H2020
Future Emerging Technologies

Vienna, 14th January 2016

Petra REITER

FET Open
Research Executive Agency
European Commission

A stronger, clearer focus

H2020 Budget: 74,8 B€ (current prices)

Excellent Science pillar in H2020

- European Research Council (13B€)
- Marie Skłodowska-Curie actions (6,1B€)
- **Future and Emerging Technologies**
- Research infrastructures programme (2,4B€)

FET: ~2,6 B€*

(*) approximate figure for the duration of H2020 (2014-2020)

"Future and emerging technologies shall support collaborative research in order to extend Europe's capacity for advanced and paradigm-changing innovation."

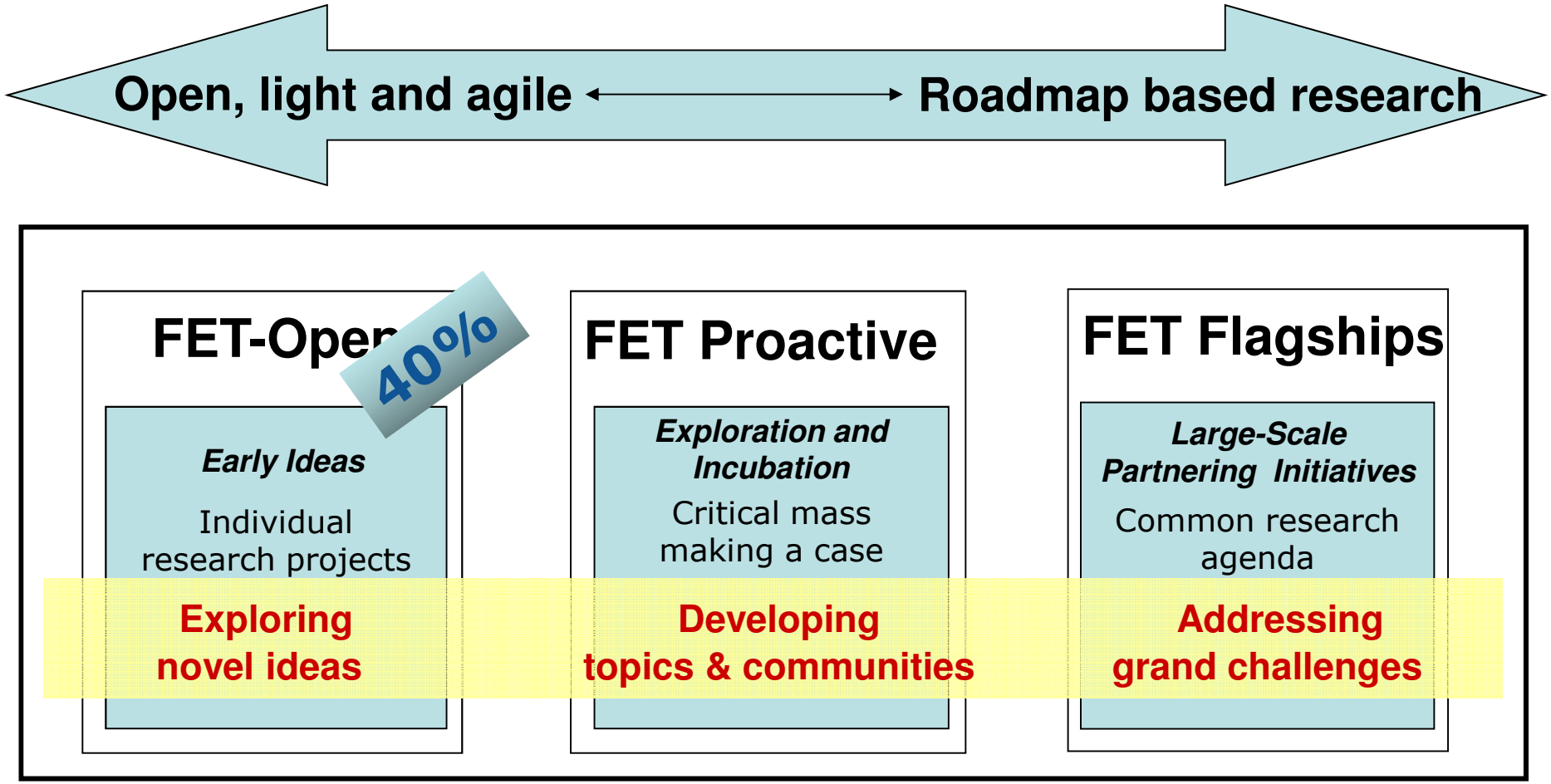
HORIZON 2020 - THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION (2014-2020)

Pathfinding Europe's technological future(s)

FET in Horizon 2020

Future and emerging technologies:

- foster scientific collaboration across disciplines on radically new, high-risk ideas
- accelerate development of the most promising emerging areas of science and technology


Open, light and agile
Roadmap based research
FET-Open
40%
Early Ideas
Individual research projects
FET Proactive
Exploration and Incubation
Critical mass making a case
FET Flagships
Large-Scale Partnering Initiatives
Common research agenda
Exploring novel ideas
Developing topics & communities
Addressing grand challenges

