European Commission

HORIZON 2020

WORK PROGRAMME 2014 - 2015[1]

Future and Emerging Technologies (FET)

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You can find all related documents at the Participant Portal:
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/index.html
The full Horizon 2020 FET Work Programme 2014-15 is available at:
http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-fet_en.pdf

[1] Important Notice on the First Horizon 2020 Work Programme: this Work Programme covers 2014 and 2015. Due to the launching phase of Horizon 2020, parts of the Work Programme that relate to 2015 (topics, dates, budget) are provided at this stage on an indicative basis only. Such Work Programme parts will be decided during 2014.

Digital Agenda for Europe

Introduction

The mission of Future and Emerging Technologies (FET) is to turn Europe's excellent science base into a competitive advantage by uncovering radically new technological possibilities. It will help Europe to grasp leadership early on in new and emerging technology areas that promise to renew the basis for European competitiveness and growth and that will make a difference for society in the decades to come.

In order to succeed in this mission FET focusses on research beyond what is known, accepted or widely adopted and supports novel and visionary thinking to open promising paths towards powerful new technologies. In particular, it funds interdisciplinary collaborations that seek genuine cross-fertilisation and deep synergies between the broadest range of advanced sciences (physical sciences, information sciences, life sciences, environmental sciences, social sciences, humanities,...) and cutting-edge engineering disciplines (chemical, physical, biological, computational, geospatial, ...) in order to turn new knowledge and high-risk ideas into a viable basis for radically new technologies. Thus, research in FET is complementary to incremental research as well as to the European Research Council, which itself is aiming at excellent individual researchers while FET supports collaborative research projects to open up new and promising fields of research, technology and innovation.

The combination of a game-changing long-term vision and technological concreteness positions FET research between blue-sky science on the one hand, and research driven by societal challenges or by industrial competitiveness on the other. It will bring closer science, engineering and society and accelerate the transition from upstream research to technology development and transformational impact. FET actions will help to create in Europe a fertile ground for responsible and dynamic multi-disciplinary collaborations on future and emerging technologies and for kick-starting new European research and innovation eco-systems around them. These will be the seeds for future industrial leadership and for tackling society's grand challenges in new ways.

FET has three main lines of activity that contribute, each in their own way, to achieving its mission.

FET Open

FET Open supports early-stage joint science and technology research around new ideas for radically new future technologies. It will build up a diverse portfolio of targeted projects to explore a wide range of new technological possibilities, inspired by cutting-edge science, unconventional collaborations or new research and innovation practices. Early detection of promising new areas, developments and trends, along with attracting new bold-visioned and high-potential research and innovation players will be key. FET-Open represents 40% of the overall FET budget in Horizon 2020.

FET Proactive

FET Proactive nurtures emerging themes and communities by addressing a number of promising exploratory research themes with the potential to generate a critical mass of inter-related projects that, together, make up a broad and multifaceted exploration of the themes and build a European pool of knowledge and excellence. Through this line of activity FET engages in the coordinated exploration of a new theme, as well as in the consolidation of promising future technologies to be taken up by industry and society. Under its proactive calls the present work programme supports three themes (H2020-FETPROACT) selected from a wide bottom-up consultation

(see 'FET Observatory'[2]) and a fourth one (H2020-FETHPC) implementing part of the HPC strategy elaborated in the context of the HPC Public-Private Partnership by ETP4HPC[3].

- **Global Systems Science (GSS)** aims to radically improve the way in which scientific knowledge can stimulate, guide, and help evaluate policy and societal responses to global challenges like climate change, global financial crisis, global pandemics, and growth of cities - urbanisation and migration. This is a highly interdisciplinary theme with strong impacts across different sectors of policy and society.
- **'Knowing, doing and being: cognition beyond problem solving'** aims at renewing ties between the different disciplines studying knowledge, cognition and related issues (e.g., embodiment, development, insight, identity, responsibility, culture...) from various perspectives (e.g., neural, physical, social, ecological), to artificial cognitive systems beyond the level of dull task execution or repetitive problem solving. This topic has been selected to stimulate new interdisciplinary configurations and for its potential to boost future innovation potential in robotics, materials and cyber-physical systems.
- **'Quantum Simulation'** challenges the research community to develop solutions using quantum technologies that will ultimately address real world problems, with a potential for disruptive change. It focuses on quantum simulation to address problems that are fundamentally beyond the reach of classical computing, e.g. in quantum materials science or the life sciences.
- **'Towards exascale high-performance computing'** is the science and technology building block of Europe's trailblazing and timely initiative to achieve world-class extreme scale computing capabilities in terms of platforms, technologies and applications. The increasing demand for computing power from all areas of modern science and industrial engineering cannot be met without radically new architectures, new algorithmic approaches and the interdisciplinary co-design of software and applications.

FET Flagships

FET Flagships support ambitious large-scale, science-driven research aimed at grand interdisciplinary S&T challenges. Such activities require and will benefit from the alignment of European and national agendas, and provide a strong and broad basis for future technological innovation and economic application in a variety of areas, as well as novel benefits for society. The present work programme continues to support and to further develop two FET flagships (call H2020-FETFLAG):

- **The Graphene flagship** pushes the science and technologies for a new class of material beyond the era of silicon, bringing graphene and related 2D-materials, from academic labs to industry, manufacturing and society.
- **Human Brain Project (HBP)** aims to simulate and better understand the Human Brain in order to develop new diagnostic tools and treatments for brain diseases, as well as new classes of low-energy technologies with brain-like intelligence, such as neuromorphic computing.

[2] http://cordis.europa.eu/fp7/ict/fet-proactive/fetconsult2012-topics_en.html

[3] http://www.etp4hpc.eu

FET aims at shaping the future technology landscape and European thought-leadership on new and emerging technologies. The combination of a bottom-up spirit and a broadly based participatory agenda-setting assures that FET explores radically new avenues while remaining sensitive to future needs from industry and society. By promoting interdisciplinary collaboration that go well beyond the strictly technological and 'hard' scientific disciplines, FET promotes dialogue and cooperation between science, industry, citizens and policy makers on how to turn new technological possibilities into an opportunity for industry and a benefit for society. This will boost long-term innovation potential in Europe both from the abundance of novel ideas and the diversity of actors ready to take them forward. Along the same line, FET will pay attention to issues such as gender, age and culture, in the research topics and teams it promotes as well as in its public engagement, aware that this can offer new perspectives, posing new questions, and opening new areas of investigations in, for instance, life sciences, engineering and technological development, environment, food and nutrition, health and medicine, or transport.

The silo-breaking research collaborations in FET will also improve readiness across Europe to take up new research and innovation practices for making leading-edge science and technology research more open, creative and closer to society, especially through 'digital science', promoting for instance open scientific data, advanced simulation, and the use of platforms for open collaboration or for better involvement of the general public in research. These are essential tools for building operational links between science, technology, innovation and society, as well as across disciplines, so that even the most advanced results can find their way to stimulate industrial leadership and for addressing societal challenges.

