

# FUTURE AND EMERGING TECHNOLOGIES: FET IN H2020



FFG

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# TABLE OF CONTENT



- I. Future & Emerging Technologies in H2020
- II. FET OPEN
- III. FET INNOVATION LAUNCHPAD
- IV. FET HIGH PERFORMANCE COMPUTING
- V. Proposal Preparation & Evaluation
- VI. References

*Writing a good FET OPEN proposal is probably  
as hard as writing a good scientific publication*



- I. Future & Emerging Technologies in H2020
- II. FET OPEN
- III. FET INNOVATION LAUNCHPAD
- IV. FET HIGH PERFORMANCE COMPUTING
- V. Proposal Preparation & Evaluation
- VI. References



1. EC program for a comprehensive challenge-driven research and innovation (2014-2020)
2. A policy tool for Europe 2020 / Innovation Union and European Research Area:
  - Responding to the economic crisis to invest in future jobs and growth
  - Addressing people's concerns about their livelihoods, safety and environment
  - Strengthening the EU's global position in research, innovation and technology
3. Largest Community Program (~ 80 B€)



# HORIZON 2020 STRUCTURE



## Excellent Science

European Research Council (ERC)

Future and Emerging Technologies (FET)

Marie Skłodowska Curie (MSCA)

Research infrastructures

## Industrial Leadership

Leadership in enabling and industrial technologies

Access to risk finance

Support innovation in SMEs

**JTIs**

## Societal Challenges

Health, demographic change

Food security, water

Secure, clean and efficient energy

Smart, green and integrated transport

Climate action, resource efficiency & raw materials

Inclusive, innovative and reflective societies

Protecting freedom and security

**Art. 185**

**Widening Participation**

**Science in Society**

**EIT**

**JRC**

**Euratom**

European Research Council (13 B€)

Marie Skłodowska-Curie Actions (6,1B€)

Future and Emerging Technologies 2,7 B€\*

Research Infrastructures program (2,4 B€)

*\* including the FET contribution to the Juncker investment package of 118 M€ over 2016-2018*



# FET MISSION



- To turn Europe's excellent science base into a competitive advantage by uncovering radically new technological possibilities
- To turn Europe into the best place for collaborative research and innovation in future and emerging technologies



*Min. 3 partners  
from 3 EU MS/AC*

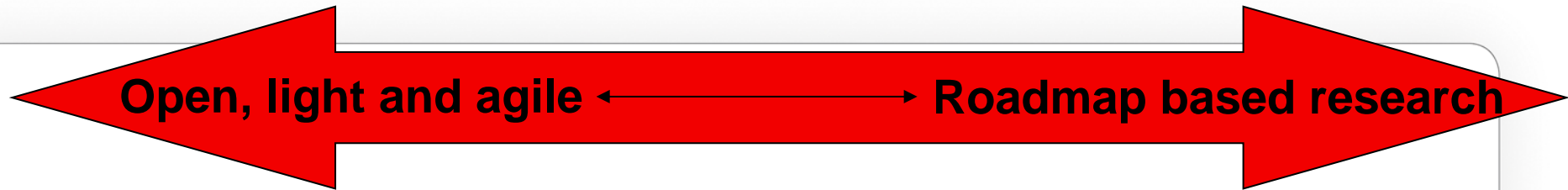
- A European lighthouse of thought leadership on future technologies
- Enlarged mandate: from ICT to 360° tech. coverage
- Implementing the European Open Science vision
- New large-scale partnering initiatives complementing small and medium scale collaborative research activities
  - FET Flagships: Graphene and Human Brain Project
  - High-Performance Computing (Public-Private Partnership)
- Bridging from science to innovation
- Key actor in the European funding landscape for S&T
- 3-fold increase of budget @ 2,7 B€



# THREE COMPLEMENTARY PROGRAM LINES



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## FET-Open

**40%**

*Early Ideas*

Individual research projects

**Exploring novel ideas**

## FET Proactive

*Exploration and Incubation*

Critical mass making a case

**Developing topics & communities**

## FET Flagships

*Large-Scale Partnering Initiatives*

Common research agenda

**Addressing grand challenges**

- I. Future & Emerging Technologies in H2020
- II. **FET OPEN**
- III. FET INNOVATION AND SMC
- IV. FET HIGH PERFORMANCE COMPUTING
- V. Prop. Preparation & Evaluation
- VI. References