FET WP2016-17, overview

- **Call - FET-Open – Novel ideas for radically new technologies**
  - FETOPEN-01-2016-2017: FET-Open research and innovation actions
  - FETOPEN-02-2016: FET-Open Coordination and Support Actions
  - FETOPEN-03-2017: FET-Open Coordination and Support Actions
  - FETOPEN-04-2016-2017: FET Innovation Launchpad
- **Call - FET Proactive – Boosting emerging technologies**
  - FETPROACT-01-2016: FET Proactive: emerging themes and communities
  - FETPROACT-02-2017: FET ERANET Cofund
  - FETPROACT-03-2016: FET ERANET Cofund in Quantum Technologies
- **Call - FET Proactive – High Performance Computing**
  - FETHPC-01-2016: Co-design of HPC systems and applications
  - FETHPC-02-2017: Transition to Exascale Computing
  - FETHPC-03-2017: Exascale HPC ecosystem development
- **Call - FET FLAGSHIPS – Tackling grand interdisciplinary science and technology challenges**
  - FETFLAG-01-2016: Partnering environment for FET flagships
- **Other Actions**
  - FET Flagship Core Projects (within FPAs)

FETOPEN

FETPROACT

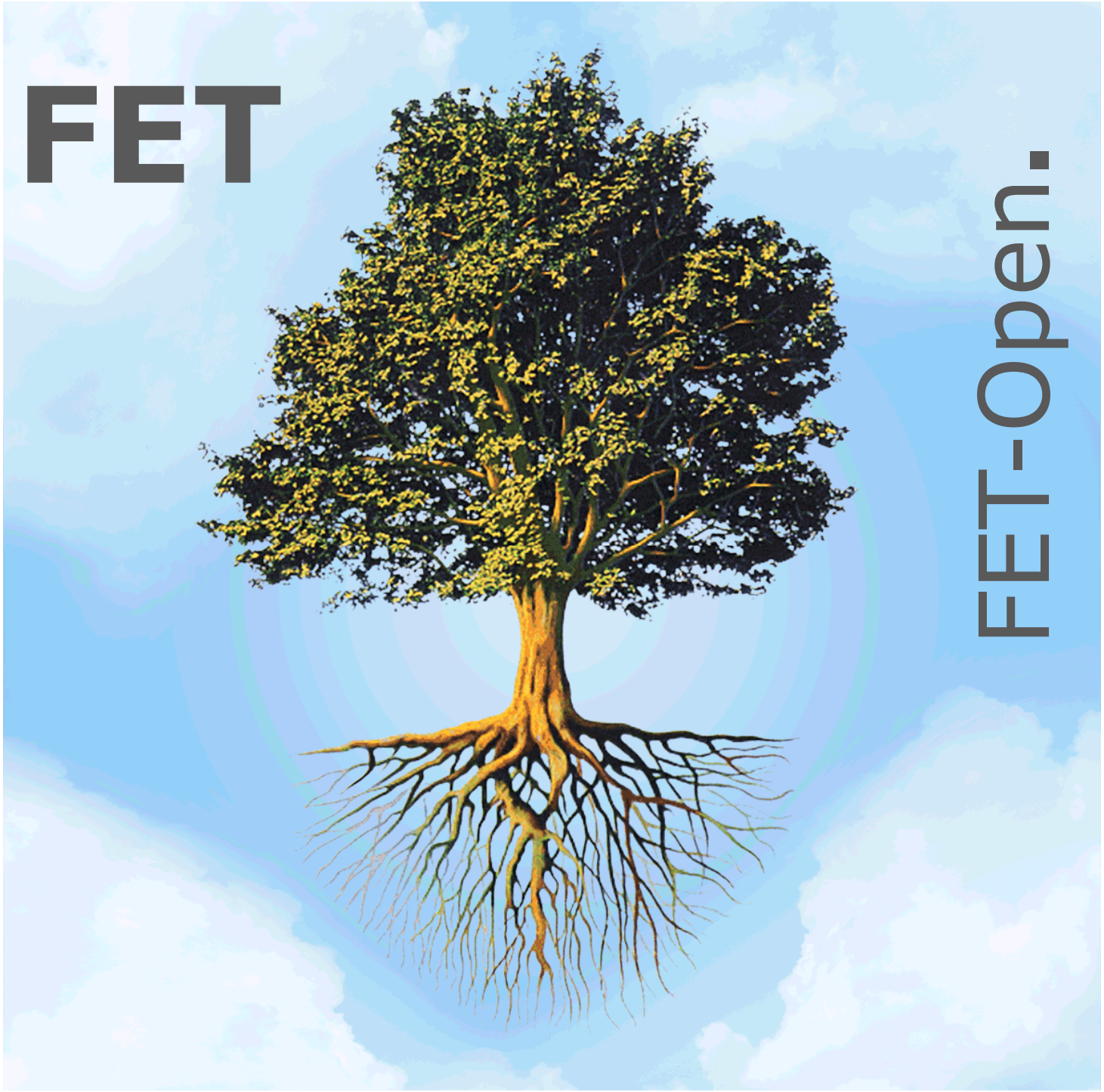
FETHPC

FETFLAG

Overview

- FET-Open
  - Research and Innovation Actions
  - Coordination and Support Actions
  - Innovation Launchpad 

- FET Proactive
- FET Flagships


FET
FET-Open.

