Mathematics in H2020

ICT Proposers' Day

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DG CONNECT

European Commission
Welcome to the ICT Proposers' Day Information Session on Mathematics!

- The conclusions from our consultation on mathematics for H2020
- Why mathematics is important in proposals
- Messages from mathematicians to proposers
Consultations for Excellence in Science

Consultations


**FET Flagships**
Share your ideas about grand Science and Technology Challenges for Europe.

**Mathematics**
Inform the future work programmes with innovative mathematical content.

**FET Proactive**
Share your ideas about new game-changing future technologies.

**e-Infrastructures**
Identify the key challenges of the future e-infrastructures.

Quick links

FET Future and Emerging Technologies

Citizen Science
Science for the people, by the people
Why? Because...

- The world has become very complex.
- Too many parameters
- Too much data
- ... to make conclusions without help

Mathematics is needed because...

- Science has become data driven.
- Data needs analysing, and analysing needs mathematical tools and methods
Why? Because...

- The world has become very complex.
- Too many parameters
- Too much data
- ... to make conclusions without help

Mathematics is needed because...

- Data crunching needs computing power, and computing, especially HPC, needs algorithms and mathematics.
- Quantum computing is mathematics
Why? Because...

- The world has become very complex.
- Too many parameters
- Too much data
- ... to make conclusions without help

Mathematics is needed because...

- Problems and required models are more and more complex
- Solutions need to consider more and more parameters
- Also improbabilities need to be considered (look at twin towers)
- Online constant changes need to be built in
The online consultation...

- was carried out between January and May 2016
- was complementary to the consultation and workshop on mathematics in 2014
- Wanted to identify **important existing and emerging mathematical domains**
- Looked for **potential** for H2020 WP2018-2020
  - New mathematical areas or ideas to consider
  - Mathematics to include into topics
- Identified potential also for H2020 WP2017 topics to consider mathematical participation
The Consultation was a success!

We received

- 181 responses
- from a wealth of mathematical disciplines
- from high level contributors
- the fields which are especially relevant to DG CONNECT were well present:
  - Modelling, simulation and optimisation (MSO)
  - Biomathematics
  - Algorithms and optimization methodologies for HPC and computing
  - Various methodology data analytics
What topics were covered?

1. EXECUTIVE SUMMARY
2. BACKGROUND
3. MATHEMATICS IN EUROPE TODAY
4. COLLABORATION, CONVERGENCE AND INTERACTION
5. CHALLENGES TO TACKLE
6. MATHEMATICS FOR INDUSTRY AND INNOVATION
7. MATHEMATICS FOR HPC
8. QUANTUM
9. DATA ANALYSIS
10. MODELLING AND SIMULATION METHODOLOGIES
11. BIOMATHEMATICS
12. OTHER MATHEMATICAL AREAS
13. SUMMARY
Areas covered:

- Theory of evolving systems: 3
- Mathematics for the common good: 6
- Mathematics for HPC: 15
- Quantum: 3
- Computational mathematics: 3
- Mathematics for Big Data: 10
- Data analysis: 12
- Topological data analysis: 6
- Inverse problems: 4
- Modelling, simulation and optimisation: 11
- Comments on funding mechanisms: 15
- Comments on the consultation settings: 5
- Various mathematical topics: 18
- Complexity: 3
- Finance mathematics: 2
- Biomathematics: 20
- Simulation: 2
- Geometrics based mathematical models: 6
Countries of contributors

Participants per country

Belgium, Canada, Columbia, Czech Republic, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Netherlands, Norway, Pakistan, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, UK, USA
Conclusion from the Consultation

- There is **vast potential** in the mathematical world in Europe
- There is **relevance** for our WP topics
- Proposals will have **better quality** with mathematical participation
- We recommend **mathematicians** to be active
- We recommend **partners to talk with mathematicians**
FET
- FETHPC-02-2017: Transition to Exascale Computing Specific
- FETHPC-03-2017: Exascale HPC ecosystem development

ICT
- ICT-23-2017: Interfaces for accessibility
- ICT-31-2017: Micro- and nanoelectronics technologies

NANO
- NMBP-25-2017: Next generation system integrating tangible and intangible materials model components to support innovation in industry

LEIT
- COMPET-3-2017: High speed data chain

Societal Challenges
- SC1-PM-15-2017: Personalised coaching for well-being and care of people as they age
- SC1-PM-16-2017: In-silico trials for developing and assessing biomedical products
- SC1-PM-17-2017: Personalised computer models and in-silico systems for well-being
Societal challenges

- LCE-06-2017: New knowledge and technologies
- LCE-01-2016-2017: Next generation innovative technologies enabling smart grids, storage and energy system integration with increasing share of renewables: distribution network
- MG-5.2-2017: Innovative ICT solutions for future logistics operations
- MG-5.4-2017: Potential of the Physical Internet
- ART-01-2017: ICT infrastructure to enable the transition towards road transport automation
- DS-06-2017: Cryptography

FOF

- FOF-12-2017: ICT Innovation for Manufacturing SMEs (I4MS)
The report:

https://ec.europa.eu/futurium/en/content/mathematics-europe-report-open-consultation