European Basic Research and its Impact

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From Research to Innovation: A Challenge for Europe
2021 Euro-Case Workshop - 10th September 2021
1. **What** is Basic Research

2. Why **investing** in Basic Research is important

3. What is done in **Europe** for Basic Research

4. What **impacts** of Basic Research in Europe

5. What **needs and challenges** for Basic Research
1. What is Basic Research

**Basic research** is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.

*Frascati Manual (OECD)*

*but contribution to many applications and discoveries...*

**Basic research** is mainly publicly funded (freedom, curiosity driven)
2. Why investing in Basic Research is important

Direct Impacts of Basic Research

- Scientific knowledge
- Training of graduates and bright minds
- Quality of education in Universities

Spillovers of Basic Research (more difficult to track…)

- Innovation → value creation, economic growth, welfare creation
- Societal challenges (climate, health, ageing population, …)
Technologies massively financed by USA and EU public funding: Internet, GPS, touch screen, voice recognition, ...

Today world is the result of research made long ago

Mariana Mazzucato, The Entrepreneurial State, Anthem Press, 2014
Industry needs universities and vice versa

Yrjö NEUVO  Helsinki University of Technology

2. Why investing in Basic Research is important

The contribution of Basic Research to innovation

**REC 2:** Recognition of Basic Research Utility (and Specificity) in Innovation - **Indicators and data collection for advocacy**
3. What is done in Europe for Basic Research

Structures

- 1928 - ..: National Research Funding or Operating Organisations
- 1954: CERN (European Organization for Nuclear Research)
- 1962: ESO (European Southern Observatory)
- 1963: EMBO (European Molecular Biology Organization)
- 1971: European Research Framework Programs (Marie Curie, Flagship, …)
- 1974: ESF (European Science Foundation)
- 1975: ESA (European Space Agency)
- 2000: The Lisbon Strategy (3% GDP invested in R&D – 1/3 public)
- 2007: ERC (European Research Council)
- 2013: Science Europe (science policy issues)
3. What is done in Europe for Basic Research

**Funding**
*National and EU*

**Public Investments in R&D (% GDP)**

Share of Basic Research in public investments below 30%?

**REC 3**: a « right » balance between **public investments** in basic research and others + **public acceptance of investments**
4. What impacts of Basic Research in Europe

Direct impacts: publications

% of scientific publications among the world’s 10% top-cited publications
4. What impacts of Basic Research in Europe

Direct impacts: doctorate holders

Only 14 European Universities in the top 50 Shangai Ranking…

OECD iLibrary | Share of 25-64 year-olds with a doctorate (2018) (oecd-ilibrary.org)
4. What impacts of Basic Research in Europe

Spillovers: the example of CERN

CERN (1954 - 23 Member States): a world-class physics research facility

What is the universe made of and how it works?

... the world wide web...
Spillovers: the example of CERN

A lot of opportunities for innovation

REC 4: Need for long-term funding of research infrastructures
4. What impacts of Basic Research in Europe

Spillovers: from basic research to start-up … (ex: Dr P. Cani, FNRS, Belgium)

- 15 years of basic research on interactions between intestinal bacteria and organs
- 2013: patent (reduction of risk of developing diabete and obesity)
- 2018: start-up (13 M€)
- 2021: EFSA (European Food Safety Authority) approval

REC 5: Need for long-term funding of researchers
5. What needs and challenges for Basic Research in Europe

a. Freedom (choice of subjects)
b. Time
c. Money

- Level of public funding
- **Science policy**: complementarity of national (*national research councils for seeding*) and international (*ERC for nurturing the stars*) funding
- **Additional** funds for strategic basic research: more attractive to policy makers (innovation expected at a shorter term, societal challenges)
- Private foundations

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**REC 6**: To consolidate funding sources and adjust overall **science policy**
5. What needs and challenges for Basic Research in Europe

a. Freedom (choice of subjects)
b. Time
c. Money

d. **Talents:** precarity of research carriers, risk of brain drain and/or lack of attractiveness of the research career

**REC 7: Developing Career Paths for Researchers in Europe**

tracking of careers, # academic positions in Europe, recognition of the value of PhD training, cross-sectorial mobility, pensions issues, …
5. What needs and challenges for Basic Research in Europe

a. Freedom (choice of subjects)
b. Time
c. Money
d. Talents (researchers’ carriers)

e. Evaluation procedures (top class, excellence, no bias)
f. Funding instruments (specific, appropriate, effective)

REC 8: Benchmarking and Guide of Best Practices

Rôle of Science Europe
5. What needs and challenges for Basic Research in Europe

a. Freedom (choice of subjects)
b. Time
c. Money
d. Talents (researchers’carriers)
e. Evaluation procedure (top class, excellence, no bias)
f. Funding instruments (specific, appropriate, effective)

g. International collaboration (1+1 >> 2)

REC 9: Increased support (funding and instruments) to international collaboration
ERA-Nets, WEAVE, …
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h. Friendly competitive environments
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h. Friendly competitive environments

i. Ecosystems (to foster discoveries and innovation)
“You never would have gotten the lightbulb if all you had done was applied science on the candle”

Rolph Heuer, former DG CERN