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European eic INNOVATION Council BETA

EMPOWERING EUROPEAN INNOVATORS

H2020 Work Programme 2018-2020

Enhanced EIC pilot topics in 2019

FETPROACT-EIC-05-2019: FET Proactive: emerging paradigms and communities

Research and Innovation

EIC Pathfinder pilot

The **EIC Pathfinder pilot** targets high-risk cutting edge projects exploring new territories aiming at developing radical and innovative technologies. It encompasses FET-Open and FET-Proactive.

- FET-Open uses interdisciplinary collaboration to tap into Europe's excellent science base for exploring radically new technologies, which may become the game-changers of the future.
- FET-Proactive aims to identify the future and emerging technological paradigms with highest potential for Europe's economy and society.

A typical Pathfinder project

Dream

A innovation engine

Reality

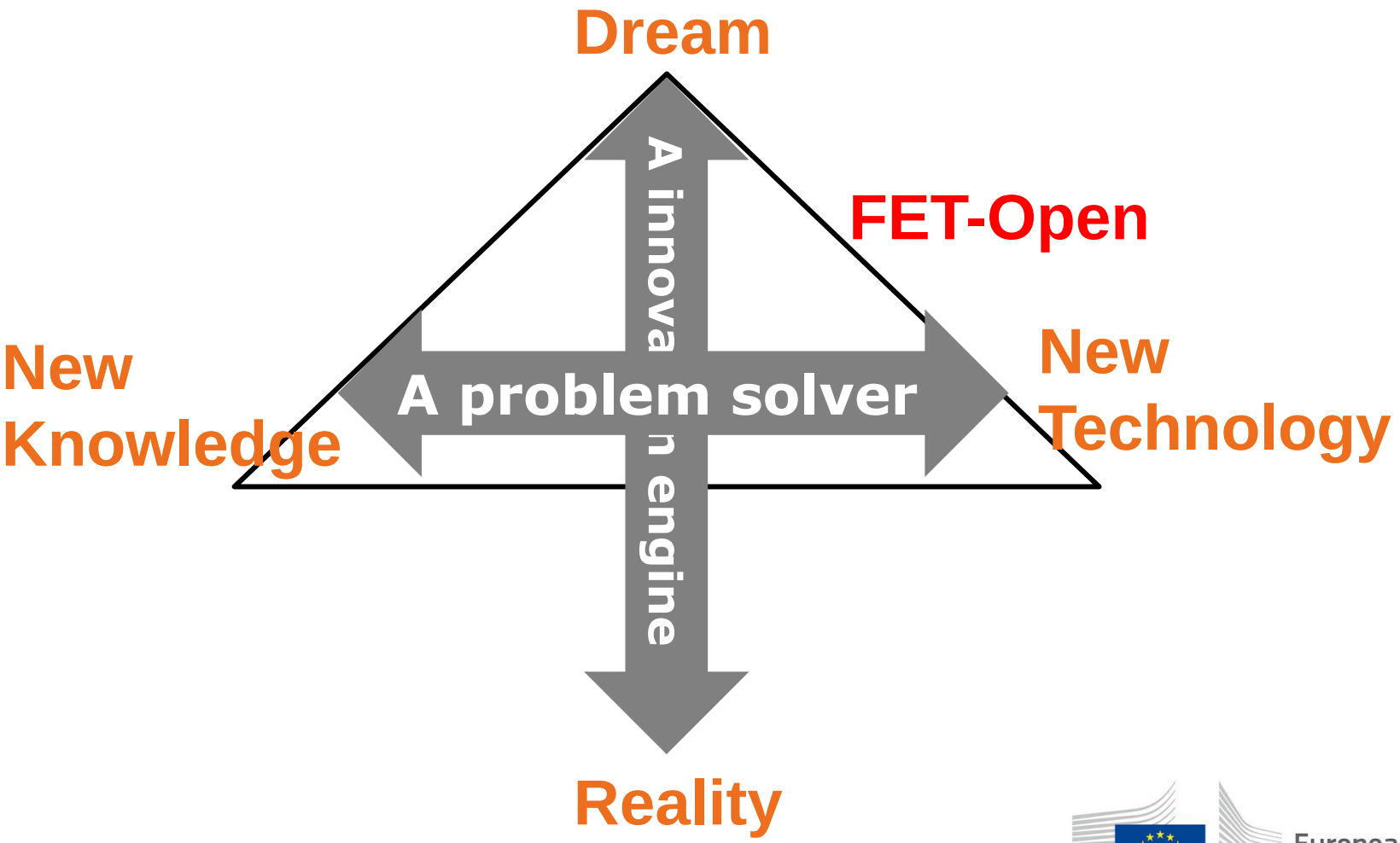
Pathfinder: science driven

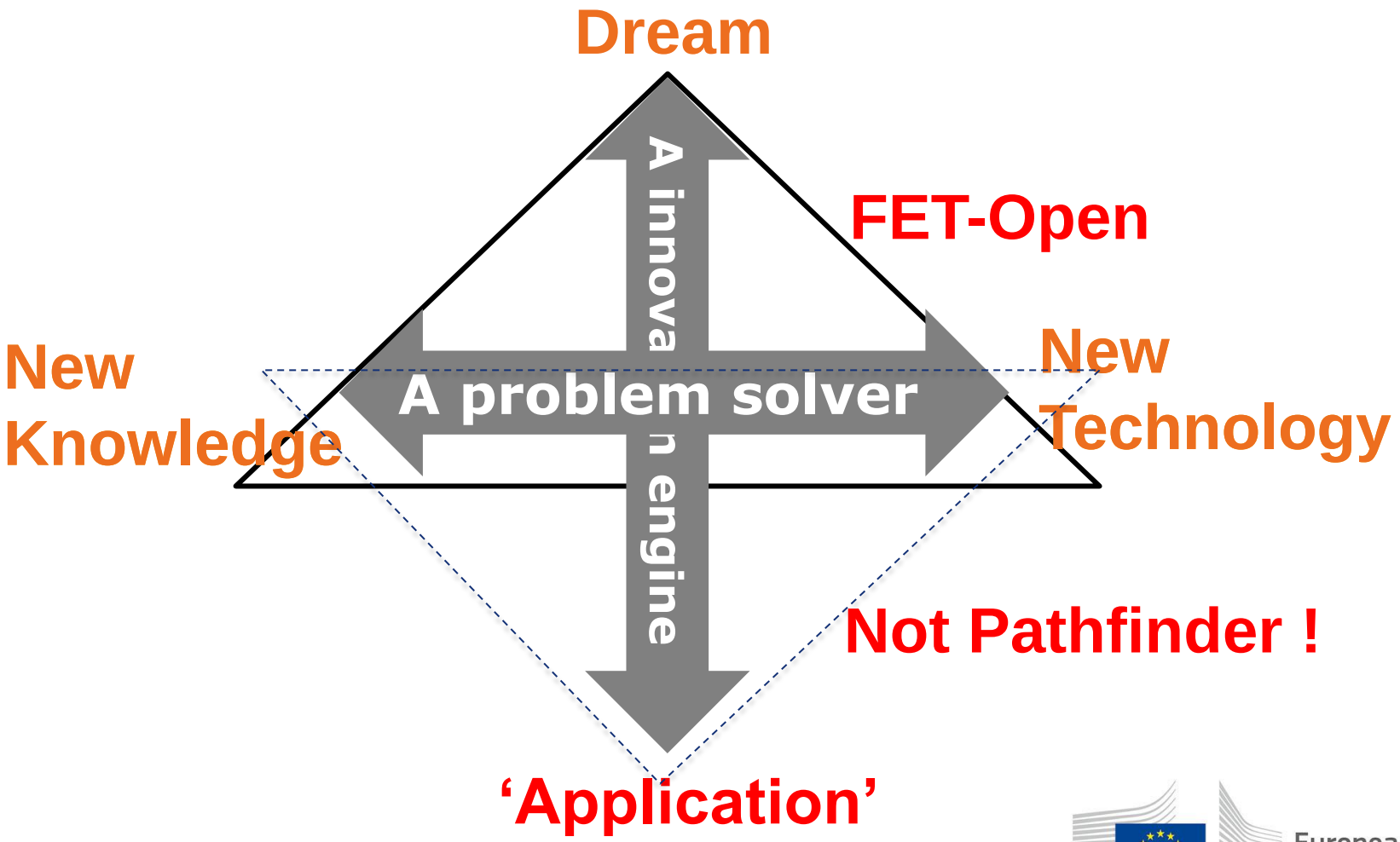
New Knowledge

A problem solver

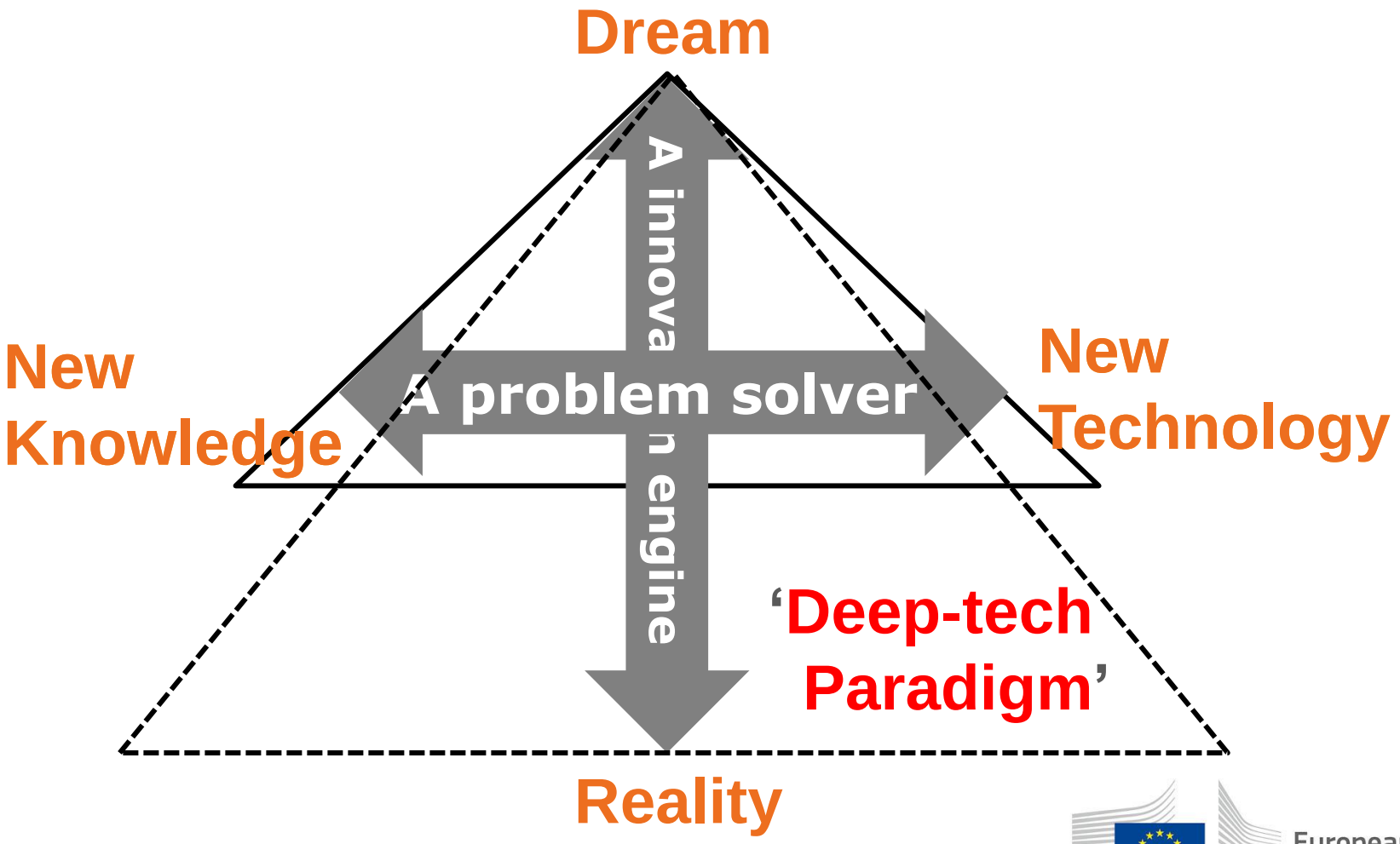
New Technology

Pathfinder

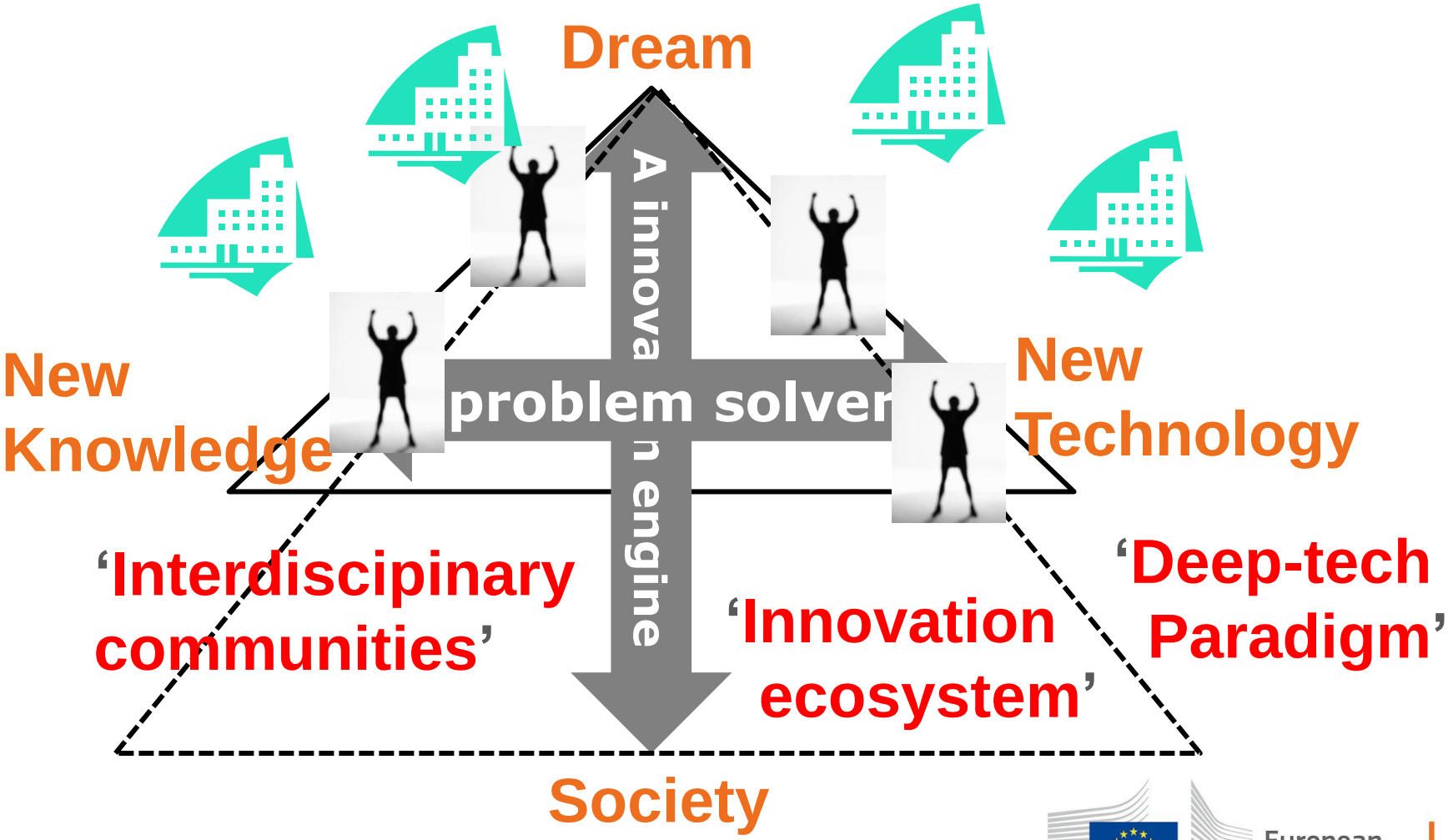

Dream
FET-Open
New Knowledge
New Technology
A innovation engine
A problem solver
Reality


Dream
FET-Open
New Knowledge
New Technology
A innovation engine
A problem solver
Not Pathfinder !
'Application'

EIC Pathfinder – FET Proactive



EIC Pathfinder – FET Proactive



FET Proactive: challenge and scope

1. To explore and consolidate a new technological direction in order to put it firmly on the map as a viable **paradigm for future technology**.
2. To foster the **interdisciplinary communities** that are able to drive this forward, extending from the participating consortia to a wider European pool of expertise.
3. To stimulate the emergence of a European **innovation eco-system** around a new technological paradigm, well beyond the world of research alone.

cutting-edge **high-risk / high-reward research and innovation projects** that aim to demonstrate a new technological paradigm

FET Proactive Evaluation Criteria

Excellence

The following aspects are taken into account:

- Clarity of long-term vision of a science-enabled technology.
- Concreteness and ambition of the proposed science-to-technology breakthrough.
- Range and added value from interdisciplinarity, novelty and non-incrementality of the research proposed.
- High-risk of the research proposed and plausibility and flexibility of the approach.