*FET Proactive opens only in 2018*



# FIRST SCHEME : FET-OPEN

- What will be funded:  
Embodiment of novel ideas into radically new technologies  
→ TECHNOLOGY PROGRAM!
- Optimal project result:  
Proof of principle  
Early lab demonstrator



Selection for funding is based on six “gatekeepers” = necessary features that any proposal with a chance to be funded has to have



## 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 scientific and technological target**

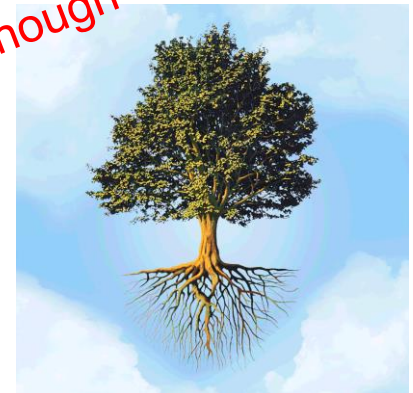
Research must target a scientifically ambitious and technologically concrete breakthrough, argued to be a crucial step towards achieving the long-term vision. The plausibility of the proposed breakthrough to be attained within the life-time of the project must be argued in the proposal.



## 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.

*Watch out: most proposals fail on novelty!  
System integration rarely enough*



## 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.

Beyond 'it has not been done before'





## 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 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.

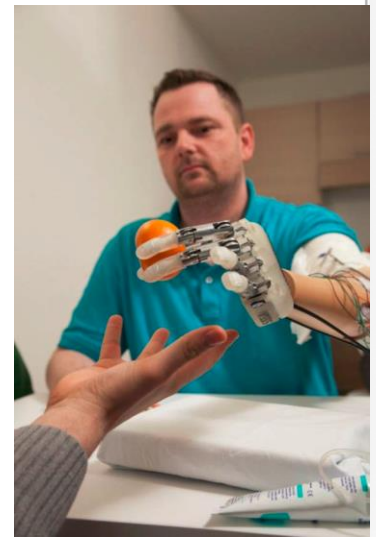
*Don't work just with your friends!*



## NEBIAS

Project aims at developing and clinically evaluating a neuro-controlled upper limb prosthesis intuitively controlled and felt by the amputee as the natural one. This will be possible by means of a novel neural interface able to provide a stable and very selective connection with the nervous system. It will allow recording of the motor-related signals governing the actions of the amputated hand/arm as well as providing sensory feedback from tactile and kinesthetic sensors.

Coordinator: Scuola Superiore Sant'Anna, Italy



### HIVE

While recent research has delivered important breakthroughs in brain-to-computer transmission, little has been achieved in computer-controlled brain stimulation. Our goal is to research, design, develop and test a new generation of more powerful and controllable non-invasive brain stimulation technologies. The project will develop multisite transcranial current stimulation technologies implementing real time EEG monitoring and feedback and explore high-level communication. Coordinator: Starlab Barcelona SL, Spain



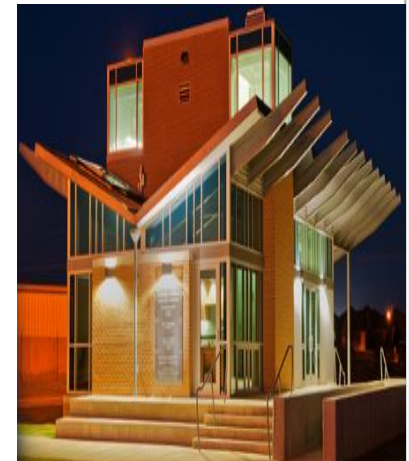
# FET OPEN: H2020 EXAMPLE 1 (Proposals selected for funding in Call May 2016)



## AMADEUS

Project investigates the next generation of materials and devices for latent heat thermal energy storage at ultra-high temperatures of up to 2000°C based on new phase-change materials coupled with novel solid-state heat to power conversion technologies.

