

**H2020-EINFRA-22-2016**

**MSO4SC - Mathematical Modelling, Simulation and Optimization for Societal Challenges with Scientific Computing**

Mathematical modelling, simulation and optimization (MSO) algorithms and computational techniques are increasingly used in all fields of science, technology, industry and public service. Since the challenges of society show rising complexity, solution processes increasingly require holistic approach. Ensuring fast prototyping and scalability of the codes are conflicting objectives for the MSO software toolkits.

The mission of the MSO4SC project is to design, build, test and deliver an e-infrastructure for hosting, developing and provisioning on demand, high performance math-supported software packages and end-user applications, based on HPC and cloud computing.

In order to achieve that mission, MSO4SC will fulfil the following objectives. First, it will develop technology to allow Mathematics Application Development Frameworks (MADFs), including FEniCS-HPC, Feel++ and OPM run on clouds and across Cloud and HPC simultaneously by exploiting containerisation, improving the automatic deployment of these applications so that their distribution in the nodes benefits from memory sharing and messaging mechanisms, as required. MSO4SC will provide simple access to on demand cloud and HPC for MADFs. To accelerate the take up and dissemination of MADFs, a product marketplace with catalogue and GUI will be set up.

As an ultimate goal, MSO4SC will demonstrate the validity of the tools, approach and sustainability with real-life scenarios on the fields including 3D urban air quality prediction, brain research, toxicological testing of drinking and waste water, research with high fidelity magnets, porous media processes, e.g. black oil recovery and marine renewable energy. MSO4SC will bring the corresponding end-user applications in the e-infrastructure to very high readiness level (at least TRL 8).