FET-Open : novel ideas for radically new technologies

“FET-Open is open!”

- No thematic restriction, no emphasis on any subject
- New areas: space research, medicine, energy…
- Successful FET project result is a proof of a concept in a lab
- Bottom-up, but targeted - not blue sky research
- Collaborative research

Call - FET-Open – Novel ideas for radically new technologies

	FET-Open	259,5M*
FETOPEN-1-2016-2017	FET-Open RIA	84+84+84M*
FETOPEN-2-2016	FET-Open CSA	3M
FETOPEN-3-2017	FET-Open CSA	1,5M
FETOPEN-4-2016-2017	FET Innovation Launchpad NEW	3M

Continuity with WP2014-15 – more than 50% budget increase

*in part from 2018 budget

FET-Open Research and Innovation Actions

Early stages of R&I on any new technological possibility

Scope defined by FET gatekeepers

Expected impact

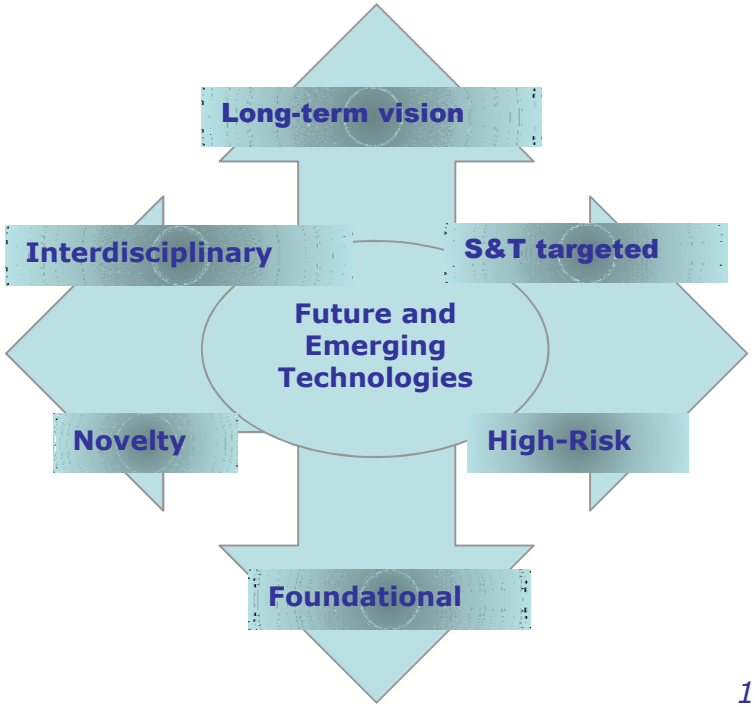
- **Establish baseline of feasibility and innovation potential**
- **European thought-leadership and future leaders**
- **New R&I practices**

FET-Open Research and Innovation Actions

Scope:

[…] Proposals are sought for ***collaborative research with all of the following characteristics*** *('FET gatekeepers'):*

- **Long-term vision**
- **Breakthrough scientific and technological target**
- **Novelty**
- **Foundational**
- **High-risk**
- **Interdisciplinary**



FET Gatekeepers (2016-2017)

European Commission

***Long-term vision**: the research proposed must address a new and radical long-term vision of a science- and technology-enabled future that is far beyond the state of the art and not currently foreseen by technology roadmaps.*

***Breakthrough S&T target**: research must target a scientifically ambitious and technologically concrete breakthrough, argued to be a crucial step towards achieving the long-term vision. The plausibility of the proposed breakthrough(s) to be attained within the life-time of the project must be argued in the proposal.*

***Novelty**: the research proposed for achieving the breakthrough must be based on cutting-edge knowledge, new ideas and concepts, rather than in the mere application or incremental refinement of existing ones.*

***Foundational**: the breakthroughs that are envisaged must be foundational in the sense that, if achieved, they would establish an essential basis for a new kind of technology and its future uses, not currently anticipated.*

***High-risk**: the inherently high risk of the research proposed will be reflected in a flexible but effective methodology for exploring alternative directions and options, supported by open and agile research and innovation practices.*

***Interdisciplinary**: the proposed collaborations are expected to go beyond 'waterfall' configurations in multi-disciplinary science- and technology research. Instead they should seek new solutions through genuine exchanges, mutual learning, cross-fertilisation and synergistic advances among distant disciplines in order to open unexplored areas of investigation and new directions for joint research.*