FET research is well placed for global collaborations that can raise the level of excellence and accelerate the impact from global alliances. Thus, participation of excellent non EU partners in FET activities, whenever necessary and essential, is welcome.

The projects funded under the Future and Emerging Technologies part of the Work Programme 2014-15 will participate in the Pilot on Open Research Data in Horizon 2020 in line with the Commission's Open Access to research data policy for facilitating access, re-use and preservation of research data. Projects have the possibility to opt out of the pilot. A related new element in Horizon 2020 is the use of Data Management Plans (DMPs) detailing what data the project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated and preserved. The use of a Data Management Plan is required for projects participating in the Open Research Data Pilot. Further guidance on the Open Research Data Pilot is made available on the Participant Portal.

FET OPEN call: novel ideas for radically new technologies

This call aims to support early-stage joint science and technology research for radically new future technological possibilities. The call is entirely non-prescriptive with regards to the nature or purpose of the technologies that are envisaged and thus targets mainly the unexpected. A bottom-up selection process will build up a diverse portfolio of projects. In order to identify and seize opportunities of long-term benefit for citizens, the economy and society, the early detection of promising new areas, developments and trends, wherever they come from, will be essential. The call also seeks for coordination and support activities to turn Europe into the best place in the world for responsible collaborative research on future and emerging technologies that will make a difference for society in the decades to come.

Proposals are invited against the following topics:

- FETOPEN-1-2014: FET-Open research projects
- FETOPEN-2-2014: Coordination and Support Activities
- FETOPEN-3-2015: Coordination and Support Activities

FETOPEN-1-2014: FET-Open research projects

Specific challenge

Supporting a large set of early stage, high risk visionary science and technology collaborative research projects is necessary for the successful exploration of new foundations for radically new future technologies. Nurturing fragile ideas requires an agile, risk-friendly and highly interdisciplinary research approach, expanding well beyond the strictly technological disciplines. Recognising and stimulating the driving role of new high-potential actors in research and innovation, such as women, young researchers and high-tech SMEs, is also important for nurturing the scientific and industrial leaders of the future.

Scope

Proposals are sought for collaborative research with all of the following characteristics:

- **Long-term vision**: the research proposed must address a new, original or radical long-term vision of technology-enabled possibilities that are far beyond the state of the art and currently not anticipated by technology roadmaps.
- **Breakthrough S&T target**: research must target scientifically ambitious and technologically concrete breakthroughs that are arguably crucial steps towards achieving the long-term vision and that are plausibly attainable within the life-time of the proposed project.
- **Foundational**: the breakthroughs that are envisaged must be foundational in the sense that they can establish a basis for a new line of technology not currently anticipated.
- **Novelty**: the research proposed must find its plausibility in new ideas and concepts, rather than in the application or incremental refinement of existing ones.
- **High-risk**: the potential of a new technological direction depends on a whole range of factors that cannot be apprehended from a single disciplinary viewpoint. This inherent high-risk has to be countered by a strongly interdisciplinary research approach, where needed expanding well beyond the strictly technological realm.
- **Interdisciplinary**: the proposed collaborations must be interdisciplinary in the sense that they go beyond current mainstream collaboration configurations in joint science- and technology research, and that they aim to advance different scientific and technological disciplines together and in synergy towards a breakthrough.

This call is open to early-stage research on any new technological possibility.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact

Proposals must aim at one of the following two impacts:

- Initiating a radically new line of technology by establishing Proof-of-Principle of a new technological possibility and its new scientific underpinning, or
- Kick-starting an emerging innovation eco-system of high-potential actors around a solid baseline of feasibility and potential for a new technological option, ready for early take- up.

The active involvement of new and high-potential research and innovation players, which may become the European scientific and technological leaders of the future, is encouraged. Impact is also sought in terms of take up of new research and innovation practices and, more generally, from making leading-edge science and technology research more open, collaborative, creative and closer to society.

Type of action

Research and Innovation Actions

Indicative budget distribution

- EUR 77 million (for deadline 30/09/2014)[4]
- EUR 38.5 million (for deadline [31/03/2015])[5, 6]
- EUR 38.5 million (for deadline [29/09/2015])[6, 7]

Call

H2020-FETOPEN-2014/2015

[4] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

[5] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

[6] The deadlines provided in brackets are indicative and subject to a separate financing decision for 2015.

[7] Out of which EUR 26.3 million from the 2016 budget. The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2016.

FETOPEN-2-2014: Coordination and Support Activities

Specific challenge

The challenge is to make Europe the best place in the world for collaborative research on future and emerging technologies that will renew the basis for future European competitiveness and growth, and that will make a difference for society in the decades to come.

Scope

Proposals shall address one of the following topics:

a) **FET Observatory**: identifying new opportunities and directions for interdisciplinary research towards new and visionary technology of any kind, combining evidence from FET (e.g., portfolio analysis) and other sources, as well as by broad and open stakeholder engagement, in particular through on line tools.

b) **FET Communication**: collecting, aggregating and disseminating information from the entire range of FET projects and activities, and using an appropriate mix of channels and formats, including activities to reach stakeholders well beyond the research communities (including the public at large), and visibility at well-selected events.

c) **FET Exchange**: structuring an emerging FET-relevant topic and the interdisciplinary communities around it. This shall include research roadmapping, stimulating learning and exchange (possibly with related initiatives worldwide) involving the appropriate range of disciplines and actors such as young researchers and high-tech SMEs, and broader stakeholder engagement.

d) **FET Conference**: supporting the organisation of the third European Future Technologies Conference and Exhibition (see http://www.fet11.eu/). The conference shall foster a dialogue between science, policy and society on future and emerging technologies, showcase progress, seed new ideas across disciplines and involve high-potential actors that can reshape the future. Proposals will address pre-conference communication, the local organisation, participant assistance and post-conference follow-up. The event shall take place late 2015 or early 2016.

e) **FET Prizes**: Identifying suitable areas in which prizes and competitions can boost FET research and increase its impact. Actions shall aim to identify a diversity of such areas, investigating for each of them the rationale, competition objectives, target communities (possibly including youngsters) and organisational aspects of running the competitions.

f) **FET Impact**: Assessing the direct and indirect impacts of the FET programme on the science and technology landscape and its perception by individuals and society. Proposals must indicate a framework of key performance indicators, a systematic assessment methodology and perform the required data collection and analysis, in line with the overall mission of FET.

