This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 777533.

PROviding Computing solutions for ExaScale ChallengeS

D9.1	Initial Dissemination and Engagement Plan and market research report		
Project:	PROCESS H2020 – 777533	**Start / Duration:**	01 November 2017 36 Months
Dissemination[1]:	PU	**Nature[2]:**	**R**
Due Date:	31.10.2018	**Work Package:**	**WP 9**
Filename[3]	D9.1_Initial_dissemination_and_engagment_plan_and_market_research_report_v1.0.docx		

ABSTRACT

This report covers the initial measures implemented by the PROCESS team to pave the way for the future exploitation of the project results and the consequent generation of sustainable impacts emerging from up taking PROCESS exascale solutions:

a) The initial market analysis of the HPC space, as PROCESS targeted environment, to refine our initial understanding of the competitive challenges and windows of opportunity for PROCESS enabled solutions. This analysis aims to provide an overview of the main components and behaviour of the HPC ecosystem and its players: stage of maturity, trends shaping the competitive environment and key players' profiles. These elements provide on the one hand the basic intelligence needed to start making strategic decisions on PROCESS's value propositions and feed the consequent Business Model(s) and plans(s). And at a tactical level, they provide key inputs to implement the project´s dissemination and engagement activities.

b) The Dissemination and Engagement Plan (DEP). It contains the strategy for dissemination and engagement with HPC ecosystem players, comprising the target groups and key messages to be delivered to such audiences. It also reports on the launching of the communication channels and vehicles as well as the dissemination actions already performed/planned.

This version is a draft of D9.1 and is under review.

1 PU = Public; CO = Confidential, only for members of the Consortium (including the EC services).

2 R = Report; R+O = Report plus Other. Note: all "O" deliverables must be accompanied by a deliverable report.

3 eg DX.Y_name to the deliverable_v0xx. v1 corresponds to the final release submitted to the EC.

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Document History

Release	Date	Reasons for Change	Status[7]	Distribution
0.8	10.10.2018	Gather partners´ feedback	Draft	Consortium
0.9	29.10.2018	Introduction of internal review suggestions	In Review	Consortium
1.0	31.10.2018	Release	Released	Consortium-EC

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7 Status = “Draft”; “In Review”; “Released”.

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Executive Summary

This report covers the initial measures implemented by the PROCESS team to pave the way for the future exploitation of project results and to maximise impacts emerging from uptaking PROCESS's exascale solutions.

Along the first year of the project, work aiming at maximising impact has been centred on:

a) Digging into the **market analysis of the HPC space** -PROCESS targeted environment- to start refining our initial understanding of the competitive challenges and windows of opportunity available for PROCESS's enabled solutions.
The initial market analysis aims to provide an overview of the main components and behaviour of the HPC market: stage of maturity, trends shaping the competitive environment and key players profiles. These elements provide on the one hand the intelligence needed to make strategic decisions on PROCESS's value propositions and the consequent Business Model(s) and plans(s); and at a tactical level, provide key inputs to implement the project´s dissemination and engagement activities.

b) the **Dissemination and Engagement Plan** (DEP)**,** designed and implemented with the ultimate objective of promoting the uptake of project results. It contains the outreach strategy, comprising the target groups and key messages to be delivered to such audiences. It also reports on the launching of the communication channels and vehicles as well as the dissemination actions already performed/planned.

This document provides additional guidance for furher market intelligence gathering, business modelling, outreach and engagement with targeted stakeholders. In turn, these tasks aim to provide insights for the validation of PROCESS results across the second and third years of the project lifecycle, when PROCESS outputs become available for showcasing their value beyond the consortium boundaries.

Given its nature and purpose, this deliverable is primarily aimed at a) PROCESS Workpackage leaders and members of the project management board in charge of decision making related to outputs production, and b) all project team members involved in the development of the PROCESS-enabled solutions, who will be likely engaged in the exploitation of project results.

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1 Introduction

This first deliverable issued by the WP9 Dissemination, Engagement and Exploitation team informs on the initial tasks performed by the consortium to prepare the conditions for future impact generation. Formally, this report delivers the initial results of T9.1 and T9.2 and T9.3. These tasks comprise the set-up and launching of the so-called Dissemination and Engagement Plan (DEP), which includes populating the targeted audiences´ listings, launching the first set of dissemination and engagement actions; developing the branding and related marketing material and launching the project´s online presence (website & social media channels). As a prerequisite for DEP, we have started the market and user communities´ investigation activities to enable works towards defining demand potential, segmentation and unmet needs and expectations; competitors' analysis and initial competitive challenges diagnoses.

The results and actionable conclusions of these analyses and planning exercises will be assessed, refined and enhanced along the second and third years of the project, to enrich the definition of the go-to-market strategy and Business Plans, to be delivered by the end of the project.

The core content of this report is structured as follows:

- Chapter 2 presents an overview of the strategic market research and diagnoses we are performing on a continuous basis to support further PROCESS exploitation activities.
- Chapter 3 presents the DEP operational design and initial implementation.

The formulation of this report is based upon:

- The rationale underlying the creation of PROCESS
- Preliminary findings in the early consultations with stakeholders, related to subjects such as the competitive landscape for future deployment of exascale HPC solutions
- Participation in HPC related events, which allowed to gather insights directly from state-of-the-art presentations and debates among top level researchers, practitioners and domain experts as well as to identify and contact key interviewees in a non-aggressive environment, thus fostering discussion engagements and facilitating further contacts.
- Desk research and bibliographic analysis to look at existing experiences and extract good practices that are relevant and could be applied to future PROCESS enabled exploitation paths. These analyses covered some purely competitive marketplace operations as well as public sector (e.g. EC policies) HPC related initiatives. Desk research and bibliographic analysis techniques, mainly used to identify best practices and lessons learnt. Desk research included the collection and review of a variety of published sources such as market research reports, white papers, articles in specialised publications, policy roadmaps and prospective studies, as well as statistics, directories and market players' databases. The review of these sources established the framework for the study with a description of HPC value chain and market trends, socio-economic conditions and structures, competition and innovation mechanisms.
- Socio-economic and market modelling: profiling the players acting along the HPC value chain, identifying the roles of the market players and their interdependencies and economic behaviour. This modelling has been framed within the context of the competitive landscape defined by external factors beyond the managerial control of HPC players.

2 Initial market analysis

"European supercomputing infrastructure represents a strategic resource for the future of EU industry, SMEs and the creation of new jobs."
Mariya Gabriel, Commissioner for Digital Economy and Society

2.1 Introduction

The initial market research tasks performed during the first year of the project aimed to confirm that the main traits of the rationale justifying the creation of PROCESS are still in place, and that the proposed PROCESS solutions are relevant for our targeted earliest adopters.

2.1.1 Key drivers for a future exascale HPC market

HPC, comprising both computing and extreme/big data services terms, is deemed as a strategic resource for those societies engaging in the emerging global data economy. The dramatic increase in the amount and variety of Big Data creates new possibilities for sharing knowledge, carrying out research, doing business and developing public policies. Applications of HPC technologies are growing countless and citizens are already benefiting from them in their everyday life in sectors like health care, weather, clean energy and cybersecurity. This is also key to ensuring that scientists reap the full benefits of data-driven science. Big industry as well as innovative SMEs are increasingly relying on the power of supercomputers to work on innovative solutions, reduce costs and decrease time to market for products and services. Finally, HPC allows/empowers governments/policymakers to develop new policies and better decision making improving the competitiveness of the economic tissues and the welfare of citizens and society as a whole. Regarding future development, **exascale class computing is recognised as the next step in the development of HPC capacities**.

These drivers have been recognised by the major economic and political blocks around the globe: USA, Japan, China, the BRIC and the EU have created their own policies, strategies and investment programmes to fight in the global race/battle/competition to become leading forces in the next generation -exascale- HPC space. While Europe has made substantial progress and built strengths for the development of its HPC ecosystem in the last few years, a recent study by the European Investment Bank [i] identified a relevant set of weaknesses that the EU must strategically address both to become (as politically declared) a global leading market force and to be able to seize unique opportunities around the next generation HPC. PROCESS is in a privileged position to become a net contributor to such endeavour.

Long term forecasts provided by HPC market specialised analysts [ii], indicate that **a stable market for Exascale-class HPC systems will take more than 5 years to develop**, with the first systems available by 2022-2024. Early in the 2030s, the market for Exascale systems will become a growth market and by 2035, the entire HPC market could be comprised of Exascale systems. Although this seems to be a too long term, key competitors are already taking positions in this market, putting pressure on European players to react accordingly and timely.

2.1.2 The HPC ecosystem market model

To support market analyses, we defined a market model to depict the structure and key relationships inside the HPC market value chain. **This model helps us clarify who the players to be involved /engaged by DEP activities should be, as well as the relevant relationships and focal points or market gaps**. The PROCESS market model is highlighted in Figure 1 below:

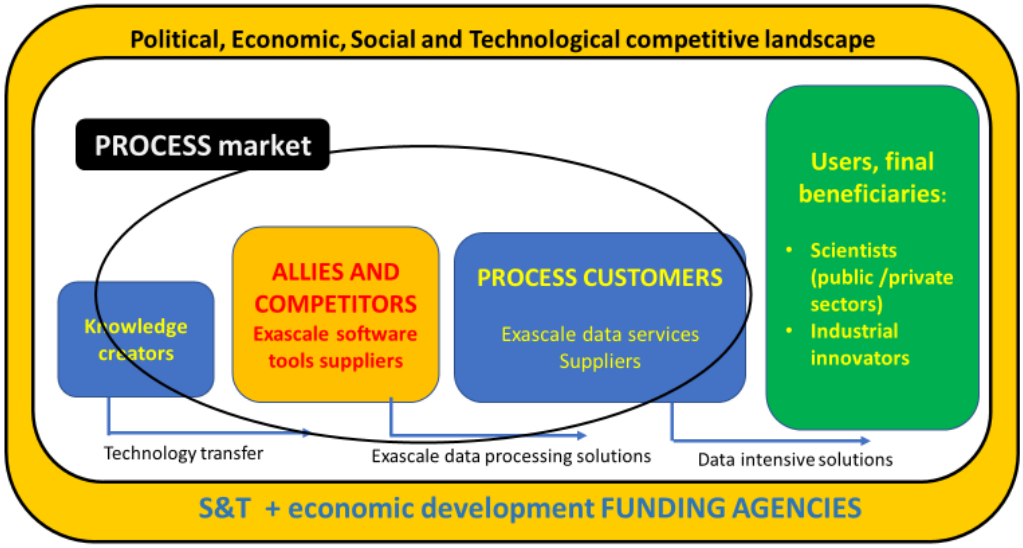


Figure 1: PROCESS's market model

The basic description of the model components is the following:

- The Political, Economic, Socio-cultural and Technological competitive landscape represents the combinations of external factors - the so-called PEST factors - shaping the creation and evolution of a market. The analysis of these macro-environment variables or Market Shaping Forces is a pre-requisite for establishing the contextual framework for the analysis of the HPC market. The future evolution of landscape trends and facts will largely shape the context for PROCESS's market opportunities.
- The Demand side: those who will potentially acquire and deploy exascale solutions in their organisations.
- The Supply side of the market: Companies and institutions offering technical, and particularly ICT-based solutions addressing one or more exascale challenges.