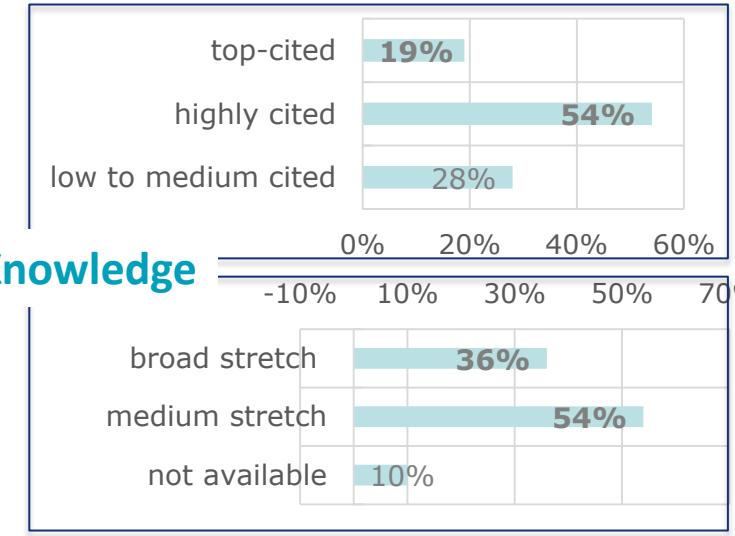
Threshold: 4/5, Weight: 60%

FET Impacts

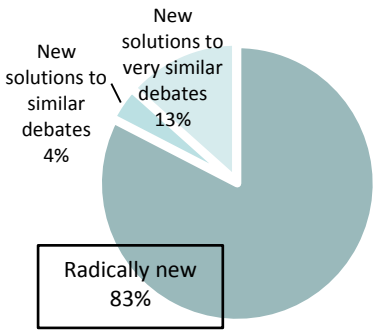
evidence from 224 FP6 & FP7 projects

FET_TRACES Report

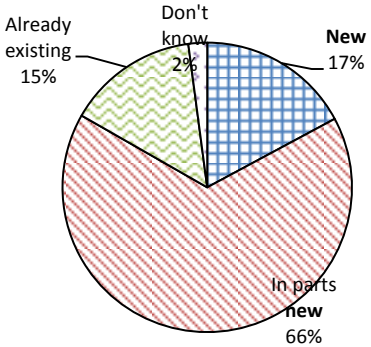
Knowledge



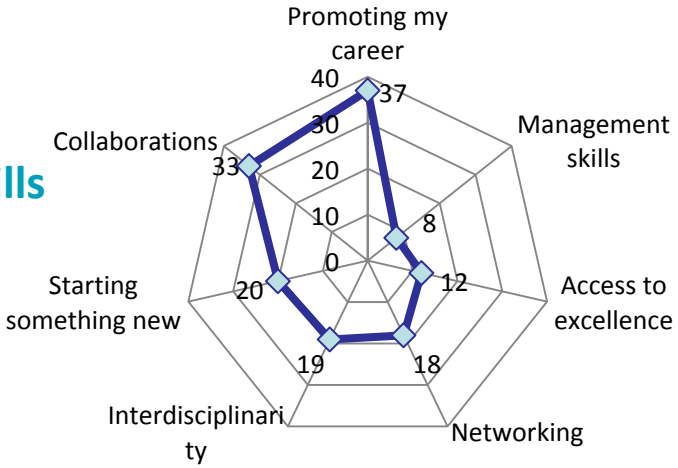
Novelty of results



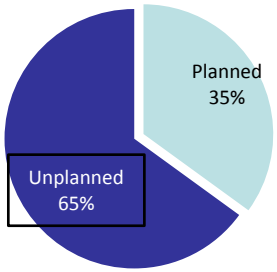
Novelty of collaboration



People and skills



Serendipity



FET Proactive Evaluation Criteria

Impact

- The extent to which the outputs of the project would contribute to the expected impacts mentioned in the work programme under the relevant FET topic.
- Effectiveness of measures and plans to disseminate and use the results (including management of IPR) and to communicate the project to different target audiences.

Threshold: 3.5/5, Weight: 20%

Proactiv: Expected Impacts

- Scientific and technological contributions to the foundation and consolidation of a radically new future technology.
- Potential for future returns in terms of societal or economic innovation or market creation.
- Spreading excellence and building leading innovation capacity across Europe by involvement of key actors that can make a difference in the future, for example excellent young, researchers, ambitious high-tech SMEs or first-time participants to FET under Horizon 2020.
- Build-up of a goal oriented interdisciplinary community (within and beyond the consortium).
- Emergence of an innovation ecosystem around a future technology in the theme addressed from outreach to and partnership with high potential actors in research and innovation, and from wider stakeholder/public engagement, with due consideration of aspects such as education, gender differences and long-term societal, ethical and legal implications.

FET Proactive Evaluation Criteria

Quality and efficiency of the implementation

The following aspects are taken into account:

- Coherence and effectiveness of the work plan to achieve project objectives and impacts, including adequate allocation of resources to tasks and partners.
- Appropriateness of the research and innovation management structures and procedures.
- Role and complementarity of the participants and extent to which the consortium as a whole brings together the necessary expertise.

