Towards a New Model for Open Collaborative Research in Europe

Share your dream

Summary Report of the Study "Boosting the Exploratory Power of Open Research in Future and Emerging Technologies"

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February 2012

The study "Boosting the exploratory power of Open Research in Future and Emerging Technologies (FET)" is designed to support the activities of the European Commission to strengthen Open Collaborative Research and to establish it as a new mode of funding and doing research in Europe. It describes the opportunities ahead, sketches a scenario and shows the main decisions to be made while implementing the new model.

The report was prepared for the European Commission by

Fraunhofer Institute for Systems and Innovation Research ISI (Germany):
- Bernd Beckert
- Michael Friedewald

Austrian Institute of Technology AIT:
- Petra Schaper-Rinkel
- Matthias Weber

TNO (The Netherlands):
- Marc van Lieshout
- Annelieke van der Giessen
- Miriam Leis

PREFACE

Research is at the heart of the European Commission's mission to deliver a flourishing European digital economy by 2020. In particular, we look to frontier research to give us the scientific and technological advantage and to lay the foundations for future digital growth and jobs in Europe.

In Europe, we are particularly fortunate to benefit from a number of successful research funding programmes which deliver the insights we need to meet our future challenges. One such programme is the Future and Emerging Technologies Programme, FET. Established in 1989, FET continues to play a pioneering role: channelling the dreams of the best European scientists and researchers into the ICT technologies of tomorrow.

This report considers in detail one of the building blocks of the FET Programme, the very popular FET-Open Scheme. Part of its popularity clearly comes from the fact that FET-Open operates on a non-thematic basis – rather than calling for research ideas in a particular subarea of technology, FET-Open implements its work through a continuously open call for ideas. The philosophy behind such an approach is that the best ideas and dreams of Europe's scientists and researchers deserve to be set free. Free from bureaucratic hurdles, free from silos, free from top-down imposed deadlines and call-based planning.

Within the Horizon 2020 Research Programme, we want to capitalise on the success of FET-Open by extending its logic to other areas of European science and technology. This report outlines some of the ideas currently being discussed to achieve this.

Europe needs a place where excellent scientific ideas, and the researchers behind them, can come together in an unconstrained environment, and meet with an engaged, knowledgeable and committed public service that can provide the funding and support needed to take these ideas to technological fruition. That place is FET-Open.

Neelie Kroes
European Commission Vice-President for the Digital Agenda

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Executive Summary

This study deals with the future of Open Collaborative Research in Europe. "Open collaborative" research is defined as research that is risky, potentially transformative, foundational, bottom-up, interdisciplinary, technology driven, and collaborative. The main findings of the study are as follows:

1 Societal and economic challenges require new models of research.

2 The internal dynamics of science requires a fast and collaborative approach to research.

3 Existing thematic (top-down) programmes 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.

4 Fostering the Open Collaborative mode of doing research in Europe requires a firm decision for a centralised approach. Embedding many small Open Collaborative Research programmes into existing programme lines will not generate the required effects.

Scaling up the existing FET Open programme requires preserving and further developing the principles and practices of the FET Open programme. We tentatively label this NEXST (New and Emerging eXplorative Sciences and Technologies). The main results concerning the scaling-up process are summarised in the following 7 key messages:

1 When implementing NEXST three core principles have to be taken into consideration:
- putting the perspective of the researchers at the centre;
- transparency and trust-based rules in the selection and review process;
- flexibility concerning the rules for spending research money.

2 Project officers in NEXST shall not be mere administrators but need to be familiar with the latest developments in the respective research field. One of the reasons is that the definition of novelty is different and more difficult when more disciplines are involved.

3 Interesting developments are taking place when research fields overlap. NEXST shall be in principle open to all areas of science and technology.

4 In order to avoid that researchers use the programme as a residual category, the nature and objectives of the programme need to be clearly communicated and contrasted to other lines of funding.

5 The new FET Open can be open to the world, but proposals have to make clear why they are relevant for Europe.

6 The new FET Open shall also have an observatory and path finding function. The results of this new mission can be linked to the more thematic programmes.

7 Technology orientation is at the heart of the new FET Open. As such it will complement basic research which is supported by the European Research Council.

CHAPTER 1

Introduction

Research funding for high-risk but potentially groundbreaking science and engineering projects is getting more important than ever. In a world where scientific disciplines and research fields are increasingly blurring, where huge amounts of information and knowledge from all over the world have become easily accessible, and where the period of time from scientific discovery to technological solutions has become a decisive factor, the established ways of research funding are being challenged.

Against this background there is currently a small window of opportunity for a limited number of funding bodies to distinguish themselves in terms of what they do, and how they do it, and to gain global visibility for their efforts.

The holy grail in Europe, not yet found, is to build a virtuous symbiotic relationship between the funding agency, the researchers and scientists it serves, innovation, and the wider world. On the supply side, processes, tools, instruments and funding opportunities need to capture the spirit of opportunity in a new way, and develop as best in class, light and fast mechanisms which keep ideas flowing, and capture the value from these ideas. On the demand side, researchers will need to understand that they are invited to take more risks, to challenge current thinking, to disrupt current practices. These elements form the concrete vision for Open Collaborative Research in Europe which underlies this study.

The effectiveness of the relationship between supply of and demand for research funding will have a direct effect on the attractiveness of Europe as a place to carry out high-risk research with the potential to transform our lives. At the same time, it is a non-trivial exercise to develop the administrative mechanisms that can truly set the best research ideas free, while at the same time scaling up to new areas of science and potentially to new geographies.

This report shows the opportunities ahead but also describes the challenges associated with the vision to scale up Open Collaborative Research in Europe. The structure of the report is as follows: First, the reasons why Open Research has become more important will be described in general (chapter 2).

Vision: The future of Open Collaborative Research in Europe

- *The funding agency, the researchers and the wider world form a virtuous symbiotic relationship.*
- *The administrative processes capture the spirit of opportunity and keep new ideas flowing and capture the value from these ideas.*
- *Open Collaborative Research will be stronger and more significant than today.*
- *The European agency, institution or unit for funding Open Collaborative Research is well-known as a generator for ideas and innovations in Europe and even worldwide.*
- *The future funding of Open Collaborative Research not only covers ICT and neighbouring fields, but is open to all of science and technology.*
- *Open Collaborative Research has become a major pillar within the European research funding landscape and successfully complements the other pillars.*

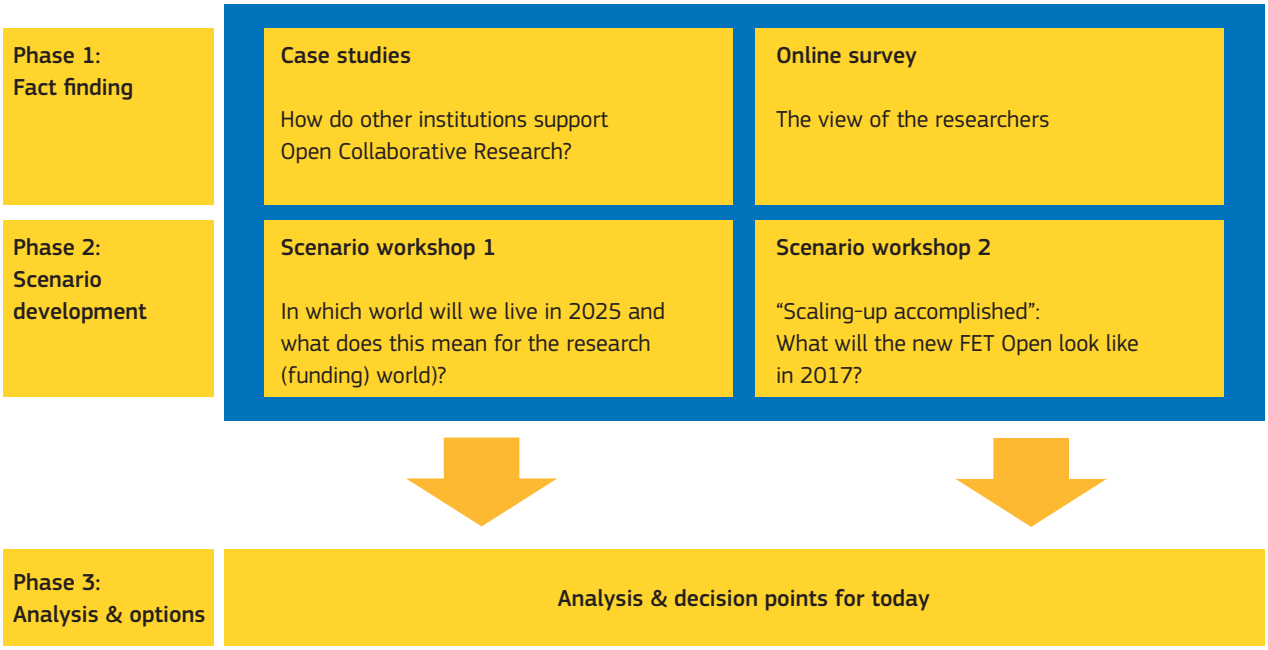
Second, two possible long-term perspectives of how to organise funding of Open Collaborative Research in Europe will be discussed (chapter 3). Third, a concrete scenario will show what could be achieved in the coming 5 years (chapter 4) and fourth, the challenges associated with the scaling up and institutionalising of Open Collaborative Research will be addressed (chapter 5). Finally, in chapter 6 the main policy issues of this process will be discussed.