For each of the scope items a), b), d), e) and f) at most one proposal will be funded.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.3 and 0.5 million, and up to EUR 1 million for scope item d), would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact

- European thought-leadership on new and emerging technologies with a strong engagement of scientists, citizens, innovators and policy makers.
- Improved long-term innovation potential in Europe both from the abundance of novel ideas and the range of actors ready to take them forward.
- Improved readiness across Europe to engage in silo-breaking research collaboration and to take up new research and innovation practices.
- Improved understanding of impact mechanisms for long-term science and technology research.

Type of action

Coordination and Support Actions

Indicative budget distribution

EUR 3 million[8] (deadline 30/09/2014)

Call

H2020-FETOPEN-2014/2015

[8] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

FETOPEN-3-2015: Coordination and Support Activities

Specific challenge

The challenge is to make Europe the best place in the world for collaborative research on future and emerging technologies that will renew the basis for future European competitiveness and growth, and that will make a difference for society in the decades to come.

Scope

Proposals shall address one of the following topics:

- **FET Exchange**: structuring an emerging FET-relevant topic and the interdisciplinary communities around it. This shall include research roadmapping, stimulating learning and exchange (possibly with related initiatives worldwide) involving the appropriate range of disciplines and actors such as young researchers and high-tech SMEs, and broader stakeholder engagement.
- **FET Take-Up**: actions for stimulating take-up of FET research results towards impact and innovation, in ways that are complementary to and beyond the capacity of single research projects. Examples include outreach to investors and entrepreneurs, use of unconventional channels (like NGOs or artists), or targeting of new audiences and purposes (e.g. for social innovation, global development or peace).

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.3 and 0.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact

- European thought-leadership on new and emerging technologies with a strong engagement of scientists, citizens, innovators and policy makers.
- Improved long-term innovation potential in Europe both from the abundance of novel ideas and the range of actors ready to take them forward.
- Improved readiness across Europe to engage in silo-breaking research collaboration and to take up new research and innovation practices.
- Increased take-up of long-term science and technology research results.

Type of action

Coordination and Support Actions

Indicative budget distribution

- EUR 1.5 million (for deadline [31/03/2015])[9, 10]
- EUR 1.5 million (for deadline [29/09/2015])[9, 10]

Call

H2020-FETOPEN-2014/2015

[9] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

[10] The deadlines provided in brackets are indicative and subject to a separate financing decision for 2015.

FET Proactive Call: Emerging themes and communities

Novel areas and themes need to be matured, by working towards structuring emerging communities and supporting the design and development of transformative research themes. The main benefits of this structuring yet explorative approach are emerging novel areas that are not yet ready for inclusion in industry research roadmaps, and building up and structuring of new interdisciplinary research communities around them. It makes the step from collaborations between a small number of researchers, to a cluster of projects that each address aspects of a novel research theme to jointly explore possibilities for, and long-term implications of future technologies that matter.

FET Proactive initiatives have one of the following strategic objectives:

- An **exploratory** initiative explores a variety of directions and builds up a pool of knowledge and new research alliances around promising emerging themes. This will encourage new inter-disciplinary collaborations around a new area or theme, sifting through a wide range of options in order to get a better understanding of which ones may be the more promising directions towards future technologies.
- A **delivery** initiative aims at translating science into concrete technological directions by projects that build on proofs-of-concept and that want to take them to a next level of development. This will consolidate a technological direction within an emerging ecosystem of science and innovation actors.

Four proactive initiatives will be funded under this work programme:

A. Global Systems Science (GSS)

B. Knowing, doing, being: cognition beyond problem solving

C. Quantum simulation

D. Towards exascale high performance computing

The first three are implemented by this call. The fourth initiative implements, through a separate call H2020-FETHPC (see page 16 of this document), part of the HPC strategy elaborated in the context of the HPC Public-Private Partnership by ETP4HPC.

Proposals are invited against the following topics:

- FETPROACT-1-2014: Global Systems Science (GSS)
- FETPROACT-2-2014: Knowing, doing, being: cognition beyond problem solving
- FETPROACT-3-2014: Quantum simulation

FETPROACT-1-2014: Global Systems Science (GSS)

Specific challenge

The ambition is to improve the way scientific knowledge can help inform and evaluate policy and societal responses to global challenges like climate change, global financial crises, global pandemics, and growth of cities - urbanisation and migration patterns. These challenges entangle actions across different sectors of policy and society and must be addressed by radically novel ideas and thinking for producing, delivering, and embedding scientific evidence into the policy and societal processes.

GSS will put to full use the abundance of data on social, economic, financial, technological, and ecological systems available today. GSS emphasises systems thinking and the need to integrate/link data, models, and policies across all policy sectors with all societal actors. GSS will build on results from, among others, Complex Systems Science, Network Science, Mathematics of Big Data, the life sciences, social sciences and humanities, behavioural sciences, statistics, econophysics, etc.

Scope

Proposals must address all of the below elements, necessary to successfully embed scientific evidence in the policy processes for tackling global challenges:

- Research grounded in theoretical foundations of, among others, systemic risk, decision making under uncertainty or conflicting evidence, mathematics and computer science for Big Data (including their characteristics), algorithmic game theory, cascading/escalating effects in networks, integration and visualisation of Big Data...
- Contributions to solving real world problems in one selected problem area - for instance tackling systemic risk in finance/economics, managing growth of cities and migration, or global pandemics - and in particular to tackle cross-cutting policy dependencies and interactions affecting the area of choice.
- Novel ideas and technologies to generate and better communicate the scientific evidence-base: advanced simulation of highly interconnected systems; mathematical and tools for analysing (often unstructured) Big Data; integration of the whole spectrum of structure and unstructured data; methods to deal with conflicting data and modeling results; novel data visualisation tools.
- Society/human-centred technologies, for instance, new approaches to allow citizens to actively participate in the policy process, to collectively gather and integrate data, analyse evidence, and novel methods to better judge and use scientific evidence: methods, e.g. games, gamification, and narratives to clearly and consistently convey data and modeling results and thereby to stimulate societal responses.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact

- Level to which research proposed is rooted in policy needs, promotes system thinking, and is delivering consistent messages from conflicting data and model results.
- Level of use/uptake of GSS tools and methods in the policy and societal processes, including in EC policies.
- Capacity of GSS to help integrate societal responses across policy domains and cross- cutting authorities by development of a system-wide integrated evidence base of data and models.

Type of action

Research and Innovation Actions

Indicative budget distribution

EUR 10 million[11] (deadline 01/04/2014)

Call

H2020-FETPROACT-2014

[11] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

FETPROACT-2-2014: Knowing, doing, being: cognition beyond problem solving

Specific challenge

This initiative addresses the interdisciplinary fundamentals of knowing, thinking, doing and being, in close synergy with foundational research on future artificial cognitive systems, robots, smart artefacts and large scale cyber-physical systems. It aims at renewing ties between the different disciplines studying knowledge (especially beyond the 'declarative' and static action oriented kind of knowledge), cognition (e.g., perception, understanding, learning, action) and related issues (e.g., embodiment, thinking, development, insight, knowledge as a social construct, identity, responsibility, culture...) from various perspectives (e.g., physical, biological, neuronal, behavioural, social, epistemological, ecological). The aim is to enable new synergies with engineering disciplines on smart and self-organising materials, embedded systems, robotics, hybrid systems or smart infrastructures and cities to take artificial cognitive systems beyond the level of dull task execution or repetitive problem solving.