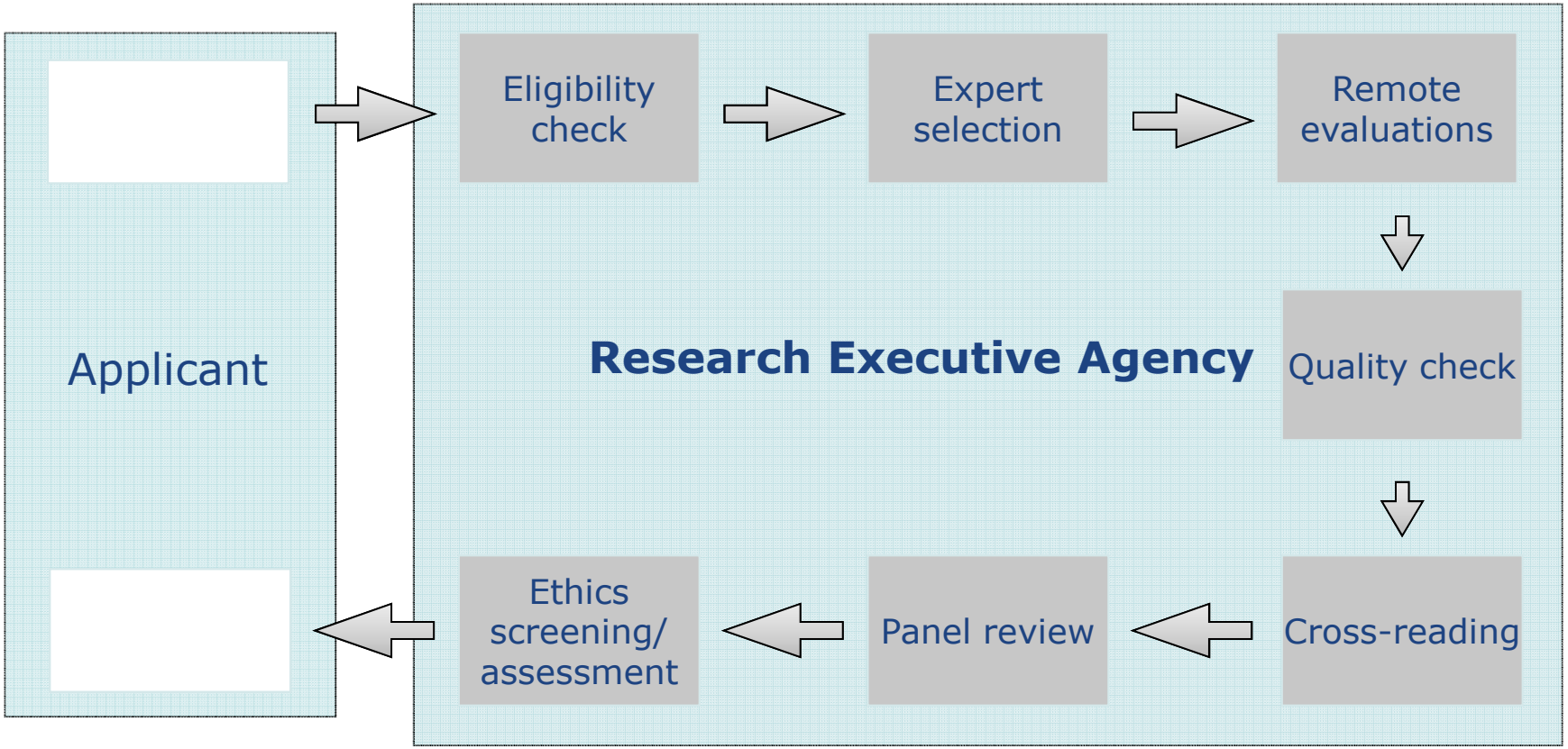
Conditions for the Call – FET Open

- **Single stage procedure**
  - Collaborative projects (RIA) up to 4M funding (indicative)
  - 1+15' pages
- **High quality peer review (remote) by 4 experts**
- Interdisciplinary final panel review
- Time table for evaluation and GA signature
  - Time to Inform (TTI) - **outcome of the evaluation** within **5 months**
  - Time to Grant (TTG) - **signature of the GA** within **8 months**
- Grant Agreement Preparation (GAP) - **grant completely based on proposal** (no negotiation)

Feedback to proposers - Evaluation Summary Report (ESR)

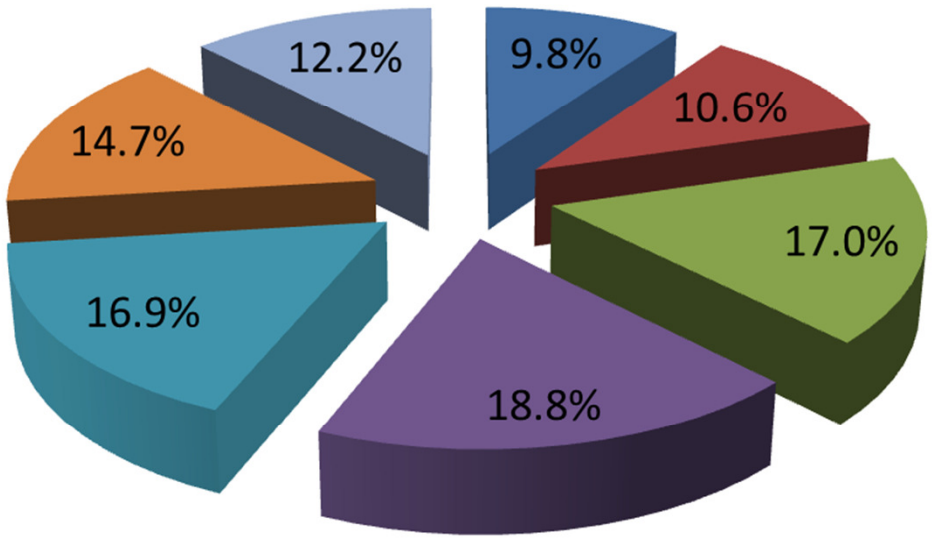
- **Collation of all evaluators' comments** , per sub-criterion, which may be mutually contradicting (no consensus) - full transparency
- Proposal score calculation (per criterion) - median of the scores from individual evaluators
- **Final score** per criteria is **decided by the final panel review**
- Total final score for the proposal is calculated as the **weighted sum of the final scores** from the 3 evaluation criteria
- Final panel review adds also some additional comments