Coordinator: Universidad Politécnica de Madrid, Spain



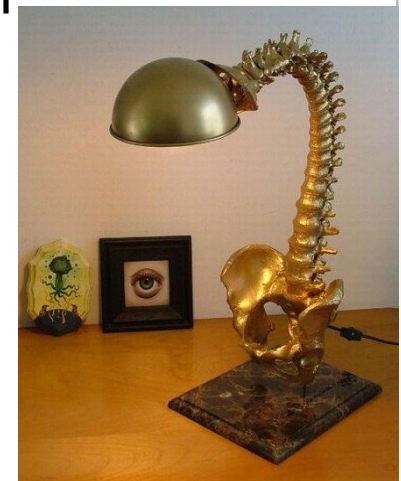
# FET OPEN: H2020 EXAMPLE 2 (Proposals selected for funding in Call May 2016)



## ByAxon

Project develops new generation of sensors and electrodes based on nano-materials for neural interfacing. We aim to design and build a prototype of an active implant that could work directly at the spinal cord level including providing proper sensory feedback.

Coordinator: Fundación Imdea Nanociencia, Spain



# FET OPEN: TYPICAL PARAMETERS



## Typical projects:

- Smaller budget:  $\leq 3$  M€
- Smaller consortia: 3 - 6 partners
- Shorter execution time: ~3 years



# FET OPEN: TYPICAL PARAMETERS



‘Light’ scheme:

- Light submission: single-stage, ‘1+15’ pages
- Light administration: mid-term and final reviews based on periodic S&T reports





# FET OPEN: EVALUATION CRITERIA



Watch out for deviations from the standard rules of H2020!

Criterion	Treshold	Weight
Excellence	<b>4/5</b>	<b>60%</b>
Impact	3.5/5	20%
Implementation	3/5	20%



## Upcoming cut-off dates:

- 11 January 2017: budget 84 M€
- 27 Sept. 2017: budget 84 M€

## Details & Submission Tool:

<http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/fetopen-01-2016-2017.html>



# MAY 2016 CUT-OFF DATE: Summary of evaluation results (RIA)



- 548 proposals submitted:
  - 44% resubmissions from Sept. 2015 cut-off date
  - 50% scored above thresholds requesting 962 M€
- Evaluation results:
  - 22 grants in preparation: total EU contribution 84.8 M€
  - 1 proposal on reserve list
  - 19 proposals on main list are resubmissions from earlier cut-off dates
- Success rates:
  - General: 4,0%
  - **By resubmissions: 7,1 % 😊**



# FET OPEN: PAST H2020 PROJECTS



Four cut-off dates so far:

- 30. Sept. 2014/ 24 RIAs funded:  
<http://ec.europa.eu/programmes/horizon2020/en/news/fet-open-projects-grant-agreement-preparation-phase>
- 31. March 2015/ 11 RIAs funded:  
<https://ec.europa.eu/programmes/horizon2020/en/news/fet-open-second-cut-projects-have-started>
- 30. Sept. 2015/ 11 RIAs funded:  
<http://ec.europa.eu/programmes/horizon2020/en/news/fet-open-13-new-proposals-start-preparation-grant-agreements>
- 11. May 2016/ 22 RIAs funded:  
<https://ec.europa.eu/programmes/horizon2020/en/news/25-new-fet-open-ideas-breakthrough-technologies>

- I. Future & Emerging Technologies in H2020
- II. FET OPEN
- III. FET INNOVATION LAUNCHPAD**
- IV. FET HIGH PERFORMANCE COMPUTING
- V. Proposal Preparation & Evaluation
- VI. References



- Since WP 2016/2017, a new minor funding line within FET OPEN line of action
- Objective: Funding further innovation-related work:
  - 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.



## Possible activities:

- Definition of a commercialisation process to be followed
- Market and competitiveness analysis
- Technology assessment
- Consolidation of IPR and IP strategy
- Scenario and business case development
- Developing contacts and support relevant activities with industrial transfer partners, potential licence-takers, investors, societal organisations or potential end-users
- ...



- EC contribution: max. 100 k€ over 18 months
- Single step submission, '1+7' pages
- Eligibility criterion:  
**Ongoing FET Open/Proactive project or project with max. one year after the end-date**
- No further (substantial) R&D activities funded
- No direct link with originating consortium needed
- Single participant possibility
- H2020 financial rules apply (e.g. no full funding for construction of prototypes)





