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Future & Emerging Technologies (FET)

Horizon 2020

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Agenda

- Future and Emerging Technologies in Horizon 2020
 - FET Open
 - FET Proactive
 - FET Flagship

- Key Elements

- Towards WP FET 2016-17



[FET]

Excellent Science

- **European Research Council**
 - Frontier research by the best individual teams
- **Future and Emerging Technologies**
 - Collaborative research to open new fields of innovation
- **Marie Skłodowska Curie actions**
 - Opportunities for training and career development
- **Research infrastructures** (including e-infrastructure)
 - Ensuring access to world-class facilities

Industrial Technologies

- **Leadership in enabling and industrial technologies**
 - ICT, nanotechnologies, materials, biotechnology, manufacturing, space
- **Access to risk finance**
 - Leveraging private finance and venture capital for research and innovation
- **Innovation in SMEs**
 - Fostering all forms of innovation in all types of SMEs

Societal Challenges

- **Health, demographic change and wellbeing**
- **Food security, sustainable agriculture, marine and maritime research & the bioeconomy**
- **Secure, clean and efficient energy**
- **Smart, green and integrated transport**
- **Climate action, resource efficiency and raw materials**
- **Inclusive, innovative and reflective societies**
- **Security society**

European Institute of Innovation and Technology (EIT)

Spreading Excellence and Widening Participation

Science with and for society

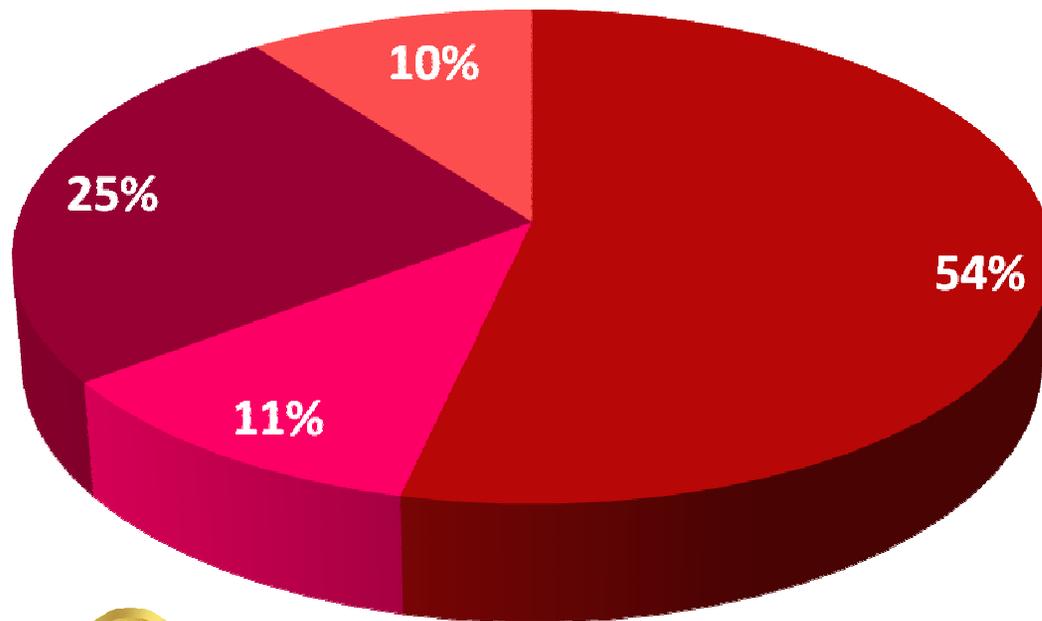
Joint Research Center (JRC)



[Excellent Science]

Budget

€ 22.274 M



€ 2.696 M for FET

- European Research Council
- Future and Emerging Technologies
- Marie Skłodowska Curie Actions
- European Research Infrastructures (including eInfrastructures)