FETOPEN - RIA EVALUATION



FETOPEN - RIA

Overview of topics covered*



- Energy, Transport, Environment
- Bio-Robotics and HCI
- Life Science, Medicine, Biology, NeuroBio
- Electronics, Telecom, Optics, Hardware, Sensors, Devices
- Computer Science, Bio-informatics, Complexity, Data mining
- Nanoscience, Quantum Physics, Astrophysics
- Materials, Chemistry

*first cut-off in 2014: 640 eligible RIA proposals - 77M€ budget - success rate ~3,75%

FETOPEN - RIA

Summary evaluation outcome: RIA

Cut-off	Eligible Proposals received	Above threshold proposals	Grant requested by above threshold proposals	Retained Proposals	Grant requested by retained proposals	Success rate
SEPT 2014	639	254	805 M€	24	78,1 M€	3,7%
MAR 2015	665	326	1079 M€	11	41 M€	1,7%
SEPT 2015	799				Max 38,5 M€	1,1%-1,3% (est.)

FET-Open is extremely competitive

Is FET-Open really the right scheme for you?

- *Check out LEIT and Societal Challenges work programmes*
- *FET is not ERC: collaboration, science and technology are all essential ingredients.*
- *It is not because something has not been done before that it is sufficiently novel for FET*
- *FET is not the long-term end of an established industry's road-map (radical novelty, interdisciplinarity,…)*
- *An exciting long-term vision is essential, but also a new and plausible idea on how to get there*
- *Writing a good FET-Open proposal is probably as hard as writing a good scientific publication.*

FETOPEN - RIA

List of funded FET-Open RIA projects

Accessible on CORDIS:

http://cordis.europa.eu/search/result_en?q=/project/relations/associations/relatedCall/call/identifier%3D'H2020-FETOPEN-2014-2015-RIA'

FET-Open Coordination and Support Actions

Continuity with WP2014-15 with some new sub-topics

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

Coordination and Support Actions (CSA)

Single step submission

FET-Open Coordination and Support Actions

Scope

- FET Exchange – networking in future and emerging R&I areas [2016 and 2017]
- FET Communication – visibility and outreach [2016]
- FET Conference – 2018 [2016]
- FET Innovation Greenhouse – capacity for facilitating earliest stages of innovation from FET research [2016]
- FET Futures – looking for new topics and strategies [2017]

FET-Open Innovation Launchpad

New topic in WP2016-17

- **This topic aims at funding further innovation related work (i.e. activities which were not scheduled to be funded by the original project) to verify and substantiate the innovation potential of ideas arising from FET funded projects and to support the next steps in turning them into a genuine social or economic innovation.**

Coordination and Support Action

single step submission, '1+7' pages

Inspired by the successful ERC Proof-of-Concept (PoC) scheme

FETOPEN-04-2016-2017

FET-Open Innovation Launchpad

Scope

- **Short and focused actions (18 months indicative, 100K funding)**
- **Early innovation steps to improve market- and investor-readiness**
- **Based on results from an ongoing or recently finished FET project**
  - Any FET-funded project (FP7 or H2020), ongoing or maximum a year from end-date of originating project to call deadline
- **No additional S&T research**
- **Actions not foreseen in originating project**
- **No direct link needed with originating consortium**
- **Single participant possibility**
- **Assurance on necessary intellectual property rights and agreements to be stated in the proposal**