The current nature and dynamics of the relationships among these market model components are key for identifying windows of opportunity for developing a portfolio of services based upon the project's outputs, as described in the following sections.

2.1.3 Current vision on the European HPC space

The EU is a leading force in the use of HPC applications, but it owns no supercomputer in the global top 10. In fact, the demand for supercomputing capabilities from European industry, SMEs and research institutions represent some 33% of global demand, far exceeding the current European supply of HPC resources, which merely represent 5% of global supply) [iii] . As a result, European knowledge creators and innovators are increasingly using supercomputers outside the EU, which leads to important risks in terms of access, data protection, cybersecurity, and data privacy.

Furthermore, no Member State can develop the necessary HPC ecosystem on its own in a competitive timeframe with respect to the USA, China or Japan. And the fragmentation and limited coordination and synchronised innovation procurement policies among Member States have resulted in a suboptimal investment climate and an underinvestment in strategic HPC infrastructures in Europe, hampering the closure of these gaps.

Europe´s HPC landscape is driven by the public sector in terms of offering, usage and funding:

- The majority of HPC capacity and utilisation is installed at universities or academic research centres, whereas a minor portion serves commercial purposes and/or HPC end users. On the other hand, private and commercially oriented HPC providers are less common in Europe. The strong competition, particularly from US-based companies such as Amazon Web Services, Google and Microsoft, has left a relatively small landscape of European players offering HPC capacities on a commercial basis.
- Demand for HPC capabilities is rapidly increasing in key sectors of the European economy, but overall impact is still low. HPC commercial users are mainly large corporations who apply HPC to reduce research and development costs by simulating prototypes of new products instead of physically building and testing them. A number of these commercial users cooperate closely with academia, using academic HPC infrastructure and partly co-developing software solutions. But the vast majority of industrial players (the SMEs) are not reaping the benefits offered by HPC.
- Most EU HPC centres are attached to scientific research institutions and academia, predominately led by research interests and focused on the public good of scientific discovery. Their financing hinges on public subsidies with very limited commercial revenue streams. Overall, however, the industrial outreach of academic HPC centres is partly curtailed by the centres' statutory funding limitations. Hence, these limitations need to be reviewed and made more flexible, to develop a commercial model, e.g. through private-sector funding mechanisms.
- HPC use and application is visible across the European big industry, but not among SMEs. HPC has become a stable component of business processes, particularly within certain industrial sectors such as automotive, aerospace, defence, bio-sciences and environmental/renewable energy. The business case behind industrial HPC use is relatively clear-cut. Its main purpose is to upgrade companies' R&D processes and reduce the time to market of innovations.
- Presently, the HPC sector in Europe is largely being financed by national budgets, university funds/grants and through significant support from EU funds.

2.2 Major initiatives in the European HPC space

The EU HPC strategy aims **not only** to close existing gaps and correct market malfunctioning and the lagging behind of Europe´s HPC global competitive position, **but to become a leading player along the next decade**. Main traits of this initiative comprise:

- European HPC is based on three pillars: Research Infrastructure (PRACE - Partnership for Advanced Computing in Europe), HPC Technology (represented by ETP4HPC) and Application Expertise (developed through the Centres of Excellence in Computing Applications (CoEs)). PRACE is the European HPC infrastructure for science - it runs calls for academic projects to be executed in its network of supercomputing resources across Europe. It also runs an HPC programme for SMEs called SHAPE - SME HPC Adoption Programme in Europe. ETP4HPC is the HPC industry-led think tank. The CoEs are projects that consolidate the European HPC applications expertise.
- The development of European HPC is based on an EC strategy paper from 2012 - Communication "High Performance Computing: Europe's place in a global race". This document stipulated the operation of the three pillars mentioned above.
- The Technology and the Applications pillar of the ecosystem form a contractual Public-Private Partnership (cPPP) with the EC. The declared objective of the cPPP is the development of European HPC technology and applications. The cPPP monitors the implementation of the European HPC strategy and its board meets twice a year. It serves as a forum in which the stakeholders involved have an opportunity to discuss this process with the EC and exchange mutual commitments.

- The European HPC strategy also provisions the establishment of a European HPC Technology Platform, which is now ETP4HPC. Its main deliverable is the European HPC Technology Roadmap - Strategic Research Agenda (SRA). ETP4HPC is led by European HPC technology vendors and it also includes research centres and users.
- The strategy above was 'upgraded' in 2016: Europe has now ambitious plans within its European Cloud Initiative. One objective of the European Cloud initiative is to have a supercomputer based on EU technology amongst the world top three by 2022.
- The European HPC ecosystem is coordinated by the EXDCI project (European eXtreme Data and Computing Initiative - coordinating the European HPC Strategy). EXDCI organises an annual event called the 'European HPC Summit Week'.
- The European Commission runs 'calls' for proposals for projects in the area of technology and application. A total of €700 million has been committed to the development of HPC technology and applications within the EC Horizon 2020 programme.
- EuroHPC Joint Undertaking (JU) is an initiative set up by Member States and the EC committing to the delivery of European world-class HPC systems. The target is to have at least two pre-exascale computers by 2020 and to reach full exascale performance by 2023. The objective is also to define testbeds for HPC and big data applications that make use of these supercomputers for scientific, public administration and industrial purposes.

2.3 Key players in the HPC ecosystem

Among HPC market player profiles, **three groups of players** are of special interest for PROCESS's future exploitation (and thus become tier-1 targets for DEP actions):

a) The HPC centres, leading the usage of supercomputers, who should install the PROCESS-enabled software and extreme data management solutions
b) The research infrastructures (and especially e-infrastructures) and their directly related research communities, acting as final users of the emerging exascale HPC services enabled (at least partially) by PROCESS solutions
c) Other initiatives (e.g. EC research projects) aiming to contribute to building up the European exascale class HPC capacities, by potentially becoming allies/earliest adopters and/or competitors to PROCESS-enabled solutions

PROCESS's key interlocutors' audience is completed by the institutional stakeholders/financial supporters -mainly the EC and the HPC proactive Member States- and their related specialised institutions, organisations, and agencies (e.g. the future EUHPC-JU, ETP4HPC, COEs, etc.).

2.3.1 HPC centres

The European landscape for HPC centres is largely dominated by publicly owned entities, mainly serving universities and research, and relying on public funding for both capital and operational expenditures. The main financial challenge for these players is the limited propensity towards commercially oriented models, and legal restrictions on increasing revenues from commercially oriented activities. As an initial round of identification of key members of this target group, we have extracted the European (in the wide sense) based HPC sites out of the Top500 listing (as per June 2018). A total of 73 Supercomputer centres have been found, 40 being of a mainly scientific and academic nature (See Table 1) while the other 33 are linked to industry. The latter belong to flagship corporations such as Atos, EDF, Total, BASF, ENI and Volvo, other non-identified Software companies (19 sites), manufacturing firms (4) and financial entities (3) across Europe.

Table 1: Academic and Research HPC centres in Europe

VSB-Technical University of Ostrava	Barcelona Supercomputing Center
CSC (Center for Scientific Computing)	KTH - Royal Institute of Technology
CNRS/IDRIS-GENCI	University of Cambridge
GENCI-CINES	University of Edinburgh
ROMEO HPC Center - Champagne-Ardenne	University of Southampton
HLRN at Universitaet Hannover / RRZN	CEA/TGCC-GENCI
HLRN at ZIB/Konrad Zuse-Zentrum Berlin	Commissariat a l'Energie Atomique (CEA)
Karlsruher Institut für Technologie (KIT)	Meteo France
Leibniz Rechenzentrum	Deutscher Wetterdienst
TU Dresden, ZIH	DKRZ - Deutsches Klimarechenzentrum
Universitaet Mainz	Forschungszentrum Juelich (FZJ)
Westfälische Wilhelms-Universität Münster	HLRS - Höchstleistungsrechenzentrum Stuttgart
CINECA	Max-Planck-Gesellschaft MPI/IPP
SURFsara	Main Computer Center of Roshydromet
UNINETT Sigma2 AS	Swiss National Supercomputing Centre (CSCS)
Gdansk Academic Computer Centre	AWE
Cyfronet	ECMWF
University of Warsaw	EPSRC/University of Edinburgh
PCSS Poznan	Science and Technology Facilities Council
Moscow State University	United Kingdom Meteorological Office

2.3.2 Potential users of future PROCESS solutions

A first group of potential users of services based on PROCESS exascale solutions is formed by the 1.000+ Europe based Research Infrastructures (RI) and their related research communities. To address this vast and scattered group of stakeholders, we take advantage of the EU funded MERIL project, led by the European Research Foundation. MERIL has created a portal where currently 1.023 European RI (See figure 2) are mapped and are easily searchable and visualised. Inclusion in the MERIL database is not limited by size or profile, with the portal covering high quality facilities that provide access to European and international users. This can include from specialised university laboratories and historical archives to biobanks and experiments at large establishments such as CERN, home of the Large Hadron Collider. The MERIL database relies on accurate information provided by all eligible research infrastructures across a wide range of scientific disciplines. The engagement of research infrastructures therefore plays a key part in its success.

