Belgian National Info Day
Brussels, 08 June 2018

FET in Horizon 2020

Walter Van de Velde
Future and Emerging Technologies
European Commission
FET in Horizon 2020 (Excellent Science Pillar) – three schemes, 2.5 B€

FET Mission
Turn Europe's excellent science base into a competitive technology

- Visionary
- Collaborative & Interdisciplinary Excellence
- Technology breakthroughs

FET Proactive
New communities

- 26%, 670 M€
- 4-7 M€ each

FET Open
Novel ideas

- 40%, 1 B€
- <3 M€ each

FET Flagships
Grand S&T challenges

- 32%, 830 M€
- ~500 M€ each

Scientific communities
Future potential and policy
Scientific, economic and societal challenges
FET in Horizon 2020 so far

**FET in numbers (2014-2017)**
- 240 grants
- 1,1 B€ EU contribution
- 2,228 participations
- 888 beneficiaries covering all member states
- Companies in 40% of projects
- 12,75% SME participation
- 10 Nobel Prize winners
- ~10,000 scientists and PhD students involved

<table>
<thead>
<tr>
<th></th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizon 2020</td>
<td>14,71%</td>
</tr>
<tr>
<td>FET</td>
<td></td>
</tr>
<tr>
<td>EU-13</td>
<td>5,46%</td>
</tr>
<tr>
<td>EU-15</td>
<td>8,18%</td>
</tr>
<tr>
<td>ERC</td>
<td></td>
</tr>
<tr>
<td>EU-13</td>
<td>4,14%</td>
</tr>
<tr>
<td>EU-15</td>
<td>12,73%</td>
</tr>
</tbody>
</table>

Sample of FET* beneficiaries network (links of coordinators to participants)
**FET Impacts**

evidence from 224 FP6 & FP7 projects – FET_TRACES Report

### Knowledge production

- **top-cited**: 19%
- **highly cited**: 54%
- **low to medium cited**: 28%

### Novelty of results

- Radically new: 83%
- New solutions to very similar debates: 13%
- Already existing: 15%
- Don’t know: 2%

### Novelty of collaboration

- Planned: 35%
- Unplanned: 65%

### Serendipity

- Broad stretch: 36%
- Medium stretch: 54%
- Not available: 10%

### People & Skills

- Promoting my career
- Management skills
- Access to excellence
- Networking
- Interdisciplinarity
- Collaborations
- Starting something new
FET Open in Horizon 2020

FET Open in numbers (2014-2017)
- Highly interdisciplinary
- 3408 proposals, 122 funded projects
- Funding rate: 1.7% in 2015, ~10% in 2018
- Many technology breakthroughs
  Towards curing cancer, Parkinson's, Alzheimer, energy storage, new computing paradigms, medical imaging, robotics, AI, etc.

FET Open is part of the European Innovation Council Pilot (2018-2020)
- Exploratory engine for new possibilities
- Starting point for deep-tech innovation
- Early detection of new opportunities
- Accelerator towards impacts
Disciplines in 3408 proposals from all finalised FET-Open batches. Note that individual proposals contain a mix of disciplines.
Step by step guide to EU innovation funding
Objective: Strengthen breakthrough innovations and boost the number of high-growth companies

Focus on:

• **Radically new ideas**

• That open up new markets and scale up growth..

• .. And combine disciplines
Market-creating innovations?
some eye-catchers based on WIPO, MIT, WEF, OECD, Harford, etc.
Comprehensive package - 4 schemes in 1

Ecosystem support
Coaching, mentoring and business acceleration services for all SMEs

€ 1.6 billion
3,900 projects
SME-Instrument
Phase-2

€ 300 million
130 projects
SME-Instrument
Phase-1

FET OPEN
Future Emerging Technologies

Visionary Idea
Test & Co-create
Feasibility Start-up
Development
Scale-up Investment

Ecosystem support

Visionary Idea

FET OPEN
Future Emerging Technologies

EIC Horizon Prizes
Innovative Batteries for eVehicles --- Fuel from the Sun: Artificial Photosynthesis --- Early Warning for Epidemics --- Blockchains for Social Good --- Low-Cost Space Launch --- Affordable High-Tech for Humanitarian Aid

Soft Blending
Under construction

Visionary Idea

FET OPEN
Future Emerging Technologies

EIC Horizon Prizes
Innovative Batteries for eVehicles --- Fuel from the Sun: Artificial Photosynthesis --- Early Warning for Epidemics --- Blockchains for Social Good --- Low-Cost Space Launch --- Affordable High-Tech for Humanitarian Aid

Soft Blending
Under construction
<table>
<thead>
<tr>
<th>FET OPEN</th>
<th>SME INSTRUMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTI</td>
<td>HORIZON PRIZES</td>
</tr>
</tbody>
</table>
Future and Emerging Technologies (FET)  
FET Open: let's try even if it fails!