This summary report is based on the study "Boosting the exploratory power of Open Research in Future and Emerging Technologies (FET)" which was commissioned by the FET-Open Unit of the DG Information Society and Media of the European Commission. The study was carried out between December 2010 and December 2011 by a research consortium consisting of the Fraunhofer Institute for Systems and Innovation Research ISI, Germany, the Austrian Institute of Technology (AIT), and TNO in The Netherlands.

The main goals of the study were to analyse approaches and experiences of other institutions funding Open Collaborative Research (case studies), to ask researchers about their view of Open Collaborative Research and what an ideal funding scheme would look like (online survey), to develop long-term and medium-term scenarios of a strengthened Open Collaborative Research scheme (scenario workshops 1 and 2) and to give input for the discussion of policy issues associated with the process of scaling up (see figure 1).

The documents are available online at:
- http://cordis.europa.eu/fp7/ict/fet-open/docs/final_study_report_boosting_fet_open.pdf or
- http://www.fetopen.isi-projects.de.

Figure 1:
Structure of the study



CHAPTER 2

The importance of Open Collaborative Research

The nature of research and technology development has changed considerably over the past decades. Among the strong trends in this development process are the growing importance of science for technology development and the importance of collaboration, both within and beyond organisational boundaries. This development was at least partly motivated by the need to accelerate the process of "putting scientific discovery to work", but also by the growing complexity of new technology which cannot be mastered by a single organisation or discipline alone.

Moreover, in order for new technologies to succeed on the market and possibly have a major impact on the economy and society, the most creative and sometimes even visionary solutions have revealed to reap the greatest benefits. To support and finance such a mode of research, however, requires entering risky and unknown territory; a territory that many, including investors and funders of research, are hesitant to adopt. At the same time, the pressure to demonstrate the benefits of public as well as private investment in fundamental research endeavours has been growing.

Yet, as many studies have shown, research which focuses on new ideas, which engages in collaborations and which relies on the creativity of the researchers, essentially contributes to the advancement of science and technology.[1] In some cases, this kind of research is even considered superior to agenda-driven research where researchers follow pre-given thematic or issue-related guidelines.[2]

It is against this background that Open Collaborative Research has grown in importance over the past years and that we currently see several initiatives extending the concept to new fields of research thereby complementing more conventional research funding schemes.

These activities reflect the changed requirements in the scientific development of new technologies. In industrial research for example, speed increasingly matters to generate significant returns on investment; sometimes even to an extent that conventional intellectual property rights are becoming less relevant. As a consequence, established forms of research planning and funding have been increasingly criticized for being too inflexible, too slow and too ineffective in stimulating creativity. Similar developments can be observed in the academic world.

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1 See for example: Simonton, Dean K. (2004): Creativity in Science. Cambridge, UK: Cambridge University Press; Hage, Jerald; Meeus, Marius; Edquist, Charles (eds.) (2006): Innovation, Science, and Institutional Change. Oxford: Oxford University Press; Häyrynen, Maunu (2007): Breakthrough Research. Funding for high-risk research at the Academy of Finland. Publications of the Academy of Finland 6/07. Helsinki: The Academy of Finland; Braben, Donald W. (2008): Scientific Freedom. The Elixir of Civilization. New York: Wiley Interscience and Prendergast, P.J.; Brown, S.H.; Britton, J.R. (2008): Research programmes that promote novel, ambitious, unconventional and high-risk research: An analysis. In: Industry & Higher Education, Vol 22, No 4, August, pp. 215-221.

2 See the analysis of Open Research programmes around the world in the fact-finding phase of the study (case studies.)

Societal and economic challenges as well as the internal dynamics of science require fast and collaborative approaches to research

Under such conditions, the ability to conduct solid collaborative, science-driven, technology- and purpose-oriented research becomes a key asset, as well as the willingness to accept risky projects and failures.

"Open Collaborative Research" can be characterised by the following features: It is foundational, fast and collaborative, interdisciplinary and technology driven (see figure 2).

In other words, Open Collaborative Research is the place where knowledge comes together to generate the most creative and sometimes surprising results with a high potential of influencing our lives through the creation of new technology. "Technology" can be understood in the context of Open Research very broadly, but it is nevertheless not surprising that fast-developing technology areas such as ICT, biotechnology, or nanotechnology are among the prime candidates for Open Collaborative Research. In many regards, these technology areas open up new avenues that require a great deal of imagination to anticipate potential applications, and often complementary social and organisational innovations to materialize.

Particularly important are the focus on new ideas and the bottom-up nature of defining research projects. We are confronted with the fast-moving pace of science and technology, which in many cases cannot be matched by traditional programme-oriented research funding. Within thematic programmes, the consultation process on new ideas can be subject to lobbies, scientific bias, vested interests, conservative thinking focusing on established players.

And even when great ideas come to the fore through consensus in these programmes, there is a serious time lag which can sometimes be more than one year from the end of the consultation process to the launch of the resulting work programme and the availability of funds for researchers. Within such environments, researchers who are not part of these consultation processes do not necessary share or understand the motivations behind particular choices, and are often forced to retrofit ideas to meet requirements of work programmes.

While dividing budgets thematically may ensure controllable programme management and a clear division of responsibilities within a funding environment or bureaucracy, it does not necessarily meet the needs of its 'clients', i.e. the researchers.

Figure 2: Definition of Open Collaborative Research

What is Open Collaborative Research?

- it focuses on **new ideas** which are **foundational** and which may have a **transformative** character,
- it is **risky** (possibility to fail),
- it is **bottom-up** (defined by researchers),
- it has a **fast and slim selection process**,
- it is **collaborative** (involves several researchers),
- it is **interdisciplinary**,
- it is **purpose-driven**, which means that it aims at **technology development**.

What it is not:

- it is not **mainstream research**,
- it is not about small **changes** of existing models or approaches,
- it does not follow a **policy agenda**, **a work programme** or **pre-defined research topics**,
- it does not rely on **track record** alone,
- it is not **discipline-oriented research**,
- it is not **pure basic science**.

The opportunity ahead

Today, the FET Open scheme (Future and Emerging Technologies) which focuses on information and communication technologies and neighbouring fields is the main programme for Open Collaborative Research in Europe, but it has remained comparatively modest in terms of size. However, the conviction is growing that Open Collaborative Research shall become a more important mode of research in the future and that Europe shall strengthen the role of Open Collaborative Research in the overall research landscape.

Currently, this kind of research falls into a gap between thematically prescriptive research funding (which is not open and fast enough), bottom-up purely curiosity-driven research funding (which is not purpose-oriented enough), and broadly based bottom-up innovation funding (which is not visionary enough).