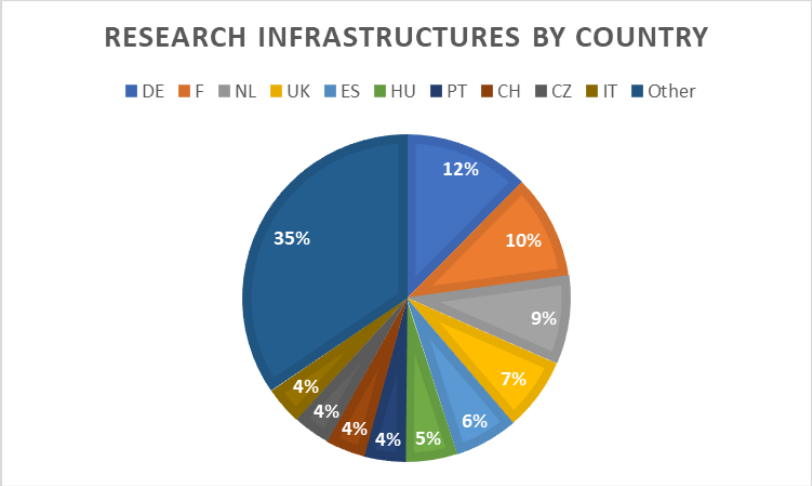


Figure 2: Geographical distribution of European RI

2.3.3 PROCESS potential allies and/or competitors

An obvious first group of potential allies and competitors to PROCESS proposed exascale solutions comprises the projects (and their members) of the wide array of projects co-funded by the EU in relation with HPC. Out of different sources (e.g. CORDIS, ETP4HPC) we have identified 50+ projects materializing the political drive of the EC to promote the HPC and more specifically the exascale build up to speed up the expansion of the European HPC ecosystem (See Table 2).

Table 2: HPC related EU projects

ACRONYM	PROJECT TITLE
AARC2	Authentication and Authorisation for Research and Collaboration
AENEAS	Advanced European Network of E-infrastructures for Astronomy with the SKA
AGINFRA PLUS	Accelerating user-driven e-infrastructure innovation in Food Agriculture
ASPIDE	exAScale ProgramIng models for extreme Data procEssing
BioExcel	Centre of Excellence for Biomolecular Research
COEGSS	Center of Excellence for Global Systems Science
CompBioMed	A Centre of Excellence in Computational Biomedicine
DARE	Delivering Agile Research Excellence on European e-Infrastructures
DEEP-	Designing and Enabling E-infrastructures for intensive Processing in a Hybrid DataCloud
E-CAM	An e-infrastructure for software, training and consultancy in simulation and modelling
eInfraCentral	European E-Infrastructure Services Gateway
e-IRGSP5	e-Infrastructure Reflection Group Support Programme 5
EoCoE	Energy oriented Centre of Excellence for computer applications
EPEEC	European joint Effort toward a Highly Productive Programming Environment for Heterogeneous Exascale Computing
e-ROSA	Towards an e-infrastructure Roadmap for Open Science in Agriculture
ESCAPE-2	Energy-efficient SCalable Algorithms for weather and climate Prediction at Exascale
ESiWACE	Excellence in SImulation of Weather and Climate in Europe
EVER-EST	European Virtual Environment for Research - Earth Science Themes
EXA2PRO	Enhancing Programmability and boosting Performance Portability for Exascale Computing Systems
ExaQUte	EXAscale Quantification of Uncertainties for Technology and Science Simulation
EXDCI-2	European eXtreme Data and Computing Initiative - 2
FREYA	Connected Open Identifiers for Discovery, Access and Use of Research Resources
HIRMEOS	High Integration of Research Monographs in the European Open Science infrastructure
MSO4SC	Mathematical Modelling, Simulation and Optimization for Societal Challenges with Scientific Computing
MuG	Multi-Scale Complex Genomics
NoMaD	The Novel Materials Discovery Laboratory
OpenAIRE2020	Open Access Infrastructure for Research in Europe 2020
OpenAIRE-Advance	OpenAIRE Advancing Open Scholarship
OpenAIRE-Connect	OpenAIRE - CONNECTing scientific results in support of Open Science
OpenDreamKit	Open Digital Research Environment Toolkit for the Advancement of Mathematics
OpenRiskNet	OpenRiskNet: Open e-Infrastructure to Support Data Sharing, Knowledge Integration and in silico Analysis and Modelling in Risk Assessment
OPERAS-D	Design for Open access Publications in European Research Areas for Social Sciences and Humanities
PhenoMeNal	PhenoMeNal: A comprehensive and standardised e-infrastructure for analysing medical metabolic phenotype data
PPI4HPC	Public Procurement of Innovative Solutions for High-Performance Computing
PRACE-5IP	PRACE 5th Implementation Phase Project
RDA Europe 4.0	The European plug-in to the global Research Data Alliance
READ	Recognition and Enrichment of Archival Documents

ACRONYM	PROJECT TITLE
RECIPE	REliable power and time-ConstraInts-aware Predictive management of heterogeneous Exascale systems
RI Impact Pathways	Charting Impact Pathways of Investment in Research Infrastructures
UBORA	Euro-African Open Biomedical Engineering e-Platform for Innovation through Education
VECMA	Verified Exascale Computing for Multiscale Applications
VESTEC	Visual Exploration and Sampling Toolkit for Extreme Computing
VI-SEEM	VRE for regional Interdisciplinary communities in Southeast Europe and the Eastern Mediterranean
VRE4EIC	Virtual Research Environment
West-Life	World-wide E-infrastructure for structural biology
XDC	eXtreme DataCloud
ALLScale	Exascale Programming, Multi-objective Optimisation and Resilience Management Environment
ANTAREX	AutoTuning and Adaptivity appRoach for Energy efficient eXascale HPC systems
DEEP-EST	DEEP - Extreme Scale Technologies
ECOSCALE	Energy-efficient Heterogeneous COmputing at exaSCALE
EuroEXA	Co-designed Innovation and System for Resilient Exascale Computing in Europe
ExaFLOW	Enabling Exascale Fluid Dynamics Simulations
ExaHyPE	An Exascale Hyperbolic PDE Engine
ExaNeSt	European Exascale System Interconnect and Storage
ExaNoDe	European Exascale Processor Memory Node Design
INTERTWINE	Programming Model INTERoperability ToWards Exascale
Mont-Blanc 3	European scalable and power efficient HPC platform
NEXTGenIO	Next Generation I/O for Exascale
NLAFET	Parallel Numerical Linear Algebra for Future Extreme-Scale Systems
READEX	Runtime Exploitation of Application Dynamism for Energy-efficient eXascale computing
Sage2	Percipient Storage for Exascale Data Centric Computing2

2.4 Competitive challenges for exascale solutions

This section outlines our current self-assessment of the competitive challenges, expressed in terms of Market Opportunities and Threats beyond PROCESS partners decision making, to be addressed through PROCESS's exploitation strategic choices and activities along the second and third years of the project.

2.4.1 Opportunities for PROCESS's exploitation

- The political and financial support to exascale and HPC in general provided by the EU, due to the recognition of their strategic value for the future of the EU.

- The growing number of HPC initiatives across the EU and beyond, not only due to the availability of the support from public bodies, but also as another evidence of the digitisation of society and the economy.
- The widespread growth in the number of potential users and customers of PROCESS-enabled services. There are HPC-related organisations in all the major EU countries and the number should grow in the near future.
- Room for developing fit-for-purpose solutions. Market in a very early stage. Pioneering case-by-case solutions (built-for-purpose, project based, one of a kind). So far, there is no formally established and widely accepted -at market level- definition of what best of breed exascale solutions for the next generation HPC should be in terms of e.g. the value delivered to scientific communities, industry and public administration policymakers.

2.4.2 Threats for PROCESS's exploitation

- The major risks are centred around a failure -or a limited success-of the Euro HPC set of initiatives. This might even result ultimately in a strong reduction in the EU financial support to the HPC ecosystem. Given the predominant role of the EU as the funding source for HPC development, the evolution of the whole market will be under jeopardy. Although the political intention clearly shows commitment beyond 2020 and well into the next decade, adverse factors such as budget cuts derived from the UK withdrawal from EU might directly or indirectly (e.g. Cohesion and other Structural Funds) affect a critical mass of demand traction coming from EC HPC ecosystem and industry.
- The heterogeneous and fragmented HPC sector continue to hamper cross-border /pan-European practical critical mass/market development. For example: although the basic principles of public procurement are shared/common within the EU legal realm, there are many peculiarities still subject to national legal frameworks, idiosyncrasy, language, cultures, etc. We are still far from the vision of a Single European Public procurement market.
- Overall size and timely deployment of exascale HPC initiatives not triggering sustainable traction/business interest: lack of timely shifting exascale HPC build-up from strongly grant-funded and pilot-project based initiatives towards more sustainable industry-academic collaboration policies, budgetary allocations, implementation of data sharing policies, deployment of adequate HPC infrastructure and Data Science Teams.
- BREXIT. Potential dramatic reduction in the overall market size and negative consequences in terms of potential 10 Billion € cuts from 2021 onwards in EU budgets with impacts on Cohesion/Regional development funds could indirectly affect EuroHPC-related programmes.

3 Dissemination and Engagement Plan (DEP)

3.1 DEP Objectives

The overall objectives for the DEP along the entire project lifecycle are to:

- Secure and feed communication flows between the Consortium and target stakeholder groups
- Secure proper awareness levels amongst target groups about the benefits derived from PROCESS.
- Implement outreach actions to engage early adopters of PROCESS's results
- Pave the way for sustainable exploitation of PROCESS outputs after EU funding ends
- Support the design and implementation of the PROCESS-enabled Exploitation Strategy.

