



**EUROPEAN TECHNOLOGY
PLATFORM FOR HIGH
PERFORMANCE COMPUTING**

HORIZON 2020: CALCUL HAUTE PERFORMANCE APPELS FETHPC

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Plan

- H2020 – introduction (credit: Frédéric LAURENT, Représentant au comité de programme H2020/TIC)
- Le HPC dans Horizon 2020 – contexte des appels FETHPC
- Les précédents appels
 - FETHPC-1-2014
 - FETHPC-1-2016
- L'appel FETHPC-2-2017
- Les futurs appels FETHPC 2018 – 2020

HORIZON *2020*

LE PROGRAMME DE RECHERCHE ET
D'INNOVATION DE L'UNION EUROPÉENNE

Crédit: Frédéric Laurent
MENESR

Horizon 2020: architecture

77,2 Md€ pour 2014-20

RDI

Défis sociétaux

- Santé, bien-être, vieillissement
- Sécurité aliment., bioéconomie
- Energies sûres, propres, efficaces
- Transports intell., verts, intégrés
- Climat, environnement, mat. 1^{ères}
- Sociétés inclusives et novatrices
- **Sociétés sûres**

Primauté industrielle

TIC
NMBP
Espace

Innovation dans les PME
(Eurostars)
Accès au financement à risque

*Recherche
fondamentale*

Excellence scientifique

Recherche exploratoire (ERC)
Technologies futures et émergentes (FET)
Infrastructures de recherche
Marie Curie

Euratom

Fission
Fusion

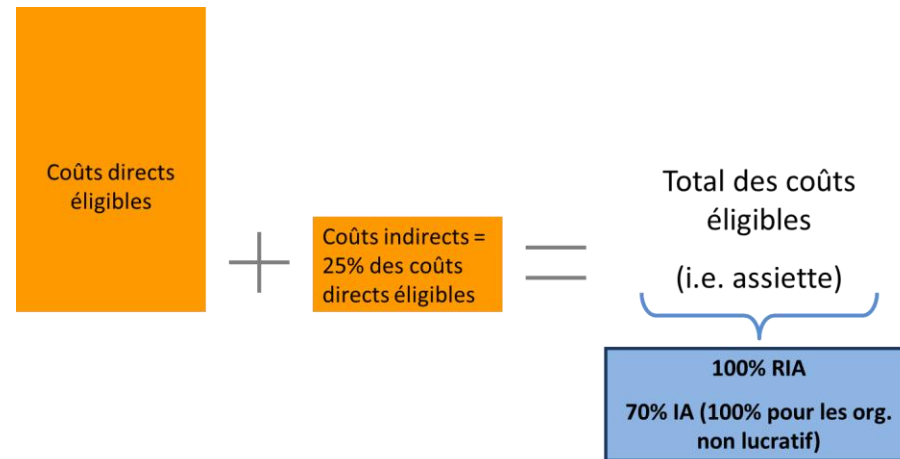
+ *Elargissement, Science et Société*

Institut européen
Innovation & Technologie
EIT / KIC

LES PRINCIPALES RÈGLES D'HORIZON 2020

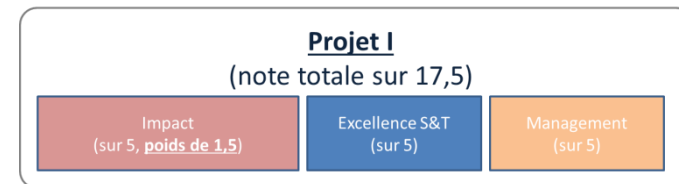
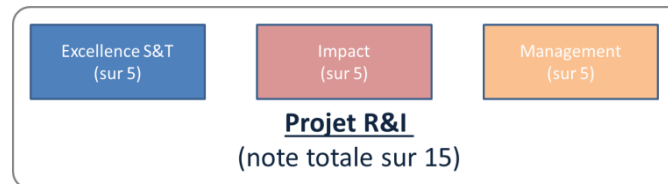
0. Des projets collaboratifs européens (min. 3 partenaires de 3 pays)

1. Des taux de subvention « simples »



A comparer aux taux nationaux !