This is a situation that calls for policy action if the benefits of Open Collaborative Research are to be reaped in Europe. In fact, the need for a change has already been recognised in the past years, with the establishment of the FET-Open programme in the first place, but also with the re-discovery of the virtues of conventional basic research funding, which lays the scientific foundation for Open Collaborative Research and ensures the training and availability of excellent scientists.

It seems it is now the time to embark on a new phase of consolidating Open Collaborative Research in Europe. Obviously, there are major challenges associated with such a vision. First of all, a long-term perspective is required to make it happen. New organisational and institutional configurations need to be built, and an open-minded, inter-disciplinary and purpose-oriented culture of research must grow. Secondly, building a comprehensive system of Open Collaborative Research will take time, but the necessary steps must be taken now, while keeping options for adjustment open.

The essential question is whether Open Collaborative Research will be integrated into current research modes and structures with their respective institutional settings, or whether new autonomous structures and institutions need to be built. It will be argued in the following that in the long run only the second option will lead to a situation where Open Collaborative Research will be given the significance it deserves.

FET Open today

The FET Open programme of the European Commission is positioned as 'the incubator for radically new research ideas and future research and innovation potential' (http://cordis.europa.eu/fp7/ict/fet-open/home_en.html).

FET Open aims to stimulate and capture new opportunities and developments in science and technology as they emerge. FET Open:

- ***Is open to any new ideas, it is bottom-up with no predefined themes,***
- ***Is open at any time: a continuously open call,***
- ***Is open to anyone: anonymous evaluation of first step proposals,***
- ***Has a light and fast selection process: a two-step process starting with a short proposal.***

CHAPTER 3

The long-term perspective

Vision

The future model for Open Collaborative Research in Europe should preserve the virtues and characteristics of today's FET Open in an enlarged environment.

As argued in the previous section we expect Open Collaborative Research to become a very significant mode of research in the future. This is crucial for ensuring Europe's competitive edge and its ability to tackle societal challenges. In order to make this work, it is necessary to shape the institutional settings for Open Research accordingly. 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 (see figure 3). These models function as long-term perspectives and can be used as an inspiration for thinking about Open Collaborative Research even after the Horizon 2020 programme.

When deciding which path to follow, the most important question is which of the models is better suited to preserve the spirit, virtues and characteristics of the current FET Open programme in an enlarged environment. This is not for the sake of preserving current structures of FET Open but to put the vision of Open Collaborative Research as described in the introduction into practice.

This vision includes that Open Collaborative Research will be stronger and more significant than today, that the European approach to support Open Collaborative Research is well-known as a generator for ideas and innovations and that the respective programme not only covers ICT and neighbouring fields, but that it is open to all of science.

Figure 3: Overview of two long-term perspectives

Embedding Open Collaborative Research into existing funding schemes

- *Practices of current FET-Open introduced into other programmes.*
- *A single entry point to Open Research across all specific programmes, but activities embedded in strategies and policies of different DGs.*
- *Clear assignment of projects to different programmes, while being open to border-crossing cases.*
- *Co-existence of Open Research funding with traditional thematic and mission-oriented funding.*

Building a strong institutional base for European Open Collaborative Research

- *High degree of autonomy for a dedicated Open Collaborative Research funding institution.*
- *Clear funding approach: open, collaborative, high-risk, visionary, purpose-oriented and science-driven.*
- *Complementing functionally the European Research Council (ERC) and the more applied, technology and mission-oriented programmes, thus mirroring the situation in the US.*

CHAPTER 3.1

Embedding Open Collaborative Research into existing funding schemes

The basic idea

The "embedded model" is based on the conviction that the characteristics of Open Collaborative Research should permeate all of science, and that open research should become a main force in the renewal of the entire science base in Europe, but that there is not a separate institution, agency or organisation responsible for this kind of research funding.

In this model there is generally a growing awareness of science and technology as a problem-solver for society and economy. Science does not exist for the purpose of science alone but is considered a vehicle to tackle major societal needs. At the same time, this perspective recognises that there is a need for a tighter interplay between fundamental scientific enquiry and application, in order to speed up the process of putting new knowledge to use. While remaining pre-competitive, Open Collaborative Research integrates and amalgamates fundamental and curiosity-driven research with a clear orientation towards purpose and technology. As a consequence, large parts of science and research need to incorporate the principles and the practices of Open Collaborative Research, in order to ensure better connections between the scientific foundations and the demand for meeting a societal or economic purpose.

Basic and disciplinary oriented modes of research still have important roles to play in this model. They complement Open Collaborative Research by helping to ensure that the knowledge frontier is pushed forward and sufficient variety is created. Open Collaborative Research in this model is the means to connect basic science to innovation.

European funding of Open Collaborative Research

In line with the above rationale, future EU research funding in all thematically oriented areas would embrace the philosophy of Open Collaborative Research. Open research in principle can develop into a main pillar in these areas. With its purpose orientation, it could serve both industrial and societal needs.

In order to facilitate access to research funding, some of the good practices of the current FET Open will be adopted in this new generation of European research funding. The central elements of this are: Providing a central, single point of entry for project proposals while ensuring a differentiated treatment of proposals by competent back-office staff; being always open with no fixed deadlines for proposals; using simple and standardised procedures and templates. While the interface to the outside world would be simplified and standardised to the largest extent possible, the research activities would still be embedded into the strategies and policies of different DGs. In this model, funding of non-European partners would also be possible when deemed of the interest to the EU.

Risks and opportunities

The embedded version of Open Collaborative Research can take the specific characteristics and needs of different research areas into account as it is directly connected to the different funding mechanisms that are discipline oriented or directly related to specific research fields. However, this could also turn into a disadvantage because there is the risk that traditional funding and research modes will dominate the new approach and thus weaken the open collaborative approach within the different research areas. The open collaborative mode would only exist as an attachment to the actual projects and programme-lines.

On the other hand, being embedded in other existing programmes and institutions also has advantages. One is that Open Collaborative Research is not restricted to a specific funding institution, but can develop as a significant element of how research funding is done in general. If the open collaborative approach is effectively followed, it would allow overcoming some of the frequently criticised deficits of (European) research funding in general, namely that it is too slow and too much oriented towards specific predefined topics. As a consequence a certain share of projects in all other programmes would be selected according to the bottom-up principle.

Organisation

This model raises a number of important organisational issues. First of all, the decentralised model of research funding, even under the roof of a common interface to the outside, requires a change in organisational cultures. The major challenge is to transfer the principles of open collaborative and risk-friendly research as it currently exists in the FET scheme to other research areas that are characterised by quite well defined thematic missions rather than by desire to turn outstanding new ideas into innovations.

Trust, flexibility and transparency are key features of Open Collaborative Research funding that allow risk-friendly research projects and use light and fast implementation procedures. On a larger scale, it is more difficult to implement features like these. Also, the trustful relationship between funding organisations and researchers which constitutes a community spirit, may be difficult to maintain in this distributed model.

CHAPTER 3.2

Building a strong institutional base for Open Collaborative Research

The basic idea

This long-term perspective for Open Collaborative Research in Europe builds on the conviction that Open Collaborative Research is a research mode in its own right which justifies setting up dedicated institutional frames next to the traditional basic and applied research funding institutions. Due to the specific nature of Open Collaborative Research, it seems more adequate to cultivate this specific spirit and funding style in a separate institution and thus facilitate the implementation of light, flexible, fast and at the same time highly demanding and selective evaluation processes.

Open Collaborative Research in this model would emphasise its role as an interface between basic research and applied research by highlighting its purpose-driven character. Purpose-driven research does not mean that researchers have to follow a politically pre-defined agenda or purpose. It means that applicants need to demonstrate in a bottom-up fashion what they expect the purpose and application potential of their proposal to be, e.g. how it might be turned into innovation and technology.

This requires a high degree of flexibility and a specific understanding of the researchers' needs on the side of the funding institution. In general, projects of different scales are required, ranging from exploratory small projects to large-scale pilots and demonstrators, as are different combinations of participants (universities, research organisations, industry, stakeholders, and civil society) and the participation of international partners from outside of Europe.