The operational objectives for the first project year were of a preparatory nature, i.e. setting up the components of the Plan to be ready for performing the main part of the DEP once the results of the project start to be available for showcasing them to our targeted audiences.

3.2 The overall dissemination and engagement strategy

The strategy defines the parties, the activities and the paths involved in the effort to accomplish the objectives established for the DEP. Within this context, we must define the optimal interrelation between the targeted audiences, the messages to be delivered and the communication channels we use.

3.2.1 DEP Target Groups

As identified in chapter 2 of this report, the PROCESS priority audiences that should secure the success in taking up project results comprise the following stakeholder groups:

- Target group 1: Technical suppliers and Users of PROCESS services prototypes
- Target group 2: Stakeholders´ Management/Decision Makers
- Target group 3: HPC **ecosystem policymakers and funding agencies**

These three groups constitute our priority audiences, which in turn are directed to the users, the final beneficiaries (scientists from public and private sectors; industrial innovators) of data intensive solutions. All these groups are approached to make them aware of the PROCESS project and understand its concept, technical background, benefits and usage. The most important for PROCESS is to engage with the target groups that will potentially uptake the project results. The engagement accomplished with early adopters is highly relevant.

Once the project begins to yield results, we can match messages to the different decision makers and address them on existing solutions to their research problems. At this point we can deploy deeper actions promoting understanding, later engagement with target groups, and finally influence action taking.

Regarding these targets, the plan is to identify, personalise and establish contact points with representatives from each of them, to later carry out direct marketing actions, given that these market segments have a reduced number of players.

3.2.2 Key messages to targeted audiences

In a Communication strategy the "messages" are the set of arguments, reasons and facts used to convince our targeted audiences to go from awareness to deciding to use PROCESS results. In PROCESS, outreach is driven by impacts which involve effectively solving seemingly impossible challenges, creating dialogue and building trust to enable a wider collaboration and knowledge exchange, and expanding users' bases: the project provides e-infrastructure services on exascale data resources and pilot users and developers can have access to HPC power.

Our messages are backed by this idea: "Why should E-infrastructures, Research Infrastructures and Institutions, Data Centres, Industry consider using PROCESS results? - Because they perceive VALUE in PROCESS's offering."

PROCESS key dissemination messages refer to three main concepts:

a) PROCESS's mission,
b) PROCESS's value proposition: what PROCESS will offer researchers, e-infrastructures and big data centres and companies: services, prototypes and tools to boost innovation and
c) scientific progress the benefits adopters of PROCESS solutions will get

The process to generate content for the messages includes extracting facts and concepts from the project activities and results, to generate evidence and credibility to PROCESS's value proposition claims. Content is generated through work package progress and is reported in the project deliverables, relevant Whitepapers and Demonstrators. Some concrete examples of sources of content are the following:

- Selected parts of Deliverables describing the value and/or the benefits for our targeted stakeholders that are derived from PROCESS's results
- Pilot cases and the progress/outputs foreseen/produced/accomplished and lessons valuable for other similar cases
- News about endorsements, acceptance, interest coming from third parties about PROCESS's works and results, including prizes, meetings with policy makers, endorsements by industry associations, etc.
- Lessons learnt, that contribute to understand what is relevant, attractive or even the basis for competitive advantage when adopting the PROCESS approach and results.

Outgoing messages are selected prioritizing those with high publicity potential and consistency with the project's objectives. They include but are not limited to:

- News to be published on the website
- Dissemination material (e.g. press releases, brochures)
- Magazine/journal articles
- General and specific slide decks

3.2.3 Mapping communication channels to Target Groups

Communication channels mix adopted for PROCESS include:

- Direct marketing/one-to-one actions (Success stories - interviews)
- Events (Conferences, workshops, webinars)
- Online presence and social media (website, detailed web pages, twitter)

- **Direct Marketing**. Given a) the small number of market player organisations involved and b) the strong possibility of identification of contact points and decision makers, allows to use Direct marketing technique as the alternative of choice for engaging with market

players, and to establish personalized communication patterns towards building up win-win relationships. GDPR compliant Direct marketing actions require highly personalised communication, e.g. via e-mail/telephone/face-to-face interviews, meetings and dedicated presentations and the usage of targeted whitepapers, journal articles, briefing papers and business cases. Meetings with key representatives of the target groups described above, either face-to-face or remote, are used to gather feedback or invite to participate in PROCESS events.

- **Events**. The project partners will seek to participate in relevant events aimed at showing results arising from the project related to the use cases and to the scientific and academic community. The project integrates contributions from scientific disciplines and will participate in scientific seminars, conferences and workshops to disseminate the PROCESS concept and ideas. Events can be organised by third-parties, which allow visibility at European-wide events to further disseminate PROCESS among the widest possible number of stakeholders. All partners will periodically evaluate participation in events based on interest and importance for the project, potential impact, audience and availability. Events also include dedicated presentations to user communities/industries, industry centric dissemination through the publication of white papers and attendance to scientific and industry (such as use case specific, e.g. airline) conferences and workshops.
- **Online channels**, include the project website (http://www.process-project.eu/) and social media (Twitter @PROCESS_H2020) . Online presence is used mainly to address non-identifiable complementary audiences, provide a meeting point, and act as a reservoir of permanent content that can be accessed by different audiences according to their needs. The online channels also serve as a follow-up tool by those interested people that have come to know PROCESS via other channels.

Different audiences call for the use of different channels to achieve successful dissemination results. Detailed scientific deliverables, specialised conferences and workshops, journal articles are oriented to researchers, technical staff and industrial practitioners who are those ones who will recommend and support the uptake of PROCESS results. Policy or decision makers are better addressed through whitepapers, public workshops, interviews, business cases reports and the website and social media.

4 Initial DEP activities

During the first year of the project, efforts devoted to the execution of DEP were mainly focused on preparing the conditions for the dissemination and communication of the project results for the rest of the project, when such outputs become available and showable to audiences beyond the consortium boundaries.

The main tasks performed in the context of the DEP during this period are the following:

1) Identification of target players and creation of a directory that includes on-going and recently finished projects related to HPC, e-infrastructure innovation, extreme data processing, and exascale initiatives. See Annex1.
2) Identification and pilot Participation in relevant events. See Annex 2
3) Engagement with those responsible in research institutions and e-infrastructures that are our potential early adopters, to create awareness and pave the ground for future synergies and collaborations.
4) Designing and launching the main online dissemination channels: the project website and the twitter account.
5) Preparation of initial support material, such as presentation flyers and press releases.
6) Development of a framework for the generation of dissemination content, and guidelines for the identification of opportunities for disseminating and communicating PROCESS outputs and activities. These included tips for content generation, focusing on the problems the project is trying to solve, the benefits the project results will provide users with, and the value of these solutions as opposed to not up taking them.
7) PROCESS has been included in the ETP4HPC platform handbook.

4.1 Direct marketing

To support engagement with PROCESS target audiences a directory of projects funded by the EC through the Horizon 2020 research and innovation programme was created, which includes the projects' basic information details such as the webpage, coordinator and the period they will be running. We provide currently identified EU research projects which PROCESS can potentially cooperate with. This includes basic data about the projects. The inclusion of finished projects has the purpose of contacting potential allies in view of the uptake of results after the end of the project. We will update this list to include any new projects that start running.

4.2 Events

Presence at events organised by third parties are useful not only for disseminating scientific progress but notably for networking as well as for establishing personal communication opportunities that emphasise further awareness towards better knowledge and possibly into action to adopt the project results.

During the initial period, several events relevant to PROCESS have been identified and an initial calendar of events and activities has been jointly created by PROCESS Partners. Partners were present or contributed with papers or posters at these events and have shown the project's progress and interacted with other stakeholders. The type and size of audience, and target countries have been indicated where possible.

This list of events, which will be regularly updated, is included in Annex 2, Main Dissemination Activities. It shows not only the identification of events but also progress in dissemination in the scientific target area and contact with other projects. It includes the presentation of posters in conferences and submission of papers/journals in specialised media, such as CAI journal.

4.3 Online presence

the website page and twitter account were created to define the online presence of the project.

- Website: The purpose of the website is to reinforce the key messages that will be articulated by other deeper and more impactful channels between the consortium members and key individuals. It also provides a platform for collaboration and development amongst consortium members, and an online environment to engage with the target communities. The website ensures a sustained presence and the presentation of a professional, public-facing front to the world. It provides up-to-date information on intermediate and final project results, including public reports and publications as well as synthesis reports drawn from selected material and events; it promotes interaction (e.g. events, consultation documents), and includes full integration with Twitter.

  PROCESS's website was launched in March 2017 and can be accessed through http://PROCESS-project.eu.

  The website presents the project's main traits, the use cases, and includes news and events about the project and publications originated in the project's activities. In Fig 3 a screenshot of the PROCESS website is shown.