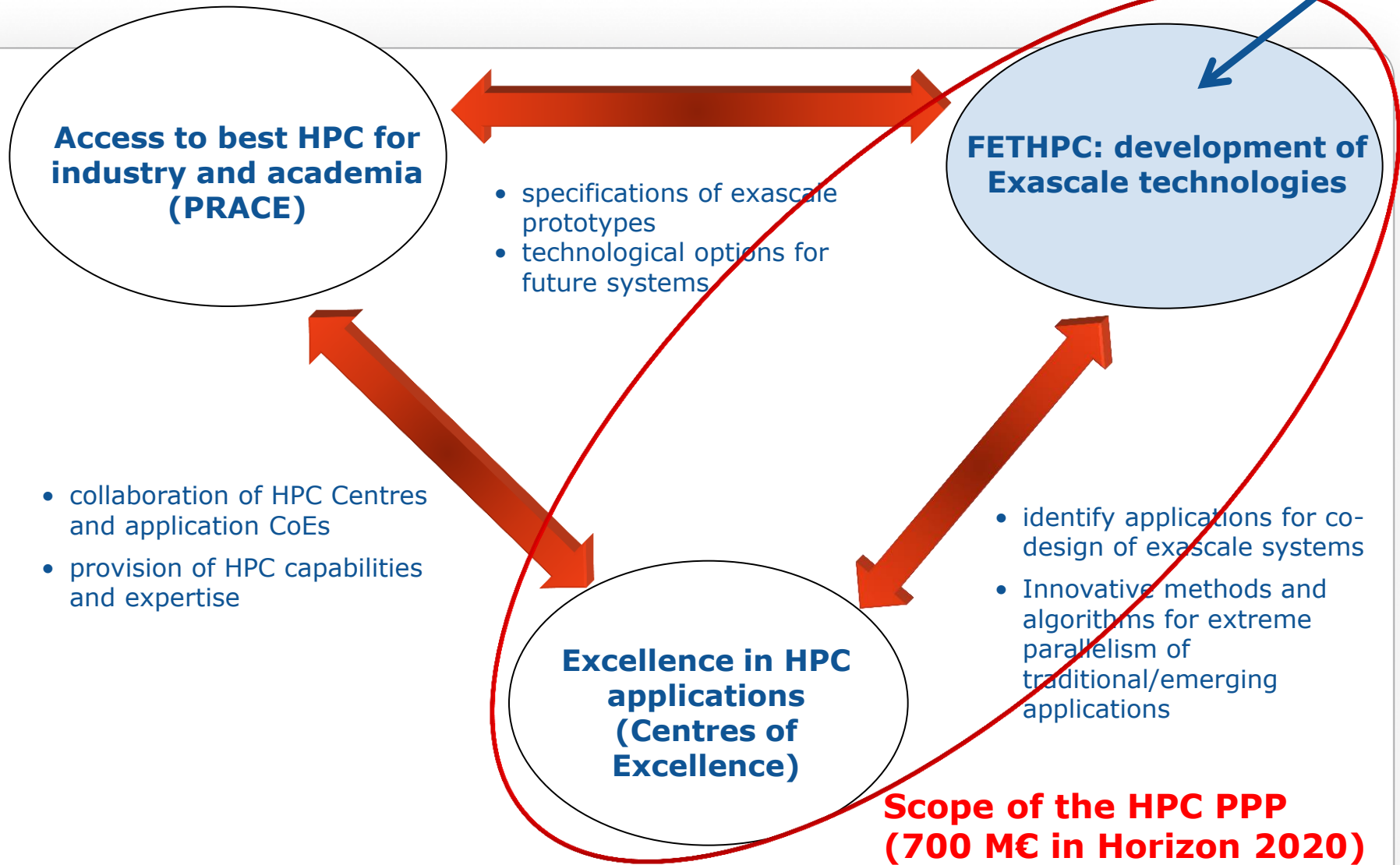
- Experience so far:
  - Success rate ~15%
  - Half of applications from universities, ~25% public research organisations, ~25% industry & SMEs
- Next cut-off date:
  - 27 September 2017: budget 1,8 M€



- I. Future & Emerging Technologies in H2020
- II. FET OPEN
- III. FET INNOVATION LAUNCHPAD
- IV. FET HIGH PERFORMANCE COMPUTING**
- V. Proposal Preparation & Evaluation
- VI. References



# HIGH PERFORMANCE COMPUTING: SUPPORT FROM THE EC



# HIGH PERFORMANCE COMPUTING: SUPPORT FROM THE EC



## HPC in FET:

- Development of „next generation“ HPC systems (from petascale to exascale)