In this model, "Open Collaborative" becomes a core branding of European research funding including a high visibility, both in Europe and internationally.

European funding of Open Collaborative Research

Due to the significance that will be assigned to Open Collaborative Research as a separate and dedicated mode of doing research, the successful FET-Open programme is consolidated in the form of a dedicated funding organisation, endowed with a high degree of autonomy from the political institutions. Similar to the ERC, such a new agency or council has the mission to turn Open Collaborative Research into a significant feature of the research landscape in Europe and establish it as a major pillar of research funding. Such a new institution may also become the European equivalent to the US DARPA, as the ERC is the European equivalent to US NSF. Obviously, there would be no military implications in such a new European institution, but some of the good practices of DARPA could also be implemented here. This could encompass its role in the research and innovation system, its institutionalisation, and its rules and procedures for example regarding IPR and the role of pre-commercial procurement.

The main focus of such a new institution would be visionary science and purpose-driven science. It would deal with transformational knowledge, whether in science or technology, and would focus on applications for the future. Moreover, collaboration would be at the centre of such an institution which would imply addressing universities and research organisations as well as highly innovative firms and SMEs.

The basic idea

Fostering an open and collaborative model of research is better served by a centralised institutionalised approach than by a embedding it in thematic programmes.

Risks and opportunities

Setting up a dedicated agency for Open Collaborative Research funding would be a strong political commitment, and a clear signal to the research community. As such, it would become a focal point and reference for researchers all over Europe, and possibly beyond; certainly more so than in the case of the embedded model described above. An agency can also strengthen the identity of the Open Research community; "open collaborative" could become a very strong brand.

Due to the autonomy of an independent agency, it is easier to keep rules and procedures light and fast, in particular in view of the likely expansion and differentiation of funding activities. With a single organisation, applicants have a clear entry point and can be reassured that the processing of their applications will be managed consistently. The scaling up as compared to the FET-Programme in Horizon 2020 can also be done better in a single organisation than on the basis of a distributed model.

A major risk associated with the separate institution model is the lack of attention to what lies outside the organisational boundaries, i.e. the interfaces with other funding bodies such as ERC, but also national bodies.

Organisation

In principle, different models for institutionalising Open Collaborative Research in a dedicated organisation at the European level are possible. An independent council is equally possible as a formally dependent agency.

The expected large volume of Open Collaborative Research funding would require a more differentiated internal organisation of such an organisation, possibly based on different panels. These panels should not be organised in disciplines or narrowly defined topics. Instead there should be open boundaries that allow the transfer of ideas and proposals.

CHAPTER 4

Scenario 2017: The new FET Open has become a reality

The current FET Open programme can be enlarged and enhanced as an in-between solution to a separate institution for the funding of Open Collaborative Research in the future.

After analysing the longer-term perspectives of funding Open Collaborative Research in Europe, this chapter describes a concrete scenario in which the extension and enlargement of the existing FET Open 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 today.

What are the key characteristics of the NEXST Open scheme?

NEXST, the extended FET open in 2017

By now, in the year 2017, NEXST (New Emerging and eXplorative Sciences and Technologies) is widely recognized as the European funding scheme that best supports Open Collaborative Research. The now famous NEXST spirit focuses on visionary novel and foundational but also purpose-driven science which contributes to solving Europe´s technological challenges.

The NEXST scheme supports researchers in creating breakthrough discoveries by funding research that challenges current thinking, pursues fresh ideas, allowing flexibility and risk taking. The NEXT scheme puts ideas and scientific excellence at the centre.

Horizon 2020 has significantly extended Open Collaborative Research. The concept of Open Collaborative Research has been extended from ICT to all sciences related to emerging technologies. Its scope has expanded from an exclusively Europe-based programme to a scheme that enables global cooperation.

Impact on future technology

The impact on future technology is a central feature of the NEXST scheme which fosters radically new, high-risk ideas to accelerate the development of the most promising emerging areas of science and technology in the next decades.

Openness

NEXST is now open to a variety of technologies and research fields such as ICT, nano, neuro, biotechnology, energy technologies, and medical technology. NEXST projects are open to all disciplines but they are problem-driven and ultimately connected to a potential future technology.

In principle, NEXST is accessible to all disciplines developing technology. In practice, NEXST is particularly compatible with fast developing and new fields and attracts research located at the boundaries and intersections of established disciplines and research fields. Multidisciplinarity and openness for methods and approaches from other disciplines are important characteristics of NEXST projects.

Long term impact	NEXST attracts projects characterized by their promise of long-term impact on knowledge and life. The funding scheme blurs the boundaries between science and technology, helping transform knowledge.
NEXST Networking brings "European thinking" into science	Cooperation and networking are unique features of NEXST. Complementary to other funding organisations, such as the ERC, that mainly care for the principal investigator and his or her teams, NEXST focuses on ideas and projects that need to be conducted in a collaborative way. It turned out that very many new and promising ideas emerged from the manifold collaborations initiated by the programme. This also reflects the approach of 'ideas come first'.
Building bridges	NEXST builds bridges between research fields, connecting science to innovation and uniting curiosity and purpose-driven research. A recent survey of researchers who have applied for NEXST projects shows that these bridges are central to attracting bright ideas from a variety of fields.
Contributions of NEXST	From the start of the Horizon 2020 Framework programme, NEXST developed specific strengths that contribute to other parts of the Horizon 2020 programme.
Informing enabling technologies	Over time, the open and transparent review and management process of the NEXST scheme was recognized as an 'early warning system'. In monitoring and analysing a wide range of project proposals NEXST has taken on an important observatory role, positioning itself to inform different actors about emerging new fields beyond current research and to make trends in science, technology and innovation more visible. NEXST therefore supports the emergence of new scientific domains which open the door to future technologies and solutions to societal challenges.
Supporting breakthrough research & enabling research in other areas of Horizon 2020	As the aim of NEXST is not only to support innovative and unconventional ideas but also to define them, the NEXST projects and proposals database is used to enable cooperation in support of the action lines "Leadership in enabling and industrial technologies" and "Tackling societal challenges".
Supporting solutions to societal challenges from SSH	Many NEXST projects aim at future technologies to deal with societal challenges and to find solutions that will greatly impact on European society long term. Consequently, a growing number of NEXST projects also involve researchers from the Social Sciences and Humanities (SSH). These NEXST projects are forms of collaboration that enable researchers to traverse intellectual and disciplinary boundaries and to contribute to a reflexive co-evolution and co-construction of future technologies and future society.

European NEXST with a global scope

The NEXST scope has expanded from an exclusively Europe-based programme to a scheme that enables global cooperation. Based on the experience of other funding programmes (such as the Marie Curie international fellowships or D-A-CH) the NEXST steering body developed an on-going process to enable international cooperation. Different mechanisms allow NEXST projects to integrate researchers from outside the EU who want to move to Europe to take part in the collaborative projects and allow NEXST researchers from the EU to participate in collaborative teams with researchers from outside the EU. Ad-hoc synchronisation with international programmes has now become possible.

Implementation

When NEXTST was set up together with the Horizon 2020 programme at the beginning of 2012, a series of implementation principles were followed. These are still valid today and consist of:

- Transparency and trust based rules,
- The programme is tailored to meet the needs of researchers to make breakthrough discoveries in their projects,
- The review and selection process is short and transparent, ultra light and fast with light financial rules.
- NEXST ensures flexibility with regard to the research direction, the adding of people to the project, and the flexibility in timing.

In order to monitor innovation in evaluation processes and learn from international experience, the steering body of NEXST established an international advisory board with members of funding organisations that focus on Open Collaborative Research.