2. Une évaluation différenciée



3. Une gamme d'« instruments » plus larges :

- De plus en plus en de PCP
- L'instrument PME
- L'instrument *Fast Track to innovation (FTI)*

4. Un « time-to-grant » de 8 mois max.

Le processus des appels



Association cPPP (feuille de route), ETP, groupes d'experts, coordinateurs...

Acteurs nationaux (GTN TIC, SEC + CoFIS)

Délégués

Délégués

WP: Consultation des acteurs clés

12 mois

Draft WP, PC consultation, validation

Appel: publication -> soumission

2-4 mois

Evaluation & préparation Grant

< 8 mois

PCN

Participants

Comment lire une ligne d'appel



PCN - Horizon2020

ICT-21-2016: Support technology transfer to the creative industries

Sujet - Année de l'appel

Specific Challenge: SMEs represent 85% of all actors in the creative industry sector. They co-exist with global players and often face difficulties in adopting state of the art ICT technologies and accessing finance. Moreover, they operate on fragmented and localised target markets and have to bear high market costs which affect their international competitiveness. In this context, ICT tools and technological innovation are fundamental for the creative industries and their competitiveness. They widen creative possibilities and improve efficiency in all sectors.

The goal is to increase the competitiveness of the European creative industries by stimulating ICT innovation in SMEs, by effectively building up and expanding a vibrant EU technological ecosystem for the creative industries' needs and by fostering exchanges between the creative industries SMEs and providers of innovative ICT solutions.

Scope: Innovation Actions

Actions should support creative industries SMEs in leveraging emerging ICT technologies for the development of innovative products, tools, applications and services with high commercial potential. Proposals should ensure that creative industries SMEs are participants in the consortium and take on a driving role in the action, i.e. leading the innovation activities and liaising with end-users, ensuring that the work responds to a clear market demand. The draft business plan provided should demonstrate that the solutions are cost-effective, market-ready and targeted at existing markets with a potential for cross-border extension.

Proposals should make clear if the action would lead to impacts at European or international level and explain how the achievement of those impacts would be measured.

The Commission considers that proposals requesting a contribution from the EU between EUR 0.5 and 1 million for a period between 12 and 18 months would allow this specific challenge to be addressed appropriately. This does not preclude the submission and selection of proposals with a different budget or duration.

Expected Impact:

- For the project portfolio resulting from the Call: tens of innovative solutions with high market potential ready to be deployed by European creative industries SMEs.
- Stronger collaboration between ICT innovative technologies providers and creative industries SMEs to improve the competitive position of the European creative industries.

Type of Action: Innovation action

Le défi à relever

Le périmètre de l'action

Indication sur le budget

Les impacts attendus

Le type d'action financée



Sites à consulter



<http://www.horizon2020.gouv.fr>



Participant Portal H2020



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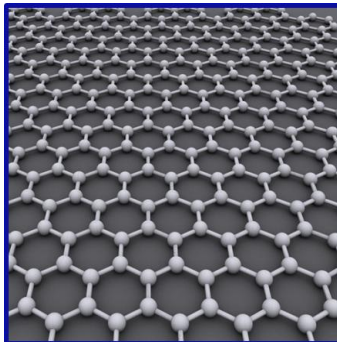
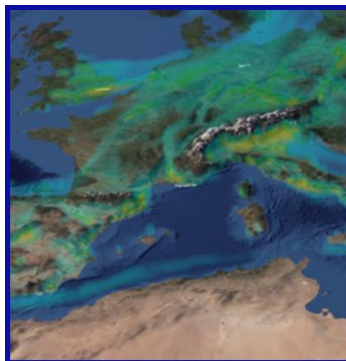
CONTEXTE