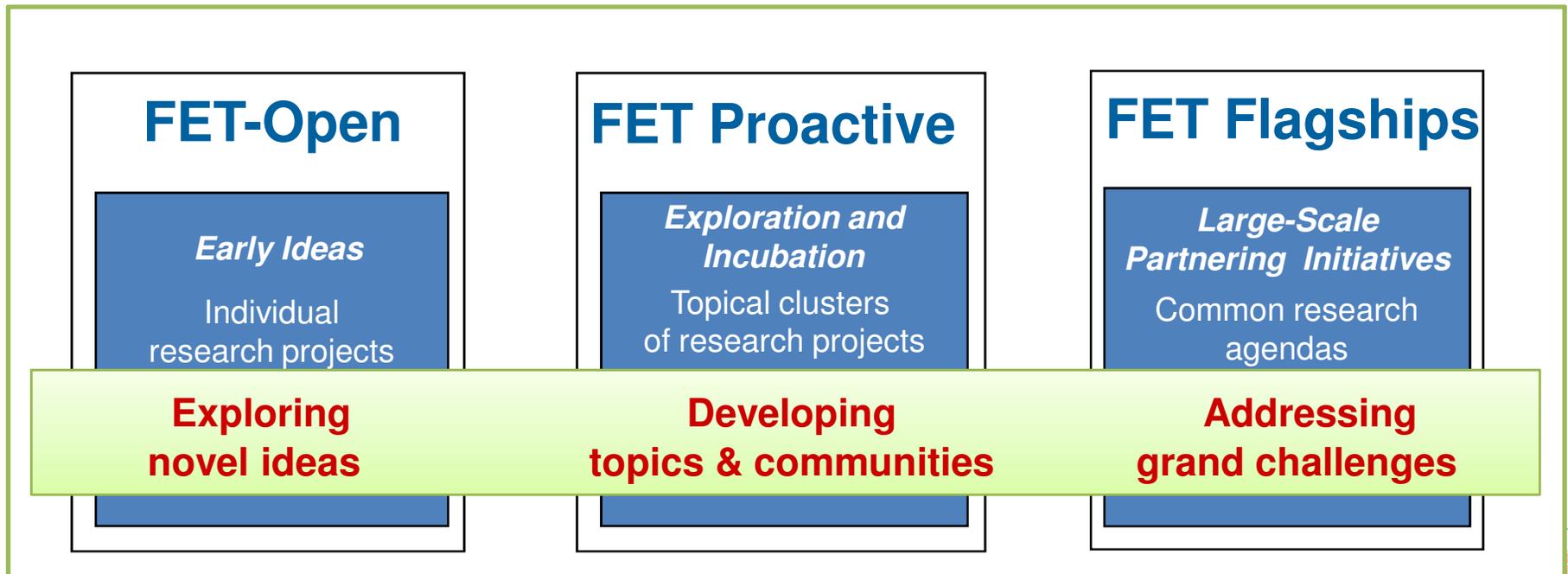
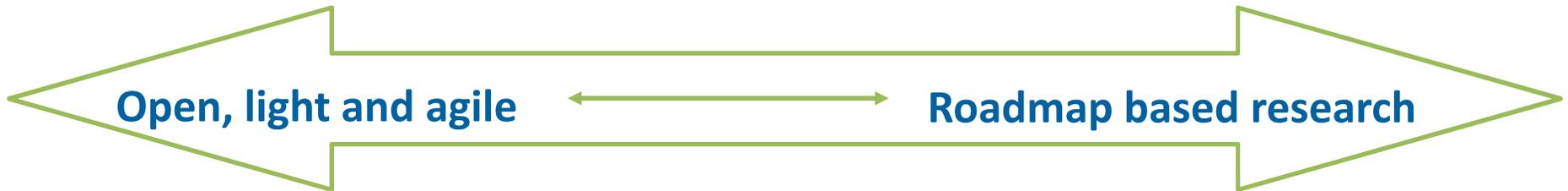
[FET in Horizon2020]

Pathfinding Europe's technological future

"Future and emerging technologies shall support collaborative research in order to extend Europe's capacity for advanced and paradigm-changing innovation. It shall foster scientific collaboration across disciplines on radically new, high-risk ideas and accelerate development of the most promising emerging areas of science and technology as well as the Union wide structuring of the corresponding scientific communities."



[FET Funding Schemes]





Future & Emerging Technologies (FET)

FET Open



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[FET OPEN: Objectives]