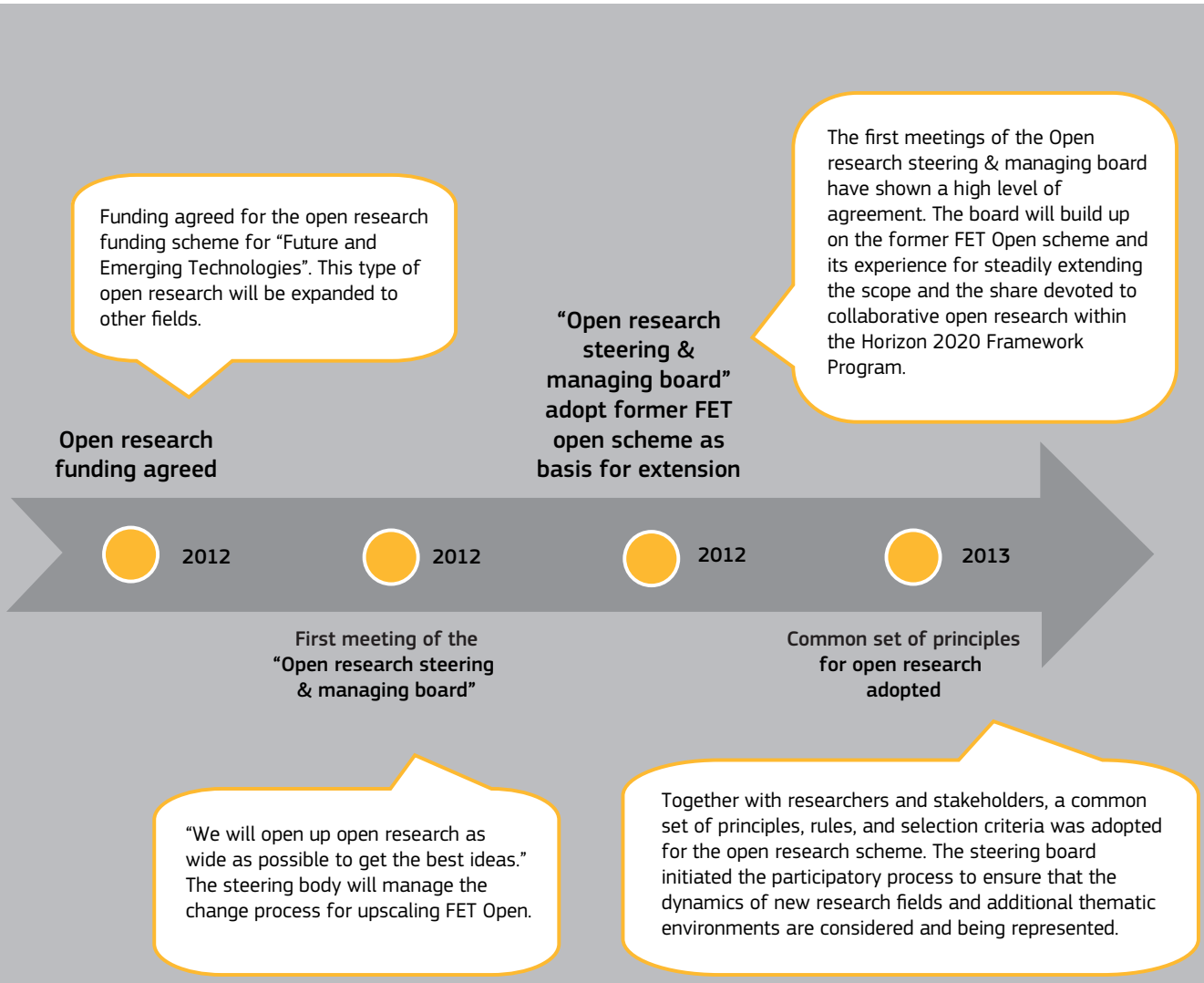
The year 2017: Planning for the next framework programme begins

Now, in the year 2017, the first debates and forward-looking activities for the next framework programme have started. The new framework programme will cover the years 2020 to 2027.

When designing new activities, experiences from past years will be considered: The 2013 NEXST slogan “NEXST is creating the science and technology base for tomorrow” raised many expectations. Today, even the most critical voices from the beginning years agree that it was worth taking the risk. Despite some initial criticism, the Horizon 2020 Programme dedicated significant funding to the Open Collaborative Research scheme NEXST, comparable to the other elements of the science pillar.

Many new ideas first funded in NEXST projects will now probably become top-down funding initiatives in the next framework programme. In a recent interview with the Science Channel, one of the first members of the NEXST steering body established in 2013 admitted:
"Initially I was sceptical, but I have come to believe that it makes sense to fund more bottom-up, high-risk open research. Some of the most 'crazy' NEXST projects of the Horizon 2020 programme are now technology! I was among those advising caution, favouring the traditional structures and the selection criteria of disciplinary oriented boards. Today, there is no doubt that it was beneficial to make bold and seemingly risky decisions. The NEXST Programme became the place where the consortia with the brightest and most visionary ideas apply for funding for their projects, a place where bottom-up technology ideas are kindled."

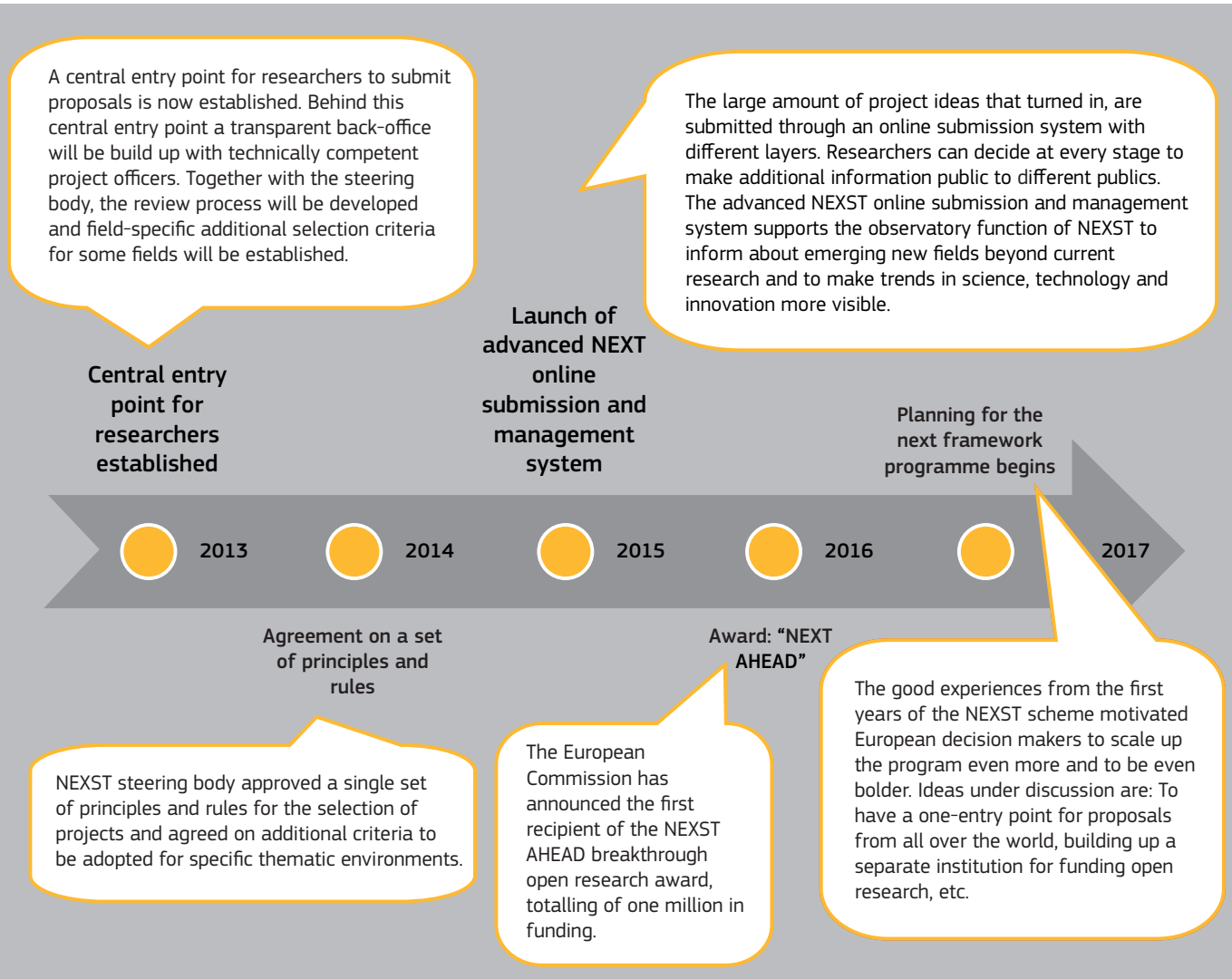
Another member of the first steering body added:
"Opening up as wide as possible to get the best ideas was considered a risky strategy in the first years of the Horizon 2020 Programme. However, we felt obliged to take the risk because we wanted researchers to take risks! At the time, reviewers mainly rewarded the track record of past research, instead of visionary ideas. Pursuing your visionary ideas was risky because a failure of a three years project would reduce your chances of receiving further funding. NEXST's bold strategy helped establish a much more risk-awarding culture in Europe, paving the way for ground-breaking results.»