HPC for science, industry and society: enabling

Life Sciences & Medicine



Earth Sciences



Materials, Chemistry
& Nanoscience



Engineering



Astro, High Energy &
Plasma Physics

- ... improved healthcare
- ... better climate forecasting
- ... superior materials
- ... sustainable energy
- ... competitiveness of our industry

Importance of HPC for Europe

Main message:

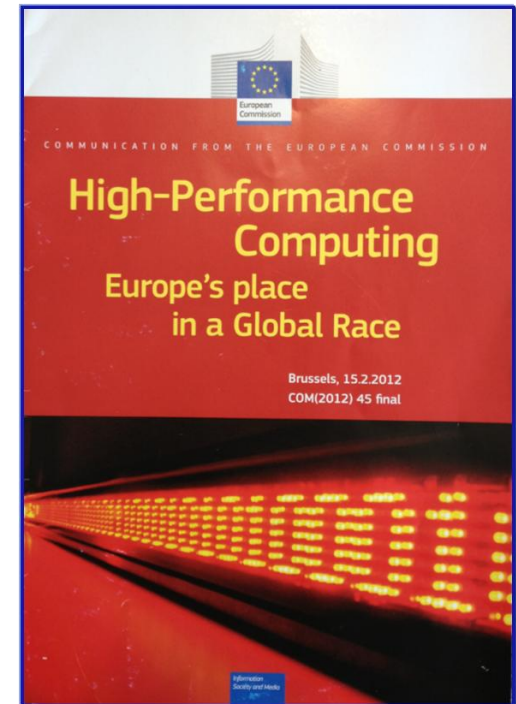
EU needs independent access to HPC technologies, systems and services, usages (whole VALUE CHAIN)

-> association ETP4HPC created in 2012,
whose members are:

- technology provider (large companies, SMEs and Start-ups)
- HPC centres
- Research centers

-> Signature of a contractual Public Private Partnership on HPC in 2013 (cPPP-HPC):