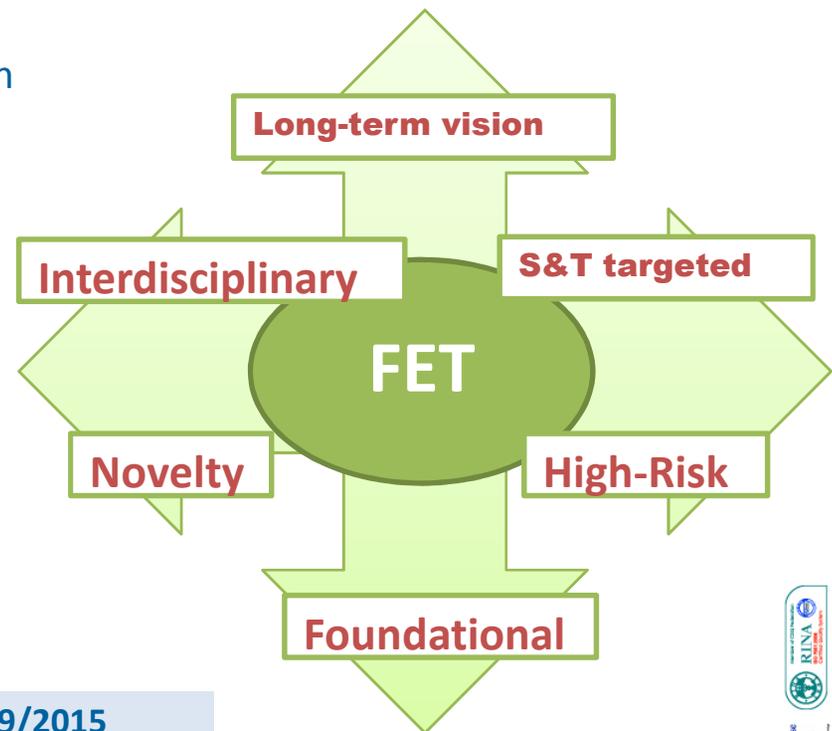
- ✓ FET Open supports **early-stage joint science and technology** research around new ideas for radically new future technologies.
- ✓ It will build up a diverse portfolio of targeted projects to explore a wide range of **new technological possibilities**, inspired by cutting-edge science, **unconventional 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 Open: 2015]

Call FET-Open : novel ideas for radically new technologies

- 'Open is open'
 - All technologies, no thematic restriction
- FET gatekeepers define the kind of research that FET is looking for
 - Scope defined by the 6 gatekeepers
 - Bottom-up, but targeted - not blue sky research
 - Collaborative research
- Total budget: 160M€ in 2014-15
- Instrument
 - Research and Innovation Action - 154M€
 - Coordination and Support actions (CSA) – 6M€
- RIA Proposal Template: 16 pages



Deadlines	30/09/2014	31/03/2015	29/09/2015
Budget	77 M€	38,5 M€	38,5M€



[FET Open: Gatekeepers]

- ✓ **Long-term vision:** a new, original or radical long-term vision of technology-enabled possibilities going far beyond the state of the art
- ✓ **Breakthrough S&T target:** scientifically ambitious and technologically concrete breakthroughs plausibly attainable within the life-time of the project.
- ✓ **Foundational:** the breakthroughs must be foundational in the sense that they can establish a basis for a new line of technology not currently anticipated.
- ✓ **Novelty:** new ideas and concepts, rather than 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 go beyond current mainstream collaboration configurations in joint S&T research, and must aim to advance different scientific and technological disciplines together and in synergy towards a breakthrough.

<http://ec.europa.eu/digital-agenda/en/news/fet-living-interdisciplinarity>



[FET Open: CSA 2015]

FETOPEN 2: Coordination and Support Activities 2015

- ✓ 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 communities
 - ✓ **FET Take Up**: 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. Outreach to investors and entrepreneurs,
 - ✓ Project size: 0,3 to 0,5M€ per topic, up to 1M€ for FET Conference
- ✓ Budget & deadline:
 - 3M€ -> Deadline: 30/9/2015



[ERC-FET: conclusions from FP7- ERC portfolio analysis]

- Overlap is small, thus complementarity strong.
- **Interdisciplinary and technology** remain the FET specificity
- Cross-over happens mainly through individuals that use both programmes
 The best way to **cross-fertilize between programmes** is to have people moving from one to the other with their ideas.
- **Very specific solutions in concrete domains** more than technologies' (with exceptions)
- Most of these (not all) remain far from market
- Several ERC grantees took their **first steps to excellence** in FET collaborative projects; Others develop ERC results in more applicative settings in FET
- Some areas with high **innovation potential** don't seem well covered by FET, in particular medical (e.g. focus on specific pathologies) and energy.



FETOPEN-RIA-2015-1

Proposals submitted for FETOPEN 2nd cut off:

- 670 proposals submitted for RIA
 of these 186 (28%) were submitted also at the 1st cut off.