A recent evaluation study of the NEXST programme showed that researchers value the programme's key characteristics: funding emerging science and technology, being radically open, being inclusive with regard to people's movement, providing trust and transparency.

Although NEXST covers a broad spectrum of concepts and topics a common NEXST attitude has developed in the participating research community. This becomes especially clear in the words of the "NEXST AHEAD" prize winner who ended her acceptance speech with the words: „We are creating the science and technology Europe needs to address the grand challenges of society.»

The following figure shows an overview of the options and decision points of the described scenario and shows which steps are necessary at what time to arrive in a world as described above.



CHAPTER 5

Extending the "open and collaborative" concept: Decision points for scaling-up

The situation described in the 2017-scenario is the result of a future development in which certain decisions have to be made and in which specific aspects have to be considered. This chapter deals in particular with the challenges of scaling up the present FET Open programme. It lists the different arguments and shows the decision points on the road to a strengthened and more comprehensive Open Collaborative Research programme in Europe.

CHAPTER 5.1

From small to big

A major challenge in scaling up FET Open is keeping the «spirit» of FET Open and translating it into an enlarged field with more people, more disciplines and more administrative entities involved. This requires a careful implementation process. We present our view on three core issues guiding this implementation process: The area of principles and the general perspective of the programme which puts the perspective of the researchers at the centre; the organisation of the selection and review process and the rules for spending the research money and the reporting requirements of researchers (see figure 4 for an overview).

Keep the FET Open culture alive means: Ensure vividness, transparency, creativity, trust and flexibility.

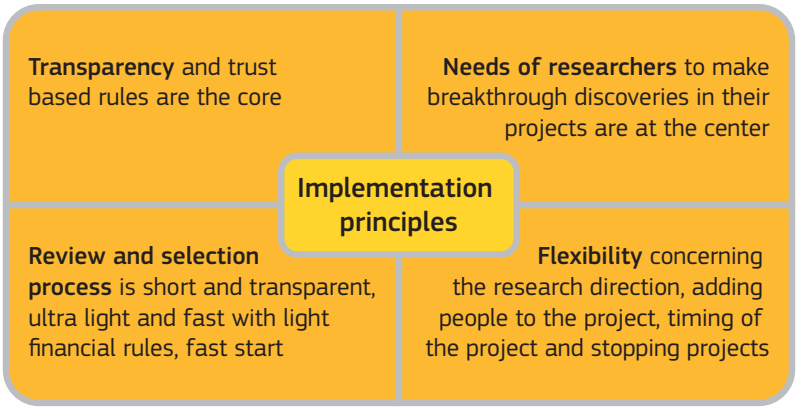


Figure 4: Overview of the implementation principles to be followed by the new FET Open programme

Which principles and guidelines are crucial to the expanded FET Open programme?

The crucial guidelines for the implementation process are "transparency" and "trust based rules". In general, attention has to be paid to the needs of the researchers who are expected to make the breakthrough discoveries in their projects. Whereas it is one thing to put these principles into practice in a relatively small unit like the current FET Open unit it is quite another thing to apply them in an enlarged surrounding. Thus, the major challenge for the new FET Open is to keep up and substantiate these principles in the different fields.

Also, the special mode of Open Collaborative Research has to be explained to the research community. It has to be emphasised that there is specific focus as opposed to mainstream funding.

The goal of Open Collaborative Research to support imaginative and radical new ideas of scientific investigation and technological development has to be communicated accordingly. This is important to avoid that «normal» research proposals are submitted or that the programme is considered as a residual funding category where researchers without a clear profile could find funding opportunities.

How to organise the selection and review process?

A unique feature of the expanded FET Open scheme is its selection process: Research proposals will be selected in a short, transparent, ultra-light and ultra-fast process. This feature is reflected in several practical issues, such as length of proposal required, level of detail requested, number of different partners involved. All these elements are organised as to evoke creative and out-of-the-box proposals and little bureaucracy.

Concerning the review process and the selection criteria the most important challenge is to ensure that only those researchers who apply who clearly pursue truly novel ideas and who aim at exploring the unknown and at the same time have future technologies in mind. Relying on track record only might encourage the wrong researchers for these purposes.

Restructuring the peer-review principle helps to prevent the selection of rather conservative approaches and projects. Project officers shall be given more freedom to decide on project proposals. Also, an advisory board needs to be set up which actively collects inventive ideas from the scientific community and invites other scientists to apply for funding.

Rules for spending the research money and reporting requirements of researchers

In addition, financial rules and reporting duties are major challenges when it comes to scaling up the programme. Financial flexibility, unforeseen changes in the research direction, and flexibility in human resources and partners in a project is easy in a programme that is small and thematically focused. Growing in size and opening up to new thematic fields makes it more difficult to grant these levels of flexibility because of increasing formal requirements. Nonetheless, these features are an inherent and genuine part of FET Open and are to be maintained with the new programme.

In the current as well as in the new FET Open programme, quality control is an important issue. Here, it is important to acknowledge that researchers have a right to fail and not to achieve the results expected at the beginning of the project. Otherwise, the programme will not be able to attract high risk but potentially ground-breaking project proposals. However, this also demands transparency on the side of the researchers. In some cases this comes close to a cultural change for the researchers because failing to achieve expected results is often stigmatised and the results are often swept under the carpet.

Principles and guidelines

In order to avoid that researchers use the programme as a residual category the nature of the programme and the differences to other programmes need to be communicated to a wider scientific community.

How to organise

Give project officers more freedom to decide and set up an advisory board to actively collect bright ideas from the scientific community.

Rules

Allow for flexibility in spending, research direction, partnerships and project team.

CHAPTER 5.2

From ICT to all science and technology

Research fields

Interesting developments are taking place at the overlap of research fields.

How to define novelty

Project officers shall not be mere administrators but need to be familiar with the state of the latest developments in the respective research field.

Opening up the thematic scope of FET Open is a major challenge. Currently, FET Open mainly supports Open Collaborative Research projects in the field of information and communication technologies (ICT) and neighbouring fields. The ICT focus is a historical one. We do not know of any inherent or systematic reasons to maintain this restriction. On the contrary, a majority of scientific disciplines and research areas can profit from an Open Collaborative Research approach. In fact, in the 6th Framework Programme, NEST[3] provided a European funding framework with similar objectives, covering all areas of science and technology.

We tackle three issues in broadening the scope of FET Open to "all of science":

- the inclusion of scientific fields in the FET Open scheme;
- the definition of novelty across the different research fields;
- the provision of entry points: either a single entry-point for all disciplines or several specific entry points with internal coordination.

What disciplines or research fields are wanted?

Since FET Open is about engaging science with societal challenges and developing the future industrial base of Europe, some research areas in the broad spectrum of science are better suited and needed for the new FET Open programme more than others. Although in principle, the new FET Open shall be open to "all of science", it shall open in particular to the fast developing technologies and research fields such as ICT, nano, neuro, biotechnology, energy technologies, or medical technology. In addition, the new FET Open shall focus particularly on the new fields which develop on the boundaries and intersections of established disciplines and research fields.

