Open Science, Open Innovation delivering sustainable societies

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Horizon Europe

Pillar 1
Excellent Science

- European Research Council
- Marie Skłodowska-Curie Actions
- Research Infrastructures

Pillar 2
Global Challenges and European Industrial Competitiveness

- Health
- Culture, Creativity and Inclusive Society
- Civil Security for Society
- Digital, Industry and Space
- Climate, Energy and Mobility
- Food, Bioeconomy, Natural Resources, Agriculture and Environment

- Joint Research Centre

Pillar 3
Innovative Europe

- European Innovation Council
- European innovation ecosystems
- European Institute of Innovation and Technology

Widening Participation and Strengthening the European Research Area

- Widening participation and spreading excellence
- Reforming and Enhancing the European R&I system
Policy Platform for Horizon Europe

- Lund Declaration
- 'LAB–FAB–APP' Lamy Report
- RISE Policy Reports
European Innovation Scoreboard 2019

Regional Innovation Scoreboard 2019
European Economic Challenge

Figure 2.19: Evolution of Total Factor Productivity (2005-2014)

European Framework H2020
€74.8 billion for 2014–20

ERC global leadership for scientific breakthroughs

Does not translate into economic impact

Impact of disruptive technologies

Lagging Leadership in Digital Economy

Note: Index 2005=100
Source: European Commission, EU Structural Change 2015, DG GROW.
Europe’s Future: Open Innovation Science World
Lund Declaration

- Incentivise Europe’s public research organizations to strengthen the interface and collaboration with stakeholders and actors outside the academic community.
- Strengthen pro-active involvement of end-users, public sector and industry in addressing societal challenges including demand-side actions.
Societal Challenges

- Align strategies, instruments, resources and actors alignment of National and European resources
- New academic researcher: creativity, entrepreneurship and innovation.
- Engagement of stakeholders: Public sector and industry
- End-users part of the innovation process

Societal Challenges require clear citizen buy-in and engagement
'LAB–FAB–APP' Lamy Report

- Adopt a mission-oriented, impact-focused approach to address global challenges

**Future markets**
- Ecosystems of researchers, Innovators, Industrialists and governments
- Invest in Innovative ideas
- Rapid scale up
- Mobilize and involve citizens: stimulate co-design and co-creation through citizen involvement
- Better align EU and national R&I investment
Innovation Dynamics

From

- Planning – linear process
- Top-down – ‘picking the winners’
- Slow & evolutionary

To

- Unpredictable - ‘orchestrated chaos’
- Bottom-up, global networks
- ‘In-the-making’ & radical

Innovation dynamics have changed
Innovation policy must change
Innovation Dynamics

Classic Innovation Policy

- Institutions
- Constraints
- Compliance

New Nature of Innovation

- People
- Openness
- Results
“.........if we are serious about using European research and innovation for something greater than our own gain. We have to embrace change – try new things and be willing to take risks”.

Carlos Moedas: Commissioner for Science and Innovation
# RISE Open Innovation

## Open Innovation
- European Innovation Council
- Venture capital funds of funds
- Pro innovaion Regulatory Environment
- Boosting Private Investment
- Maximizing Impact of EU funding

## Open Science
- Open Access
- Open Data and European Open Science Cloud
- Research Integrity
- Inclusiveness & Citizen Science

## Open to the World
- Leading & working with multilateral initiatives & international organizations
- Better framework conditions for scientific cooperation
- Science diplomacy and synergies with the EU's external policies
Open Science

- Public accessibility and full transparency of scientific communication;
- Public availability and reusability of scientific data;
- Transparency in experimental methodology, observation, and collection of data;
- Complete scientific collaboration.
Open Science: Requirements

• Linking scientists to science policy making.
• Developing proper e-infrastructures, digital tools and services for OS.
• Changing legal tools and policy requirements for open science.
• Enabling solid foundation and values.
• Preparing skilled people for openness.
• Open Science promotes Research Integrity which requires researchers conduct intrinsic to the values of research and the trust it engenders Research Integrity.
Open Access:

“Two basic models exist:

**Gold** open access (open access publishing): payment of publication costs is shifted from readers (via subscriptions) to authors.

**Green** open access (self-archiving): the published article or the final peer-reviewed manuscript is archived by the researcher in an online repository before, after or alongside its publication.

(European Commission, 2010)
RISE Recommendations on Open Access

- **Assessment**: Green open access model with an open access button
- **Control of bad practices**: references to reviewer papers or sister journals (promote OpenAIRE)
- **Recognition of preprints**: as evidence of productivity in proposal evaluation
- **Digital Open Access Identifier (DOAI)** and the ORCID identification system
- **Infrastructure**: the *Open Access Infrastructure for Research in Europe* (OpenAIRE) to provide a long-term consistent, stable and sustainable *open access* infrastructure integrated to the European open science cloud
RISE Recommendations on Open Access

- Development of new publishing services in open access. Such an open access infrastructure should allow to design and experiment new services.

- Open source software and metadata standards.

- Transparency of ownership, processes and cost of publishing.

