

Transversal Recommendations

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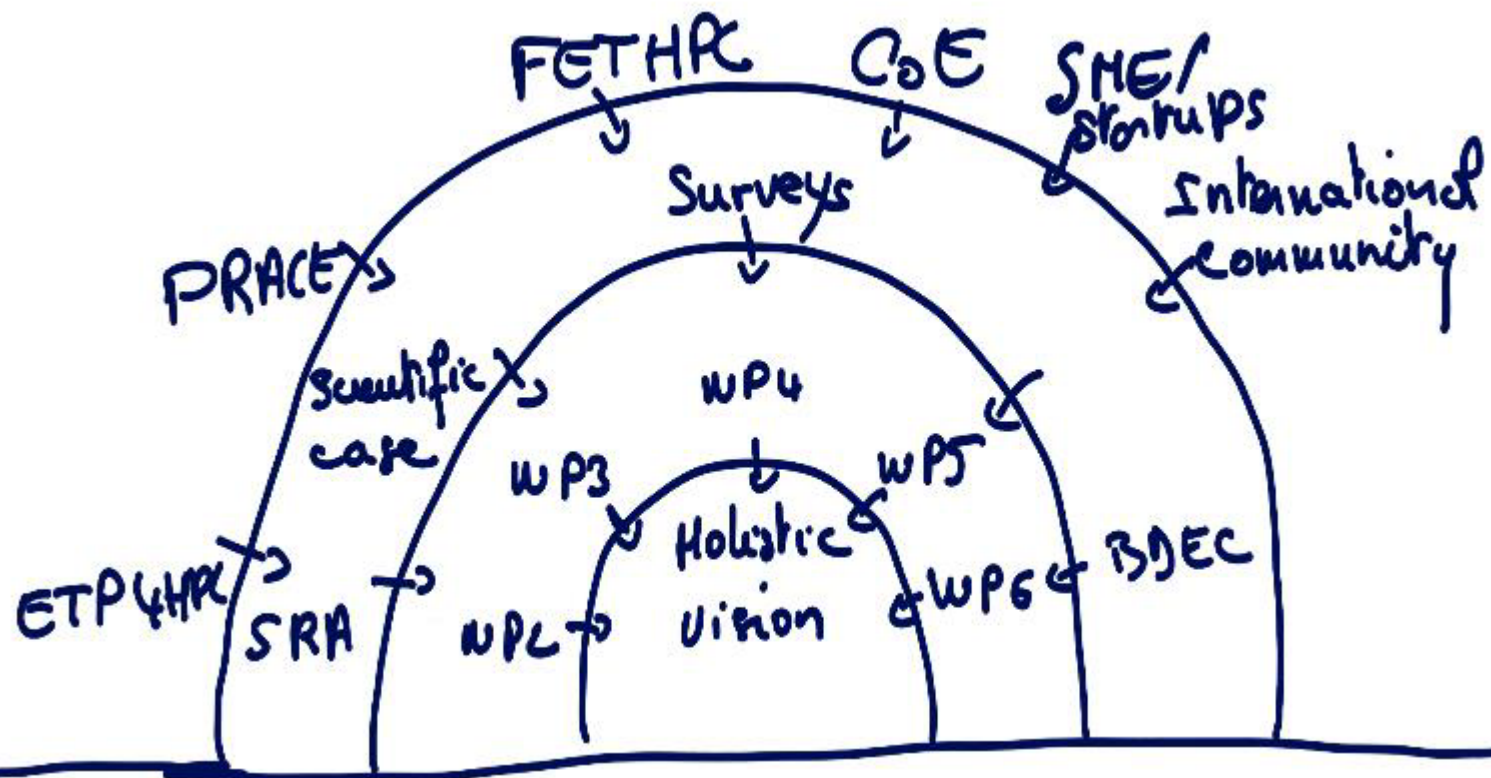
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- The global vision aims at improving the ecosystem components
 - Research instruments
 - R&D efficiency
 - Industrial competitiveness
- Complementary to the technical work performed in
 - The SRA
 - The EsD
 - The FET HPC projects and CoE
- Deliver a set of "*ecosystem level*" recommendations

Elaboration Process

- EXDCI WPs provided a set of critical recommendations
 - WPs collected information from the HPC stakeholders via PRACE, ETP4HPC, etc.
- Trying to cover the main topics structuring the HPC ecosystem



Nine recommendations

- Aiming at building efficiency and coherence in the ecosystem
- Issued by WPs covering
 - SME/Startup
 - Extreme Scale Demonstrators, IPCEI
 - HPC centers
 - R&D

Recommendations	Expected impact
Encouraging commercial relationships between SME and industry through European projects	Increase competitiveness
Concerted approach to HPC training in Europe	
Incentives to increase EU stakeholders implications in standards initiatives	
IPCEI for advanced research and innovations	R&D efficiency
Paving the way from EsD development towards applications	
Improving FETHPC and CoE results capitalization	
Operation policies and federation toward convergence	Better research instrument
Big Data and extreme scale international initiative	
Access to advanced technologies	

Operation Policies and Federation toward Convergence

- *Main contributor* → J.P. Villotte / WP3
- *Origin* → Access to data is changing the ways in which we think about and address problems in science and societal research
- *Type of actions required* → multi-organization task-force
- *Expected impact* → Better research instrument

It is recommended that a task force be formed to pioneer the federation of autonomous organizations providing data, computing and data-intensive analysis resources, together with a comprehensive and operational virtual research environment and E-infrastructure devoted to the full path of data use in a research-driven context.

