# SRA 2 and 3, EsD-status

## EXDCI technical workshop,

21st September 2016, Barcelona

octobre 4, 2016

The EXDCI project has received funding from the European Unions Horizon 2020 research and innovation programmed under the grant agreement No 671558.

# SRA – 2: status (1)

- SRA -2 published in January 2016 (on the web since Nov. 2015)
- 4 feedbacks received (public calls for comments & personal sollicitation)

1

Dear ETP 4 HPC

Re the evolution of the road map, we believe
* growing concern over climate change & energy will lead to a step change in required compute-to-(electrical) power ratio, moving to TFLOPS/Watt for those wanting on-going competitive advantage
* the use of #greenerCompute by example employing the vast array of very low power devices available to undertake distributed compute (think Condor on IoT devices)
* EU governments should themselves (as well as work with industrial partners such as Intel, AMD, NVIDIA & ARM) to provide 100 times as much training as is currently undertaken, in the arena of #highendcompute and #greenerCompute

Yours, Michael
http://highendcompute.co.uk

2

Overall 2015 Update of the Strategic Research Agenda for
European Technology Platform for High-Performance Computing
looks fine.
My expertise is related with few aspects of this document on which I have the following comments:
A new section Mathematics & algorithms for extreme scale HPC systems seems essential.
I would entirely agree with the statement on page 16:
"One example is the methods for scalable data analytics, an area which is predominantly driven by commercial operators and where huge progress in algorithms is required to make them scalable."

Giving priority on "usability" and "affordability" looks fine, however energy efficiency on both hardware and software seems vital and presence of new section 5.4 Energy and Resiliency seems timely, however the content of this section could be improved.
Subsections 5.4.1 to 5.4.10 focus on very specific tasks and objectives. Criteria for achievement need clarification.

A general issue in minimising resources usage and maximising efficiency is scalability of modern optimisation methods. The strategy could address this in an appropriate section. The aim of this section will be to advance optimisation methods scalability to large number (more than 1000) of parameters (variables, dimensions) with competitive level of results precision and energy efficient software algorithms.

# SRA – 2: status (2)

3

Amid all the euphoria about technology, we must keep in mind that what computers are for: to run applications. To guide the development of exaflop computers, it would be wise to select a sample of representative applications that are expected to benefit from such a level of performance, and conduct the necessary research to thoroughly understand the requirements these applications will impose on the computers that will run them.

Such research will necessarily involve deep study of the underlying mathematical formulations of the governing principles, such as natural laws, behind the applications, the discretization of continuous variables, and the methods and algorithms used to arrive at the appropriate approximation to the desired result. Accuracy of approximation, and verisimilitude of results are fundamentally important aspects of such research.

There does not appear to be a well-defined, concerted program in Europe to address such applications research. I urge ETP4HPC to include a proposal for such research in their roadmap. The European Commission should likewise be urged to include such an applications research project in their Horizon 2020 program.

4

Dear Catherine Gleeson

I would like to express a lot of thanks to you to have given me the opportunity to study this interesting paper of ETP4HPC SRA 2015 Update.

I confirm that it includes many valuable points for the future EXA scale computing. I have focused on the section 5 Technical Research Priorities for my comments below since I believe it is the core of this document.

Best Regards, Tamura

...following 6 pages of details.....

# WP2 actions 2016 so far

01-2016 : Release of Strategic Research Agenda 2

05-2016 : Conducted first EsD full day workshop during HPC summit

- 80 participants
- 5 parallel tasks:
  - technical goals
  - use cases
  - budget aspetc
  - procurement options
  - consortia composition

06-2016 : Conducted second EsD full day workshop during ISC

- 40 participants
- Focus on analysis of 5 HPC use cases

07-2016 : Generated 18 page document summrizing EsD concept current status

# SRA-3: update roadmap

- Last planned update of the SRA within H2020 !
  - Suggestion: we generate a „lessons learned" report at the end of the H2020 period
- Expected availability date to the ETP4HPC SB: July 31st 2017
- Roadmap:
  - **09-2016**: Use case analysis (BDVA, HPC scientific cases), ESD-interlock with system integrators
  - **12-2016**: Workshop Analysis of five BDVA technical prorities - Zurich
  - **02-2017:** 2-days workshop:
    - Interlock with CoE: applications and use cases anaylsis
    - SRA 2017 - kickoff meeting (ETP4HPC WGLs, Energy-and Software-WG leads) - Munich (start writing)
  - **02 to 05-2017**: regular calls to stay in sync, solve issues, monitor progress
  - **05-2017:** HPC Sumit: Full day review of intermediate status (8x30 min sessions) open to all ETP4HPC members, CoE, EXDCI-W3 leads, BDVA in a closed workshop
  - **06-2017:** Finalizing write up, reviews
  - **07-31st 2017**: deliver to SB for review

# SRA-3: sources of input

- Various sources for update & review:
  - **BDVA**:
    - Use cases:

| | |
|---|---|
| Healthcare | 1 |
| Transport | 5 |
| Civil Safety | 1 |
| Natural Language Processing | 1 |
| Performance Aware Big Data processing | 1 |
| Total | 9 |

    - Technical priorities:

Technical Priorities
3.1 Analysis and Identification of Technical Priorities
3.2 Priority "Data Management"
3.3 Priority "Data Processing Architectures"
3.4 Priority "Data Analytics"
3.5 Priority "Data Protection"
3.6 Priority "Data Visualisation and User Interaction "
3.7 Roadmap and Timeframe