- 21 proposals submitted for CSA

- Follow-up of the 1st cut-off proposals
 - 61% proposals evaluated above threshold were resubmitted in the 2nd cut off
 - 12% proposals were below one or more thresholds, ineligible, inadmissible or withdrawn, were resubmitted





FETOPEN-RIA-2015-1

Division of RIA proposals into 4 clusters

- Electronics, ICT, Systems and Communication Engineering.
- Chemistry, Materials, Energy and Environment.
- Physics, but also few proposals from Mathematics, Sociology and Economics,
- Life Sciences.

IMPORTANT: FETOPEN RIA has only 1 evaluation panel, 1 budget and 1 ranking list.



Well Done!

- ✓ **Clarity of targeted breakthrough** (*objectives*)
- ✓ **Foundational character and novelty** (*possible extension of existing technologies*)
- ✓ Focus on **Technology** and problem to be address with a **clear methodology**
- ✓ **Challenges and high risk** (*experimental*)
- ✓ **Risk management** (*clear strategy*)
- ✓ **Ethical advisory board** (*collaboration modalities*)
- ✓ **Link to European Research Initiatives** (interdisciplinary)
- ✓ Reference of a possible **exploitation plan**
- ✓ **Integrated Data Management Plan**
- ✓ **Good dissemination plan**





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FET Proactive



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[FET Proactive 2014-2015]

Collaborative research

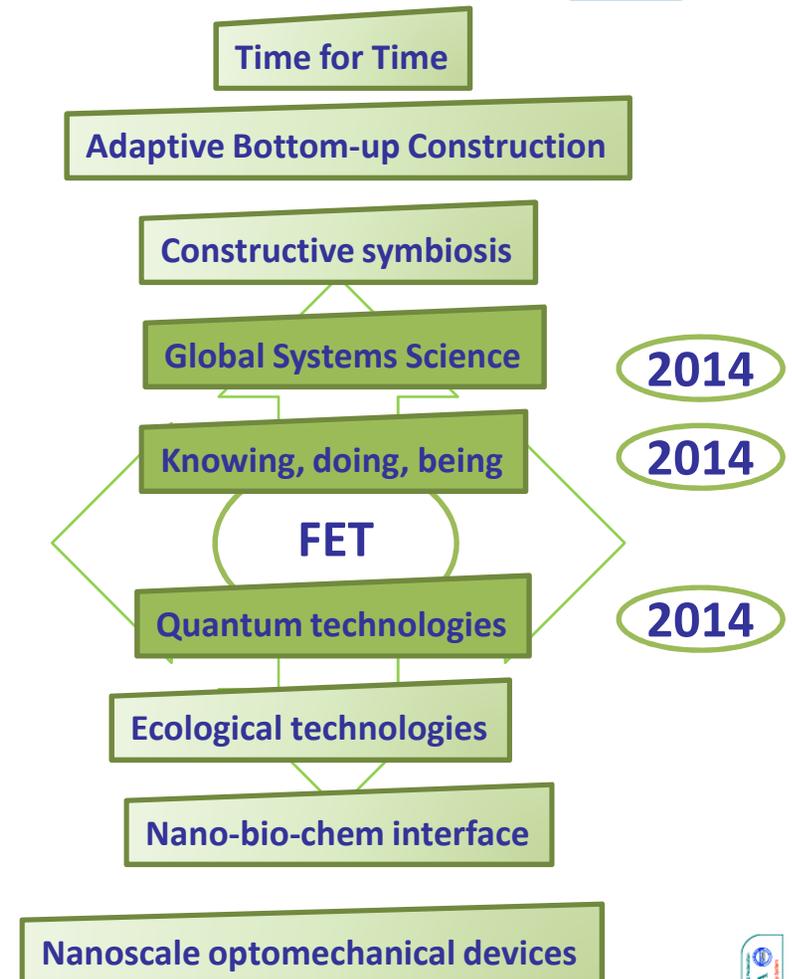
Structured around 9 candidate topics,
over 1927 contributions

A set of thematic initiatives on promising
emerging research themes.