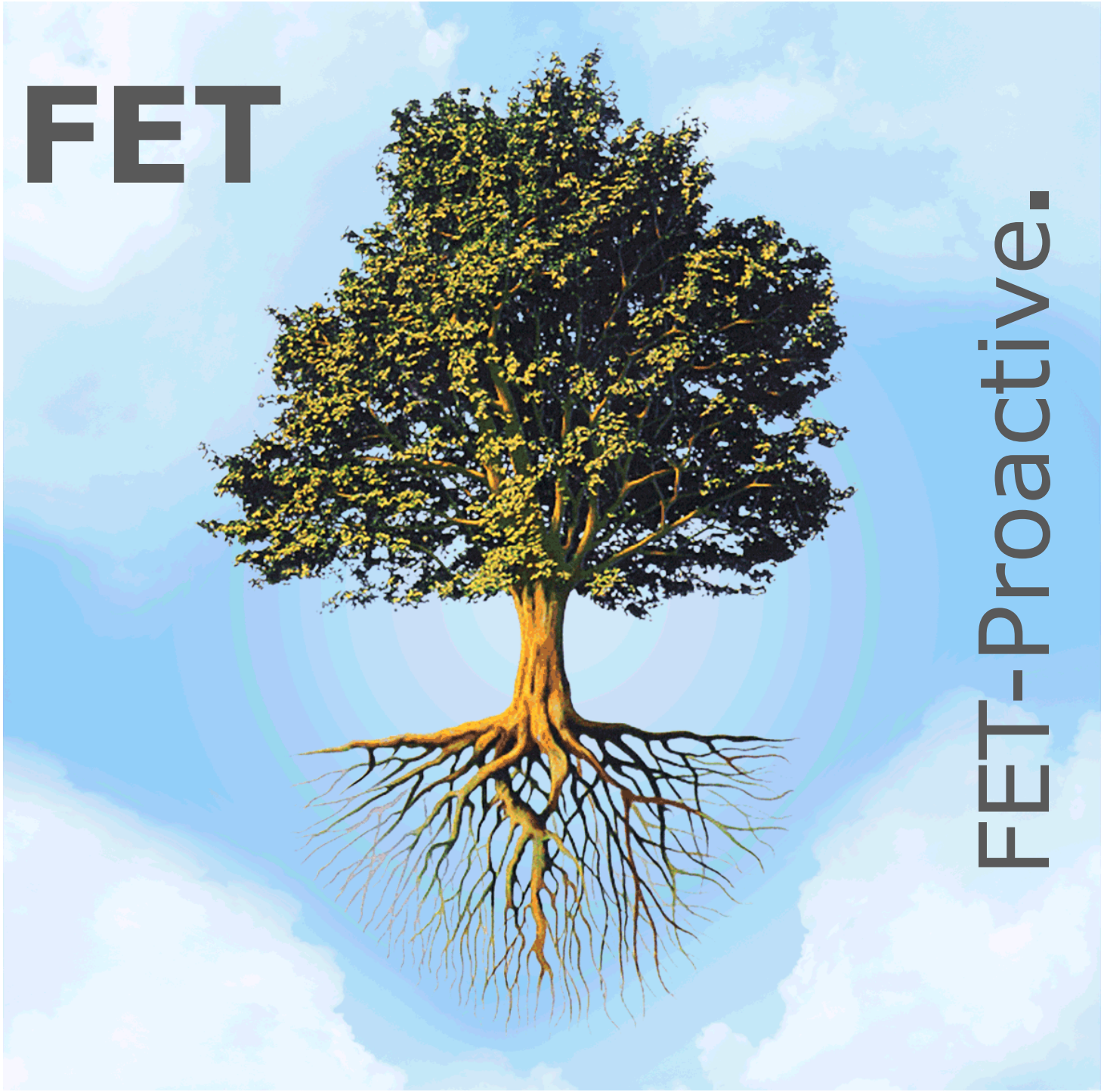
FETOPEN-04-2016-2017

FET-Open Innovation Launchpad

Opening: 01 Mar 2016			
FETOPEN-04-2016-2017 (CSA)	**1.20M Euro**	**1.80M Euro**	**29 Sep 2016** **27 Sep 2017**

Conditions for the Call – FET-Open

Topic	Budget 2016 (€ Million)	Budget 2017 (€ Million)	Deadlines	Opening
FETOPEN-01-2016-2017 (RIA)	84.00	84.00 84.00	11 May 2016 17 Jan 2017 27 Sep 2017	8 Dec 2015
FETOPEN-02-2016 (CSA)	3.00		11 May 2016	8 Dec 2015
FETOPEN-03-2017 (CSA)		1.50	17 Jan 2017	20 Sep 2016
FETOPEN-04-2016-2017 (CSA)	1.20	1.80	29 Sep 2016 27 Sep 2017	1 Mar 2016
Total:	88.20	113.80		


FET
FET-Proactive.

Call - FET Proactive – Boosting emerging technologies

FET Proactive *addresses promising directions for research on future technologies in order to build up a European critical mass of knowledge and excellence around them.*

	FET-Proactive – boosting emerging technologies	**95M**
FETPROACT-01-2016	Emerging themes and communities	80M
FETPROACT-02-2017	FET ERANET Cofund	5M
FETPROACT-03-2016	FET ERANET Cofund on quantum technologies	10M

Call - FET-Proactive – boosting emerging technologies

Emerging themes and communities

- **Almost 3x budget increase compared to WP2014-15**
- **Further opening up to all technology areas**
- **10 sub-topics identified from on-line public consultation and other sources**
- **New design in WP2016-17 - more 'bottom-up' while still strategic**

FET ERANET Cofund

FET ERANET Cofund on quantum technologies

FET-Proactive –emerging themes and communities

Scope: Proposals should address research and innovation activities, aimed at jointly exploring directions and options to establish a solid baseline of knowledge and skills, and to foster the emergence of a broader innovation ecosystem for a new technology as well as a fertile ground for its future take-up (e.g., through public engagement processes when relevant, or through formal and informal education). Proposals should address a single of the specific subtopics within one of the following areas:

