# Positive results for BSC in the first rounds of Horizon 2020 funding


BSC has had 18 research and innovation projects accepted for under the Horizon 2020 programme, with a combined funding of more than 8 million Euros. The approved projects cover research topics from smart cities to big data, from drug design to geophysical exploration and from safety-focussed embedded technology to high performance computing infrastructures. Even though Horizon 2020 is the biggest EU Research and Innovation programme up to now, there is currently more competition for EU funding than ever before.

Proposals presented under the programme must show that they will perform new research into areas including ICT, Energy, Transport, Climate and Health. They must also prove that this research will be well managed and that the expected results have the potential achieve a significant impact on science, society and the economy.

“Our success so far in the Horizon 2020 programme can be put down to a combination of the excellent quality of our scientists, our contacts with partners from all over Europe and our project management expertise” says Eugene Griffiths of BSC’s Project Management Office.

Since BSC was founded in 2005, its participation in European programmes has steadily increased, and from 2007-2010 it achieved the 10th largest return of any Spanish organisation in the Seventh Framework Programme. Below is a list of the eighteen Horizon 2020 projects approved, the relevant principal investigator from the BSC and a brief description.

## BSC Approved H2020 Projects

**Hi-EST** - *Holistic Integration of Emerging Supercomputing Technologies*, David Carrera.

In the last ERC Starting Grant call, BSC researcher David Carrera, based in the Computer Sciences Department, was one of 328 first-class scientists to have been selected for a prestigious European Research Council (ERC) Starting Grant. The goal of his project is to perform a significant advance in the field of methods, mechanisms and algorithms for the integrated management of heterogeneous supercomputing workloads. This will result in a more efficient management of the computing infrastructure that will continuously adjust the number and type of resource allocated to each workload.

**PRACE 4IP** *Partnership for Advanced Computing in Europe 4th Implementation Phase Project*, Sergi Girona.

This project supports the PRACE pan-European supercomputing research infrastructure through which six supercomputers are deployed by four countries including Spain. The project will facilitate transition to the second phase of the research infrastructure (PRACE 2.0) by: preparing strategies towards exascale computing, supporting users, promoting HPC to industry, analysing new flexible business models for PRACE 2.0, proposing strategies for deployment of leadership systems and continuing to provide advanced training.

**AXIOM**, *Agile, eXtensible, fast I/O Module for the cyber-physical era*, Xavier Martorell.

We are entering the so-called Cyber-Physical age, in which both objects and people will become nodes of the same digital network for exchanging information. The AXIOM project aims at researching new software/hardware architectures for CPSs. The technical approach aims at solving fundamental problems to enable easy programmability of multi-core multi-board systems through BSC-develped OmpSs open-source programming model.

**SHERLOC**, *Structural HEalth Monitoring, Manufacturing and Repair Technologies for Life Management Of Composite Fuselage*, Guillaume Houzeaux.

The design and maintenance of pressurized fuselage composite structures for aircraft is mainly influenced by the requirement to cope with accidental impact damages. The project will develop a prototype for Condition Based Maintenance based on Structure Health Monitoring techniques including sensor technology, system validation and integration, global systems and regulatory guidance. This will be able to detect and repair damage to aircraft.

**DPETNA**, *Dynamics and Predictability of the ENSO teleconnection to the Tropical North Atlantic,* Francisco Doblas.

In this Individual Marie Sklodowska Curie fellowship project, researcher Javier Garcia-Serrano will explore the El Niño-Southern Oscillation influence on the tropical North Atlantic (TNA) sea surface temperature (SST). The scientific objective of this project is to advance understanding of the simulation and prediction of TNA SST at seasonal to inter-annual timescales.

**BigStorage**: *Storage-based Convergence between HPC and Cloud to handle Big Data*, Antonio Cortes.

This project will train future data scientists on how to manage massive amounts of digital data (Big Data) through approaches which require HPC and Cloud infrastructures using redefined storage architectures, with highly ambitious performance and energy usage objectives.