- *Fixed deadlines calls*
- *15 page proposals*
- *1 step submission, 1 stage evaluation*
- *3 evaluation criteria*

Instrument

- Research and Innovation Actions (100% funding)
- **Total budget: 35M€ in WP 2014-15**





[FET Proactive: HPC]

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

Specific challenge: Addressing the exascale challenges to achieve, by 2020, the full range of technological capabilities for **exascale-class HPC systems** which are balanced at all levels and validated with significant application drivers

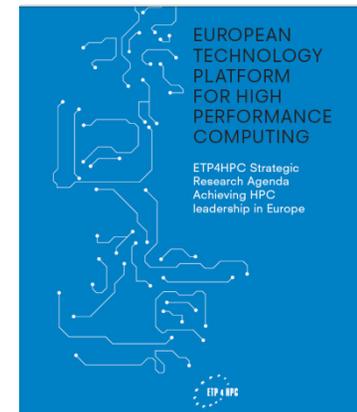
Project size : 2 to 4M€, up to 8M€ for topic a)

Budget & Deadline : 93,4M€ -> Deadline: 25/11/2014

FETHPC 2: HPC Ecosystem Development - 2014

Specific challenge: Addressing the implementation of a common HPC strategy and boosting the relevant European research excellence

Budget & Deadline: 4M€ -> Deadline: 25/11/2014



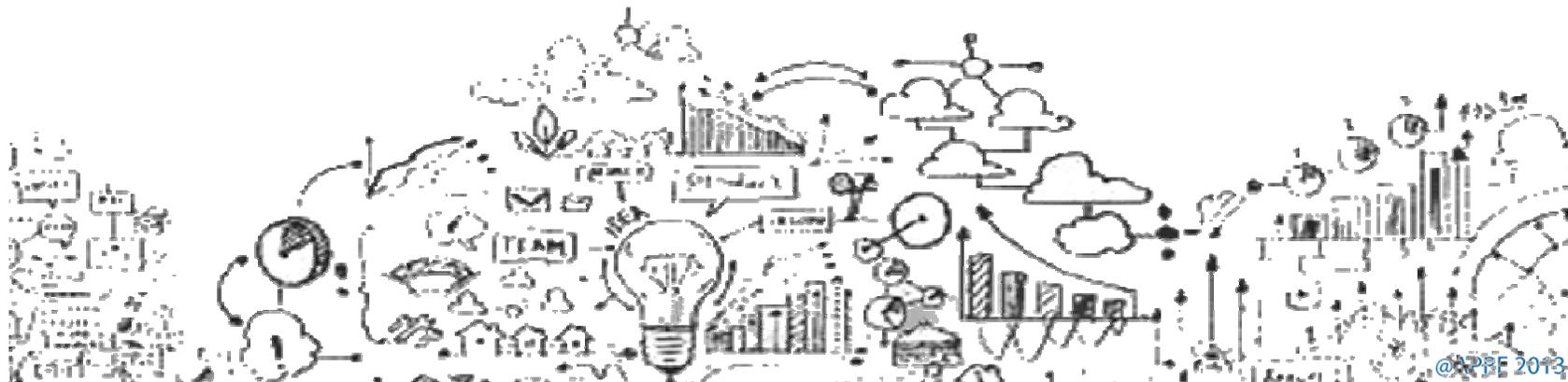
The fourth initiative implements, through a separate call (H2020-FETHPC), part of the HPC strategy elaborated in the context of the **HPC Public-Private Partnership** by **ETP4HPC**, signed on 17th December 2013.





Future & Emerging Technologies (FET)

FET Flagships



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[FET Flagships:2014-2015]

FET Flagships are highly ambitious, large-scale, long-term, science-driven, goal-oriented, roadmap-based research initiatives

FET Flagships Core projects -2015

The core project should progress FET Flagship research tasks in accordance with the defined roadmap, and also (amongst others)

- ensuring the overall continuity and coherence
- governance of the initiative
- collaboration with other initiatives or programmes at regional, national, transnational or global level (e.g. related ERANET projects)

Type of action: Research and Innovation Action funded through a specific grant agreement Framework Partnership Agreement.

Budget:

Graphene FPA: EUR 89 million from the 2015 budget

HBP FPA: EUR 89 million from the 2015 budget

Indicative timetable: Second quarter of 2015



[FET Flagships: 2014-2015]

Graphene & Human Brain Project selected



SCIENCE WORLD REPORT sciencewr.com

Home Space & The Future Nature & Environment Health & Medicine **Tech** Physics Human V

Brain Simulation and Graphene Research Receive Billion Euro Each

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Mark Hoffman First Posted: Jan 28, 2013 09:57 AM EST

The result of the highly anticipated decision of which two research projects will receive a one billion Euro research grant, the largest single research award ever, from the European Commission were announced by the European Commission's Vice-President Neelie Kroes today.