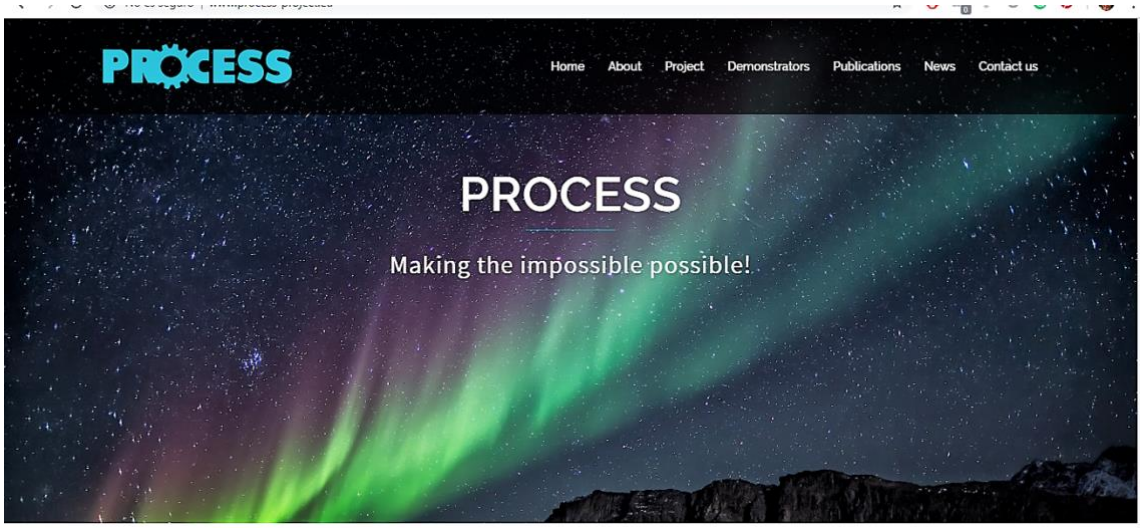


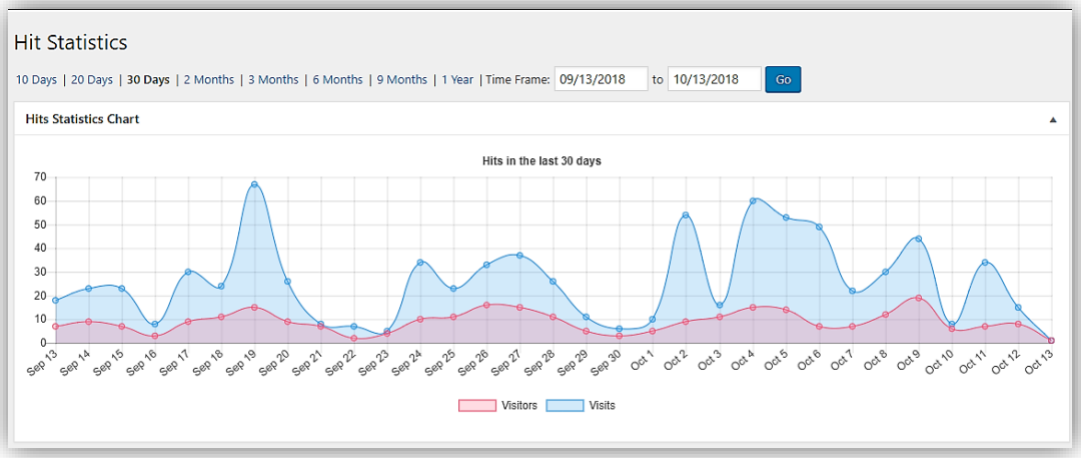
Figure 3: Screenshot of the PROCESS website

The PROCESS website currently contains the following sections and sub sections:

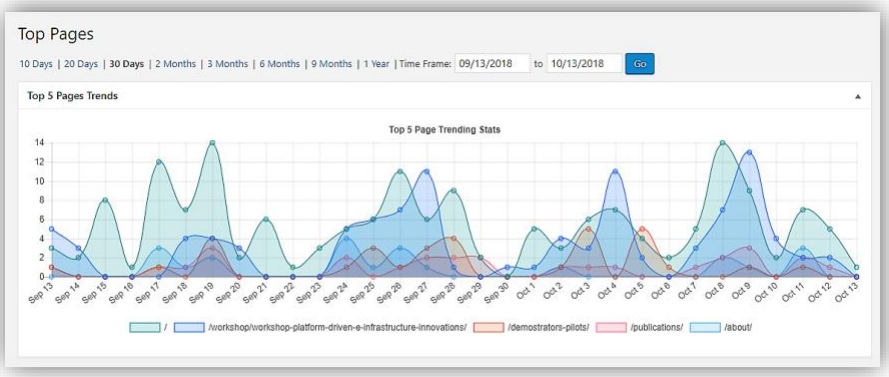
- HOMEPAGE presents the project, use cases, latest news and partners, with click through to the section pages: §About §Project §Demonstrators §Publications §News §Contact details. It mentions the EU funding acknowledgement and Social media.
- ABOUT showing the basic information about the project.
- PROJECT describing the project's objectives, outputs, activities and team.
- DEMONSTRATORS including the pilot cases' descriptions, and the prototypes to be published when they become available.
- PUBLICATIONS with deliverables, white papers and articles built upon the project's results.
- NEWS with recent or future activity such as workshops and events.
- CONTACT US providing contact persons' names and a form to fill in.

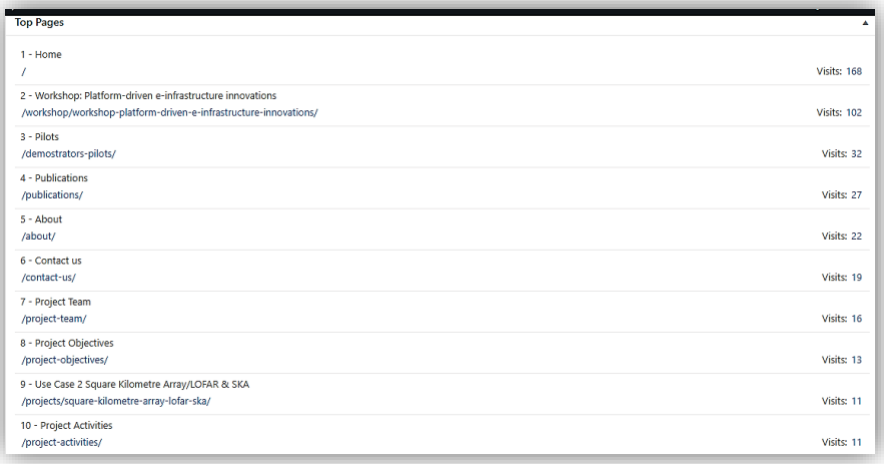
Monitoring the website results: Since metrics have been available (August 2018) there were 562 visitors and 1516 visits to the website. Half the visits were during the 13 Sept. - 13 Oct.

period: 800. People who visit the website land on the home page, which was the most viewed, nearing 400, followed by the news about the platform driven e-infrastructure workshop on October 29, 2108: 150. The following images reflect a general overview of the Website.



The most visited pages are the Home page and the news about the platform driven e-infrastructure innovations workshop:





- Twitter : The Twitter account @PROCESS_H2020 is similar in terms of look and feel to the website (Fig 4).

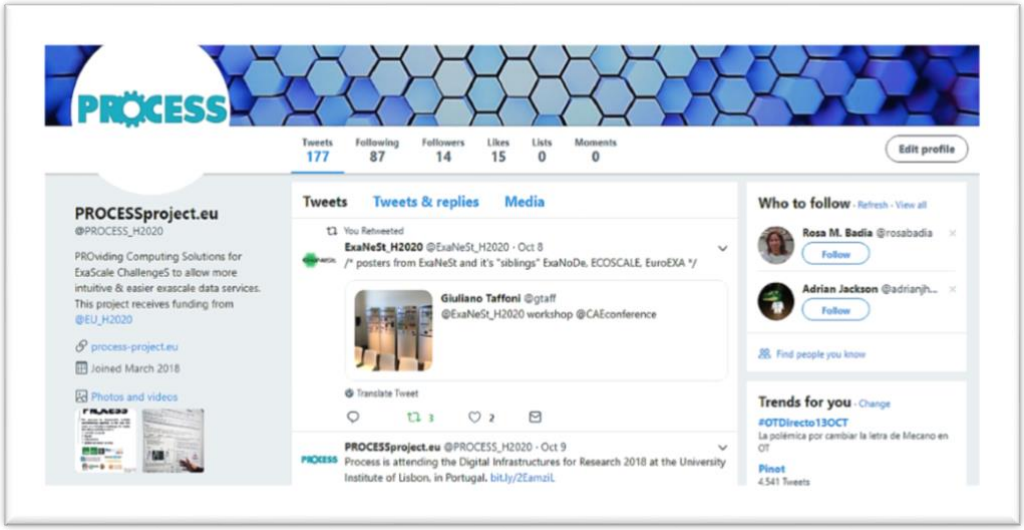


Figure 4: Screenshot of twitter home page

It is used to steer additional traffic to the website and provide additional visibility to the project. Linkage to the main fields of partners' activity allows reaching out to an audience that is more closely associated to PROCESS's pursuits. Systematic "following" of PROCESS relevant market players and close attention to what is going contributes to identify who our main influencers are, and to discover and attract new potential targets. Key dimensions of the project are covered, tweets refer to the latest news from the project, and retweets are from related accounts on similar initiatives and others related to our target segments.

Monitoring Twitter results: Although in its initial steps, it can be noticed that following partners and people related to the project's interests and retweeting content from them is proving to be a good strategy to obtain visibility, increase our number of followers and convey visitors to the website. Impressions though small yet, are growing systematically, as are followers as our activity grows. 177 tweets and retweets were cast until 13 October, with a total of 645 impressions. During the last month the account received 645 impressions (772 in the last 2 months) and 46 profile visits. It is to be noted that visits to the website increase on the day (and subsequent) that new tweets are cast.

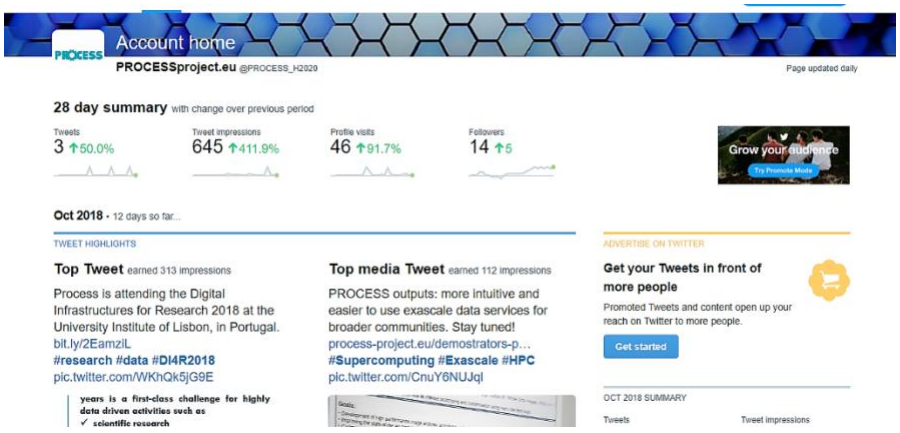


Figure 5: Screenshot of top tweets during the last month

4.4 Dissemination support material

The PROCESS project's dissemination support material has been produced to provide a consistent background message towards our target audiences whenever the project is present at different events or in the media. It aims to facilitate communication of the project's main concept and showcase PROCESS activities, benefits and outcomes, including slide deck presentations, press releases, flyers, and additional material.

