

**Title**

Breaking the boundaries of traditional research funding policies

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Societal and economic challenges require new models of research and new models of promoting ground-breaking, high-risk research. In recent years there has been an increasing interest in developing policy instruments to stimulate scientific and engineering research that is of greater societal consequence and has potentially high economic significance. Open research is defined as research driven by ideas that have the potential to radically change the current understanding of important existing scientific or engineering concepts or leading to the creation of new paradigms or fields of science or engineering. National and European research funding institutions are paying increasing attention to Open Research. Instead of relying on traditional and existing scientific approaches and results, Open Research programmes focus on the explorative aspect of research and attempt to initiate radical instead of incremental advances in science. This paper is based on the study “FET Open: Boosting the exploratory power of Open Research in Future and Emerging Technologies (FET)”.

The purpose of the project – a science foresight - was to study current practices in thematically open bottom-up approaches to funding cross-disciplinary frontier research (such as the Open scheme of the Future and Emerging Technologies challenge within the EU ICT work programme), to develop scenarios for the possible future design of such schemes, and to formulate recommendations and options to address the opportunities ahead for boosting transformative research by breaking the boundaries of traditional research funding.

#### *Current practices in thematically open bottom-up approaches to funding cross-disciplinary frontier research*

This paper analyses in its first part the different approaches to supporting Open Research in different countries, asking: What are the different strategies of national research funding agencies for supporting Open Research? How is the selection process structured to identify the most promising and relevant new ideas? In this project a total of 70 international funding schemes were analysed. The analysis of the cases reveals a broad spectrum of approaches used by decision makers today to define what is transformative research and to select the most promising projects, for example by supporting young in addition to well-established researchers, focusing on interdisciplinarity, and focusing on ideas rather than past success. The analysis reveals also the limitations of the different approaches that usually address only limited dimensions (for example reducing risk-taking by funding big risky projects proposed by established researchers or the other way round: reducing risk-taking by reducing the period of funding and/or sum of funding).

#### *Tensions in funding high-risk projects*

The science foresight explored the barriers towards funding Open research, because of the paradoxical situation that several governmental agencies aim at providing funding for high risk projects but in practice the risk-taking expected of researcher is not always matched by risk-taking on the part of the funding programmes. Asking researchers (online-survey) and representatives of funding agencies and actors of science policy, we identified several barriers to fund open research despite the overall consensus to fund this kind of research.

#### *Scenarios – long-term perspectives for breaking the boundaries of traditional research funding*

In the second part of the paper we analyse future development paths of Open research funding in Europe, considering context factors of the STI system as well as internal

mechanisms of granting such research projects. We developed scenarios of the future of Open research in Europe. The scenarios were drafted together with research planning experts and researchers which gathered in two expert workshops. While a range of specific models are possible, two quite distinct long-term visions of open research can be envisioned. The first reflects the idea of open research pervading the established science and funding system. The second suggests the need to build a strong and new institutional base for Open Collaborative Research to complement the prevailing modes of funding research. These models function as long-term perspectives and can be used for thinking about Open Research beyond the Horizon 2020 programme.

### *Scenario for funding transformative, ground-breaking, high-risk research that can open radically new directions for emerging technologies in the future*

After analysing the longer-term perspectives of funding Open Research in Europe, the paper will depict a concrete scenario in which the extension and enlargement of the existing Open Collaborative Research scheme has been successfully accomplished. The description of the situation in the year 2017 lays out the options to be considered and the decisions to be made until then.

We will describe decision points for scaling-up Open Collaborative Research and analysing the main policy issues. These applies especially to the management of innovation policies as breaking the boundaries of traditional research funding, policies policy interventions need to address three main areas:

- the internal organisation,
- the long-term institutional solution which requires a fundamental decision,
- the communication measures to inform the scientific community.

#### **Internal organisation**

Funding transformative, ground-breaking, high-risk research that can open radically new directions for emerging technologies in the future means that such an approach has to find its place in the European funding landscape beyond the Horizon 2020 programme. This means Open collaborative Research has to highlight its specific contributions to the European research scene as compared to other approaches (for example the PI driven research funded by the ERC) and to other existing research funding organisations. In this paper we will describe in detail what these contributions are. Quite central are close interconnections between Open collaborative Research and the European programmes tackling societal challenges. Other challenges are to preserve and develop further the principles and mechanisms such as a fast and light application process, allowing financial flexibility, permitting changes in the research direction, and tolerating flexibility in human resources.

#### **A basic decision for the long-term perspective**

In the long run, policy makers will have to decide which organisational framework will be used to manage Open Collaborative Research funding in Europe. We will present two basic models for such an organisational framework. The decentralised model reflects the idea of Open

Collaborative Research pervading the established science and funding system. The centralised model suggests the need to build a strong new institutional base for Open Collaborative Research to complement the prevailing modes of doing research.

#### Communicating the new FET Open to the scientific community

Positioning such funding in the global scientific community requires a dedicated communication strategy. In extending the scope and focus of Open Collaborative Research in the new programme, policy makers and the administration have to communicate the specific criteria for open research (novel, foundational, potentially transformative, collaborative, etc. research) to a variety of scientific communities with different cultures and assessment regimes.

#### Conclusions

As societal and economic challenges require new models of research and the internal dynamics of science require a fast and collaborative approach to research, existing thematic (top-down) funding approaches are too slow and too narrow to respond to these societal, economic and scientific challenges. Thus, the Open Collaborative Research model will become more prominent in the future.

Scaling up this kind of research requires putting the perspective of the researchers at the centre, implementing transparency and trust-based rules in the selection and review process and ensuring flexibility concerning the rules for spending funding. In order to avoid that researchers use the programme as a residual category, the characteristics and objectives of such research need to be clearly communicated and contrasted to other lines of funding. Funding transformative, ground-breaking, high-risk research that can open radically new directions for emerging technologies in the future need to focus on a long-term technology orientation. As such it will complement basic research which is supported by national funding policies and the European Research Council.