The first project is the [Human Brain Project](#), led by neuroscientist Henry Markram at the Swiss Federal Institute of Technology (EPFL) in Lausanne, which aims to simulate the human brain in a supercomputer, in order to aid medical advancement in brain disorders.

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The second, called [Graphene Project](#), is led by theoretical physicist Jari Kinaret at Chalmers University of Technology in Gothenburg, Sweden. Its goal is to develop the graphene

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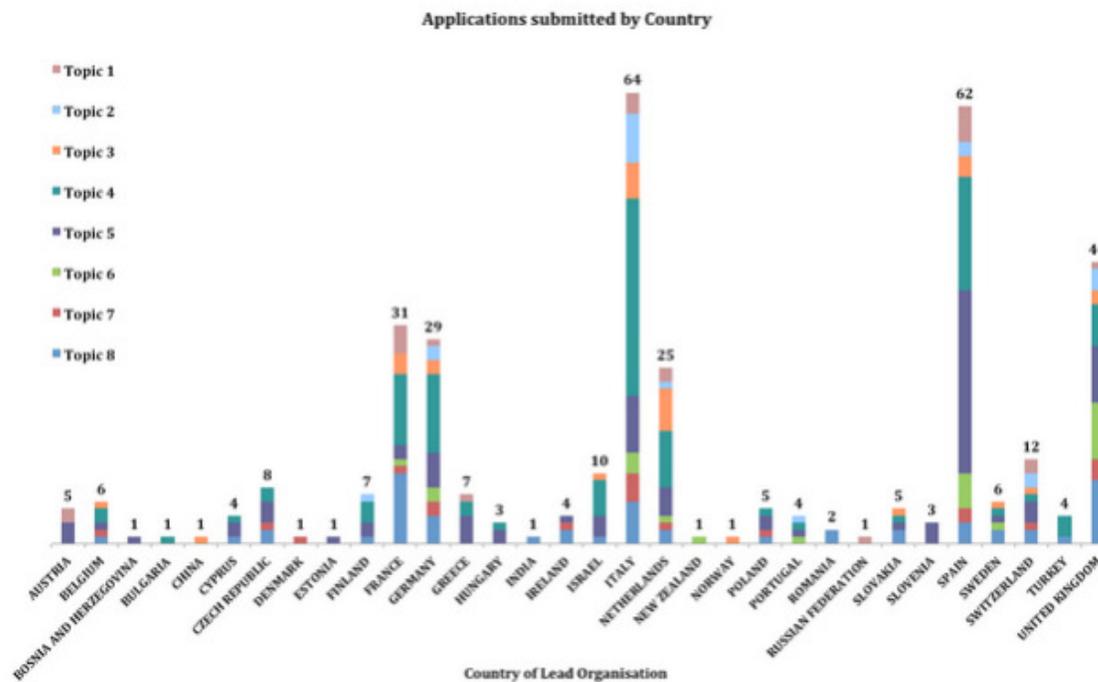




[FET Flagships: HBP 2013 Competitive Call]

Preliminary submission overview

Topics	Applications submitted
1. Human and mouse neural channelomics and receptoromics	22
2. Genotype to phenotype mapping of the mouse brain	19
3. Identifying, gathering and organizing multimodal human and nonhuman neuroscience data	28
4. Cognitive architectures	104
5. Novel methods for rule-based clustering of medical data	87
6. Neural configurations for neuromorphic computing systems	23
7. Virtual robotic environments, agents, sensory & motor systems	19
8. Theory of multiscale circuits	53
TOTAL	355





FLAG-ERA Joint Transnational Call

Started on 1st of October 2013, aimed at enhanced complementarities and synergies of regional, national, European and international research programmes and initiatives.