Figure 6: PROCESS Logo

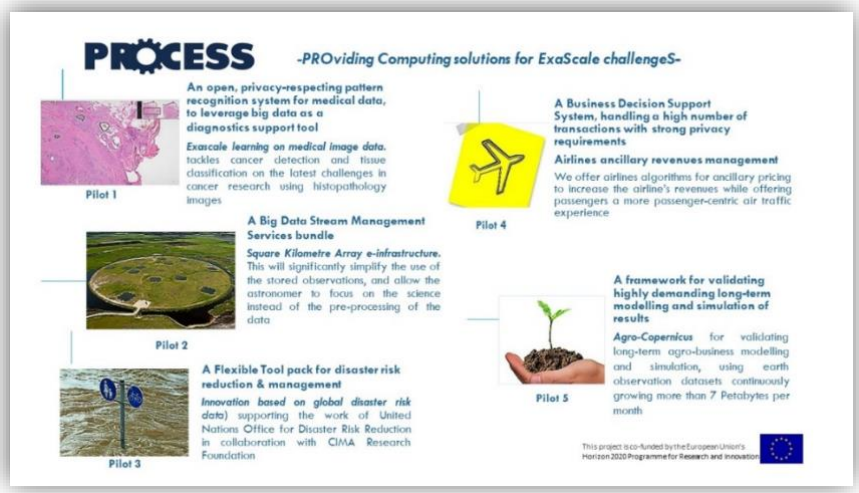


Figure 7: Flyer front and back sides

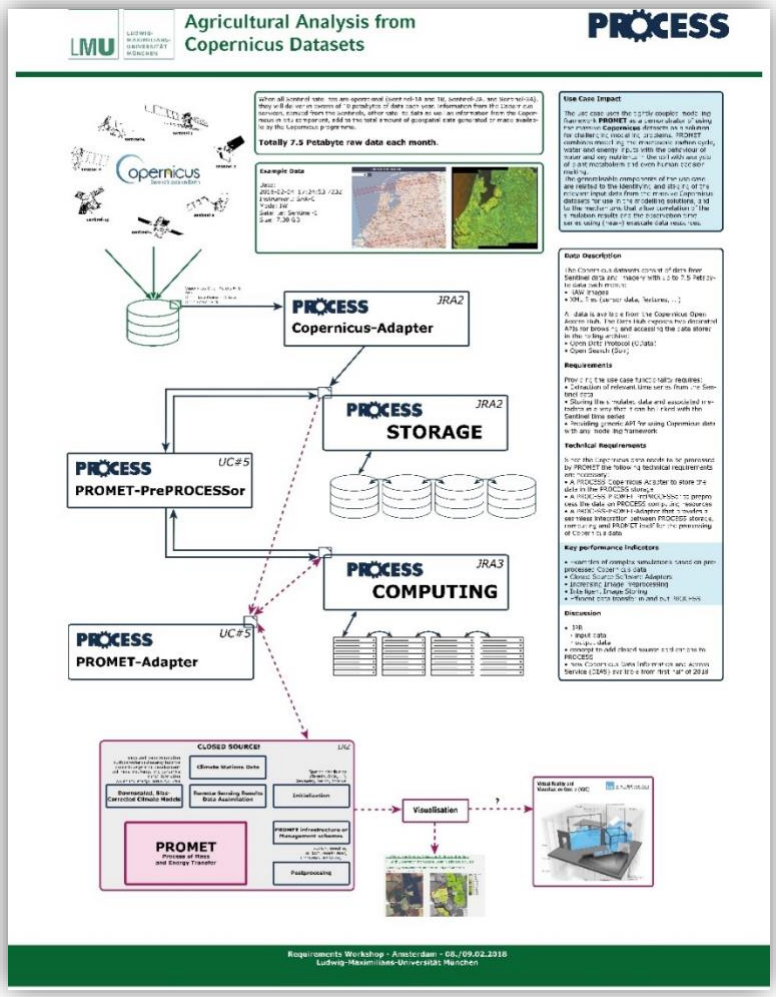


Figure 8: Project poster

5 Ongoing Dissemination and engagement activities

The second and third year of the project will bring in new requirements both in terms of audiences and of content to disseminate. The experience of the first year rendered recommendations to enhance the existing dissemination channels and activities supporting direct marketing actions and (either PROCESS-organized or third-party) events.

The progressive delivery of new project results and continuous activity of partners should generate special interest amongst our target groups. There will be higher and wider quantities of content to be disseminated, and the first targeted audiences will begin to react.

The plan for dissemination and collaboration for the remaining period of the project includes:

a) Continuing to promote interest in the PROCESS services with the purpose of engaging PROCESS early adopters
b) Broadening the outreach spectrum
c) Continuously updating and enhancing our dissemination content and channels.

Operational implementation of these actions will combine:

- Actions based upon Direct Marketing campaigns engaging a critical mass of prospects via personalized promotion and invitations using the Directory created previously, partners´ contacts and participation in diverse collaborative initiatives. These actions can be supported with other events such as innovation focus groups and dedicated presentations in workshops and conferences.
- Interactive dissemination events where project outputs and evidence arising from the pilots will be showcased, combining internal participation with interested outside parties.
- Support through the online channels.

These activities are grouped in 3 Action Lines:

Action Line 1: Engage early adopters: The results of the pilot case experiments provide tangible results which are relevant not only to knowledge creators but also to exascale data services suppliers and potential final users such as industry players who provide technological solutions. Taking advantage of these tangible outputs, the Dissemination actions within this action line will be specifically aimed at:

- Encouraging EU exascale data services suppliers and potential final users to check, experiment and eventually adopt some of the initial services to test their suitability.
- Inviting solutions suppliers that might be of value, while at the same time contribute to enhance the potential uses of the PROCESS results to be used as services.
- Inviting institutions and organisations that are suppliers of technological solutions to learn about the collaboration opportunities to engage either in the direct use as an item in their own services or indirectly, creating other services by leveraging PROCESS results.

Action Line 2: Broaden outreach spectrum: This line of action aims at mobilising a community of market and non-market players around the PROCESS project. Under this line of action, the two key activities are:

a) the co-operation with other projects and
b) the dissemination of results in suitable events.

Regarding the co-operation with other projects, the “natural” field of operations is, in a first instance, the group EU funded H2020 projects, Possible joint/coordinated efforts to explore and pursue include:

- Technical cross-fertilisation
- Co-operation in promotional activities
- Collaboration in market intelligence gathering and/or analyses, community boosting, alliances with industry, etc.
- Cross-advertising, especially across online channels
- Distribution of relevant whitepapers through the contact base of project partners

Regarding dissemination of results at events, some examples of events, both of scientific or specific interest to the industrial sector (as the case of LSY) are:

- ICCS - International Conference on Computational Science (Faro, Algarve, Portugal - June 2019)
- HPDC - High Performance Parallel and Distributed Computing (June 2019)
- IPDPS - International Parallel and Distributed Processing Symposium (Brazil - May 2019)
- Euro-Par
- Supercomputing and International Supercomputing conferences (SC18) (Dallas, TX, USA - Nov. 2018)
- International Conference on Grid and Cooperative Computing (CCGrid) (Larnaca, Cyprus - May 2019.)
- ACM SIGMOD International Conference on Management of Data (SIGMOD) (Amsterdam, NL -June 30 - July 5, 2019)
- International conference on Very Large Databases (VLDB) (Los Angeles, CA, USA - August 2019)
- IATA World Passenger Symposium (or Airline Industry Retailing Symposium)
- Gesellschaft für Operations Research (GOR) Chemnitz, Germany - March 2019

Action Line 3: Improve dissemination content and online channels. This action line comprises:

- Continuous update of PROCESS’s online channels. The website is conceived to be updated with growingly richer content such as the use case results as the project progresses, and together with Twitter will support targeted actions and provide access to the project to unidentified interested people. The website will be enhanced with blog posts describing and illustrating the use cases, as they start to show results, and will include publications and inform of our presence in major dissemination events. Whitepapers to influence the decision-making processes of prospective customers will be included. As the project progresses the key messages can be sharpened, aiming at making communication more streamlined and adapted to the different target audiences.
- Monitoring and reporting of dissemination actions carried out by partners will be enlarged and improved, reporting asap on planned actions and providing meta information about the future and past events (upcoming events, quantity and quality of audiences, etc.). In the case of Twitter, as a traffic channelizer for the website, we will expand the number of tweets and add more content. As the project progresses, news and images from events and workshops will be included, as well as information on current activities and results.

6 Conclusion

In this deliverable we have presented the results of the initial analyses of the competitive environment for the future exploitation of PROCESS outputs, and we have further elaborated on the threats and opportunities for PROCESS's results. This report also included the first edition of the DEP guiding the formulation and execution of outreach activities to support future exploitation of the project results. This report integrates the overall design of the DEP, the initial preparatory activities performed during the first year of the project and the action plan for the next period of the PROCESS lifecycle. It sets out a comprehensive and inclusive approach that provides guidance and direction for all partners in their own actions to promote the usage of the project's results.