Scope

Proposals must address at least one of the following elements:

- New concepts and paradigms in cognitive systems such as new approaches to embodiment, learning, motivation, autonomy, knowledge and mind, not limited to prior anthropocentric or bio-mimetic models. Proposals will aim to demonstrate these paradigms in robust performance of future robotic systems (possibly nano-, micro-, multi-, hybrid- or unconventional ones) in challenging changing environments, possibly co-habited with or linked to biological systems, and over long periods of time.
- Integrative studies of knowing, thinking, doing and being that bridge between low-level (e.g., neuronal, physiological) and high-level (e.g., belief, intention, identity) descriptions. These multidisciplinary studies are expected to go well beyond addressing the perception-action loop, and to tackle issues such as development, experience, understanding, empathy, memory, attention, the emergence and development of self, social belonging and culture. They are to be researched in close synergy with technological experiments, for instance in computational neuroscience, intelligent materials, robotics, cyber physical settings or large scale simulations that incorporate, test and refine insights gained.
- Approaches for understanding the long-term development of individual and social knowledge and identities, especially in highly heterogeneous and dynamic settings (reflecting aspects of e.g., diversity, urban change, migration, social and gender divides, multiculturalism, inter-disciplinarity, etc.). Proposals are expected to take into account the role of technologies and infrastructures in this, as well as how these facilitate or hamper societal changes.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact

- New foundations for future robotics and other artificial cognitive systems with clear progress beyond current capabilities and design concepts.
- A deeper understanding of non-performative aspects of development and interaction in mixed human/technological settings.
- Improved understanding of the impacts of the technologically enhanced environments on the human behaviour, at the individual and collective levels
- Understanding the origins and development of synergies and divides in socio/technical contexts and ways to influence them.

Type of action

Research and Innovation Actions

Indicative budget distribution

EUR 15 million[12] (deadline 01/04/2014)

Call

H2020-FETPROACT-2014

[12] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

FETPROACT-3-2014: Quantum simulation

Specific challenge

Devices that exploit quantum phenomena such as superposition and entanglement have the potential to enable radically new technologies. Several promising directions are now well known, for instance in quantum computation and simulation, quantum communication, quantum metrology and sensing. However, overcoming basic scientific challenges as well as bridging from the scientific results to concrete engineering technologies has proved difficult. This objective challenges the research community to develop solutions using quantum technologies that will ultimately address real world problem, with a potential for disruptive change.

Scope

Proposals shall address research and development for quantum simulation to address a class of problems that is beyond the reach of classical computing, and that can contribute to answering questions in fundamental or applied sciences, e.g. in quantum materials science or the life sciences.

This topic is complementary to quantum technology research topics that are called under the ICT part of the LEIT Workprogramme 2014-15 and that are related to the domains of nano- electronic technologies[13] ("new computing paradigm like quantum computing"), photonics[14] ("disruptive approaches in sensing.. ..based on quantum optics or quantum technologies...") and cybersecurity[15] ("Quantum key distribution systems and networks for long-term security by design").

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact

- Contribution to solving problems in fundamental and applied science using new tools based on quantum physics and quantum technologies
- Build-up of core competences for the wider exploitation of quantum science and technologies in mainstream engineering.

Type of action

Research and Innovation Actions

Indicative budget distribution

EUR 10 million[16] (deadline 01/04/2014)

Call

H2020-FETPROACT-2014

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[13] See LEIT ICT Work Programme 2014-15 Topic 25.

[14] See LEIT ICT Work Programme 2014-15 Topic 26.

[15] See LEIT ICT Work Programme 2014-15 Topic 32.

[16] Out of which EUR 2 million from the 2015 budget. The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

FET Proactive Call: Towards exascale high performance computing

High Performance Computing (HPC) is a crucial asset for Europe's innovation capacity and is of strategic importance to its scientific and industrial capabilities, as well as to its citizens. The HPC strategy of the European Commission[17] aims at ensuring European leadership in the development and use of HPC systems, software, applications and services by 2020. The implementation of this HPC strategy in Horizon 2020 combines three elements: (a) developing the next generation of HPC towards exascale; (b) providing access to the best supercomputing facilities and services; and (c) achieving excellence in HPC applications. A Public Private Partnership (PPP) with the European Technology Platform in HPC (ETP4HPC) (establishment expected by the end of 2013) will provide, throughout Horizon 2020, the framework for the implementation of elements (a) and (c) of the evolving HPC strategy, based on the Strategy Research Agenda (SRA) of the ETP4HPC[18] . Note however that the call is open to proposals from all organisations, whether or not they are involved in ETP4HPC or the PPP.

The focus of this proactive call is on element (a) of the HPC strategy and the research and development for advanced applications and co-design of element (c). The support for elements (b) and the infrastructure aspects of HPC applications in element (c) of the strategy will be provided by the e-Infrastructure part of the Excellent Science pillar.

This call aims at leveraging the existing European strengths for building the next generation of extreme performance computing by 2020 and taking advantage of the new opportunities created from the transition from peta to exascale computing.

The goal is to achieve world-class extreme scale computing capabilities in platforms, technologies and applications. While focused on the extreme end of HPC, these results will, over time, spill over into a broad spectrum of mid-range and entry-level HPC systems, thus maximizing over time the exploitation potential of the targeted technologies. The presence of a sustainable European HPC Ecosystem will also boost research and innovation in scientific areas such as physics, chemistry, biology, life sciences, materials, climate, geosciences, etc..

This activity will be coordinated with complementary work in LEIT/Advanced Computing, LEIT/Photonics, and ECSEL (Electronic Components and Systems for European Leadership) that will develop basic system technology that is relevant to the needs of exascale computing (e.g. microprocessors, photonics components, interconnects or system software, programming environments for critical/real time systems, etc.).

Proposals are invited against the following topics:

- FETHPC-1-2014: HPC Core Technologies, Programming Environments and Algorithms for Extreme Parallelism and Extreme Data Applications
- FETHPC-2-2014: HPC Ecosystem Development

[17] As reflected in the Commission Communication "High Performance Computing: Europe's place in a Global Race" COM(2012)45 and the related Council Conclusions of 29/30 May 2013.

