ASSESSING RISK IN EVALUATION OF «RETURN ON INVESTMENT» OF RESEARCH FUNDING ORGANISATIONS

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A follow up from last year’s workshop:

A « micro case study » to illustrate the limitations and difficulties of an evaluation of «return on investment » in research...

… while concluding on the possibility and necessity to deal with it.
HFSP in a nutshell

History
1987: First mention of the Human Frontier Science Program by Mr Y. Nakasone at G7 Economic summit Venice
1989: Creation of HFSPO, based in Strasbourg France

Statutory aim of the Program:
"to promote, through international cooperation basic research focused on the elucidation of the sophisticated and complex mechanisms of living organisms and to make the fullest possible utilization of the research results for the benefit of all humankind …"

Members:
Australia (2005), Canada, France, Germany, India (2006), Italy, Japan, New Zealand (2006), Korea (2005), UK, USA, EU

Budget: ~ 60 mio USD in FY 2007

Program activities
Research Grants: teams of 2 to 4 scientists for 3 years: 750 – 1350 kUSD per award depending on team size.
   Young Investigators: within their first 5 years after independent lab position
   Program Grants: at any stage of their career

Career Development Awards: support to establish an independent position in home country: 3 years, 300 kUSD

Long Term Fellowships: Postdoc scientists training in different field/continent: 3 years ~ 150 kUSD.

Annual Awardees meeting: Scientific meeting for scientific interaction among HFSPO constituency.
Assessment of HFSPO

- Annual audit by external auditors appointed by HFSPO Board (one from Europe, America and Asia) on procedures and organisation
- Annual audit of accounts by statutory auditors

- In depth review on effectiveness and uniqueness every 5 years (1996, 2001, 2006) by independent organizations (ARA, PREST, NIFU STEP) and by high level scientific panels.
  
  Combination of methods: bibliometrics, interviews, review of processes and implementation, feedback from awardees.

  Conclusions from these reviews used by the IGC in making its decision to extend its support to HFSP.
Evaluation of return on investment in research is bound to take place as one component of accountability.

Reluctance to change or genuine concern?
“institutional ranking have huge influence”

Academics strike back at spurious rankings

A call by a group of US colleges earlier this month to boycott the most influential university ranking in the United States has shone the spotlight on the problem of institutional rankings. Experts argue that these are based on dubious methodology and spurious data, yet they have huge influence. But help is at hand: European academics are putting some rigour into rankings by tackling the problem themselves.

On 5 May, Douglas Bennett, president of Earlham College in Richmond, Indiana, and 11 other college presidents asked colleagues to refuse to fill out surveys for the US News & World Report. That survey of institutions, they argued, “implies a false precision and authority that is not warranted by the data they use”. Another 17 colleges have since signed up.

“All current university rankings are flawed to some extent; most, fundamentally,” says Alan Gilbert, president and vice-chancellor of the University of Manchester in Britain. “But rankings are here to stay, and it is therefore worth the time and effort to get them right.”

The rankings in the US News & World Report and those published by the British Times Higher Education Supplement (THES) depend heavily on surveys of thousands of experts — a system that some contest. A third popular ranking, by Jiao Tong University in Shanghai, China, is based on more quantitative measures, such as citations, numbers of Nobel prizewinners and publications in Nature and Science. But even these measures are not straightforward.

Thomson Scientific’s ISI citation data are notoriously poor for use in rankings: names of institutions are spelled differently from one article to the next, and university affiliations are sometimes omitted altogether. After cleaning up ISI data on all UK papers for such effects, the Leeds-based consultancy Evidence Ltd, found the true number of papers from the University of Oxford, for example, to be 40% higher than listed by ISI, says director Jonathan Adams.

Researchers at Leiden University in the Netherlands have similarly recompiled the ISI database for 400 universities: half a million papers per year. Their system produces various rankings based on different indicators. One, for example, weights citations on the basis of their scientific field, so that a university that does well in a heavily cited field doesn't get an artificial extra boost (see table).

The German Center for Higher
…We have used the evaluation tool very reluctantly because we do not find it to be a very good tool in understanding the dynamical behaviour of an institutional system. …

(one ) extremely important issue …is the availability of high quality indicators; indicators which not so much look at the performance of individual institutions as trying to define our knowledge system.

The universities and the research institutions represent a system which produce knowledge, but knowledge in itself is not of any interest if it is not moved…

We ought to be concerned about (how we transmit knowledge from one person to another, and from one institution to another) because it is in that process that we generate added values of our knowledge system. It is in that way we can formulate new innovation policies….

Society invests a lot of money in research, not to keep the individual scientist happy but because it is good for the society. Research produces students and knowledge, and this knowledge is to be used in society.