IPCEI for advanced research and innovations

- *Main contributors* → Jean Gonnord, Jean-Philippe Nominé / WP2
- *Origin* → IPCEI is likely to be a major initiative in the EU HPC landscape with strong impact on current various efforts
- *Type of actions required* → EXDCI coordination action
- *Expected impact* → R&D efficiency

It is recommended that EXDCI considers and actively supports the articulation between the European Cloud Initiative (and its underlying European Data Infrastructure), FETHPC projects incl. Extreme Scale Demonstrators, and IPCEI.

Paving the way from EsD development towards applications

- *Main contributor* → Michael Malms / WP2
- *Origin* → "Extreme-Scale Demonstrators concept: Current State of Definition" document
- *Type of actions required* → Elaborating an EU EsD approach for developing Extreme Scale Demonstrators
- *Expected impact* → R&D efficiency

Enabling development and deployment of ambitious Extreme scale Demonstrator projects paving the way to Europe's competence in RD&I of competitive High Performance Systems Technology. These projects need new implementation instruments in the area of application & technology co-design and deployment to enable solutions of a large variety of extreme complex scientific problems.

Follow-up actions

- See the « The Extreme-Scale Demonstrators concept: Current State of Definition » document

Big Data and extreme scale international initiative

- *Main contributor* → Mark Asch / WP6
- *Origin* → Convergence of HPC and Data Analytics is going to shape HPC's future. This cannot be addressed at a national level.
- *Type of actions required* → Reinforce the structuring of the BDEC initiative at the EU level.
- *Expected impact* → Better research instrument

The recommendation aims at encouraging the EU to facilitate future international collaborations involving compute-intensive exploitation of scientific data, as advocated by the BDEC consortium. This should be an integrated action, within the EOSC (European Open Science Cloud) initiative, that could associate other major international initiatives in "Data Management and e-Infrastructures", notably those of Belmont Forum and Future Earth.

Follow-up action

- A common white paper is being prepare for SC with the BDEC community (leader for EU Mark Asch)

Concerted approach to HPC training in Europe

- *Main contributor* → Catherine Inglis / WP5
- *Origin* → Training is at the core of the ecosystem competitiveness; although large scale initiatives such as PATC exist, outreach could be improved, especially with respect to new technologies.
- *Type of actions required* → Promote the breadth/depth of training available to the EU HPC community and identify and adapt to changing needs.
- *Expected impact* → Increased competitiveness

A concerted approach to HPC training in Europe must be put in place to allow rapid uptake by developers and end-users alike of the new HPC technologies currently being developed through numerous European initiatives. This will allow the European HPC community to keep up-to-date with new technologies and techniques and to become confident in their use, thus helping to secure Europe's competitive edge in the international arena.

Improving FETHPC and CoE results capitalization

- *Main contributors* → François Bodin, Thierry Bidot / WP4
- *Origin* → Survey shows capitalization plan are not key to projects
- *Type of actions required* → Define best practice in FET project organization in order to be effective in managing innovations
- *Expected impact* → Better research instrument

We recommend that specific best practices and support actions be set up in a systematic way to organize market-reaching plan within early stage of FET projects.

Incentives to increase EU stakeholders implications in standards initiatives

- *Main contributor* → François Bodin / WP4
- *Origin* → HPC (defacto) standards weak involvement
- *Type of actions required* → Promote agility of trainings offering to the EU HPC community
- *Expected impact* → Increased competitiveness

Incentives for EU stakeholders to participate in international standardization in the extreme scale computing and big data must be increased. New forms of support must be invented to ensure the presence of high-profile scientists and EU industry stakeholders in existing and emerging initiatives.

Access to advanced technologies

- *Main contributor* → Guillaume Colin de Verdière / WP2
- *Origin* → HPC very sensitive to technologies, many research are lacking access to state-of-the-art technologies
- *Type of actions required* → Establish way to access to advance technologies by leveraging EU ecosystem
- *Expected impact* → R&D efficiency

We recommend that the EU commission ecosystem creates a body able to facilitate access (technical and legal) to advanced technologies to research groups.

Encouraging commercial relationships between SME and industry through European projects

- *Main contributors* → Maïke Gilliot, François Bodin / WP4
- *Origin* → Feedback from SMEs and startups
- *Type of actions required* → Define best practices and potentially extends projects' capabilities
- *Expected impact* → Increased competitiveness

Larger companies should be strongly encouraged to extend their collaboration with start-ups and SMEs beyond European R&I actions and to engage direct business relations.

Suggestion for follow-up action

1. Collect key issues, for example:

- Connect to customers
- Making it easier to respond to public procurements
- Business models and product position
- Sustainability of supply and demand

2. One-day-workshop to discuss those topics with all stakeholders with objective to release recommendations / best practices for implementation in EsD

- Suppliers : SME and Large companies acting as integrators
- Customers
- Academic data centres and commercial end-user customers

Conclusion

- Today European HPC ecosystem is rich in initiatives and projects, therefore
 - Ensuring coherence and efficiency is needed
 - Actions are scattered and thus may not reach the critical mass
- Tomorrow depends on our capability to create synergies between stakeholder
- Suggestion for next steps: setting up a set of EXDCI tasks force for implementing each recommendation