Science studies have shown that especially on the boundaries and overlaps of current, established disciplines and research fields the most interesting developments take place with both scientific and technological appeal.

Also, the new FET Open projects shall not be restricted for example to the field of application-oriented research, but focus on projects which are characterized by a tight interplay between fundamental scientific enquiry and technological application.

How to define novelty in a heterogeneous scientific environment?

Opening FET Open to "all of science" (with the recommendations made above) also means that different notions of what is "really new" have to be dealt with. Researchers from different disciplines or research fields have different definitions of what is novel, unconventional, high-risk or transformational research. A convincing generalisation is obviously not possible. Ultimately, the evaluators of the proposals or the evaluation panels have to decide this. However, project officers from the programme are the first entry points for proposals and a first assessment is made there.

This implies that programme administrators of the new FET Open need to be well familiar with the research field and are aware of the latest developments in the respective field in order to assess the received proposals appropriately, to identify suitable evaluators and even to actively seek out the new ideas in a proposal.

3 New and Emerging Science and Technology (NEST) was part of FP6 and aimed to support unconventional and visionary research with the potential to open new fields for European science and technology, as well as research into potential problems uncovered by science. There were no restrictions on the scientific fields to be addressed except that the research carried out under NEST should cut across or lie outside the thematic priority areas of FP6.

A centralised or decentralised organisational approach?

In chapter 3 we presented two long-term perspectives for the new FET Open which differ in the way the administrative process is organised. Model one is the embedded model with several small FET schemes and model two describes a separate institution, agency or organisation for Open collaborative Research in Europe.

The distributed model needs to be attached to existing administrative entities. It leads to a FET Open scheme for ICT, a FET Open scheme for Biotechnology, a FET Open scheme for Environmental technologies, etc. In this model, the specificities of the different fields of research are addressed more easily when programme officials are very familiar with the special characteristics. However, we doubt that the organisation of a common FET "spirit" or common identity of the different small FETs will succeed.

The visibility of small FETs is likely to be limited leading to less awareness in the scientific community and fewer contributions to societal challenges and the industry base. The existing FET Open Energy programme, which seems not to be very well known in the scientific community, is instructive here.

The centralised model, in contrast, implies a central entry-point for all researchers from "all of science". The advantages of this model are straightforward. Such a model gains a higher visibility in the scientific community as it is recognised as a unique scheme for new, unconventional, multidisciplinary, purpose-oriented science and technology. Also, in such a model it is easier to see and develop links between different disciplines.

As a disadvantage, it means a considerable build-up of new administrative capabilities to cover all the different fields of research. Still, it may be less costly than replicating FET Open-type of procedures in a range of different fields.

A third model in between these two is based on a "virtually" distributed approach. In this model, which is also assumed in the 2017 scenario, we anticipate a central entry point for applicants combined with decentralised processing of applications in a range of programmes. Such a model presents a starting point for the FET up-scaling process. However, this virtually distributed approach is not sustainable in the long term and needs replacement by the centralised or distributed model as described above.

A centralised or decentralised approach?

Many small embedded FET schemes may not be as visible and thus may not attract the most creative researchers.

In a centralised model, all Open Collaborative Research projects can be pooled which provides for manifold synergies. Also, the centralised model will attract more attention in the scientific community and beyond.

CHAPTER 5.3

From Europe to the world

FET Open can be open to the world, but proposals have to make clear why they are relevant for Europe.

Research is a global activity. Competition for the brightest minds is a multi-dimensional "game": From the perspective of the funding agencies it is the game of receiving the best results for the money spent, for researchers it is the game of receiving the best facilities at as low an additional burden (administration, management) as possible. FET Open demonstrates this game *in optima forma*.

Most research funding agencies offer strict guidelines as to whom can profit from the budgets made available. European-based scientists, co-operating with scientists abroad, compete for available resources. Results from the Open Collaborative Research efforts eventually become available to European firms and entrepreneurs and contribute to solving societal challenges within Europe. By focusing on excellent research and researchers in Europe FET Open tries to create an interesting level playing field for the best researchers in Europe.

How to keep up the quality level

Quality control is important but researchers have the right to fail. Transparency on the researchers' side is also expected.

We voice the following issues that need to be tackled in order to make the global character of the expanded FET Open a political reality:

- keeping control over intellectual property rights,
- the construction of a coherent globally rooted scientific research programme,
- the organisation of quality control.

How to keep control over intellectual property rights?

An expanded and globalised FET Open scheme needs to keep control over intellectual property rights. Global collaboration of scientists still amount to scientific results which become available for European society and European entrepreneurs. Property rights are protected through a variety of measures, such as Non-Disclosure Agreements and patents – that protect vested interests of contributing and participating European industries. Opening up to the world implies that the brightest minds are invited globally to develop solutions and approaches to societal problems Europe and other parts of the world face. Commercial interests of firms, participating in this Open and Collaborative Research, are safeguarded in order to achieve the highest level of cooperation.

How to construct a coherent globally operated programme on open and collaborative research?

A globally organised and fully bottom-up process without any constraints at all leads to a fragmented and incoherent research programme. The expanded FET Open programme organises its focus through its project officers, through its collaboration and interaction with other European programmes and activities and through monitoring external developments. Its profile attracts outstanding researchers all over the world who are receptive to the notion of Open Collaborative Research. These researchers recognise the foci of the expanded FET Open programme and consider themselves to be able to contribute to these. We perceive a continuous process of innovation and adaptation in the FET Open community and the FET Open administrators due to a continuous influx of novel and interesting ideas.

How to keep up the quality level of open and collaborative research?

Having the right to fail is a crucial determinant of the new FET Open programme. Performing high-risk, transformative research sometimes leads to insurmountable problems and misjudgements that require the adjustment of initial objectives and approaches. Award criteria within the FET Open approach enable researchers to make multiple attempts at realising innovative ideas. The evaluation process within FET Open prevents failure to backfire on scientific reputations. Through the monitoring process of on-going research projects, and of the scientific and societal world in which they operate, and through the requested transparency on the side of the scientific consortia regarding achievements, failures, changes in research and researchers, the expanded FET Open connects quality control to flexibility and minimum bureaucracy in project management.

Globally operating consortia request even more intense monitoring procedures in order to eliminate research groups that cannot comply with the criteria of performing high-risk, transformative, foundational and purpose-driven research.

Modalities for going global

In opening up to the world one can differentiate between several modalities. One dimension is the level on which it is acceptable to have non-European based scientists to participate in research funded by the new FET Open. We sketch three approaches that successively include more globalisation:

Europe, unless ...

The main contractor should be European based; if research groups from outside Europe become involved this should be because similar expertise is not available within Europe. Only when it is absolutely necessary to broaden the scope to researchers and research groups that are not based in Europe this is acceptable. The accompanying principle is the need to prove the necessity to open up to outside Europe.

Europe as the nucleus, global as the shell

Any consortium with a mix of both European and non-European-based research groups is eligible to submit proposals for funding. No clear limitation on distribution of resources exists. This is the approach to getting the best research in house with a European flavour. The accompanying principle is "Let's have the best consortia with a European nucleus".

Research without frontiers

The third scenario foresees that any consortium is eligible to apply for research funding. No limitation on the composition of the research consortium exists. The accompanying principle here is "We only go for the best in research".

Figure 5:
Three approaches to going global

CHAPTER 5.4

From a funding niche to centre stage

The contribution

Technology orientation is at the heart of the future FET Open. As such it will complement basic research supported by ERC.

How to establish

The observatory and path finding functions of the future FET Open is important for the linking to other, more thematic programmes.

How to connect

Open collaborative research will by its very nature be interlinked with societal challenges and key enabling technologies.

The current discussion about the future of FET Open is characterised by its positioning within the existing funding landscape in Europe and its specific contribution to the other pillars of the Horizon 2020 programme. We highlight three aspects:

- the contribution of the new FET Open to an excellent science base,
- the contribution of the new FET Open to industrial leadership,
- the input of the new FET Open to tackle societal challenges.