From knowledge...  
... to new technology
Early science-driven technological innovation...
... a key starting point for radical innovation; only done by FET

Inspiring the entrepreneurial mind...
... even when far from market, all FET-Open projects are full of inspiring ideas for the entrepreneurial minds in EIC

Early detection of opportunities...
... Where researchers see possibilities, they see more research. Where entrepreneurs see possibilities, they see an opportunity.

Accelerator towards impact...
... FET Innovation Launchpad is a fast learning track into the EIC
FET Open – Research and Innovation projects
Foundations for radically new future technologies, high-risk & high-impact interdisciplinary research with "FET gatekeepers":

• Radical vision

• Breakthrough technological target

• Ambitious interdisciplinary research
The project goal
To explore radically new manufacturing and processing technologies for novel 2D semiconducting materials

How?
Proof-of-Principle of covalent organic frameworks (COF)-based inks that exceed the current limits of graphene-based inks.
- Stablishing Precursor synthesis and assembly protocols
- Developing localised distortions of the planar aromatic framework
- Formulating inks from dispersions of stable monolayers to enable low-cost processing.
- COF inks will be evaluated against state-of-the-art semiconducting inks

Impact on
Science - framework to encourage creativity in the synthesis of COF
Technology - realisation of ultra-thin, transparent and flexible electronic devices
Society - new 2D semiconductors will create new materials
The project goal
Designing and developing a programmable modular bioreactor-wall capable of extracting valuable resources from waste water and air, generating oxygen, proteins and biomass for energy production.

How?
Based on the operational principles of microbial fuel cells as a programmable environment and its technical integration with synthetic ‘consortia’ of microbes.

Impact on
Environmental performance of living spaces, improving health, productivity and ecosystems impact.
The project goal
Development of a scientific clock that reaches a much higher precision compared to the best clocks that are operated today

How?
- Identification and characterization of the 229Th isomer transition.
- Development of trapping and cooling techniques for 229Th ions together with solid-state approaches to furnish thorium ensembles for direct laser spectroscopy.

Impact on
- Scientific impact — the 229Th isomer state will be accessible to direct laser manipulation.
- Technological impact — Th-based clocks → simpler, smaller, cheaper, more robust, smaller uncertainty compared to others.
PHENOMEN

The project goal

- Development of novel phononic-based components driven by light, primarily focusing on
  (i) phonon sources/lasers
  (ii) phonon detectors
  (iii) phonon waveguides and
  (iv) RF-light transducers

How?

- Theory and multi-scale modeling
- Nanofabrication of optomechanical and phononic components
- Full system integration

Impact on

1. ICT:
   Telecommunication process can be done in a passive way (faster and more efficient) without additional power consumption and without electrical connection

2. Space:
   Developed new chips can be used for high efficiency and high speed information processing for satellite communication
FET Open – Research and Innovation projects

- EU contribution up to 3 Mio € (indicative)
- Consortia of minimum 3 partners from 3 EU / associated countries

A typical Research and Innovation Action project

- Average funding per project: 3.4 million €
- Average number of partners per project: 6
- Average project duration: 41 months
Expected Impact:

- Scientific & technological contributions to the foundation of a new future technology
- Potential for future social or economic impact or market creation
- Building leading R&I capacity across Europe by involvement of key actors, for example:
  - excellent young researchers
  - ambitious high-tech SMEs
  - first-time participants to FET under H2020
FET Innovation Launchpad

Turning a result of a FET project into an innovation

Max 18 months, €100,000

Other support services for involved SMEs

- Coaching services
- Business acceleration services
## Considering participation...?

<table>
<thead>
<tr>
<th><strong>FET OPEN</strong></th>
<th><strong>FTI</strong></th>
<th><strong>SME instrument</strong></th>
<th><strong>Horizon Prizes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Open to participants from...</strong></td>
<td>EU and Horizon 2020 associated countries, but exceptions...</td>
<td>EU and Horizon 2020 associated countries only</td>
<td>EU and Horizon 2020 associated countries only</td>
</tr>
</tbody>
</table>

| **For who?** | Consortia open to anyone – specific targets: - Excellent young researchers - Ambitious high-tech SMEs - First-time FP participants | Consortia open to anyone – specific targets: - Private-for-profit entities (industry) - First-time FP participants | SMEs only (also single SMEs!) | Anyone |

| **Size of EU grant?** | • Up to EUR 3 million (RIA) • EUR 0.1 million (Inno launchpad) | Up to EUR 3 million (IA close-to-market) | • EUR 50,000 (ph 1) • EUR 0.5 to 2.5 million (ph 2), exceptions possible | Between EUR 1 and 10 million |

| **Upcoming submission deadlines?** | - 16/5/2018 (RIA) - 16/10/2018 (Inno launchpad) | 3 per year – - 21/2/2018 31/5/2018 23/10/2018 | 4 per phase per year -- Ph 1: 8/2/2018, 3/5/2018... Ph 2: 10/1/2018, 14/3/2018... | No deadlines announced yet -- All contests open until at least Q2 of 2019 |
# FET Open – upcoming call deadlines