[18] See http://www.etp4hpc.eu/strategy/strategic-research-agenda/

FETHPC-1-2014: HPC Core Technologies, Programming Environments and Algorithms for Extreme Parallelism and Extreme Data Applications

Specific challenge

The challenge is to achieve, by 2020, the full range of technological capabilities needed for delivering a broad spectrum of extreme scale HPC systems. The designs of these systems need to respond to critical demands of energy efficiency, new delivery models, as well as to the requirements of new types of applications, including extreme-data applications. New methodologies, environments and tools for extremely-parallel and data-intensive programming are needed to achieve code quality and portability, reduce software development and maintenance costs while maximally exploiting underlying system capabilities (e.g., exploiting millions of cores in an energy-aware way). New mathematics and new algorithms are needed for ultra-scalable algorithms with predictable performance for existing or visionary applications, including data-intensive and extreme data applications in scientific areas such as physics, chemistry, biology, life sciences, materials, climate, geosciences, etc.

Scope

Proposals shall target one of the following subtopics:

a) **HPC core technologies and architectures**, addressing one or more of the HPC core technologies (processors, memory, interconnect and storage) and their optimal integration into extreme scale HPC systems, platforms and prototypes. Proposals should have a co-design approach driven by ambitious applications and in close cooperation with the scientific disciplines and stakeholders concerned, aiming at radical overall system performance improvement while at the same time addressing issues such as: a holistic understanding of energy efficiency across the full HPC system architecture; I/O, storage and data-throughput capabilities especially for big-data applications; radical scalability, concurrency, locality and resilience in the presence of millions of cores. A minimum of 60% of the available budget for this topic will be allocated to research under this part.

b) **Programming methodologies, environments, languages and tools**: development of new programming models, domain-specific languages, programming paradigms, visualisation and data-analysis tools to facilitate the effective exploitation of the full system capabilities (including energy management) of the emerging large- and extreme scale systems, in particular for extreme parallelism and extreme data applications.

c) **APIs and system software for future extreme scale systems**: New APIs and the corresponding efficient, flexible and scalable exascale system software for managing extreme scale systems, taking into account extreme parallelism, extreme data, energy consumption and resilience. Proposals are expected to include communication and dissemination activities towards relevant standards bodies and research programmes. It is expected that proposals on this point have the critical mass, if necessary beyond Europe, to strategically coordinate the API work in the exascale stack.

d) **New mathematical and algorithmic approaches** for existing or emerging applications on extreme scale systems. Work proposed should include energy-aware algorithms and maximally exploit the projected characteristics of exascale-class systems. Specific issues are quantification of uncertainty and noise, multiscale and extreme data. Software engineering for extreme parallelism should be addressed. Open source development is privileged.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Under part a) of the scope also larger proposals requesting a contribution from the EU of up to EUR 8 million can be envisaged. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Collaborations with Russian partners that can contribute outstanding scientific excellence in mathematics and algorithms for HPC is welcomed. These partners will however not be funded under this call.

Expected impact

- Contribution to the realisation of the ETP4HPC Strategic Research Agenda, thus strengthened European research and industrial leadership in HPC technologies.
- Covering important segments of the broader and/or emerging HPC markets, especially extreme-scale HPC systems.
- Impact on standards bodies and other relevant international research programmes and frameworks.
- European excellence in mathematics and algorithms for extreme parallelism and extreme data applications to boost research and innovation in scientific areas such as physics, chemistry, biology, life sciences, materials, climate, geosciences, etc.

Type of action

Research and Innovation Actions

Indicative budget distribution

EUR 93.4 million[19] - with a minimum of 60% of the available budget to be allocated to research under part a) of the scope (deadline 25/11/2014).

Call

H2020-FETHPC-2014

[19] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

FETHPC-2-2014: HPC Ecosystem Development

Specific challenge

To develop a sustainable European HPC Ecosystem.

Scope

Proposals shall address one of the two following topics:

a) **Coordination of the HPC strategy:** The aim is to support the implementation of a common European HPC strategy through coordination of the activities of stakeholders such as the European Technology Platform for HPC (ETP4HPC), PRACE, application owners and users (including emerging HPC applications), the European exascale computing research community, the open source HPC community, related activities in other parts of H2020, etc. Proposals must include activities for promoting a joint community structuring and synchronisation as well as other non-research activities such as the development of Strategic Research Agenda for High Performance Computing (including the roadmap for exascale in Europe), the link to the H2020 Societal Challenges, the mapping and analysis of related national and international R&I programmes/activities/research agendas in HPC towards exascale, coordination with and participation in relevant international activities, etc. Specific actions for attracting young talent into HPC must be included.

b) **Excellence in High Performance Computing Systems:** The aim is to boost European research excellence on the key challenges towards the next generations of high-performance computing systems (such as energy efficiency, complexity, dependability and cutting across all levels - hardware, architectures, programming, applications), to ensure a durable integration of the relevant European research teams, to identify and promote best practices in curricula and training, to build and strengthen links to venture capital, and to promote entrepreneurship and industry take-up. Activities towards self-sustainability of the research integration on the longer-term must be included.

Expected impact

- Strengthened European research and industrial leadership in the supply, operation and use of HPC systems;
- Contribution to the realisation of the ETP4HPC Strategic Research Agenda;
- Development of competitive European technology for building and exploiting a wide range of next-generation extreme performance computing systems;
- Structuring the efforts of stakeholders for implementing the European HPC strategy;
- Reinforced cooperation in international endeavours on HPC software and systems towards exascale;
- European Excellence in High Performance Computing systems.

Type of action

Coordination and Support Actions

Indicative budget distribution

EUR 4 million[20] (deadline 25/11/2014)

Call

H2020-FETHPC-2014

[20] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

FET FLAGSHIPS call - tackling grand interdisciplinary science and technology challenges

FET Flagships are science-driven, large-scale, multidisciplinary research initiatives oriented towards a unifying goal, aiming at transformational impacts on science and technology and substantial benefits for European competitiveness and society. The goals of such initiatives are visionary and highly ambitious in terms of scientific challenges, resources and coordinated efforts that require cooperation among a range of disciplines, communities and national, regional and European programmes. FET Flagships require partnerships extending over a long period (in the order of 10 years duration) that enable effective coordination of efforts.

FET Flagships are expected to provide European leadership in their domains. They should lead to a more efficient ERA, reducing fragmentation and optimising complementarities between EU and national programmes. They should aim, therefore, at establishing a closer link with similar activities at national and regional level and at ensuring a proper coordination and integration of all the research activities that contribute to the Flagship. They differ from the public-private partnerships (PPPs)[21] as they are science-driven at the outset, while the industrial participation will build up over the ten-year duration of the Flagships.

The selection of the FET Flagships has been carried out through a competitive process driven by scientific excellence that was initiated after the Commission's communication "Moving the ICT Frontiers"[22]. A dedicated call in 2013 (FP7-ICT-2013) resulted in the final choice of the Flagships Graphene and the Human Brain Project. For each of these, a first project funded by the EU has been launched in October 2013, with the aim of building up the initiative during a ramp-up phase which lasts until spring 2016.