**EUDAT2020**, *European Data Infrastructure*, David Vicente.

EUDAT2020 brings together a unique consortium of e-infrastructure providers, research infrastructure operators, and researchers from a wide range of scientific disciplines, working together to address the new data challenge. EUDAT2020's vision is to enable European researchers and practitioners from any research discipline to preserve, find, access, and process data in a trusted environment.

**GrowSmarter**, José María Cela.

GrowSmarter is a Smart Cities project which will demonstrate twelve smart, integrated solutions for improving the quality of life for European citizens through better mobility, housing and the quality of urban infrastructure while lowering energy costs at three lighthouse cities: Stockholm, Barcelona and Cologne. The solutions will later also be implemented by five follower cities: Graz, Suceava, Valetta, Porto and Cork.

**IOSTACK**, *Software Defined Storage for Big Data*, Antonio Cortes.

This project's main objective is to create a Software Defined Storage toolkit for Big Data on top of the OpenStack platform. IOStack will enable efficient execution of virtualized analytics applications over virtualized storage resources thanks to flexible, automated, and low cost data management models based on software defined storage.

**SAFURE**, *SAFety and secURity by design for interconnected mixed-critical cyber-physical systems*, Francisco Cazorla.

SAFURE aims to design of dependable embedded systems by implementing a methodology that ensures safety and security "by construction". SAFURE will help European suppliers of safety-critical embedded products to develop more cost and energy-aware solutions

**EUROfusion**, *Implementation of activities described in the Roadmap to Fusion during Horizon*,

Mervi Mantsinen.

The European Consortium for the Development of Fusion Energy, manages European fusion research activities on behalf of Euratom. EUROfusion funds all fusion research activities in accordance with the Roadmap to the realisation of fusion energy. This Roadmap outlines the most efficient way to realise fusion electricity.

**HiPerMeGaFlowS**, Guillaume Houzeaux.

High-fidelity flow simulation will be extremely important for exascale computing. This capability will facilitate cheaper development of aeronautical and automotive designs able to meet the strict European energy consumption and noise emission regulations. In this Marie Sklodowska Curie Individual fellowship project to be carried out by Xevi Roca, the integration of three high-performance tools will be studied as a promising alternative for performing high-fidelity flow simulations.

**eDRUG**, *Drug eDesign: Building the next generation of software solutions for drug design*, Victor Guallar.

This European Research Council Proof of Concept project aims to combine computer power and human intelligence to create fully interactive computational tools for drug design.

**RDA Europe 3**, *Research Data Alliance Europe 3*, Sergi Girona.

The Research Data Alliance (RDA) aims to enable open sharing and re-use of data on a global level. RDA-Europe, the European part of the global Research Data Alliance, aims to advance the use of its results by engaging with European research, industrial, e-Infrastructure and policy stakeholders.

**Actris2** *Aerosols, Clouds, and Trace gases Research Infrastructure Network*, Oriol Jorba.

ACTRIS-2 aims to establish a user-oriented Research Infrastructure by integrating European ground-based stations for long term observations of aerosols, clouds and short lived gases. The project will also develop integration tools and observational protocols to permit harmonization and dissemination of collected data.

**GEAGAM**, *Geophysical Exploration using Advanced GAlerkin Methods*, José María Cela.

The main objective of this Marie Sklodowska Curie RISE action is to improve and exchange interdisciplinary knowledge on applied mathematics, high performance computing, and geophysics to be

able to better simulate and understand the materials composing the Earth's subsurface.

**PRIMAVERA**, *PRocess-based climate sIMulation: AdVances in high-resolution modelling and European climate Risk Assessment*, Francisco J.Doblas.

Its goal is to deliver novel, advanced and well-evaluated high-resolution global climate models (GCMs), capable of simulating and predicting regional climate with unprecedented fidelity, out to 2050. This capability will deliver innovative climate science and a new generation of advanced Earth System Models.

**IMPREX**, *IMproving PRedictions and management of hydrological Extremes*, Francisco J.Doblas.

IMPREX will improve forecast skill of meteorological and hydrological extremes in Europe and their impacts, by applying dynamic model ensembles, process studies, new data assimilation techniques and high resolution modeling.

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