- technology provision
- application expertise



ETP4HPC Members

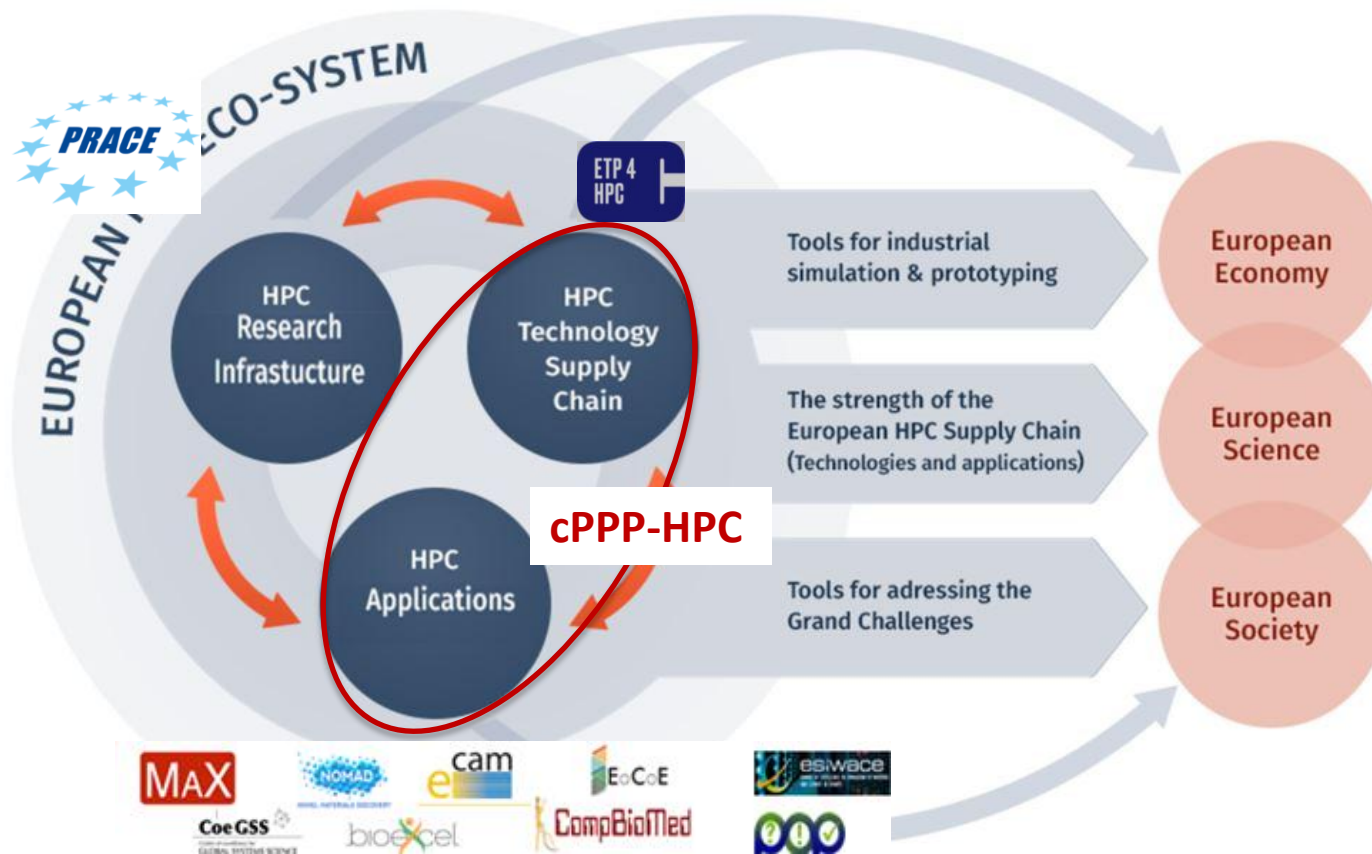
Dutch Association founded in 2012

80 Members

(as of December 2016)

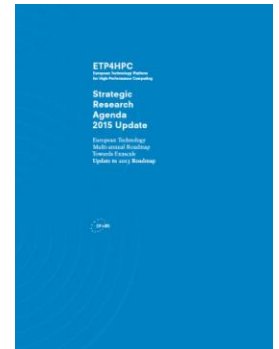
- 53 Full
- 27 Associated
- 40 Private
- 25 SMEs
- 12 Larger companies
- 37 Research organisations

