PNSC demonstrator

A brief description of this platform, according to your questions, is provided below. It would be great if we could show it during the meeting.
Thank you in advance for your feedback on this.
If there is also any way in which we could support this BDEC initiative please let us know.

1. What innovative capabilities/functionalities will the proposed candidate platform demonstrate (e.g. transcontinuum workflow, edge computing, data logistics, distributed reduction engine, etc.)?

The Innovation Driven Computing platform provides an architecture and set of tools enabling execution of applications in containerised environments both at HPC center and edge level. It includes own solutions for:
- Distributed workflow management & application execution and coupling (new version of QCG software stack)
- Advanced visualization and in-situ steering (QCG Now and VR tools),
- Extreme scale and energy efficient application modelling (DCworms)
- Lightweight data and digital objects management (Ibis)
- Research Objects and metadata management platform
Computations can be run at large centralised systems as well as executed efficiently at edge nodes. Our recent research achievements in the area of microservers and edge computing deliver a set of dedicated and optimized systems such as:
- Powerful AI processing
- Autonomous and energy efficient processing
- Automated and adaptable power capping
- Thermal management

2. What applications/communities would/could be addressed?

The applications that are addressed by the platform include:
- Applications based on numerical weather forecasts, e.g. prediction of air quality in cities or renewable energy production
- AI for industry4.0: analytics and predictive maintenance in electrical vehicles and smart factories
- Analytics and services for energy sector and smart grids
- Other industrial applications, e.g. design (of furnitures)
- Agriculture, e.g. detection and prevention of diseases
The aim of the platform is to address (in addition to traditional scientific applications) key industrial sectors that may take advantage of convergence of edge, cloud and HPC technologies.

3. What is the "platform vision," i.e. what kind of shared cyberinfrastructure (CI) for science would the further research/design/development of this platform lead to?

The platform is built around a vision of Innovation Driven Computing. It addresses the computing continuum from edge to clouds/HPC by optimised distribution of data and computing across these layers. To achieve this goal it combines tools for execution of computing and data processing in HPC systems, Platform as a Service (PaaS) interfaces, and machine learning and data analytics tools.
It assumes the use of existing computing, storage and network infrastructure built for large scientific applications and enhance it with cloud functions that facilitate development of industrial applications and with integration of edge systems.

4. How available/ready/complete is the set of software components to be used to build the demonstrator?

The platform leverages on existing tools and applications developed over last decade by PSNC within EU research projects and industrial cooperations, complemented by the relevant open source projects. These software components are mainly based on the QCG software, PaaS system and microserver managment developed within M2DC project (http://m2dc.eu), and other tools listed also in point 1.

5. As far as one can tell at this early date, to what extent can this be done with existing and/or otherwise available hardware/software/human resources?

The demonstrator can be done integrating HPC data centers, in particular PSNC supercomputing and edge resources/testbeds, and a consistent PaaS core platform with various new capabilities. Testbeds include a micro data centre laboratory where new systems can be deployed and tested, and remote labs such as FutureLab Living Laboratory or the (under construction) "Airport of Things" lab that might allow tests of edge systems for drones, robots, and other unmanned vehicles.

6. What is the potential international footprint of the demonstrator?

The demonstrator will use tools and applications developed or used in multiple international consortia with large multinational companies, renown universities and research centres etc. Among others, part of the demonstrator will be developed and used in the national PRACE-LAB project that aims at large distributed HPC and data processing platform. The demonstrator will reach communities of EU projects such as M2DC or FET-HPC ones: VECMA, ASPIDE, RECIPE. The significant participants of these initiatives include companies such as ARM, Bull, Vodafone, Huawei, as well as biomedical, numerical weather forecast communities and many others.