The contribution of the new FET Open to an excellent science base

The largest proportion of the "Horizons 2020" Framework Programme is allocated to programmes which fund research in thematic areas related to technologies, sectors and challenges, mostly on a "top-down" basis. This is complemented by specific funding which funds researchers to carry out breakthrough, genuinely cutting-edge frontier research on a "bottom-up" basis. Whereas the European Research Council focuses on investigator-driven research, the expanded and revised FET Open will focus on novel ideas and collaborative projects just as the current FET Open already does. The specific contribution of FET Open is its orientation on disruptive technologies and its integration of technology into basic research.

The boundaries between science and technology and between specific subject areas are becoming increasingly blurred. FET Open allows scientist to dedicate their research to scientific excellence and technology breakthroughs. They do not have to choose between science and technology. The new FET Open contributes to the scientific ecosystem by ensuring a diversity of new ideas and approaches towards key enabling technologies.

How to establish the nexus between science and technology through FET Open?

An expanded FET Open will contribute to a smart, sustainable and inclusive economy by linking science to (future) innovation. The new programme will strive to achieve a leadership position in enabling technologies by fostering novel and visionary ideas. These ideas open new paths for the development and use of emerging technologies such as ICT, Nanotechnology, Biotechnology or advanced manufacturing and processing.

The new FET Open also informs actors in the field about novel approaches that advance enabling technologies. Beyond its contribution to the science base of today's emerging technologies, FET Open has an important observatory function beyond the emerging technologies already known.

Through the large and rising amount of projects submitted, FET Open provides information about new trends in future fields. However, the challenge is to ensure that novel ideas are monitored, assessed and documented in a way that can be used as an input to the other pillars. By exploring unknown territory, it can contribute to testing promising directions of scientific enquiry, and thus to identifying areas that might be worth expanding within other research and research funding frameworks (e.g. in specific thematic programmes, or for larger-scale research initiatives). For the future of the FET programme, this may be an important new task.

How to connect FET open with societal challenges?

The novel ideas supported by the new FET Open help to provide answers and the technologies needed to solve grand societal challenges such as energy, climate change and universal healthcare. The new FET Open will build bridges across borders and disciplines and will create a space for transformative research. The FET Open project teams will drive excellence within European and globally organised research and innovation communities and present outstanding perspectives of future science for the wider society.

The FET Open promise of long term impact on knowledge is realized by connecting the programme with the part of the Horizon 2020 programme that is dedicated to tackling societal challenges. Monitoring the FET Open proposals and identifying potentially relevant technologies for societal challenges as early as possible requires the establishment of close interconnections between the FET Open programme and the programmes tackling societal challenges.

CHAPTER 6

Main policy issues

An expanded FET Open programme that supports Open Collaborative Research in Europe and possibly beyond is feasible and desirable from a societal and industrial perspective. The previous sections have highlighted the various dimensions of such an Open Collaborative Research programme. We labelled this research programme tentatively NEXST, for New Emerging and eXplorative Sciences and Technologies. In order to realise this programme, we propose policy interventions addressing 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

NEXST has to find its place in the new funding landscape of the Horizon 2020 programme. This means it has to highlight its specific contributions to the European research scene as compared to other pillars and to other existing research funding organisations. We have described in detail what these contributions are.

Especially, in order to enhance the real-world relevance of Open Collaborative Research, we recommend establishing close interconnections between NEXST and the European programmes tackling societal challenges. One central challenge NEXST is to preserve and develop further the currently successful FET Open principles and mechanisms: Organising a fast and light application process, allowing financial flexibility, permitting changes in the research direction, and tolerating flexibility in human resources is easier when the programme is small and thematically focused. With the programme growing in size and opening to new thematic fields, maintaining these characteristics becomes more difficult. Since these features are an inherent and genuine part of the existing FET Open programme they shall be maintained with the new programme. When designing and implementing new mechanisms (for the selection, administration and controlling of research projects), we consider it crucial to keep the “spirit” of the existing FET Open programme.

We experience the need to infuse the existing spirit into NEXST also into the organisation of the selection process of research projects. Proper design and implementation of the review process and careful compilation of selection criteria ensure that those researchers who apply pursue truly novel ideas and aim to explore the unknown and at the same time have future technologies in mind. Relying on track records only might not always encourage the researchers in these paths.

The peer review principle sometimes supports rather conservative approaches and projects. In order to avoid this one is to give project officers more freedom to decide on project proposals. Another option is to set up an advisory board which actively collects bright ideas from the scientific community and to invite other scientists to apply for funding.

Another basic decision for policy makers concerns the future scope of NEXST: Which disciplines and fields of research will it cover apart from ICT and its neighbouring fields? We have given some indication of possible candidates and of what makes Open Collaborative Research attractive. This entails to take into consideration the developments taking place at the junctions and intersections between existing fields but without overruling the bottom-up principle.

Another potential policy relates to the observatory function of NEXST: If NEXST shall not only support and finance new and potentially transformative ideas and technology developments but also be an observatory for new ideas, the respective administrative resources have to be planned for in order to fulfil this function. By analysing the project ideas submitted, NEXST will be able to provide information about new trends in future technology fields. This requires that new ideas are adequately monitored, assessed and documented in a way that is usable as input into the other pillars.

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 have proposed two basic models for this 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.

This is not a decision which needs to be taken at the start of the new programme. We suggest examining in the course of the Horizon 2020 programme which of the two models shall be pursued in the future.

For the time until 2017 we have assumed a "virtually" decentralised model. In this model, a central entry point for applicants exists but internally a decentralised processing of applications in a range of programmes takes place. Although this seems to be an adequate approach to start NEXST, in the longer term it is necessary to make a decision in favour of a centralised or a distributed model.

Another basic decision concerns the question whether NEXST will in fact be open to the whole world and not be restricted to research projects in Europe. Open and Collaborative Research clearly benefits from a potential worldwide participation. Science is increasingly a global undertaking. We have sketched the policy options available while the bottom line is that maximum benefits will come from a worldwide approach.

Communicating the new FET Open to the scientific community

Positioning NEXST adequately in the global scientific community requires a dedicated communication strategy. The existing system of assessing project proposals and composing evaluation panels is quite well suited to NEXST. In extending the scope and focus of Open Collaborative Research in the new programme, policy makers and the administration have to carefully communicate the specific criteria for open research (novel, foundational, potentially transformative, collaborative, etc. research) to the scientific community. The specific focus of NEXST as opposed to mainstream funding needs to be explained and illustrated accordingly.

Finally, this programme addresses a particular kind researcher. Open Collaborative Research for the best of (European) science, for the best of (European) society and (European) industry needs to succeed in attracting the brightest and most creative researchers by offering them the best framework conditions for their research efforts.

ANNEX

List of Consultees

Simon Bensasson	Former Head of Unit FET
Alain Berthoz	College de France
Michel Bidoit	CNRS
Vittoria Colizza	NSERM
Matthias Haury	Head of Science Operations COST
Petros Drineas	NSF
Lynda Hardman	Centre for Mathematics and Informatics (CWI)
Florian Daniel	University of Trento, DISI
Maarja Kruusmaa	ISTAG
Jerzy Langer	Academia Europea
Laura Pontiggia	ERCEA
Yvette Tuin	NOW
Kornelia Konrad	University Twente
Gerben Wedekind	Turkish Research Orgainsations
Fabien Petitcolas	Microsoft
Peter Walters	UK National Contact Point
Laura Pontiggia	ERCEA
Vladimir Buzek	Research Center for Quantum Information
Stephan Kuster	Swiss State Secretary for Education and Research
Mario Rasetti	Politectnico di Torino, ISI Foundation
Elisabeth Giacobino	Laboratoire Kastler Brossel
Yves Samson	CEA
Thibaut Lery	ESF
Tommaso Calarco	University of Ulm
Monica Dietl	COST
Christoph Bärenreuter	FWF
Gai Oren	Committee on Industry, Research and Energy
Carlos Saraiva Martins	European Commission

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