Joint Transnational Call, deadline PASSED 27th January 2015

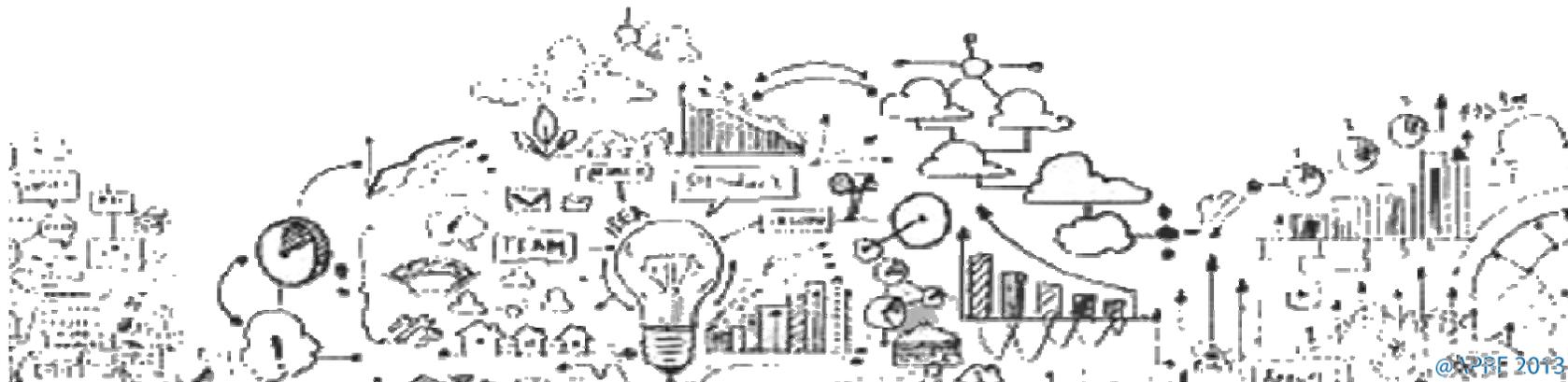
Call topics:

Graphene Flagship	Human Brain Project
1. Computational modelling of devices and systems	1. Targeted Mapping of the Mouse Brain
2. Advanced nanofabrication and spintronics	2. Targeted Mapping of the Human Brain
3. Active THz components	3. Theoretical and Mathematical Foundations of Neuroscience
4. Multifunctional composites	4. Neuroinformatics
5. Functional coatings	5. Brain Simulation
6. Nanofluidics applications	6. High Performance Computing
7. Biological and chemical sensors	7. Medical informatics
8. Immunogenomics and proteomics	8. Neuromorphic Computing
9. New layered materials and heterostructures	9. Neurorobotics
10. Energy	10. Ethics and Society
11. Prototypes	



Future & Emerging Technologies (FET)

Main elements





Education in FET

While FET actions have a **direct impact on career opportunities** through the researchers that complete PhD or post-PhD study within FET projects, further specific actions will increase the **impact on education**, for example through:

- **new academic curricula in multidisciplinary domains,**
- **increased visibility of inspiring FET topics to high-school students,**
- **entrepreneurship courses,**
- **training opportunities for industry.**



Responsible Research and Innovation (RRI) and Social Sciences and Humanities (SSH)

Future and emerging technologies can have a profound impact on our lives and society. Therefore, the **Social Sciences and Humanities (SSH)** play an important role in the **multi-disciplinary research** supported by FET.

Attention will be given also to **Responsible Research and Innovation (RRI)** so that new technologies can be gracefully embedded in society, thus contributing fully to a more sustainable future and to a society that is supportive of research.

Specific actions could cover the **widening of the ethics debate** in multi-disciplinary research endeavors, involving also the behavioral sciences, and active engagement with the organized civil society and the public at large.

Various aspects (**gender, participation, public engagement, informal learning**) explicitly mentioned where relevant



Industrial & SMEs Participation

FET Open will discover the 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**.

A particular attention will be paid to tap into the **innovation potential** that can **accelerate the exploitation of early results** from FET research. It will be considered including support to the **high-potential innovators** that can push the realization of untapped market opportunities emerging from FET research results.

Interdisciplinary aspects will be discovered also on regards of innovation potential between **collaboration academia/private sector**, in order to achieve advances on **professional skills and market replicable ideas** coming from academia landscape.