Threshold: 3/5, Weight: 20%

FET Proactive: some peculiarities

- Interdisciplinarity is a must
- Consider Responsible Research and Innovation approach
- Proposals of maximum 30 pages (section 1 to 3) submitted through H2020 Funding & Tenders Portal
- Indicative budget and duration: 4-5M€, up to 4 years
- Cascaded grants ('Annex K') are allowed
  - for small scale experimentation by third parties outside of the consortium
  - for prize organised by the project
- For AI topic and transition to innovation activities: exploitation in Europe preferred (special clause)

Deadline: 3 Sep 2019

FETProact-EIC-05-2019 budget: 52M€

Emerging paradigms and communities

- To explore and consolidate a new technological direction in order to put it firmly on the map as a viable **paradigm for future technology**.
- Stimulate the emergence of a European innovation eco-system around a **new technological paradigm**
- **Scope is one of the following subtopics:**
  - Human-Centric AI
  - Implantable autonomous devices and materials
  - Breakthrough zero-emissions energy generation for full decarbonisation
- Up to **€4-5 million and u**p to **4 years**
- Minimum **3 partners** from 3 EU / AC

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Sub-topic (a)

Human-Centric AI

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Research and Innovation

The broader picture

The projects are expected to contribute to the wider debate on the sociotechnical, organisational and AI-ethical dimensions of such technologies and systems, and link to the 'Commission's broader AI strategy.

See Artificial Intelligence for Europe (COM(2018) 237 final, 25.4.2018) and Coordinated Plan on Artificial Intelligence (COM(2018) 795 final, 7.12.2018).

Maximising benefits from AI

Economic impact

+

Contribution to societal challenges

Healthcare

Energy efficiency

Road safety

Cybersecurity

...

AI

The challenge: Human-Centric AI

Artificial intelligence (AI) is gaining more and more footholds in various aspects of our life. However, many issues need to be faced, like:

- Transparency and Accountability
- Robustness and Safety
- Data Governance and Privacy
- Diversity and Non-discrimination
- Human Autonomy and Oversight
- Societal and Environmental well-being

The problem

Explicability has become an essential element if users are to trust, accept and adopt the next generation of intelligent machines on a wider scale.

This initiative seeks to advance to the next AI frontier with verifiable, evidence-based features of trustworthiness (i.e., reliable and unbiased alignment of values, goals and beliefs) and transparency (explainable performance), exploring radically new approaches (e.g., inspired from neuro-science, cognition or social science).

Human-centric?

For instance,

explanation could be more tightly intertwined with the decision making process itself

decisions can be challenged, interpreted, refined and adjusted through mutual exchange, introspection (e.g., self-awareness of biases, reflecting on the internal functioning of the learning system, or on what caused a wrong or unacceptable decision)

active learning of both system and user, for example through dialogue or other forms of multi-modal interaction aimed at establishing mutual trust.

Solutions: Beyond the state-of-the-art

New data collection and ownership/governance models that go beyond the dominant off-line and centralised data processing should be investigated, and new avenues, such as for incremental, unsupervised, active, one-shot and 'small data' machine learning, should be explored.

Novelty often comes from radical interdisciplinarity – compose your consortium accordingly.

Clear potential for social sciences and humanities.

Don’t think only tech

The European AI Alliance

Joint reflection on the future of AI in Europe

Full mobilisation of all stakeholders needed: industry, academia, civil society

Supported by high-level expert group on AI and an online platform

Goal: Making it a reference platform for thinking and reflecting on AI

https://ec.europa.eu/digital-single-market/en/european-ai-alliance

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H2020 Work Programme 2018-2020

Enhanced EIC pilot topics in 2019

FETPROACT-EIC-05-2019:
FET Proactive: emerging paradigms and communities

Sub-topic (b)

Implantable autonomous devices and materials

Jose-Luis Fernandez-Villacanas
FET CNECT.C3

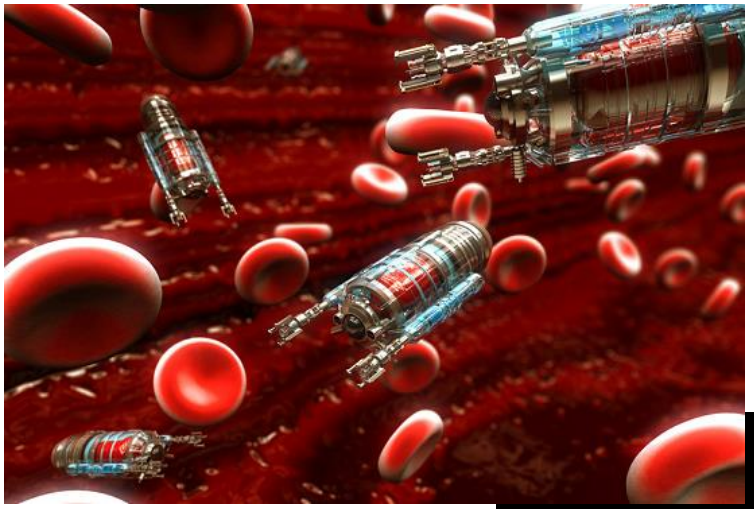
Research and Innovation

Background (the need)