<table>
<thead>
<tr>
<th>Topic (Type of Action)</th>
<th>Budget 2018 EUR Million</th>
<th>Budget 2019 EUR million</th>
<th>Budget 2020 EUR million</th>
<th>Deadlines (cut-off dates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FETOPEN-03-2018-2019-2020 (CSA) Innovation Launchpad</td>
<td>2,50</td>
<td>2,70</td>
<td>3,00</td>
<td>16 October 2018 8 October 2019 14 October 2020</td>
</tr>
</tbody>
</table>
### Evaluation criteria

<table>
<thead>
<tr>
<th>Excellence</th>
<th>Impact</th>
<th>Quality and efficiency of the implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adherence to the &quot;FET gatekeepers&quot;</strong></td>
<td>☐ The extent to which the outputs of the project would contribute to the <strong>expected impacts</strong> listed in the work programme under this topic.</td>
<td>☐ <strong>Coherence and effectiveness</strong> of the research methodology and work plan to achieve project objectives and impacts, including <strong>adequate allocation</strong> of resources to tasks and partners.</td>
</tr>
<tr>
<td>☐ <strong>Clarity</strong> of the radical vision of a science-enabled technology and its differentiation from current paradigms</td>
<td>☐ <strong>Effectiveness</strong> of measures and plans to <strong>disseminate</strong> and use the results (including management of IPR) and to <strong>communicate</strong> about the project to different target audiences.</td>
<td>☐ <strong>Role</strong> and <strong>complementarity</strong> of the participants and extent to which the consortium as a whole brings together the necessary expertise.</td>
</tr>
<tr>
<td>☐ <strong>Novelty</strong> and ambition of the proposed <strong>science-to-technology breakthrough</strong> that addresses this vision.</td>
<td>☐ Range of and added value from <strong>interdisciplinarity</strong> for opening up new areas of research; <strong>non-incrementality</strong> of the research proposed.</td>
<td></td>
</tr>
<tr>
<td>☐ <strong>High-risk, plausibility and flexibility</strong> of the research approach.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Threshold: 4/5</th>
<th>Threshold: 3.5/5</th>
<th>Threshold: 3/5</th>
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<tbody>
<tr>
<td>Weight: 60%</td>
<td>Weight: 20%</td>
<td>Weight: 20%</td>
</tr>
</tbody>
</table>
## FET Open in 2014-2017

<table>
<thead>
<tr>
<th>Calls</th>
<th>Total # of eligible proposals</th>
<th>Number of grants</th>
<th>Success rate</th>
<th>Total Budget (M€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep-14</td>
<td>639</td>
<td>24</td>
<td>3.8%</td>
<td>78.1</td>
</tr>
<tr>
<td>Mar-15</td>
<td>665</td>
<td>11</td>
<td>1.7%</td>
<td>41</td>
</tr>
<tr>
<td>Sep-15</td>
<td>800</td>
<td>11</td>
<td>1.4%</td>
<td>37.8</td>
</tr>
<tr>
<td>May-16</td>
<td>544</td>
<td>23</td>
<td>4.2%</td>
<td>87.8</td>
</tr>
<tr>
<td>Jan-17</td>
<td>365</td>
<td>26</td>
<td>7.1%</td>
<td>84.8</td>
</tr>
<tr>
<td>Sep-17</td>
<td>395</td>
<td>27</td>
<td>6.8%</td>
<td>85.3</td>
</tr>
<tr>
<td>Total</td>
<td>3408</td>
<td>122</td>
<td></td>
<td>414.8</td>
</tr>
</tbody>
</table>
**FET-Open Evaluation process (example for RIA)**

- **Applicant**
  - Proposal submission
  - Feedback (TTI) in 5 months

- **REA**
  - Eligibility & Admissibility Check
  - Ethics screening/assessment
  - Panel Review
    - Panel comment
    - Final score
  - Expert Assignment
  - Cross-Reading
    - Panel comment
    - Final score
  - Median score