HPC cPPP – Building a European HPC Ecosystem

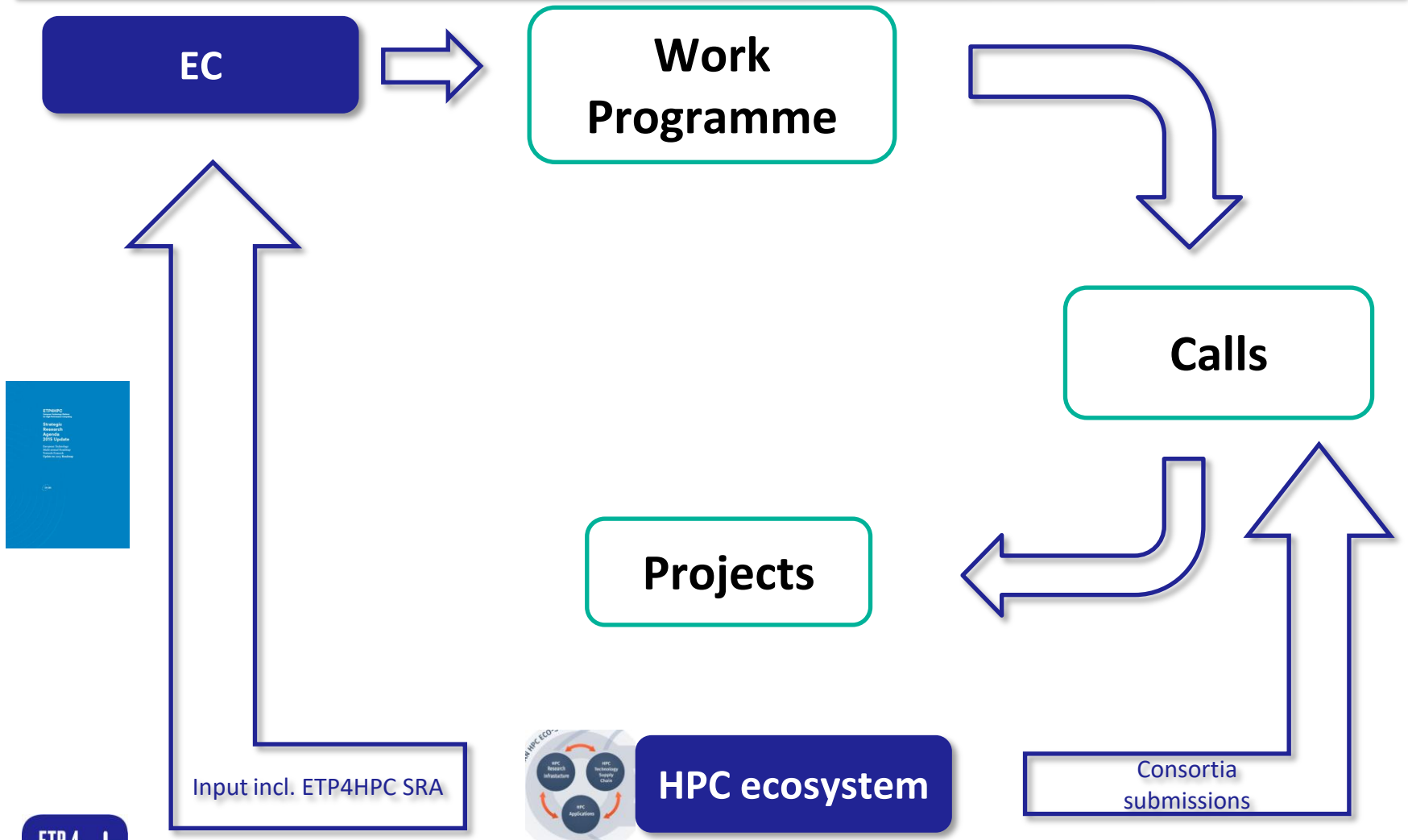


cPPP: how does it work?

- ‘Structured dialogue’
 - Private side represented by ETP4HPC and the CoEs
 - Partnership Boards twice a year
- Private side provides input to define H2020 HPC programmes (“Strategic Research Agenda (“SRA”) – which are funded and operated by the EC
- Commitment from private partners to match EC funding
 - FETHPC calls
 - Calls for Centres of Excellence (CoE)
- Joint progress- and impact monitoring
- Collaboration with PRACE, BDVA/Big Data PPP, HiPEAC, Eurolab4HPC...



Work programme definition process



PREVIOUS CALLS

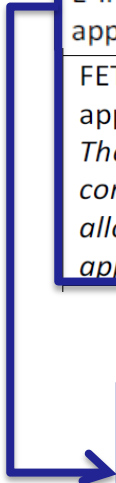
- FETHPC-1-2014
- FETHPC-1-2016

Previous calls

Topic	Type of actions	Funding	Closing Date
FETHPC-1-2014: HPC Core Technologies, Programming Environments and Algorithms for Extreme Parallelism and Extreme Data Applications ⁷	RIA	€93.4 M	25 November 2014
FETHPC-2-2014: HPC Ecosystem Development ⁸	CSA	€4 M	25 November 2014
E-INFRA-5-2015: Centres of Excellence for computing applications ⁹	RIA	€40 M	14 January 2015
FETHPC-01-2016: Co-design of HPC systems and applications ¹³ <i>The Commission considers that proposals requesting a contribution between EUR 10 and 20 million would allow this specific challenge to be addressed appropriately.</i>	RIA	€41 M	14 April 2016 26 September 2016



→ system design (under evaluation)