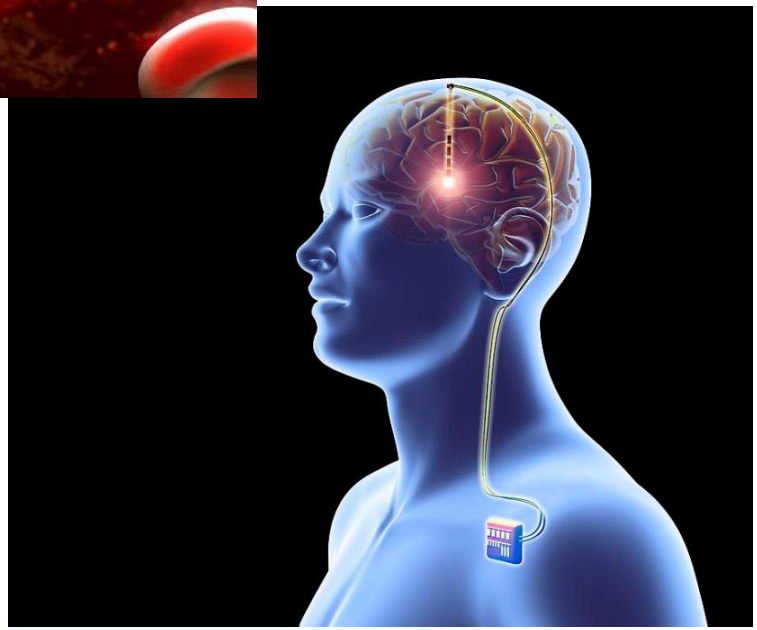
Background – what do we have?

Current implants do not last long/the materials are not bio-compatible/are not adaptable/no clever sensing/no shape/function change/no movement/no power management

Challenge and Scope

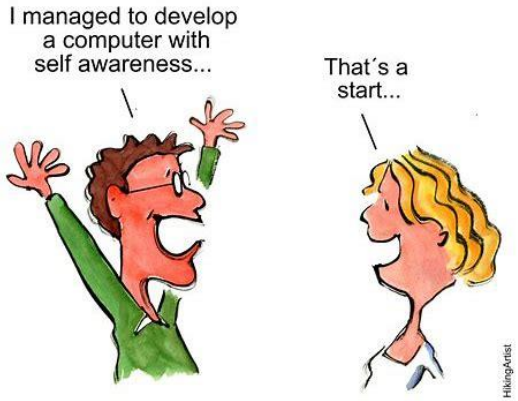


Radically new biomedical tech is needed for implantable devices and materials with dramatically longer functional lifetimes



Examples of properties

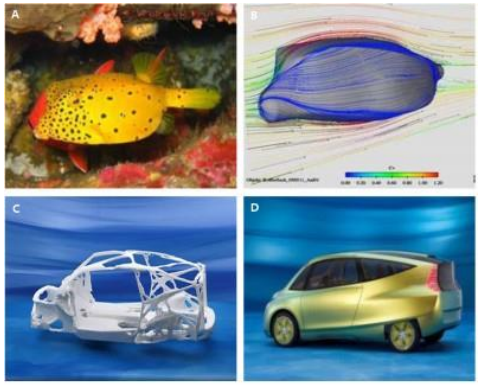
Smart sensing



Self-Awareness

Adaptation (form and function)

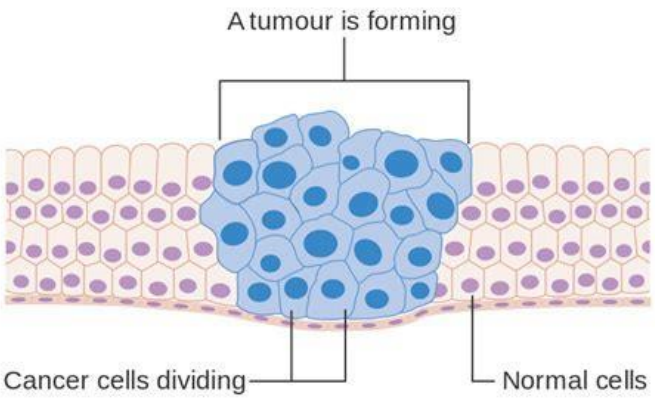
Self-repair

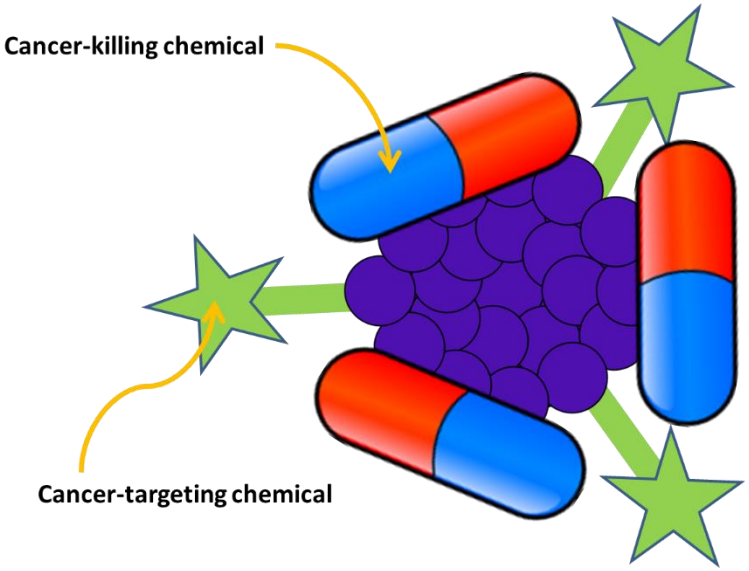


Bio-mimetism

In-situ integration

Practical examples (e.g. micro/nano devices)





Autonomously moving/
Distinguish tissue types

Sensing and Acting
Delivering therapeutic agents

And finally, let's not forget!