The Graphene FET Flagship constitutes a major effort of Europe to achieve a leading position in this scientific field and in related technologies with great potential for future industrial applications. It will exploit the properties of graphene, a revolutionary carbon-based material which has the potential to become the wonder material of the 21st century, finding its way to a vast range of applications from electronics to ultra-lightweight materials for aeronautics, super capacitors for energy applications and artificial retinas. The initial consortium consists of 75 research organisations and industrial partners from 17 EU Member States and Associated Countries, with 136 principal investigators, among which 4 Nobel laureates. Graphene builds on existing national research programmes in the area of graphene, which show a rapid increase in funding (reaching in the order of EUR 50M in 2012). More details about Graphene can be found at http://www.graphene-flagship.eu/.

The goal of the Human Brain Project (HBP) is to combine all existing knowledge about the human brain and to reconstruct it in supercomputer-based models and simulations. The models will offer the prospect of a new understanding of the human brain and its diseases and of completely new computing technologies. The initiative will produce brain-inspired 'neuromorphic' computing systems with revolutionary properties, including resilience and drastically reduced power-consumption and costs. In response to the urgent need in healthcare to combat brain disease and its associated costs to society, HBP will develop simulation tools facilitating the identification of new drug targets, the screening of potential treatments and the development of personalised medicine. The initial consortium involves 80 European and international institutions from more than 22 countries. More details about HBP can be found at http://www.humanbrainproject.eu/.

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[21] COM(2013) 4942.

[22] COM(2009) 184.

The Graphene and Human Brain Project FET Flagships will establish large-scale long-term European partnerships. These partnerships between the EC and the institutions and organisations involved in the Flagships will be formalised through a Framework Partnership Agreement[23]. This framework will be the basis for concluding specific grant agreements to support the FET Flagships. The overall EC contribution to each FET Flagship initiative in Horizon 2020 is expected to be around EUR 50 M/year, subject to several factors such as budget availability, quality of proposals and performance of the action.

Under the Seventh Framework Programme an ERA-NET project ("FLAG-ERA", call FP7- ICT-2013-11) involving national and regional funding agencies aimed at supporting the two FET Flagships was launched in 2013, providing a basis for calls for transnational projects and for strengthening the synergies with regional and national programmes. A call inviting for a follow-up ERA-NET Cofund action is foreseen for 2016.

The topics in this call are aimed at ensuring the continuation of the two initiatives after the ramp-up phase:

- Establishing a Framework Partnership Agreement with each of the two Flagships (topic 1)
- Providing EU support for policy development actions for FET Flagship (topic 2).

Proposals are invited against the following topics:

- FETFLAG-1-2014: Framework Partnership Agreement
- FETFLAG-2-2014: Policy environment for FET Flagships

[23] Commission Delegated Regulation (EU) No 1268/2012 of 29 October 2012, Article 178. See also article 16(6) of the H2020 Rules for Participation.

FETFLAG-1-2014: Framework Partnership Agreement

Specific challenge

The objective is to establish, for each of the FET Flagships, a stable and structured partnership between the EC and the institutions and organisations who commit themselves to establish, maintain and implement the strategic research roadmap of the flagship. These partnerships will be set up through a Framework Partnership Agreement (FPA) which will cover the full initiative in order to enable the completion of the research roadmap within the context of the agreement.

The consortia responding to the call may include research institutes, universities, foundations, industry, SMEs as well as other organisations that can play a role in the realisation of the Flagships. The Framework Partnership Agreement shall specify the common objectives, the nature of the actions planned, and the procedure for awarding specific grants.

Scope

Proposals should address the following points:

- The general and specific objectives of the partnership;
- The related research roadmap;
- The initial consortium which will implement the Flagship initiative;
- The way the consortium will foster complementarities, foster synergies and enhance the overall outcome of regional, national, European and international research programmes;
- The commitments made by the consortium members, which would be complementary to EU/national contributions;
- Quantified targets for the Flagship initiative and Key Performance Indicators to assess the expected progress over time;
- The governance structure, including provisions for openness and evolution of the consortium;
- The ability of the consortium to seize exploitation opportunities.

Expected impact

- Formalised commitment of the partners of the Flagship partnership;
- Stable and structured environment for the benefit of the realisation of the Flagship;
- Overall continuity and coherency in the execution of the Flagship.

Type of action

Framework Partnership Agreements

Indicative budget distribution

This topic does not require a budget allocation (deadline 10/04/2014)

Call

H2020-FETFLAG-2014

FETFLAG-2-2014: Policy environment for FET Flagships

Specific challenge

The overall challenge is to foster a common European effort by contributing to dissemination efforts, impact assessments and other actions which support and strengthen the FET Flagship initiatives. This also extends to enhancing the interplay between FET Flagships and other Union policies and technology transfer of technologies towards exploitation. Any proposal has to demonstrate that it adds value beyond the activities implemented in each the FET Flagships Graphene and HBP.

Scope

Actions supporting the policy environment of the FET Flagships, addressing aspects such as:

- Supporting collaboration between the FET Flagships and international programmes;
- Assessing the impacts of FET Flagship initiatives, including through metrics and indicators;
- Analysing market potential and supporting technology transfer;
- Collection of information need for policy making, e.g. through consultation actions and surveys.

Expected impact

- Enhanced flow of information from FET Flagships towards in particular policy makers and the wider public;
- Enhanced complementarities between FET Flagships and related initiatives, in particular those at a global level;
- Improved understanding of impacts of FET Flagships on science, technology, economy and society;
- Better use of opportunities for technology transfer, innovation and exploitation;
- Improved availability of information need for policy making;
- Stable and structured environment for the benefit of the FET Flagships.

Type of action

Coordination and Support Actions

Indicative budget distribution

EUR 1.6 million[24] (deadline 10/04/2014)

Call

H2020-FETFLAG-2014

[24] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

OTHER ACTIONS

FET Flagship Core Projects (Other Actions 2a and 2b)

2a. Graphene FET Flagship Core Project

Within the Graphene Framework Partnership Agreement (FPA) awarded under topic FETFLAG-1-2014 of the call FET Flagships, the selected consortium will be invited to submit a proposal that will implement the first 2,5 to 3 years (indicative) of the action plan defined in the FPA.

The proposal must progress the graphene FET Flagship in accordance with the research roadmap as defined in the FPA. This covers in particular progress in key areas such as the development and exploration of material aspects of graphene, energy and health applications, the production of graphene or graphene film, high-frequency electronics, optoelectronics, spintronics, sensing and nanocomposites, as well as work on related 2D layered materials.

The proposal should cover a core of the research work, and the coordination of the overall Flagship initiative. The coordinating role must include in particular actions to ensure the overall continuity and coherence in the management of the Flagship initiative, such as (i) the cooperation with complementary projects launched specifically in the context of the Flagship, (ii) the collaboration with other initiatives or programmes at regional, national, transnational or global level (e.g. with related projects funded through an ERA-NET Cofund action) and (iii) the governance of the Graphene FET Flagship initiative.