FETHPC-1-2014: overview figures

#eligible proposals	79
#retained proposals	19
#participants in eligible proposals	652
#participants in retained proposals	178
Budget requested by the eligible proposals	€340,000,000
Indicative budget for the call	€93,400,000
Actual funding	€94,549,793

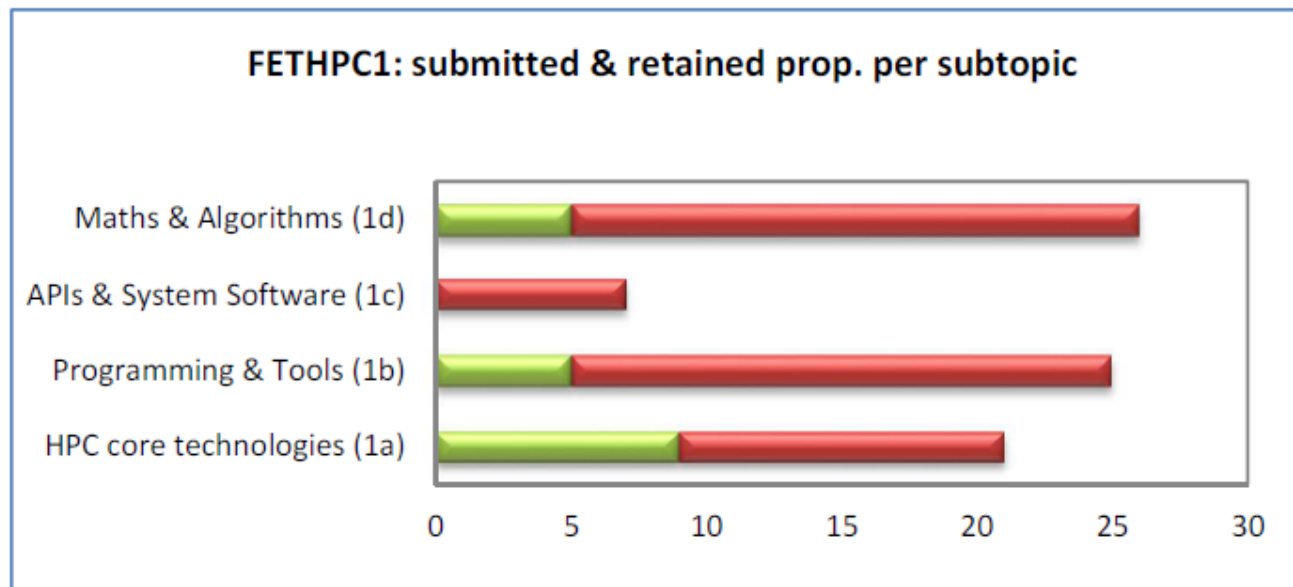
Summary evaluation outcome: RIA

Cut-off	Eligible Proposals received	Above threshold proposals	Grant requested by above threshold proposals	Retained Proposals	Grant requested by retained proposals	Success rate
SEPT 2014	639	254	805 M€	24	78,1 M€	3,7%
MAR 2015	665	326	1079 M€	11	41 M€	1,7%
SEPT 2015	799				Max 38,5 M€	1,1%-1,3% (est.)

**For comparison:
Outcome of FET-OPEN**

FETHPC-1-2014: proposals per sub topics

Sub topic	#submitted	% submitted	#retained	%retained
HPC core technologies (1a)	21	26,6%	9	47,4%
Programming & Tools (1b)	25	31,6%	5	26,3%
APIs & System Software (1c)	7	8,9%	0	0,0%
Maths & Algorithms (1d)	26	32,9%	5	26,3%
Total FETHPC 1	79	100,0%	19	100,0%



FETHPC-1-2014: accepted projects

<https://ec.europa.eu/programmes/horizon2020/en/news/21-new-h2020-high-performance-computing-projects>

FETHPC1 Sub topic addressed	Proposal Acronym
A - HPC core technologies and architectures 9 projects	ECOSCALE
	ExaNeSt
	ExaNoDe
	EXTRA
	greenFLASH
	MANGO
	Mont-Blanc 3
	NEXTGenIO
	SAGE
B - Programming methodologies, environments languages and tools 5 projects	ALLScale
	ANTAREX
	ESCAPE
	INTERTWINE
	READEX
D - New mathematical and algorithmic approaches 5 projects	ComPat
	ExaFLOW
	ExaHyPE
	ExCAPE
	NLAFET










CSA : European eXtreme Computing and Data Initiative



The EU HPC Ecosystem Booster!