Power generation/ management

Ethical implications of the technologies

Impacts

New exciting science
And technology

Creating the community of researchers and innovators that will change the future

Potential returns for society, economy and markets

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Sub-topic (c)

Breakthrough zero-emissions energy generation for full decarbonisation

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Research and Innovation

Zero-emissions energy generation

Background

Present transport engines (eg petrol/diesel/jet) release much waste energy

Waste energy is used to heat the vehicles (cold climates), power air-conditioning (hot regions) or for auxiliary systems (eg equipment environment)

Electric vehicles much more efficient – little waste heat

Inefficient to use batteries for heating

- Battery capacity needed to maximise range
- Electricity production from thermal energy ~ 30% efficient

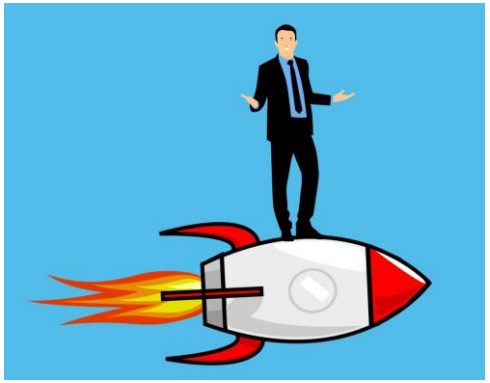
Compact, portable, zero-emission energy source needed

Is there anything better than batteries/fuel cells?

Zero-emissions energy generation: Challenge and scope

Proposals should:

- Address new technologies (high risk) for energy generation with potential for significant take-up



- Bring together a European interdisciplinary pool of expertise to reach its goal, and encourage outside interest to increase the community working on the area

- Lay the foundations for a European innovation ecosystem (not only researchers) that can pursue the development after the project

Zero-emissions energy generation Scope

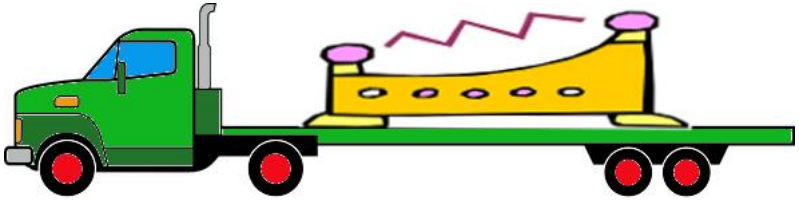
Any safe form of thermal or electrical energy generation

Proposed technology should produce no CO_2

Equipment should be compact and portable:

- Transportable by lorry, boat, aircraft, people, ….
- Not built in to a fixed location
- Higher energy density than batteries

Identified application area



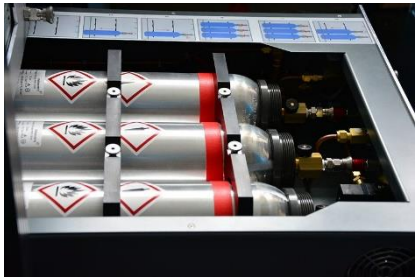
Minimal or no rare/toxic materials

Competitive (low cost)

Clear/ambitious performance targets and milestones needed

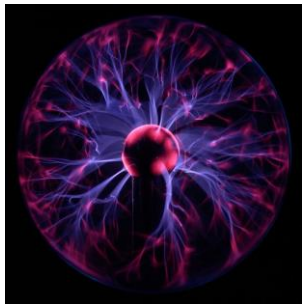
Work on batteries, solar cells, fuel cells excluded

Zero-emissions energy generation Scope – possible examples



Hydrogen storage eg metal hydrides

- Large, safe, increase in storage density possible?



Plasma systems

- Plasmas are the most energetic state of matter
- Can they be confined in a portable device?

Cavitation systems

- Cavitation assisted energy harvesting systems:
- Can they provide enough energy in a portable form?

NB These are not preferred approaches, just possible examples

Zero-emissions energy generation
Expected impact

Foundations for new portable energy technologies

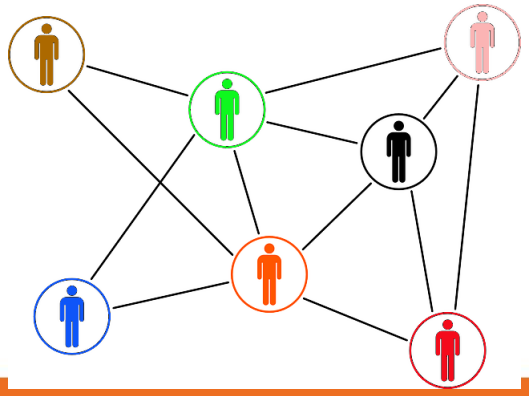
Building up interdisciplinary communities with

- Young researchers
- High-tech SMEs
- First time FET participants

… leading to

Emergence of new innovation ecosystems

- able to develop the market potential of the new tech
- including wider stakeholder engagement beyond researchers alone



FETPROACT-EIC-05-2019:
Budget allocation between sub-topics

Total budget for all 3 sub-topics is 52 M€

Proposals from all 3 sub topics ranked in 1 list according to score

Proposals selected for funding according to ranking list as follows:

1. Top 2 proposals from each sub-topic funded
2. 3rd proposal from each sub-topic funded if budget available
3. Proposals funded from global list until budget exhausted

NB only proposals above the evaluation thresholds can be funded

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Enhanced EIC pilot topics in 2019