Industrial & SMEs Participation

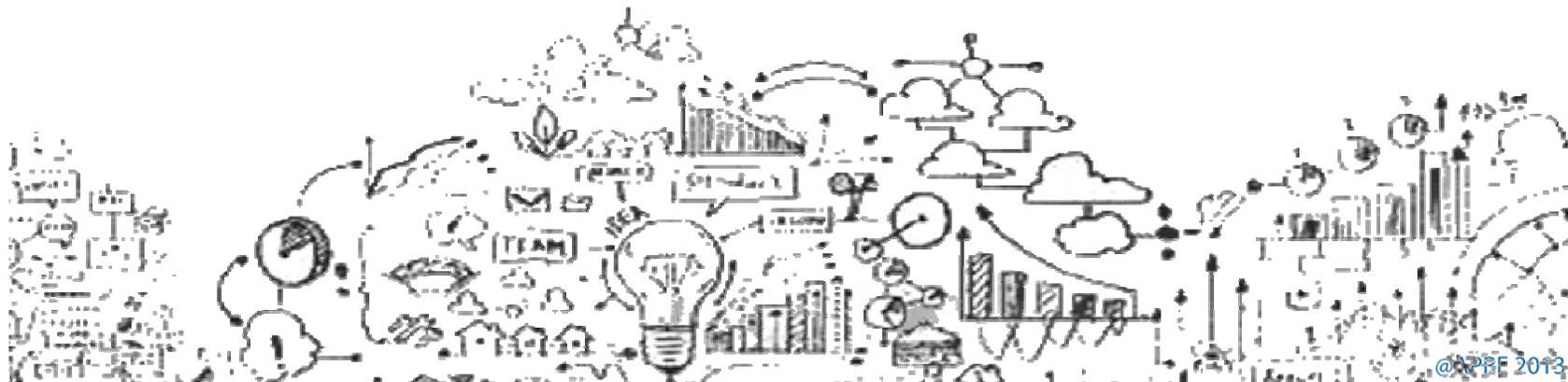
Key Note:

- Link **novel ideas** from science on the one hand, and marketable ideas on the other, and can lead to new, visionary and **non-mainstream business opportunities** and future markets.
- Generate a new scientific and technological asset base on which the SMEs can establish themselves firmly as future innovation players in areas with a **high potential for future commercial or societal impact**.
- **NO short term commercial outcomes:**
 not support, for example, the incremental improvement of state-of-the-art technology, mainstream research aimed at short term product or service development, the incremental improvement of existing lines of business activity, research aimed to catch-up with the competition, foraging or market studies, or the mere development of new business models or business plans.
- The aim is **not for the industrial part to coordinate the academic part something obviously unrealistic**. What we need is to build further the academic dimension of the European ecosystem through a separate action driven by academia itself.



Future & Emerging Technologies (FET)

Waiting for 2016-17





FET WP 2016-17 Structure

- FET-Open – novel ideas for radically new technologies
 - FET-Open RIA
 - FET Open CSA
 - FET-Innovation Launchpad **NEW**
- FET Proactive – boosting emerging technologies
 - FET-Proactive emerging themes and communities
 - FET ERANET CHISTERA
 - FET ERANET Cofund in Quantum Technologies **NEW**
- FET Proactive – High Performance Computing
 - Co-design of HPC systems and applications
 - Transition to Exascale Computing
 - Exascale HPC ecosystem development
- FET Flagships – tackling grand interdisciplinary science and technology challenges
 - Partnering environment for FET Flagships
- Other Actions
 - FET Flagship Core Projects (within FPAs)



FET WP 2016-17: Proactive emerging themes

- *4 of 10 themes (derived from consultation) identified*
 - Collective technologies for societal change
 - Biotech and computing for better life
 - Alternative technologies for smart devices
 - New technologies for Energy and Materials

Range of topics for which FET may provide funding under its Proactive scheme:

<http://ec.europa.eu/programmes/horizon2020/en/node/1422>



Useful Links

✓ Proposal Template

http://ec.europa.eu/research/participants/data/ref/h2020/other/call_ptef/pt/h2020-call-pt-ria-ia_fetopen-fetproact_en.pdf

✓ Self Evaluation Form

http://ec.europa.eu/research/participants/portal/doc/call/h2020/h2020-fetopen-2014-2015-1/1592627-self-evaluation_form_fetopen-1_fetproact_en.pdf

✓ Previous Projects funded under H2020- FET

[http://cordis.europa.eu/projects/result_en?q=\(contenttype%3D'project'%20OR%20/result/reasons/categories/resultCategory/code%3D'brief','report'\)%20AND%20programme/pga%3D'H2020-EU.1.2.*](http://cordis.europa.eu/projects/result_en?q=(contenttype%3D'project'%20OR%20/result/reasons/categories/resultCategory/code%3D'brief','report')%20AND%20programme/pga%3D'H2020-EU.1.2.*)

✓ FET – WP 2016-2017 preparation

<http://ec.europa.eu/programmes/horizon2020/en/node/1422>



GRAZIE PER L'ATTENZIONE!

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