The proposal must describe how the activities carried out during the ramp-up phase will be continued involving the relevant disciplines and stakeholders, how results of the ramp-up phase will be used, and how they will provide efficient coordination under strong scientific leadership. Proposals should detail activities in areas such as education, dissemination, ethics and societal aspects. They should also describe how they will grasp the technological potential in a way that accelerates innovation in all relevant application areas. Partners will be required to give other partners access to results needed for the purpose of any other specific actions under the FPA.

The submitted proposal will be evaluated according to specific criteria, see "Specific evaluation criteria and evaluation procedure for Other Actions 2a and 2b" (pages 31-32 of this document).

This action allows for the provision of financial support to third parties in line with the conditions set out in Part K of the General Annexes.

Type of action

Research and Innovation Action funded through a specific grant agreement under the Graphene Framework Partnership Agreement.

Indicative budget distribution

EUR 89 million from the 2015 budget[25].

[25] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

2b. Human Brain Project FET Flagship Core Project

Within the Human Brain Project Framework Partnership Agreement (FPA) awarded under topic FETFLAG-1-2014 of the call FET Flagships, the selected consortium will be invited to submit a proposal that will implement the first 2.5 to 3 years (indicative) of the action plan defined in the FPA.

The proposal must progress the HBP FET Flagship in accordance with the research roadmap as defined in the FPA. This covers in particular progress in key areas such as the generation and collection of key data on the mouse and human brains (both male and female) and their cognitive architectures, theoretical foundations for brain research, platforms for neuroinformatics, brain research, optical imaging and bioimaging, medical informatics, high performance computing, neuromorphic computing and neuro-robotics, as well as ethical and societal aspects.

The proposal should cover a core of the research work, and the coordination of the overall Flagship initiative. The coordinating role must include in particular actions to ensure the overall continuity and coherence in the management of the Flagship initiative, such as (i) the collaboration with complementary projects launched specifically in the context of the Flagship, (ii) the collaboration with other initiatives or programmes at regional, national, transnational or global level (e.g. with related projects funded through an ERA-NET Cofund action) and (iii) the governance of the HBP FET Flagship initiative.

The proposal must describe how the activities carried out during the ramp-up phase will be continued involving the relevant disciplines and stakeholders, how results of the ramp-up phase will be used, and how they will provide efficient coordination under strong scientific leadership. Proposals should detail activities in areas such as education, dissemination, ethics and societal aspects. They should also describe how they will grasp the technological potential in a way that accelerates innovation in all relevant application areas. Partners will be required to give other partners access to results needed for the purpose of any other specific actions under the FPA.

The submitted proposal will be evaluated according to specific criteria, see "Specific evaluation criteria and evaluation procedure for Other Actions 2a and 2b" (pages 31-32 of this document).

This action allows for the provision of financial support to third parties in line with the conditions set out in Part K of the General Annexes.

Type of action

Research and Innovation Action funded through a specific grant agreement under the Human Brain Project Framework Partnership Agreement.

Indicative budget distribution

EUR 89 million from the 2015 budget[26].

[26] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

Study contract on Digital Science

Studies related to FET. A procurement process for a study on metrics and data gathering for Digital Science will be launched.

Type of action

Public procurement - 1 service contract.

Indicative timetable

First quarter of 2014.

Indicative budget distribution

EUR 0.2 million[27]

[27] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

Indicative Timetable and Budget

Objective	Type of actions	Submission deadline[28, 29]	Budget[30] (EUR million)
FETOPEN-1: FET-Open research projects	RIA	- 30/09/2014 - [31/03/2015] - [29/09/2015]	77 38.5 38.5
FETOPEN-2: Coordination and Support Activities	CSA	30/09/2014	3
FETOPEN-3: Coordination and Support Activities	CSA	- [31/03/2015] - [29/09/2015]	1.5 1.5
FETPROACT-1: Global Systems Science (GSS)	RIA	01/04/2014	10
FETPROACT-2: Knowing, doing, being: cognition beyond problem solving	RIA	01/04/2014	15
FETPROACT-3: Quantum simulation	RIA	01/04/2014	10
FETHPC-1: HPC Core Technologies, Programming Environments and Algorithms for Extreme Parallelism and Extreme Data Applications	RIA	25/11/2014	93.4
FETHPC-2: HPC Ecosystem Development	CSA	25/11/2014	4
FETFLAG-1: Framework Partnership Agreement	FPA	10/04/2014	Non-applicable
FETFLAG-2: Policy environment for FET Flagships	CSA	10/04/2014	1.6
OTHER ACTIONS: FET Flagship Core Projects 2a. Graphene 2b. Human Brain Project	RIA action under the specific FPA	Second quarter of 2015	 89 89
OTHER ACTIONS: Study contract on Digital Science	Public procurement	First quarter of 2014	0.2

Funding schemes

RIA Research and Innovation Action
CSA Coordination and Support Action
FPA Framework Partnership Agreement

[28] The Director-General responsible may delay this deadline by up to two months.

[29] The deadlines provided in brackets are indicative and subject to a separate financing decision for 2015.

[30] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.
The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

FET Eligibility and Evaluation criteria

Elegibility and admissibility conditions

The conditions are described in parts B and C of the General Annexes to the work programme, with the following additions:

FETOPEN-1, FETPROACT-1, FETPROACT-2, FETPROACT-3	Part B is strictly limited to 16 A4 pages and shall consist of: • A single A4 title page with acronym, title and abstract of the proposal. • Maximum 15 A4 pages consisting of an S&T section (section 1), an Impact section (section 2) and an Implementation section (section 3).
FETOPEN-2	For each of the scope items a), b), d), e) and f) up to one proposal will be funded.

Specific evaluation criteria and evaluation procedure applicable to FET-Open and FET-Proactive Emerging themes and communities calls (FETOPEN and FETPROACT)[31]

FET support interdisciplinary research positioned between research driven by science and research driven by societal challenges or by industrial competitiveness. FET research aims at accelerating the transition from upstream research to technology development. Due to this specific nature of FET research, FET applies specific evaluation criteria.

Thresholds and weights are set for each criterion, as indicated in the table below. A proposal failing to achieve any of these threshold scores will not be funded.