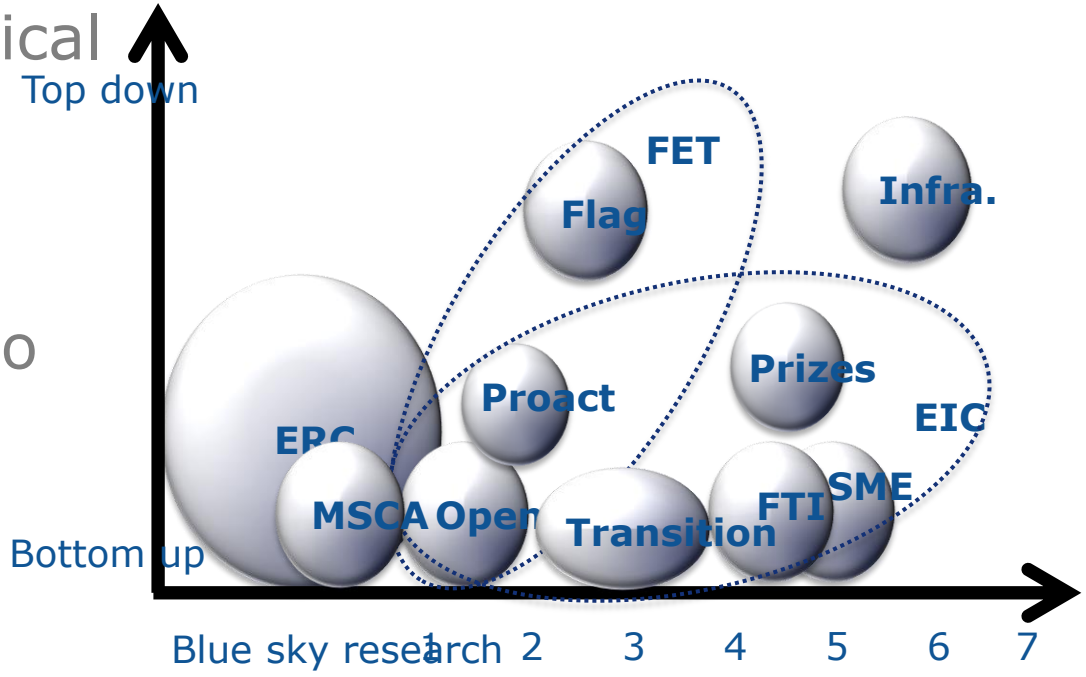
FETPROACT-EIC-06-2019: EIC Transition to Innovation Activities

Martin MÁJEK
FET CNECT.C3

Research and Innovation

The need for Transition to innovation activities

- Gap between end of typical FET project and next opportunity: FTI, SMEi
- Improving chance of turning FET research into innovation
- Increasing technological readiness of research outcomes



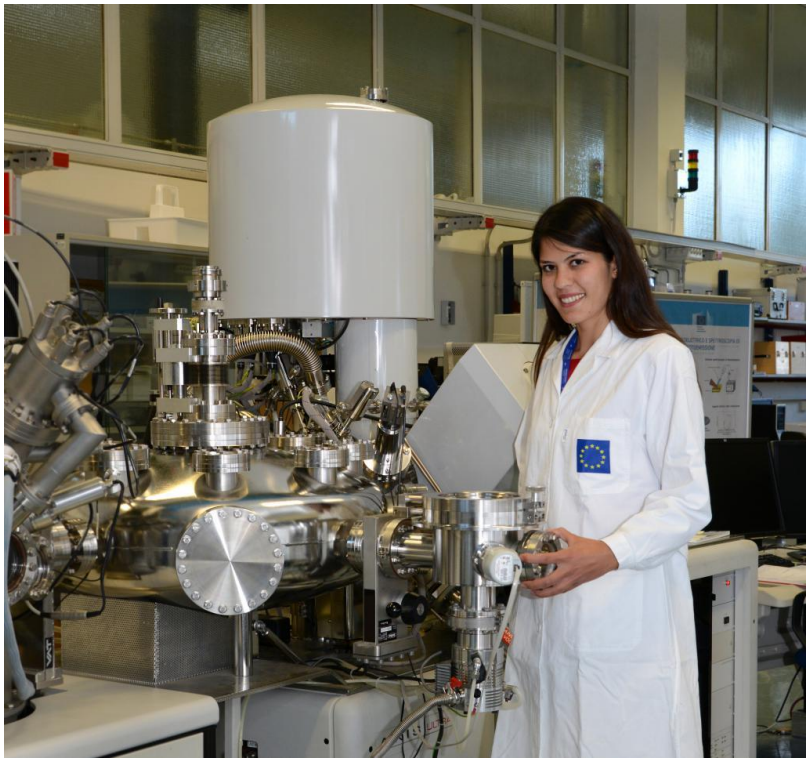
The Challenge for Transition Activities

- Create a fertile ground for FET research results to mature, to a level where they start to be interesting for investors.
- Turn FET projects promising results into genuine technological breakthrough and disruptive innovations

Scope of Transition to Innovation Activities

- Advancing TRL of promising technologies starting at TRL 2/3
- Business driven visionary leadership
- Lean and ambitious consortium
- Essential capabilities to increase the maturity of targeted technology
- E.g. activities with TT partners, licence-takers, investors and users

Areas Transition to Innovation Activities



- ☐ Micro- and Nano-technologies;
- ☐ AI and advanced robotics;
- ☐ Life sciences, health & treatment;
- ☐ Energy technologies;
- ☐ Interaction technologies (incl. VR,AR, Mixed Reality)

Expected Impact Transition to Activities

- ☐ Increased value from FET projects
- ☐ Fast development & take-up of promising FET technologies
- ☐ Increased H2020 first time participation of high tech SMEs
- ☐ Leveraging more private investment into research and innovation

Deadline: 3 Sep 2019

Conditions Transition to Innovation

- Total budget: **16M€**
- Small RIA up to 24 months
- EU contribution: 1-2M€
- Explicit links with H2020 FET OPEN and PROACT project(s)
- No duplications with activities of the original project(s)!
- Well-defined intended outcome, KPIs
- Strong exploitation plan with market potential
- Agreement on project(s) IPRs in proposal