“How good is a research funding organisation at generating and moving knowledge, and participate to the “system” ?”
Evaluate generation and movement of knowledge
A “micro test case”

• Perimeter:

• Indicators
  – Quantitative (generation):
    – publications, patents before and after award
      With and without host
  – Qualitative (Movement)
    – significance of work: cross reference of publications or patent
    – Networking/knowledge sharing: referee activity, conferences
    – Own career profile: location and position (“tree of knowledge”)

Data sources
  Thomson “ISI Web of Knowledge”
  World Intellectual property Organization (WIPO) database
  Internet search engines (Google)
« tree of knowledge »

- Government Minister
- Executive director
- Non-profit foundation
- Industry CEO
- Research director
- Science policy head
- Science communication
- Journalist, editor, producer
- Government administration
- Scientific program director
- Government ministries
- Non-profit sector executive director
- Industry research team member
- Group leader, head start-up company
- Law
- Environmental protection organizations
- Policy
- Non-profit funding administration
- Journalism
- Law school
- Industry technician
- Business administration
- Non-profit and government
- Agronomist
- Clinical trial team leader
- Legislative assistant
- Public health manager
- Science administration
- Science education and outreach programs
- Laboratory technician
- Professional schools
- Writers
- Foundation assistants
- First degree
- Science major
- Non-academic
- Academic
- Science outreach
- Public literacy programs
- Media
- Museum exhibits
- Science education
- Tools
- Primary, secondary and pre university
- Science enrichment
- Science curriculum development

Report on a Meeting held in Strasbourg, France, November 29-30, 2001 on International Training and Support of Young Investigators in the Natural Sciences

10/08/2007
## Individual summary

**knowledge creation and movement**

### Articles

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<th>(Thomson Web of knowledge) (hfsp cited)</th>
<th>Creation - communication</th>
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### Other scientific communication

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<th>reviews books conferences</th>
<th>Diffusion - networking</th>
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### Awards

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<th>hfsp cited</th>
<th>Recognition - influence</th>
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### Patents

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<th>hfsp cited</th>
<th>(co) inventor publications/patent</th>
<th>value capture - application</th>
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### career path

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<th>Role - « tree of knowledge »</th>
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### Issues/comments

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Comparisons and statistical analysis possible within and between organisations.

Interaction host/fellow.

Need to add information on field.

Reference to HFSP very rare, not retrievable from ISI data.
Comparisons and statistical analysis possible
very heterogeneous – case of Pe: research on prion
Few patents filed as «inventor», and …
…apparent relationship with position (see next slide)
lag time
Reference to HFSP rare and buried in the description
No links between bibliographic and patent databases (incl. in Thomson group)
### Sample results

#### Career path

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- Be: Univ Fribourg  
- Sp: Univ Basel Dept of botany CH  
- Pe: Department of Biology, Technion, Israel Inst of Technology  
- Ha: Univ of Tokyo  
- Pr: Univ Bath, Dept Biol & Biochem England

#### Notes:

- **Descriptive – comparison more complex**
- **HFSP link with mobility obvious but impact on career only by interview…**
- **Mobility academic > industry**
- **Need to add information on position**
- **No database available - time consuming**

10/08/2007
Immediate issues

Ineffective Identifiers… if any

Homonyms (ex. of Hamaguchi Masaaki (Genetic analysis of human cancer)):
375 records found for “Hamaguchi M” in 21 subject categories (ISI data)
76 records in "oncology“ only with Hamaguchi M/otohiro, M/ichinari, M/asaaki
But … "first names are not searchable“ in Thomson ISI database …

Change of Institutional denomination and perimeter > combined with above : career path hard to capture

Search engines give anecdotal information and existing databases are not connected (e.g; Derwent and SCI)

No field for funding organizations …
Risks of “return on investment” evaluation

Risk of not doing it

Unsustainable:
As if not for profit research was not accountable?
The argument that it is too complex to evaluate does not hold with current digital information storage and retrieval technologies.

Counter-productive:
Ambitious goals such as in the « Lisbon agenda» in Europe are not met. Translation of faith into priorities would be helped by good quality data.
How can «best practices» be identified and leveraged without means to identify them?

“Dangerous”:
Tools developed by the industry for applied R&D are inappropriate for fundamental research, humanities, social sciences.
The demand for such evaluation, in particular from politicians, creates a niche market. Commercial information providers might fill this need but with their own agenda (not bad in itself, but risky quality-wise and probably expensive).
Risks of “return on investment” evaluation

Risk of doing it

Could generate an alien “culture of result” that might antagonise the research community.

Counter-productive if too simplistic, with abuse of bibliometrics and impact factors.

The average return on investment in intellectual assets is highly skewed. Many research projects do not succeed but the returns on successful projects more than compensate.

Misappropriation of (good) results. What credit or share of a successful career or project can be claimed by a single organization nowadays?

Could be (mis)used to serve a hidden agenda (cost cuts, restructuring and concentration…)

Potential for excessive complexity and finally no use.
Risks of “return on investment” evaluation

Misc. considerations

A great diversity of goals, disciplines and cultural environment makes comparison and benchmarking difficult (and even the very idea of performance evaluation may be alien).

This is about evaluation *a posteriori*, and not *about* research prioritisation

Confusion and ignorance favour a less challenging status quo.

Requires a very important and sustained intellectual, conceptual and material investment. Needs a driving force with recognised global authority.
Other important communities are dealing with this issue

“The relative lack of recognition of intangibles in accounting coupled with their growing importance in the value creation process, means that the financial statements have lost some of their value for shareholders.”

Policy Brief OECD Feb 2007
Conclusion

Evaluation of return on investment in research is bound to take place as one component of accountability.

The research community would be the first beneficiary of a proactive attitude so as to mitigate the risk of misconception, misuse, or costly monopoly.

There are already interesting approaches and no need to «reinvent the wheel » but an overview and practical step forwards are missing at the international level.

There is an obvious need for universal unambiguous identifiers of researchers, research institutions, funders …just to make possible adequate referencing.

A global role for an existing or ad hoc global organisation (e.g. OECD ) ?
Thank you for your attention