## HPC elsewhere in H2020:

- Calls in subprograms e-Infrastructures: Access to „supercomputer“ facilities and services
- Calls in LEIT-ICT: Excellence in HPC applications

## HPC Public Private Partnership:

- ETP4HPC <http://www.etp4hpc.eu/>



# HIGH PERFORMANCE COMPUTING: SUPPORT FROM THE FET PROGRAM



## HPC topics in FET WP 2016-2017:

- 2016: Co-design of HPC systems and applications
- **2017: Transition to Exascale Computing (RIA)**
- **2017: Exascale HPC ecosystem development (CSA)**



# FETHPC-02-2017: Transition to Exascale Computing (RIA)



Proposals have to cover one of the following sub-topics:

- a. High productivity programming environments for exascale
- b. Exascale system software and management
- c. Exascale I/O and storage in the presence of multiple tiers of data storage:
- d. Supercomputing for Extreme Data and emerging HPC use modes
- e. Mathematics and algorithms for extreme scale HPC systems and applications working with Extreme Data

*At least one project per subtopic (i.e. layer of the exascale stack) will be funded*



# FETHPC-02-2017: Transition to Exascale Computing (RIA)



## Typical parameters:

- Smaller focused projects
- 2-4 M€ indicative funding per project
- Deadline: 26 Sept. 2017
- Total budget 40 M€
- EC is looking for a step-change, i.e. good arguments for your development and achievable goals by 2022 are to be provided.



# FETHPC-02-2017: Transition to Exascale Computing (RIA)



## Further advice:

- Consult the Strategic Research Agenda of ETP4HPC
- Look at the current Centers of Excellence funded under the e-Infrastructure Program
- Check the call EINFRA-21-2017 (b) 2 'Computing e-infrastructure with extreme large datasets' for funding deployment of existing methods





# FETHPC-03-2017: Exascale HPC ecosystem development (CSA)



- Coordination & Support Action:
- Two subtopics:
  - Coordination of the Exascale HPC strategy and International Collaboration
  - Boosting excellence in Exascale Computing Systems
- 1-2 M€ indicative funding per project
- Deadline: 26 Sept. 2017
- Total budget 4 M€



- I. Future & Emerging Technologies in H2020
- II. FET OPEN
- III. FET INNOVATION LAUNCHPAD
- IV. FET HIGH PERFORMANCE COMPUTING
- V. Proposal Preparation & Evaluation
- VI. References



- ‘Participant Portal’ of the EC for H2020:
  - All information about H2020 and H2020 calls
  - Direct link to the submission tool from the call web page
  - <http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020>



# FET RIA PROPOSAL STRUCTURE



- Template is to be downloaded from the submission portal
  - 1+3+2 sections:
    - Front page: Acronym, title & abstract
    - Section 1. S&T Excellence
    - Section 2. Impact
    - Section 3. Implementation
- 
- Section 4. Consortium
  - Section 5. Ethics & Security

15 pages max !!!



# EVALUATION CRITERIA



Description/content of sections 1-3 matches very closely  
the description/content of the respective evaluation  
criteria!



# 1. SECTION S&T EXCELLENCE (FET OPEN 2017)



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- Long term vision and targeted breakthrough towards that vision, objectives (SMART rule!\*)
- Novelty, non-incrementality, plausibility and foundational character (new line of S&T research)
- Research methodology, dealing with S&T risks
- Interdisciplinarity

*\*Specific Measurable Attainable Relevant Time-Bound*





Compliance with the FET-gatekeepers as described in the call:

- Clarity and novelty of long-term vision, and ambition and concreteness of the targeted breakthrough towards that vision.
- Novelty, non-incrementality and plausibility of the proposed research for achieving the targeted breakthrough and its foundational character.
- Appropriateness of the research methodology and its suitability to address high scientific and technological risks.
- Range and added value from interdisciplinarity, including measures for exchange, cross-fertilisation and synergy.

Threshold: 4/5, Weight: 60%

## 2. SECTION IMPACT (FET OPEN 2017)



- Impact on technology and/or society
- Impact on future European S&T and industrial leadership
- Dissemination and exploitation of project results
  - Plan for dissemination and exploitation of results
  - Proposed measures to achieve expected impact (specific measures for target groups)
  - How will research data be exploited and/or be shared for verification and re-use
  - Strategy for knowledge management and protection
- Communication of project activities and findings





## Subcriteria for evaluation criterion 2 Impact



Contributions to the impacts listed under this topic in the work program:

- Importance of the new technological outcome with regards to its transformational impact on technology and/or society.
- Impact on future European scientific and industrial leadership, notably from involvement of new and high potential actors.
- Quality of methods and measures for achieving impact beyond the research world and for establishing European thought leadership, as perceived by industry and society.