- **Area 1: Future technologies for societal change**
- **Area 2: Biotech for better life**
- **Area 3: Disruptive information technologies**
- **Area 4: New technologies for energy and functional materials**

FETPROACT-01-2016

European Commission

10 sub-topics from FET Pro-active consultation

Future technologies for societal challenges

- **Being human in a technological world**
- **New science for a globalised world**

20M max

Biotech for better life

- **Intra- and inter-cell bio-technologies**
- **Bio-electronic medicines and therapies**
- **Cognitive neuro-technologies**

30M max

Disruptive information technologies

- **New computing paradigms and their technologies**
- **Quantum engineering**
- **Hybrid opto-electro-mechanical devices at the nano-scale**

30M max

New technologies for energy and functional materials

- **Ecosystem engineering**
- **Complex bottom-up construction**

20M max

Up to 80M max

FET-Proactive –emerging themes and communities

Expected Impacts

- **Maturing themes and structuring communities through jointly exploring options**
- **Emergence of a broader innovation eco-system for a new technology**

Larger projects: 4-10MEuro, up to 5 years (compare FET-Open: up to 4MEuro) addressing a single theme

Optional use of cascade funding (e.g., for prize)

Single deadline, single step submission

Conditions for the Call – FET Proactive

Topic	Budget 2016 (€ Million)	Budget 2017 (€ Million)	Deadlines	Opening
FETPROACT-01-2016 (RIA)	80.00		12 Apr 2016	8 Dec 2015
FETPROACT-02-2017 (ERA-NET-Cofund)		5.00	24 Jan 2017	20 Sep 2016
FETPROACT-03-2016 (ERA-NET-Cofund)	10.00		12 Apr 2016	8 Dec 2015
Total:	90.00	5.00		

FET

FET Flagships.

FET Flagships

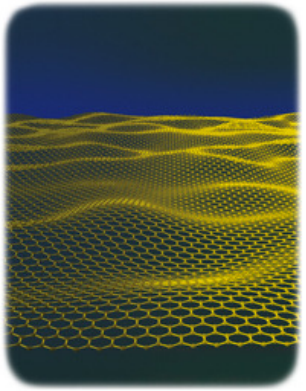
FET Flagships address ambitious S&T challenges that require:

- Setting up **large-scale partnerships** that bring together the leading researchers from a large number of research organisations (academia and industry);
- Commitment to a **strong science investment over a long time** period that cannot be carried out alone by the Commission or any single Member State

Graphene FET Flagship

Graphene, is a 2D material , a single layer of carbon atoms, stronger than diamond, yet lightweight and flexible
and an exceptional electricity conductor.

The Graphene Flagship will bring graphene, and related 2D materials, **from academic labs to industry, manufacturing and society.**



Artistic impression of a corrugated graphene sheet
Credit: Jannik Meyer

Examples Applications:

- ✓ electronic paper; bendable smartphones; enhanced solar cells and batteries; lighter and more energy efficient airplanes …
- ✓ On the longer term, graphene is expected to give rise to new computers and revolutionary medical applications such as artificial retinas.

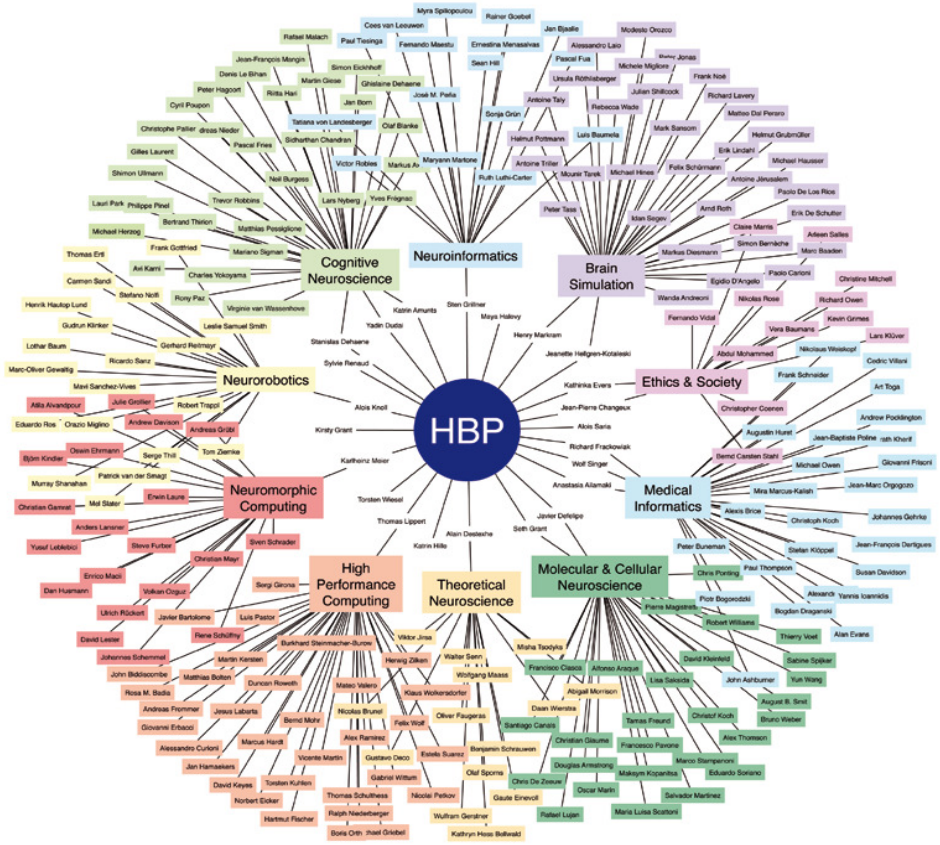
Nokia Morph concept - Credit: Nokia Research Center

