the perimeter when they also perform (at least to some extent) research.

# Best suited definition

- PREST (2000): “National, non- university public or semi- public research institutes as well as institutes from the non-profit foundation sector “where government was the major customer or the driving force behind their creation and existence”
- Unit of analysis: the organisations as such (not research team, neither the internal institutes), although a more sophisticate and precise analysis would require information at the very work floor level



# The positioning indicators

- The approach proposed is the “positioning indicators” (Lepori, et al., 2008) which assumes that indicators are evidences aimed at position the actors in a multiple space.
- Indicators support the actors’ strategic decisions (instead to pursue efficiency of the production processes)
- Indicators are supposed to improve the co-ordination of the system, rather than to focus only to provide information useful for steering purposes
- Indicators concern flows and linkages (for example careers or scientific collaborations or allocation mechanisms of funding)

# Dimensions of internationalisation

- Internationalisation dimensions:
  - funding flows from/to international agencies,
  - collaboration and networking patterns between institutions, groups and individuals,
  - co-production of knowledge (publications and technological outputs).
- Each PROs would be more close to one or another of the apexes according to the mission and the objectives, but also according to traditional behaviour, norms and value existing at national and institutional level.

**Funding  
flows**

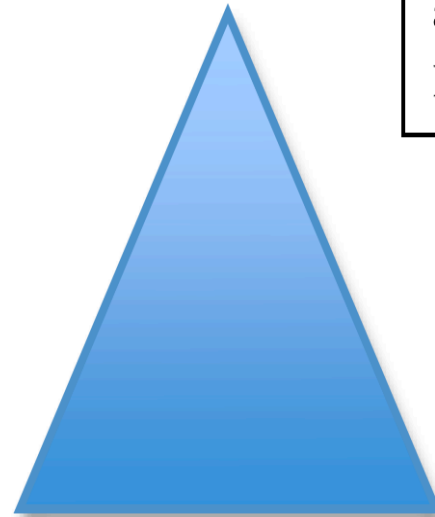
Funding flows from/to abroad,  
Opening of national funding schemes,  
Joint programmes, Panellists from  
abroad in ex-ante evaluation  
processes

**Collaboration  
and networking**

Collaboration schemes, Phd  
schools and training from/to  
abroad, Leading positions of  
foreign scholars, Membership in  
international networks, LSF use

**Knowledge  
production**

Co-publication and co-patenting with  
foreign partners, Mobility of senior,  
junior and Phds, Research Units  
abroad



# Positioning PROs

- All these dimensions can alternatively be interpreted as driver of internationalisation or as consequences of internationalisation.
- Causal relationships being difficult to grasp, the positioning indicators approach focus on the specification of the actors' spaces instead of on input/output relationships.
- Focus on vertical relationships (with funding agencies) and horizontal relationships (with other performers)

# A wish list of indicators

- To be developed on the base of national and international sources
- Activities
  - Co-publication and co-patenting with foreign researchers (bibliometric and patenting resources)
  - Funding from abroad by source of funding
  - Participation/leadership in EU programmes (EUFPs, ERANET, Technological platform, COST, EUREKA, etc)
  - Participation in European and transnational initiatives (CERN, Elettra, PNRA/IPAB, etc.)
  - Mobility of researchers (brain drain and brain gain) by duration, age, gender and career position
  - Research projects in collaboration with foreign partners (amount, type of partnership, type of funding organization, role in the partnership)
  - Students trained in Phd courses and Schools in collaboration with foreign institutions

# A wish list of indicators

- Structures
  - Use of LSF and other international infrastructures (i.e.databases)
  - Research units located abroad (funding by source and human resources)
  - Level of openness to the international arena
    - Researchers recruitment
    - Leading positions
    - Positions in government bodies
    - Participation in evaluation panels, etc
  - Strategic plan for internationalisation

# A possible way forward

- The feasibility of all the indicators listed above would be difficult and problematic.
- The way forward implies:
  - Defining the evaluation design (what we want to observe and for what purpose) because universal indicators do not exist
  - A conceptualisation of the internationalisation of PROs according to a selection of key functionalities representing their main profiles
  - A design of few descriptors and indicators (name of the indicator, description, use, source), and a test on the degree of comparability between countries

**ERA indicators most related to internationalisation that can be referred also to PROs**

European integration of research system (**policies**)

*Indicator: Share of National Public Funds for Trans-nationally Coordinated Research.*

ERA research actors cooperation and cohesion

*Indicator: Share of co-publications (as regard to publications and to co-publications), which are with EU partners, among which with the 10 Member States with the lowest R&D intensity*

International cooperation in S & T and opening to the **world (ERA Initiative)**

*Indicator: Share of co-publications (as regard to publications and to co-publications) which are with non- EU partners*

Mobility of researchers and research careers (**ERA Initiative**)

*Indicator: Percentage of Doctoral degree Holders who obtained their doctorate in another EU country and/or have worked in another EU country*

Knowledge transfer between public and private sector (**ERA Initiative**)

*Indicator: Share of publicly-performed research which is financed by business*

Pan-European research infrastructures

*Indicator: Amount of funding committed to new pan-European research infrastructures in the agreements*