  - **CoE**: Recommendations out of joint analysis of typical use cases
  - **IDC**: SWOT analysis results („HPC R&D in Europe") and assessment of progress since 2013
  - **PRACE**: Recommendations out of joint analysis of typical use cases
  - **ETP4HPC members**:
    - Questionaire to all members asking for trends and directions (see BDVA questionaire)
    - working groups, recommendations out of specific interlock (e.g. System integrators)

# SRA 3 – 1. General Part – Suggested Contents

- **The Process of Building the SRA**
- **Analysis of the current European HPC Ecosystem**
  - Results of the (on-going) FETHPC Projects ('what is in place') = the impact of the SRA so far
  - PRACE and CoEs
  - BDVA
- **PESTLE** – Political, Economic, Sociocultural, Technological, Legal, Environmental factors
  - PRACE Input
  - CoE Input
  - BDVA Input
- **SWOT** Analysis – from the Point of View of the European HPC Technology Industry
  - SWOT Findings – Critical Directions

# SRA-1-3-3 side-by-side:

| SRA 1 (WP14-15) (86 p) | SRA 2 (WP16-17) (86p) | SRA3 (WP18-20) |
|---|---|---|
| The added value of HPC in Europe (4) | The European HPC Ecosystem (6) → | The Process of building the SRA |
| Building the SRA (6) | → | The current state of European HPC<br>PESTLE<br>SWOT |
| A Multidimensional HPC vision (4) | New trends in HPC challenges, use... (10) → | Our Multidimensional Vision of HPC |
| Technical Research Priorities (28) | Technical Research Priorities (37) → | update ( milestones, content) |
| Completing the Value chain (8) | End-user & ISV requirements (4) | Other output of SWOT |
| | Extreme scale Demonstrators (5) → | |
| Links with other initiatives (2) | Ecosystem at large – stake holders & init. (6) → | How links with other inititiaves should develop |
| Make it happen (4) | | |
| | | **Anything else ?** |
| | | |
| | | |
| | | |

# Timetable & Sources - 1

| The Process of Building the SRA | Analysis of the current European HPC Ecosystem | PESTLE | SWOT | Technical Update | Other SWOT outcomes | Links with other initiatives |
|---|---|---|---|---|---|---|
| Internal Research – using the sources available | ☻ | | | | | |
| **09-2016/BCN** – EXDCI Workshop – BDVA, PRACE and Integrators | | ☻ | | | | |
| **12-2016/Zurich** – Workshop on BDVA's 5 priorities | | ☻ | | | | |
| **02-2017/Munich**: 2-days workshop: 1/ CoE: applications and use cases analysis; 2/ SRA kick-off meeting (WGLs, Energy-and Software-WG leads) | | | ☻ | | ☻ | ☻ |
| **02 to 05-2017**: regular con calls | | | | ☻ | | |

# Timetable & Sources - ctd

| The Process of Building the SRA | Analysis of the current European HPC Ecosystem | PESTLE | SWOT | Technical Update | Other SWOT outcomes | Links with other initiatives |
|---|---|---|---|---|---|---|
| **05-2017/BCN**: HPC Summit: Full day review of intermediate status (8x30 min sessions) open to all ETP4HPC members, CoE, EXDCI-W3 leads, BDVA in a closed workshop | ☻ | ☻ | ☻ | ☻ | ☻ | ☻ |
| 06-2017: Writing Up | ☻ | ☻ | ☻ | ☻ | ☻ | ☻ |
| **31st Jul 2017: deliver to SB for review** | | | | | | |

# WP 2018-2020 recommended budgets

21st September 2016, Barcelona,

octobre 4, 2016

The EXDCI project has received funding from the European Unions Horizon 2020 research and innovation programmed under the grant agreement No 671558.

# Extreme scale Demonstrators: some words upfront (1)

- Agenda for this session:
  - Quick recap of the current status of the EsD proposal (Thomas Eickermann, 20 min)
  - System integration related discussion points (next page) (Michael Malms, 10 min)
  - Presentation of System Integrators (10 min each)
    - Lenovo
    - Cray
    - Megware
    - e4
    - Atos/Bull
    - Eurotech
    - Fujitsu
    - Huawei
  - Discussion „essential steps towards executable EsD projects“ (All, 60 min)

# Extreme scale Demonstrators: some words upfront (2)

System integrators play a pivitol role in the EsD concept both during Phase „A" (development & integration) as well during phase „B" (evaluation/ benchmark and deployment).

(Note: the term „system integrator" is vage and can span a variety of roles and steps towards making a system „shippable").

It is important for the definition of the next layer of the EsD concept to understand and discuss the different positions of interested EsD system integrators such as:

## Suggested topics for the presentations of the system integrators:

1. What is your motivation for potentially assuming the role of a system integrator in one of the Esd projects ?
2. What are the responsibilities and scopes you wish to cover:
   - System architect
   - Development of own subsystem(s) or subcomponent(s)
   - Integration of entire system including third party subsystems & components
   - System Test and EsD-release
   - Maintenance & support
3. What is your view on how best to implement the object of „integrate technology researched and prototyped in pevious FETHPC projects"? (analysis-process, estimated time and resources required, IP-aspects, etc.)
4. What is your view on the governance – structure of an EsD project, what are your fundamental requirements?
5. Any thoughts about required budgets and funding mechanisms ?
6. Any „no go" aspects ?