

**Title**

Research and innovation futures 2030: Emerging issues for science and research policy

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## Objectives

This paper is forward-looking in nature and analyses emerging issues for science and research policy as resulting from the interplay of future developments of which we currently observe only first glimpse. Current debates on such new ways of doing and organizing focus on the potentially high impact of some prominent, but rather isolated developments, such as data-driven research, open science / open research or more broadly speaking Science 2.0. By ignoring inter-dependencies with other developments and path-dependencies of existing structures and institutions, a great deal of hype is associated to such isolated developments. This sceptical assessment does not at all mean that these developments should be underestimated in their transformative potential, but they need to be put into context if they are to inform serious debates about science and research policy.

Against this background, the paper aims to contribute to a better understanding of how transformative change might come about in our research systems a consequence of such emerging developments, and what institutional and policy requirements need to be met if they really are to have a major impact.

## Approach

Our work on future transformative change in science and research is based on a multi-level perspective that distinguishes between actual changes in research practices, institutional settings, and the societal context in which science and research are embedded and which formulates requirements with regard to what they are supposed to deliver.

In methodological terms, the paper is based on combination of analysis of current trends in science and research and participatory scenario development involving experts and stakeholders in science and research. Current and emerging trends provide the basis for sketching explorative scenarios in the mid-term (2020), and in particular tensions that are likely to emerge if current trends continue to unfold. In a second stage of scenario developments these tensions are taken as a starting point for identifying possible triggers and mechanisms that could drive process of more radical in the longer term (2030). These transformative scenarios thus go beyond sketching future images, and look also into the transformative dynamics and pathways, and the actor constellations and position that would be compatible with the transformative change. By contrasting these scenario elements with the present situation, policy issues are extracted for further deepening. While this may not (yet) lead to clear-cut conclusions and recommendations, the intention is to devise more transparent and better founded inroads for debating policy needs in relation to future science and research systems.

## Expected results

As a result of the analysis of current trends and developments, six main dimensions of change could be identified, each underpinned by a number of more specific issues of change:

- Digitalization & Virtualization: Digital Science, Research 2.0
- Collaboration & participation: New ways of collaboratively doing & organizing research
- Access: Access to research data, funding, infrastructure, results, benefits, and careers
- Impact: Assessment, public accountability & tackling grand challenges
- Globalisation & internationalisation: Global scientist, global research and international cooperation
- Re-contextualizing Science in Society

Based on a longer list of potential tensions resulting from the interplay of these six dimensions and issues of change, a limited number of key tensions have been selected around which explorative scenarios of the future of doing and organising research in the mid-term were constructed in a participatory process. A basic assumption of these scenarios is that the institutional settings for doing and organising research will not fundamentally change until 2020. The explorative scenarios are built around tensions associated to the following main topics:

- Struggles for excellence and promising high tech
- Recontextualisation of science meets the new governance of science
- Research careers and reproduction of scientific communities
- Private sector research and public-private collaboration and coordination
- Expertise and contestation (and research integrity)
- Changes in the practice of science

Many of the tensions that prevail in the explorative scenarios are likely to get reinforced over the years. As a consequence, radical changes in the institutional settings may become necessary in the longer-term in order to cope with the tensions. Six such transformative scenarios have been developed:

- Scenario I: Open Research Landscape  
European research is coordinated by “Open Research Platforms (ORP)” where different types of globally connected actors align their funding activities. Each ORP runs an open knowledge sharing WIKI platform where researchers integrate their findings. The new gatekeepers of scientific quality are science&society social networks. University performance is judged by their contribution to the ORPs success.
- Scenario II: Divided Science Kingdom  
The research landscape is divided between two extremes: strictly governed publicly-funded research applying traditional quality criteria versus an open “knowledge parliament” where knowledge claims and funding opportunities are continuously negotiated. Universities are highly diversified according to the two realms.
- Scenario III: Grand Challenges for real  
European research and innovation is strictly organized around Knowledge and Innovation Communities (KICs) that develop solutions for key societal challenges through large-scale socio-technical research and experimentation aligning diverse actors and knowledge types. Large shares of public budgets are used to finance the KICs in a coordinated manner. This happens in a period of reduced economic growth in Europe, where higher priority is given to other dimensions of quality of life.
- Scenario IV: Tailored Research  
The research landscape is coordinated through a fully tailored system of functions fulfilled by highly specialised actors that share revenues according to market rules. At the top of the pyramid, Research Assembling Organisations (RAOs) integrate the contributions of second and third tier research service providers into systemic solutions. A few actors define the rules of interaction and control access to research results and resources. Science is viewed as one of the key enablers for winning the global economic competition race.
- Scenario V: Slow Science  
A dedicated group of scientists, also known as “slow science community”, is orienting research towards societal and policy needs, and placing high emphasis

on work-life balance and on making the results of their research work effective in practice. The community is locally rooted, globally connected and funded by bottom-up crowd funding from diverse sources.

- Scenario VI: Competition 2.0 – European public research divided

Driven by business pressure, Europe's emphasis is on innovation-oriented research with a focus on improving mid-term global economic competitiveness. Independent basic research has almost vanished and struggles for funding from public sources.

The paper will further explore these transformative scenarios in terms of the policy issues each of them may raise.