Threshold: 3.5/5, Weight: 20%

### 3. SECTION IMPLEMENTATION (FET OPEN 2017)



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- Work plan and intermediate targets, work packages (and their interaction)...
- Management structure, procedures, milestones and implementation risks
- Relevance of expertise in the consortium
- Allocation and justification of resources (person-months, equipment, budget)





The following aspects are taken into account:

- Soundness of the work plan and clarity of intermediate targets.
- Relevance of expertise in the consortium.
- Appropriate allocation and justification of resources (person-months, equipment).

Threshold: 3/5, Weight: 20%



## 4. SECTION CONSORTIUM

This section is NOT part of the expert evaluation and is NOT covered by the page limit.

HOWEVER, the information provided here will be used to judge the operational capacity [of the project partners]!

- Participants (applicants), how they match the tasks assigned, CVs of key personnel...
- Third parties involved in the project (third party resources)



## 5. SECTION ETHICS AND SECURITY



This section is NOT part of the expert evaluation and is NOT covered by the page limit.

- Ethics: to be filled in ONLY if the ethical issues in Part A flagged
- Evtl. security issues, classified info



# INDICATORS THAT YOUR IDEAS IS NOT FET



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- You propose basic research without any technology being developed/envisioned.
- You are addressing a topic which is/has already been in another work program.
- You are addressing a topic from a Roadmap of a stakeholder organisation.
- Your proposal goes beyond proof of concept or technology demonstration to technology validation.
- A product derived from your work will be on the market within five years.



# TAKE-HOME MESSAGES



- Balance between ground-breaking and feasibility = high risk, but realistic.
- 'Less is more': it's the idea that counts, do not attempt to cover everything.
- **FET character needs to be visible early in the proposal!**
- Consortium 'fit for purpose'
- If feasible, devote certain project budget to an SME (high potential actor).



# TAKE-HOME MESSAGES



- Structure: follow the template!
- Use graphics/figures, make sure you are understood!
- Keep references short, they count to the page limit.

„Summary box“ is a very useful tool, despite the space restrictions

- **Submit a concise and consistent proposal on time!**





- I. Future & Emerging Technologies in H2020
- II. FET OPEN
- III. FET INNOVATION LAUNCHPAD
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- VI. References



- Communicating EU research and innovation guidance for project participants,  
[http://ec.europa.eu/research/participants/data/ref/h2020/other/gm/h2020-guide-comm\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/other/gm/h2020-guide-comm_en.pdf) (Sept. 2014)
- Guidelines on FAIR Data Management in Horizon 2020,  
[http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/hi/oa\\_pilot/h2020-hi-oa-data-mgt\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf) (July 2016)
- Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020,  
[https://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/hi/oa\\_pilot/h2020-hi-oa-pilot-guide\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf) (Aug. 2016)



- H2020 FET Open Project NEMX21: How we wrote an FET Open Grant, Gregor Tanner, University of Nottingham, [https://connect.innovateuk.org/documents/414751/30349009/NOTT\\_GT\\_slideset.pdf](https://connect.innovateuk.org/documents/414751/30349009/NOTT_GT_slideset.pdf)
- Building Impact in Horizon 2020 Projects, Jussi Alho & Maarit Haataja, University of Helsinki, [https://tapahtumat.tekes.fi/uploads/470e7757/building\\_impactv2-1135.pdf](https://tapahtumat.tekes.fi/uploads/470e7757/building_impactv2-1135.pdf)
- How to write an impact section in proposals under the H2020 framework, Pablo Garcia Tello, CERN, <https://indico.cern.ch/event/557642>



## Support from the FFG:

- Check of the FET project idea
- Intermediate proposal consultations
- Proposal Check
- Feedback to evaluation results



THANK YOU FOR YOUR ATTENTION



David Kolman

- National Contact Point for Future and Emerging Technologies
- Tel: +43 (0)5 7755 4208
- [david.kolman@ffg.at](mailto:david.kolman@ffg.at)