Appendix

Annex 1 – Exascale related EU PROJECTS

Table 3: Exascale related EU PROJECTS

Acronym	Project name	website	Coordinator	Timescale
AARC2	Authentication and Authorisation for Research and Collaboration	https://aarc-project.eu/	GEANT VERENIGING	From 2017-05-01 to 2019-04-30
AENEAS	Advanced European Network of E-infrastructures for Astronomy with the SKA	https://www.aeneas2020.eu/	STICHTING ASTRON, NETHERLANDS INSTITUTE FOR RADIO ASTRONOMY	From 2017-01-01 to 2019-12-31
AGINFRA PLUS	Accelerating user-driven e-infrastructure innovation in Food Agriculture	http://www.plus.aginfra.eu/	AGROKNOW IKE	From 2017-01-01 to2019-12-31
ASPIDE	exAScale ProgrammIng models for extreme Data procEssing	https://www.aspide-project.eu/	UNIVERSIDAD CARLOS III DE MADRID	From 2018-06-15 to 2020-12-14
BioExcel	Centre of Excellence for Biomolecular Research	https://bioexcel.eu/	KUNGLIGA TEKNISKA HOEGSKOLAN	From 2015-11-01 to 2018-10-31
COEGSS	Center of Excellence for Global Systems Science	http://coegss.eu/	UNIVERSITAET POTSDAM	From 2015-10-01 to 2018-09-30
CompBioMed	A Centre of Excellence in Computational Biomedicine	http://www.compbiomed.eu/	UNIVERSITY COLLEGE LONDON	From 2016-10-01 to 2019-09-30
DARE	Delivering Agile Research Excellence on European e-Infrastructures	http://project-dare.eu/	NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS"	From 2018-01-01 to 2020-12-31
DEEP-HybridDataCloud	Designing and Enabling E-infrastructures for intensive Processing in a Hybrid DataCloud	https://deep-hybrid-datacloud.eu/	AGENCIA ESTATAL CONSEJO SUPERIOR DEINVESTIGACIONES CIENTIFICAS	From 2017-11-01 to 2020-04-30
E-CAM	An e-infrastructure for software, training and consultancy in simulation and modelling	https://www.e-cam2020.eu/	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	From 2015-10-01 to 2020-09-30

Acronym	Project name	website	Coordinator	Timescale
eInfraCentral	European E-Infrastructure Services Gateway	http://einfracentral.eu/	EUROPEAN FUTURE INNOVATION SYSTEM CENTRE	From 2017-01-01 to 2019-06-30
e-IRGSP5	e-Infrastructure Reflection Group Support Programme 5	http://e-irgsp5.e-irg.eu/	GOTTFRIED WILHELM LEIBNIZ UNIVERSITAET HANNOVER	From 2016-12-01 to 2018-11-30
EoCoE	Energy oriented Centre of Excellence for computer applications	https://www.eocoe.eu/	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES	From 2015-10-01 to 2018-09-30
EPEEC	European joint Effort toward a Highly Productive Programming Environment for Heterogeneous Exascale Computing		BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION	From 2018-10-01 to 2021-09-30
e-ROSA	Towards an e-infrastructure Roadmap for Open Science in Agriculture	http://www.erosa.aginfra.eu/	INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE	From 2017-01-01 to 2018-06-30
ESCAPE-2	Energy-efficient SCalable Algorithms for weather and climate Prediction at Exascale		EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS	From 2018-10-01 to 2021-09-30
ESiWACE	Excellence in SImulation of Weather and Climate in Europe	https://www.esiwace.eu/	DEUTSCHES KLIMARECHENZENTRUM GMBH	From 2015-09-01 to 2019-08-31
EVER-EST	European Virtual Environment for Research - Earth Science Themes	https://ever-est.eu/	EUROPEAN SPACE AGENCY	From 2015-10-01 to 2018-09-30
EXA2PRO	Enhancing Programmability and boosting Performance Portability for Exascale Computing Systems	http://exa2pro.eu/	INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS	From 2018-05-01 to 2021-04-30
ExaQUte	EXAscale Quantification of Uncertainties for Technology and Science Simulation	http://exaqute.eu/	CENTRE INTERNACIONAL DE METODES NUMERICS EN ENGINYERIA	From 2018-06-01 to 2021-05-31
EXDCI-2	European eXtreme Data and Computing Initiative - 2	https://exdci.eu	PARTNERSHIP FOR ADVANCED COMPUTINGIN EUROPE AISBL	From 2018-03-01 to 2020-08-31

Acronym	Project name	website	Coordinator	Timescale
FREYA	Connected Open Identifiers for Discovery, Access and Use of Research Resources	https://www.project-freya.eu/en	SCIENCE AND TECHNOLOGY FACILITIES COUNCIL	From 2017-12-01 to 2020-11-30
HIRMEOS	High Integration of Research Monographs in the European Open Science infrastructure	http://www.hirmeos.eu/	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	From 2017-01-01 to 2019-06-30
MSO4SC	Mathematical Modelling, Simulation and Optimization for Societal Challenges with Scientific Computing	http://mso4sc.elmerex.hu/	ATOS SPAIN SA	From 2016-10-01 to 2018-09-30
MuG	Multi-Scale Complex Genomics	http://www.multiscalegenomics.eu	FUNDACIO INSTITUT DE RECERCA BIOMEDICA (IRB BARCELONA)	From 2015-11-01 to 2018-10-31
NoMaD	The Novel Materials Discovery Laboratory	https://nomad-coe.eu/	MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV	From 2015-11-01 to 2018-10-31
OpenAIRE2020	Open Access Infrastructure for Research in Europe 2020	https://www.openaire.eu/	ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON	From 2015-01-01 to 2018-06-30
OpenAIRE-Advance	OpenAIRE Advancing Open Scholarship	https://www.openaire.eu/advance	ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON	From 2018-01-01 to 2020-12-31
OpenAIRE-Connect	OpenAIRE - CONNECTing scientific results in support of Open Science	https://www.openaire.eu/connect	CONSIGLIO NAZIONALE DELLE RICERCHE	From 2017-01-01 to 2019-06-30
OpenDreamKit	Open Digital Research Environment Toolkit for the Advancement of Mathematics	https://opendreamkit.org/	UNIVERSITE PARIS-SUD	From 2015-09-01 to 2019-08-31
OpenRiskNet	OpenRiskNet: Open e-Infrastructure to Support Data Sharing, Knowledge Integration and in silico Analysis and Modelling in Risk Assessment	https://openrisknet.org/	DOUGLAS CONNECT GMBH	From 2016-12-01 to 2019-11-30

Acronym	Project name	website	Coordinator	Timescale
OPERAS-D	Design for Open access Publications in European Research Areas for Social Sciences and Humanities	https://operas.hypotheses.org/projects/operas-d	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	From 2017-01-01 to 2018-06-30
PhenoMeNal	PhenoMeNal: A comprehensive and standardised e-infrastructure for analysing medical metabolic phenotype data	http://phenomenal-h2020.eu/home/	EUROPEAN MOLECULAR BIOLOGY LABORATORY	From 2015-09-01 to 2018-08-31
PPI4HPC	Public Procurement of Innovative Solutions for High-Performance Computing	https://www.ppi4hpc.eu/	FORSCHUNGSZENTRUM JULICH GMBH	From 2017-04-01 to 2021-09-30
PRACE-5IP	PRACE 5th Implementation Phase Project	http://www.prace-ri.eu/prace-5ip/	FORSCHUNGSZENTRUM JULICH GMBH	From 2017-01-01 to 2019-04-30
RDA Europe 4.0	The European plug-in to the global Research Data Alliance	https://rd-alliance.org/rda-europe	TRUST-IT SERVICES LIMITED	From 2018-03-01 to 2020-05-31
READ	Recognition and Enrichment of Archival Documents	https://read.transkribus.eu/	UNIVERSITAET INNSBRUCK	From 2016-01-01 to 2019-06-30
RECIPE	REliable power and time-ConstraInts-aware Predictive management of heterogeneous Exascale systems	http://www.recipe-project.eu/	POLITECNICO DI MILANO	From 2018-05-01 to 2021-04-30
RI Impact Pathways	Charting Impact Pathways of Investment in Research Infrastructures	http://ri-paths.eu/	EUROPEAN FUTURE INNOVATION SYSTEM CENTRE	From 2018-01-01 to 2020-06-30
UBORA	Euro-African Open Biomedical Engineering e-Platform for Innovation through Education	http://ubora-biomedical.org/	UNIVERSITA DI PISA	From 2017-01-01 to 2019-06-30
VECMA	Verified Exascale Computing for Multiscale Applications	http://www.vecma.eu/	UNIVERSITY COLLEGE LONDON	From 2018-06-15 to 2021-06-14
VESTEC	Visual Exploration and Sampling Toolkit for Extreme Computing		DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV	From 2018-09-01 to 2021-08-31

Acronym	Project name	website	Coordinator	Timescale
VI-SEEM	VRE for regional Interdisciplinary communities in Southeast Europe and the Eastern Mediterranean	https://vi-seem.eu/	ETHNIKO DIKTYO EREVNAS TECHNOLOGIAS AE	From 2015-10-01 to 2018-09-30
VRE4EIC	A Europe-wide Interoperable Virtual Research Environment to Empower Multidisciplinary Research Communities and Accelerate Innovation and Collaboration	https://www.vre4eic.eu/	GEIE ERCIM	From 2015-10-01 to 2018-09-30
West-Life	World-wide E-infrastructure for structural biology	https://about.west-life.eu/	SCIENCE AND TECHNOLOGY FACILITIES COUNCIL	From 2015-11-01 to 2018-10-31
XDC	eXtreme DataCloud	http://www.extreme-datacloud.eu/	ISTITUTO NAZIONALE DI FISICA NUCLEARE	From 2017-11-01 to 2020-01-31
ALLScale	An Exascale Programming, Multi-objective Optimisation and Resilience Management Environment Based on Nested Recursive Parallelism	http://allscale.eu/	UNIVERSITAET INNSBRUCK	From 2015-10-01 to 2018-09-30
ANTAREX	AutoTuning and Adaptivity appRoach for Energy efficient eXascale HPC systems	http://www.antarex-project.eu/	POLITECNICO DI MILANO	From 2015-09-01 to 2018-08-31
DEEP-EST	DEEP - Extreme Scale Technologies	http://deep-est.eu/	FORSCHUNGSZENTRUM JULICH GMBH	From 2017-07-01 to 2020-06-30
ECOSCALE	Energy-efficient Heterogeneous COmputing at exaSCALE	http://ecoscale.eu/	TELECOMMUNICATION SYSTEMS INSTITUTE	From 2015-10-01 to 2018-09-30