- **Evaluator**
  - Writes Individual Evaluation Report (IER)
  - Evaluation
    - IER Quality Check with support of Vice Chairs
    - Collated IERs Check by 4 evaluators
    - Draft ESR
  - Iterations if necessary
  - X 4

- **For each**
  - Final score by Panel Members

**Key Points**
- Conflict of Interest (COI) check at any stage of evaluation
- Median score
- Draft ESR created
- Proposal review

**Research and Innovation**
Country participation
FET Open 2014-2017 (RIA signed grants)
<table>
<thead>
<tr>
<th>Participant Legal Name</th>
<th>Country</th>
<th>Number of projects' coordinator</th>
<th>Total number of projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS</td>
<td>FR</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>CONSIGLIO NAZIONALE DELLE RICERCHE</td>
<td>IT</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>AGENCIA ESTATAL CONSEJO SUPERIOR DEINVESTIGACIONES CIENTIFICAS</td>
<td>ES</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN</td>
<td>DE</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>AARHUS UNIVERSITET</td>
<td>DK</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES</td>
<td>FR</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>EIDGENOEISSCHE TECHNISCHE HOCHSCHULE ZUERICH</td>
<td>CH</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>UNIVERSITY OF OXFORD</td>
<td>UK</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>UNIVERSITY OF GLASGOW</td>
<td>UK</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>FOUNDATION FOR RESEARCH AND TECHNOLOGY HELLAS</td>
<td>EL</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>FRAUNHOFER GESELLSCHAFT</td>
<td>DE</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE</td>
<td>CH</td>
<td>1</td>
<td>6</td>
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<tr>
<td>UNIVERSITE PARIS-SUD</td>
<td>FR</td>
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<td>6</td>
</tr>
<tr>
<td>UNIVERSITY COLLEGE LONDON</td>
<td>UK</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE</td>
<td>UK</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>
SMEs in proposals
SMEs in projects
Female main contacts in proposals
Female main contacts in projects

Sep-14
Mar-15
Sep-15
May-16
Jan-17

0%
5%
10%
15%
20%
25%
30%

Research and Innovation
Funded projects

- Mathematics, Computer sciences and information science: 11 projects (Sep-14), 13 projects (Mar-15)
- Chemical sciences: 18 projects (Sep-14), 13 projects (Mar-15)
- Biological sciences and biotechnology: 7 projects (Sep-14), 10 projects (Mar-15)
- Electrical and electronic engineering, robotics and automation: 9 projects (Sep-14), 14 projects (Mar-15)
- Medicine and medical engineering: 11 projects (Sep-14), 14 projects (Mar-15)
Thank you!

About FET

ec.europa.eu/digital-agenda/FET

FET in H2020 (calls & projects)

ec.europa.eu/horizon2020/fet

FET traces:


@fet_eu & @FETFlagships

Subscribe to FET newsletter
FET mission

Dream

Establish possibility

New knowledge

New technologies and their applications
A typical FET-Open project

Dream

New technologies and their applications

Establish possibility

S&T Breakthrough as Proof-of-Concept

New knowledge
And innovation?
Keeping focus on scientific risk don't try to do too much in a single project!

New knowledge

Establish possibility

S&T Breakthrough as Proof-of-Concept

New technologies and their applications

Dream

Reality
FET-Open is extremely competitive

• Don't waste time on a proposal that has no chance to make it through the FET-Open evaluation.

• Is FET-Open really the right scheme for you?
• Check out LEIT and Societal Challenges work progammes.
• 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
• A long-term vision is essential, but also a plausible idea on how to get there.
• Writing a good proposal is probably as hard as writing a good scientific publication (and more intellectually rewarding).
Tips to write a good FET-Open proposal

*Be ambitious, follow your 'dream'*

- Novelty is essential
- Incremental refinements rarely make it – high-risk does
- Boil down the vision to a concrete and ambitious proof-of-concept

*Consortium for pathfinding*

- There are no hidden expectations from our side (beyond the rules for participation), i.e. no cosmetic roles – keep it simple
- Look for renewal here too - novelty probably starts here
- Narrow inter-disciplinarity will not be good enough to win (look beyond your comfort zone – this is not ERC-like career building)
- Commitment: will the project transform the partner(ship)? (mission vs. role)
Collaborate, collaborate, collaborate...

- Take inter-disciplinarity seriously - write your proposal together
- Collaboration throughout the project, driven by joint questions, goals and mutual learning, not just passing on results between silos
- Explore new ways of working/learning/changing together

Communicate and engage

- Scientific publications
- Social networks & media
- Public engagement

Keep it simple

- Focus on the high-risk parts with crisp targets
- Don't write for 'us', but for people like you
- Check your deliverables list