- Managed by PRACE and ETP4HPC (coordinator: PRACE)
- Started in Sept 2015
- Main activities :
 - roadmaps : technical (**SRA 3**), scientific cases
 - cross cutting topics : technical topics, training, SMEs
 - international cooperation
 - impact assessment
 - **HPC Summit Week**
→ **May 15-19, 2017, Barcelona.**

Centres of Excellence (CoE): Excellence in HPC applications

	Material sciences: Materials design at the eXascale
	Material sciences: The Novel Materials Discovery Laboratory
	Material sciences: An e-infrastructure for software, training and consultancy in simulation and modelling
	Energy: Energy oriented Centre of Excellence for computer applications
	Climate: Excellence in Simulation of Weather and Climate in Europe
	Global Systems Science: Center of Excellence for Global Systems Science
	Bioscience: Centre of Excellence for Biomolecular Research
	Biomedicine: A Centre of Excellence in Computational Biomedicine
	Performance: Performance Optimisation and Productivity

Call FETHPC-1-2016:

Co-design of HPC systems and applications

- Proposals with innovative and ground-breaking **approaches to system architectures targeting extreme scale**, power-efficient and highly resilient platforms
- Proposals should have a **strong co-design approach driven by a mix of ambitious applications** and in close cooperation with the various scientific disciplines and stakeholders concerned.
- Proposals should show how their proposed solution improves energy efficiency and **demonstrate the reduced energy-to-solution** for the selected applications.



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UPCOMING CALLS

2017 call

<i>Topic</i>	<i>Type of actions</i>	<i>Funding</i>	<i>Opening Date</i> <i>Closing Date</i>
FETHPC-02-2017: Transition to Exascale Computing ¹⁴ <i>The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately.</i>	RIA	€40 M	12 April 2017 26 September 2017
FETHPC-03-2017: Exascale HPC ecosystem development ¹⁵ The Commission considers that proposals requesting a contribution between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.	CSA	€4 M	12 April 2017 26 September 2017

CALL: <https://eceuropa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/fethpc-02-2017.html>

ABOUT FET: http://www.kpk.gov.pl/wp-content/uploads/2015/10/M.Lopatka_H2020-FETWP2016-17.pdf

Call FETHPC-2-2017

This call is about different software aspects that are needed to take advantage of the full capabilities of Exascale computing

Subtopics

- 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

Funding:

The Commission considers that proposals requesting a contribution from the EU between **EUR 2 and 4 million** would allow this specific challenge to be addressed appropriately. Nonetheless, ...

At least one project per subtopic will be funded

Expected Impact:

Contribution to the realisation of the **ETP4HPC Strategic Research Agenda**, thus strengthened European research and industrial leadership in HPC technologies.

a) High productivity programming environments for exascale

Simplify application software development for large- and extreme-scale systems

- development of more productive programming models and environments,
 - managing data transfers, data locality and memory management
 - dealing with inter-application dynamic load balancing and malleability,
 - unified performance tools
- the easier combination of different programming models,
 - DSL frameworks are required
 - interoperability and standardisation of programming model, API and runtime as well as the composability of programming models
- using increased intelligence throughout the programming environment.
 - APIs, runtime systems and the underlying libraries should support auto-tuning for performance and energy optimisation.
 - automated support for debugging and anomaly detection is also included under this subtopic.

b) Exascale system software and management:

Advance the state of the art in system software and management

- data aware scheduling
- run time handling of all types of resources (cores, bandwidth, logical and physical memory or storage) and controls, e.g. for optimised data coherency, consistency and data flow
- new multi-criteria resource allocation capabilities
- interaction during task execution, with the aim to improve resilience, interactivity, power and efficiency
- explore on-the-fly analysis methods offering reactivity, compute efficiency and availability
- graphical simulation interaction will require new real-time features
- configuration and deployment tools will have to evolve to take into account the composability of software execution environments.

c) Exascale I/O and storage in the presence of multiple tiers of data storage

- Fine grain data access prioritisation of processes and applications sharing data
- Runtime layers should combine data replication with data layout transformations for improved performance and resiliency
- provide optimal performance or reliability especially in the presence of millions of processes simultaneously doing I/O
- programming system interoperability and standardised APIs are critical
- On the fly data management supporting data processing
- real time in situ/in transit processing

d) Supercomputing for Extreme Data and emerging HPC use modes

HPC architectures for real-time and in-situ data analytics are required to support the processing of large-scale and high velocity real-time data together with large volumes of stored data

- support for real-time in-memory analysis of different data structures
- direct processing of compressed data and
- benchmarking method for performance analysis.
- Interactive 3-D visualisation of large-scale data for on-demand data analysis in real-time
- Interactive supercomputing for workflows urgent decision
 - adapting operational procedures of HPC infrastructures
 - improving checkpoint/restart and extreme data management

e) Mathematics and algorithms for extreme scale HPC systems and applications working with extreme data

- quantification of uncertainties and noise
- multi-scale, multi-physics and extreme data
- mathematical methods, numerical analysis, algorithms and software engineering for extreme parallelism
- novel and disruptive algorithmic strategies to minimize data movement/ communication/synchronisation
- parallel-in-time methods
- take into account data-related uncertainties:
 - unified European VVUQ (Verification Validation and Uncertainty Quantification) package for Exascale computing should be provided
 - access to the VVUQ techniques for the HPC

More information on the sub topics

Sub topic	Related projects	SRA
High productivity programming environments for exascale		Sec 5.3
Exascale system software and management		Sec. 5.2
Exascale I/O and storage in the presence of multiple tiers of data storage	NEXTGenIO, SAGE	Sec. 5.5
Supercomputing for Extreme Data and emerging HPC use modes		Sec. 5.6
Mathematics and algorithms for extreme scale HPC systems and applications working with extreme data	ComPAT, ExaFLOW, ExaHyPE, EXCAPE, NLAFFET	Sec. 5.7

Beyond FET: FET Launchpad

**Cut-off date:
27 September 2017**

The FET Innovation Launchpad aims to take FET research closer to the society and the market. By their very nature – foundational, novel, high-risk, interdisciplinary – FET-funded projects have the potential to create many innovative social and economic opportunities. Not all of those promising ideas can however be taken-up under the original project.

This is where the Innovation Launchpad comes in. It will take-up those ideas from FET funded projects and explore their possible social and market applications. Ultimately it aims at stimulating entrepreneurial mind-set in the FET research world. Participants of ongoing or recently finished FET projects under FP7 or H2020 are invited to apply to the FET Innovation Launchpad .

Webpage: <https://ec.europa.eu/digital-single-market/en/news/deadline-fet-innovation-launchpad-29th-september-2016>

Outlook:

WP18-20

- Developed by ETP4HPC in collaboration with the CoEs, PRACE
- In synchronisation with BDVA and other stakeholders
- Draft submitted to the EC in Dec. 2016:
 - Technology – « FETHPC » follow-up
 - Extreme Scale Demonstrators to integrate FETHPC outcomes
 - Centres of Excellence (second round)
 - Coordination and Support Action
- SRA Version 3 (2017 edition) will develop a more detailed technical vision and WP18-20 calls will implement the SRA



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**THANK YOU FOR
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WWW.ETP4HPC.EU
OFFICE@ETP4HPC.EU**

*HPC strategy, work programmes and HPC related news:
ec.europa.eu/horizon2020-hpc*