Acronym	Project name	website	Coordinator	Timescale
EuroEXA	Co-designed Innovation and System for Resilient Exascale Computing in Europe: From Applications to Silicon	http://euroexa.eu/	INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS	From 2017-09-01 to 2021-02-28
ExaFLOW	Enabling Exascale Fluid Dynamics Simulations	http://exaflow-project.eu/	KUNGLIGA TEKNISKA HOEGSKOLAN	From 2015-10-01 to 2018-09-30
ExaHyPE	An Exascale Hyperbolic PDE Engine	https://exahype.eu/	TECHNISCHE UNIVERSITAET MUENCHEN	From 2015-10-01 to 2019-09-30
ExaNeSt	European Exascale System Interconnect and Storage	http://exanest.eu/	FOUNDATION FOR RESEARCH AND TECHNOLOGY HELLAS	From 2015-12-01 to 2018-11-30
INTERTWINE	Programming Model INTERoperability ToWards Exascale (INTERTWinE)	http://www.intertwine-project.eu/	THE UNIVERSITY OF EDINBURGH	From 2015-10-01 to 2018-09-30
Mont-Blanc 3	Mont-Blanc 3, European scalable and power efficient HPC platformbased on low-power embedded technology	http://montblanc-project.eu/	BULL SAS	From 2015-10-01 to 2018-09-30
NEXTGenIO	Next Generation I/O for Exascale	http://www.nextgenio.eu/	THE UNIVERSITY OF EDINBURGH	From 2015-10-01 to 2018-09-30
NLAFET	Parallel Numerical Linear Algebra for Future Extreme-Scale Systems	http://nlafet.eu/	UMEA UNIVERSITET	From 2015-11-01 to 2018-10-31
READEX	Runtime Exploitation of Application Dynamism for Energy-efficient eXascale computing	https://www.readex.eu/	TECHNISCHE UNIVERSITAET DRESDEN	From 2015-09-01 to 2018-08-31
Sage2	Percipient Storage for Exascale Data Centric Computing2		SEAGATE SYSTEMS UK LIMITED	From 2018-09-01 to 2021-08-31

Annex 2 Dissemination activities: Nov 2017 - May 2019 period

Table 4: Dissemination activities: Nov 2017 - May 2019 period

NO.	Activity type [1]	Partner	Title	Date	Location	Audience [2]	Status [3]
1		UvA	A Framework for creating data processing pipeline using online services- IEEE eScience 2018	Oct 29 2018	Amsterdam, NL	SCI	D
2	3PE	UvA	paper: "Validating data integrity using blockchain technology" at the International Workshop on Resource brokering with blockchain	Dec.10 2018	Nicosia, Cyprus	SCI	P
3	3PE	UvA	paper: "Privacy-Preserving Record Linkage with Apache Spark" at CCgrid 2019	May 14-17 2019	Larnaca, Cyprus	SCI	P
4	3PE	UvA	paper: "A comparative study on ” at CCGRID 2019	May 14-17, 2019	Larnaca, Cyprus	SCI	P
5	3PE	INM / LMU	SC18 Supercomputing conference 2018 https://sc18.supercomputing.org/	Nov 11-16 2018	Dallas, TX USA	SCI	
6	3PR	HESSO	ISPDC 2018 http://lsds.hesge.ch/ISPDC2018/	25-28 June 2018	Geneva, Switzerland	SCI	
7	3PE	IISAS	Bobák, Martin - Belloum, Adam S. Z. - Nowakowski, Piotr - Meizner, Jan - Bubak, Marian - Heikkurinen, Matti - Habala, Ondrej - Hluchý, Ladislav. Exascale computing and data architectures for brownfield applications. In 14th IEEE International Conference on Natural Computation, **Fuzzy Systems and Knowledge Discovery** (ICNC-FSKD 2018) http://icnc-fskd2018.org	28-30 July 2018	Huangshan, China	SCI	D

NO.	Activity type [1]	Partner	Title	Date	Location	Audience [2]	Status [3]
8	3PE	IISAS	Mojžiš, Ján - Krammer, Peter - Kvassay, Marcel - Budinská, Ivana - Hluchý, Ladislav - Jurkovič, Marek. Crawling and Analysis of Online Discussions in Major Slovak National Newspapers. In 22nd IEEE International Conference on Intelligent Engineering Systems (**INES 2018),** p. 119-126. ISBN 978-1-5386-1121-0. ISSN 1562-5850	Jun 21-23 2018	Gran Canaria, Spain	SCI	D
9	3PE	IISAS	Krammer, Peter - Kvassay, Marcel - Mojžiš, Ján - Budinská, Ivana - Hluchý, Ladislav - Jurkovič, Marek. Clustering analysis of online discussion participants. Procedia Computer Science, Volume 134, 2018, pp. 186-195, ISSN 18770509, (15th **International Conference on Mobile Systems and Pervasive Computing - MobiSPC 2018**);. http://cs-conferences.acadiau.ca/fnc-18	August 13-15 2018	Gran Canaria, Spain	SCI	D
10	RE/PR	IISAS	Babič, Matej - Hluchý, Ladislav - Krammer, Peter - Matovič, Branko - Kumar, Ravi - Kovač, Pavel. New method for constructing a visibility graph-network in 3D space and a new hybrid system of modeling. In Computing and informatics, 2017, vol. 36, no. 5, pp. 1107-1126. (2017 Current Contents). ISSN 1335-9150. Golden Open Access. www.cai.sk	December 2017	journal CC paper	SCI	D
11	3PE	LMU	Poster at EnviroInfo 2018 http://www.enviroinfo2018.eu/	5 - 7 September 2018	Munich, Germany		
12	3PE	IISAS	Krammer, Peter - Kvassay, Marcel - Hluchý, Ladislav. Predicting the probability of exceeding critical system thresholds. CEUR Workshop Proceedings, Volume 2139, 2018, pp. 189-196, ISSN 16130073, (11th International Conference of Programming - UkrPROG 2018), Kyiv; Ukraine; May 2018. Open Access.	May 2018	Kyiv, Ukraine	SCI	D

NO.	Activity type [1]	Partner	Title	Date	Location	Audience [2]	Status [3]
13	3PE	IISAS	Krammer, Peter - Kvassay, Marcel - Hluchý, Ladislav: Enhanced data modelling approach with interval estimation. In 16th IEEE International Symposium on Intelligent Systems and Informatics (SISY 2018), Subotica, Serbia, September 13-15, 2018, pp. 179-184, ISBN 978-1-5386-6841-2.	September, 2018	Subotica, Serbia	SCI	D
14	RE/PR	IISAS	Ivan Mrnčo, Peter Blštak, Peter Hudec, Matej Kochan, Tomáš Gibala, Ondrej Habala: Application of Advanced Information and Communication Technologies in a Local Flood Warning System. Computing and Informatics (Current Contents), Vol. 37, No. 6, 2018. ISSN: 2585-8807. December 2018. Golden Open Access.	December 2018	journal CC paper	SCI	P
15	3PE	IISAS	Thieu Nguyen, Nhuan Tran, Minh Nguyen and Giang Nguyen: A resource usage prediction system using Functional-Link and Genetic Algorithm Neural Network for multivariate cloud metrics. The 11th IEEE International Conference on Service-Oriented Computing and Applications (SOCA'2018), November 2018, Paris, France.	November 2018	Paris, France	SCI	P
16	3PE	IISAS	Bobák, Martin eScience'2018 participation	October 2018	Amsterdam, Netherland	SCI	F
17	RE/PR	IISAS	Bobák, Martin journal paper in Computing and informatics	2019	journal CC paper	SCI	F
18	3PE	IISAS	Bobák, Martin chapter in book	2018	NA	SCI	F
19	3PE	HESSO	Graziani, Mara paper at the Workshop on Interpretability of Machine Intelligence in Medical Imaging Computing at MICCAI 2018	September 2018	Granada, Spain	SCI	

NO.	Activity type [1]	Partner	Title	Date	Location	Audience [2]	Status [3]
20	3PE	HESSO	Graziani, Mara seminar at the Argonne National Laboratory	August 2018	Argonne USA	SCI	D
21	3PE	HESSO	Graziani, Mara talk at the Valais/Wallis AI Workshop 3rd Edition	April 2018	Lausanne, Switzerland	SCI	D
22	3PE	HESSO	Graziani, Mara alumni talk at the Cambridge Engineering Department	June 2018	Cambridge, UK	SCI	D
23	3PE	HESSO	Graziani, Mara talk at the Quantitative Tumor IMaging Lab at MGH	July 2018	Boston (MA), USA	SCI	D
24	3PE		**Poster** International Symposium on Grids and Clouds 2018 http://indico4.twgrid.org/indico/event/4/	6 - 23 Mar. 2018	TaipeiTaiwan	SCI	D
25			CAI 2019 **Journal Paper** www.cai.sk planned			SCI	P

(1) Type of activity	RE: PROCESS supported Event (organised/co-organised by PROCESS partner/s) 3PE: Third party event e.g. Workshop, Exhibition, Conference, etc N: News third-party: for news published in other websites PR: Press release: published press releases M: Media: interview about the project W: Website links - third party: links from external website to the project's website
(2) Type of Audience(s)	SCI: Scientific; IND: Industry ; OTH: Other audiences (academic, government…)
(3) Status	D: Done ; P: Programmed ; F: Foreseen, but not yet confirmed

References

[i] Financing the future of supercomputing. How to increase investments in high performance computing in Europe. European Investment Bank Advisory Services. 2018
[ii] Intersect360 Research report
[iii] COM (2016) European Cloud Initiative- Building a competitive data and knowledge economy in Europe.