[31] For FET Proactive Towards exascale high performance computing call (FETHPC), the criteria, scoring and threshold are described in part H of the General Annexes to the work programme. The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

Evaluation criteria

	1. Excellence [32]	2. Impact	3. Quality and efficiency of the implementation
Research and Innovation Actions (FETOPEN-1, FETPROACT-1, FETPROACT-2, FETPROACT-3)	• Clarity of targeted breakthrough and its specific science and technology contributions towards a long-term vision. • Novelty, level of ambition and foundational character. • Range and added value from interdisciplinarity. • Appropriatness of the research methods.	• Importance of the new technological outcome with regards to its transformational impact on technology and/or society. • Quality of measures for achieving impact on science, technology and/or society. • Impact from empowerment of new and high potential actors towards future technological leadership	• Quality of the workplan and clarity of intermediate targets. • Relevant expertise in the consortium. • Appropriate allocation and justification of resources (person- months, equipment, budget).
	Threshold: 4/5 **Weight: 60%**	**Threshold: 3.5/5** **Weight: 20%**	**Threshold: 3/5** **Weight: 20%**
Coordination and Support Actions (FETOPEN-2, FETOPEN-3)	• Clarity of objectives. • Contribution to the co-ordination and/or support of high-risk and high-impact research, for new or emerging areas or horizontally. • Appropriateness of the coordination and/or support activities.	• Transformational impact on the communities and/or practices for high-risk and high-impact research. • Appropriateness of measures for spreading excellence, use of results, and dissemination of knowledge, including engagement with stakeholders.	• Quality of workplan and management. • Relevant expertise in the consortium. • Appropriate allocation and justification of resources (person- months equipment, budget).
	Threshold: 3/5 **Weight: 40%**	**Threshold: 3/5** **Weight: 40%**	**Threshold: 3/5** **Weight: 20%**

Specific evaluation procedure applicable to FET-Open and FET-Proactive Emerging themes and communities calls (FETOPEN and FETPROACT)

At consensus stage, the consensus score for each evaluation criteria will be the median of the corresponding scores attributed by the individual evaluators and the consensus report will comprise a collation of the comments from individual reports, or extracts from them.

The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

The full evaluation procedure is described in the relevant guide associated with this call.

A single stage submission procedure will be followed.

[32] Excellence of the S&T section.

Specific evaluation criteria and evaluation procedure for the FET Flagship call topic FETFLAG-1 (FPA)[33]

This topic uses specific criteria as the proposals are of a fundamentally different nature as compared to regular research proposals.

	Sub-criteria
Criterion 1 Excellence	• Scientific and technological quality of the individual participants and of the consortium as a whole in view of the objectives and the roadmap of the Flagship • Quality and relevant experience of the individual participants and the consortium as a whole with regards to non-scientific aspects (e.g., ethics, dissemination, societal engagement and gender issues)
Criterion 2 Impact	• Contribution to the expected impacts listed in the work programme • Extent to which the consortium enables access to resources required to achieve the complete flagship roadmap • Extent to which the consortium enables fostering complementarities, exploiting synergies, and enhancing the overall outcome of regional, national, European and international research programmes
Criterion 3 Quality and efficiency of the implementation	• Quality of the proposed governance and management structure • Openness and flexibility of the consortium

Thresholds are set at 3 for each criterion in topic FETFLAG-1. A proposal failing to achieve any of these threshold scores, or an overall score of 10, will be rejected. Each of these three criteria has equal weight.

Specific evaluation procedure

The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes, with the following specific procedure for:

FETFLAG-1	Up to two projects (Framework Partnership Agreements) shall be selected

The Framework Partnership Agreements (FPA) to be selected under the FETFLAG-1 topic will serve to create a stable and structured environment for the Flagships. Each identified consortium will be invited to submit a proposal for the specific grants described under the 'Other Actions' 2a and 2b of this document (pages 24-25).

[33] For FET Flagships call topic FETFLAG-2, the criteria, scoring and threshold are described in part H of the General Annexes to the work programme. The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes.

Specific evaluation criteria and evaluation procedure for Other Actions 2a and 2b

Due to the specific nature of the flagship initiatives, which span over a longer period and build on links to related projects as well as national and transnational programmes, special criteria are used to assess the core projects of these initiatives.

	Sub-criteria
Criterion 1 Excellence	• Degree of adherence to the programme of activities as envisioned in the framework partnership agreement • Soundness of scientific concept, quality of objectives and progress beyond the state-of-the-art • Quality and effectiveness of the workplan (including milestones, flexibility and metrics to monitor progress) • Quality of measures for the coordination of activities across the Flagship Initiative, in particular to ensure overall continuity and coherence of the initiative.
Criterion 2 Impact	• Contribution to the expected impacts listed in the work programme • Extent to which the proposal makes use of complementarities, exploits synergies, and enhances the overall outcome of related regional, national, European and international research programmes • Effectiveness of measures for use of results, management of intellectual property and dissemination of knowledge • Effectiveness of measures relating to human capital, education and training at European level • Approach to address societal benefit and potential ethical and legal implications, including engagement with authorities and end-users
Criterion 3 Quality and efficiency of the implementation	• Quality of the governance, including management procedures and risk management • Quality and relevant experience of the individual participants, and their contribution to the common goal • Quality of the consortium as a whole (including complementarity, balance, involvement of key actors) • Openness and flexibility of the consortium • Appropriateness of the allocation and justification of the resources to be committed (e.g. in-kind contributions, infrastructures, person- months, equipment and budget)

Thresholds are set at 3 for each criterion in topics 1-3. A proposal failing to achieve any of these threshold scores, or an overall score of 10, will be rejected. Each of these three criteria has equal weight.

Indicative timetable for evaluation and grant agreement

	Information on the outcome of the evaluation	Indicative date for the signing of grant agreements
All calls (FETOPEN, FETPROACT, FETHPC, FETFLAG)	Maximum 5 months from the final date for submission	Maximum 3 months from the date of informing applicants

Consortium agreements

In line with the Rules for Participation and the Model Grant Agreement, *participants in Research and Innovation Actions or in Innovation Actions* are required to conclude a consortium agreement prior to grant agreement, except for Other Actions 2a and 2b; the latter will be bound by a consortium agreement for each FPA.

European Commission

Directorate General for Communications Networks, Content and Technology (DG CONNECT)
Directorate C 'Excellence in Science'
http://ec.europa.eu/programmes/horizon2020/en/h2020-section/future-and-emerging-technologies

Unit C.2 'Future and Emerging Technologies'

FET Open & Proactive Info Desk: cnect-fet@ec.europa.eu
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FET Open: https://ec.europa.eu/digital-agenda/node/10612
FET Proactive: https://ec.europa.eu/digital-agenda/node/10627
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Unit C.4 'Flagships'

Flagships Info Desk: cnect-flagship@ec.europa.eu
Tel: +32 (0) 29 96 834
https://ec.europa.eu/digital-agenda/node/10630
http://www.facebook.com/FETFlagships
http://twitter.com/FETFlagships

This is not an official document. Proposers are reminded that they should consult the full text of the Horizon 2020 FET Work Programme 2014-15 available at http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-fet_en.pdf. All related documents can be found at the Participant Portal: http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/index.html.