The Human Brain Project (HBP)

HBP will create the wold's largest **experimental facility for developing the most detailed models of the brain** (from genes to mind), for studying how the human brain works and ultimately for simulating and developing personalised treatment of brain diseases.

This research lays the scientific and **technical foundation for medical progress**: identifying new drug targets and treatment, in response to the urgent need to combat brain diseases and their associated costs to society.

HBP will also produce brain-inspired **'neuromorphic' computing** systems that could drastically reduce power-consumption for super-computers and enhance robots.



FETFLAG

Call - FET FLAGSHIPS – Tackling grand interdisciplinary science and technology challenges

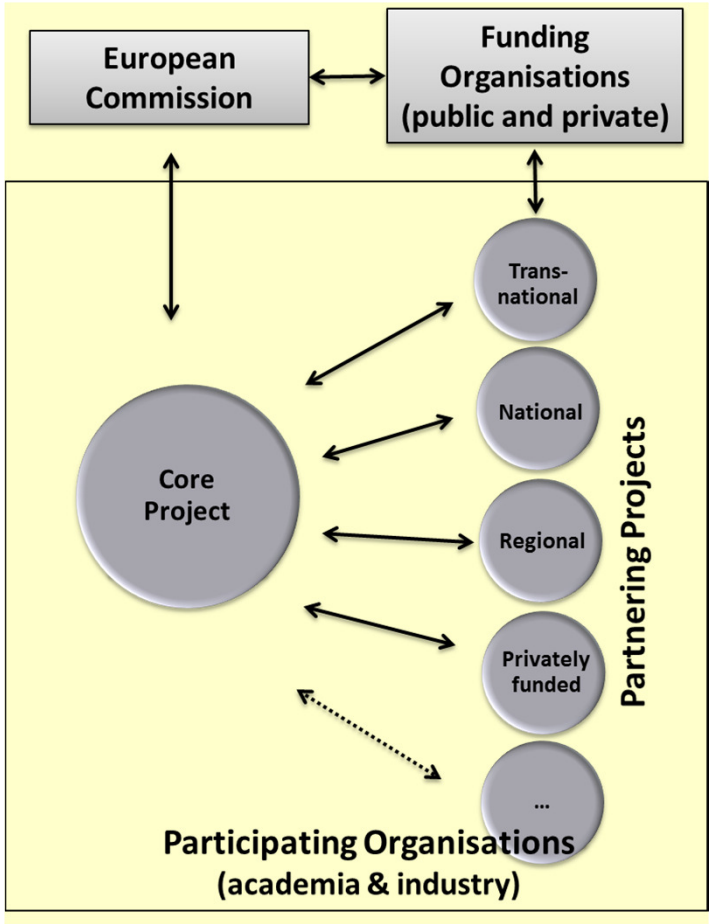
***FET** Flagships are science-driven, large-scale, multidisciplinary research initiatives oriented towards a unifying goal, aiming at transformational impacts with substantial benefits for European competitiveness and for society.*

	FET-Flagships	185M
FETFLAG-01-2016	Partnering environment for FET Flagships	
	ERA-NET Cofund action (deadline 1 March 2016)	8M
	Coordination and Support Action (deadline 1 March 2016)	1M
[2017]	Pro memori: Core project funding (through 'Other Actions')	88+88M

FET Flagship Partnering Projects

- *The implementation model of the Flagships aims to link together and ensure coordination and synergy of all those research activities relevant for the Flagship that are funded by the Commission and the Member States.**

- *Partnering Projects are projects supported by national/regional funding agencies and/or by private funding. They are addressing areas relevant for the Flagships and contribute to their objectives.***



*See http://ec.europa.eu/programmes/horizon2020/en/news/fet-flagship-model-implementation-and-governance-model-horizon-2020-short-overview-presentation

**See Staff Working Document: SWD(2014) 283 final of 16.09.2014

Call for experts !

- **Do you have a high-level of expertise in the relevant fields of research and innovation of H2020?**

- **Can you be available for occasional, short-term assignments**

Sign up at the participant portal:

http://ec.europa.eu/research/participants/portal/desktop/en/experts/

Thanks for your attention!

H2020 website:
http://ec.europa.eu/programmes/horizon2020/
Participant portal:
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/index.html

FET Work Programme 2016-2017 call text :
http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-fet_en.pdf

Twitter: @FET_EU


FET
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