- Transparency: legal support to researchers, librarians and funding agencies.

- Modification of the public market law. Modify the exception to the public market law which authorises subscription contracts (which now include article processing charges) to be non-disclosable, in order to protect intellectual property rights.
Extreme competition for limited resources discourages openness

• Scientists want open science, but warped incentive structures resulting from extreme competition are a major barrier

• Top-down directives do not remove the sources of the barriers
  – they are not long-term solutions
  – they do not ensure global competitiveness

• A fundamental change in research funding allocation could create meaningful shift in scientific culture, towards openness

If Open Science is a priority, then funding models should be rethought to encourage openness
Current barriers to Open Science are a direct result of funding, reward structures

- **Barriers to Open Access**
  - Need to publish in “high impact” journals to compete for funding, career progression

- **Barriers to Open Data**
  - Heavy investment into data collection
  - With uncertain funding future, proprietary data is a way to keep an “edge”
  - Cost and effort associated with storing, maintaining accessible databases

- **Challenges to Research Integrity**
  - Pressure to publish in “high impact” journals encourages picking and choosing data to build an exciting narrative
  - Open Data provides important checks for research integrity, reproducibility

**Changes in research funding models represent a powerful way to remove these barriers and promote Open Science**
Current science funding in Europe discourages Open Science

• Low success rates
  – It is impossible to distinguish quality beyond ~top third
  – Emphasis on metrics rewards “bad” behavior

• Tremendous administrative burden
  – Both sides: preparing and evaluating proposals
  – Deters many from applying
  – Reduces the size and quality of the applicant pool

• Emphasis on large-scale, top-down projects
  – Inflexible, can’t respond to current needs/ ideas
  – Inaccessible to researchers outside of established communities

Need better ways to identify and support the very best researchers and ideas
Beyond Compliance: Long-term suggestions for changing research culture via changes in funding models

• Meaningful changes to assessment practices
  – Indicators, not metrics
  – Allow candidates to create their narratives (need training for this)
  – Start with ERC panels
    • Under our jurisdiction
    • May trickle down to member states and Universities

• More, smaller grants with possibility for renewal
  – It is impossible to predict which projects will be successful, particularly with basic research
  – May require changes to evaluation and management process
  – Possibility for renewal ensures that the best projects have stability/continuity, and could decrease administrative burden (relative to de novo applications)

• Funding centered on “People, not projects”

Europe has an opportunity to lead the way on Open Science
Open Science Policy Platform
Recommendations

- Rewards and Incentives
- Research Indicators and Next-Generation Metrics
- Future of Scholarly Communication
- European Open Science Cloud
- FAIR Data
- Research Integrity
- Skills and Education
- Citizen Science
Open Innovation
“Open innovation as a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model”.

Chesbrough and Bogers (2014)
Challenges to creating an Open Innovation Environment

- Bottom-Up
  - Digitalisation and globalisation: innovation created by pockets of creative individuals rather than corporations or universities.

- Iterative
  - Non Technological innovation does not always descend sequentially from science
  - Circular processes in creativity, testing and scientific analysis have mutual interplays

- Uncertainty

- Technology Disruption and New business models
Classifying Citizen Science Activities

- **Contractual projects**, communities ask professional researchers to conduct a specific scientific investigation
- **Contributory projects**, generally designed by scientists and for which members of the public primarily contribute data;
- **Collaborative projects**, generally designed by scientists and members of the public contribute data but might refine project design, analyze data, and/or disseminate findings;
- **Co-Created projects**, designed by scientists and members of the public working together and some of the public participants are actively involved in most or all aspects of the research process;
- **Collegial contributions**, non-credentialed individuals conduct research independently with varying degrees of expected recognition by institutionalized science and/or professionals.

Missions: Open Science and Open Innovation for Sustainable Society
“Open innovation as a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model”.

Chesbrough and Bogers (2014)
European Innovation Scoreboard

Regional Innovation Scoreboard 2019
Knowledge generation, innovation and innovation diffusion

Impact of the quality of knowledge and education on innovation and its diffusion between firms
Increase the impact of European research and innovation Missions

- BOLD, INSPIRATIONAL WITH WIDE SOCIETAL RELEVANCE
- A CLEAR DIRECTION: TARGETED, MEASURABLE AND TIME-BOUND
- AMBITIOUS BUT REALISTIC RESEARCH & INNOVATION ACTIONS
- CROSS-DISCIPLINARY, CROSS-SECTOR AND CROSS–ACTOR INNOVATION

Figure 1. From Challenges to Missions Image: RTD-A1 based on Mazzucato (2017)
Increase the impact of European research and innovation Missions

Creates environment for the flow of knowledge and know-how from innovation rich to innovation poor regions based on openness

Builds on Quadruple Helix

Public participation crucial
The Creation of Open Markets for the Future

• Globalisation, Disruptive technologies and associated new business models have redefined the relationship between science, innovation and economic development.

• Digitalisation and innovative technology must have society and the needs and values of citizens at their core.

• Open Innovation Ecosystems to localise benefits of the Digital Economy.