

## RESEARCH EDUCATION INNOVATION

The Action will produce outreach training and educational materials aligned with the European Commission initiative on "Increasing the Attractiveness of Science, Engineering & Technology Careers".

Tackling complementary objectives in Science, Engineering and Technology, the materials will arguably increase the general visibility of the Action and, ideally, reach new audiences such as ICT professionals, commercial software developers, and, above all, the general public. It is important to highlight that Big Data has started to emerge as a buzzword in the ICT industry and neutral informative training is required.

The Action will strive to use and exploit all Action results through Open Science/Data practices, i.e. open access publication, open access to data repositories, and open-source software development. Aligned with EC regulations, the Action will nurture a balanced support to both 'Green Open Access' (immediate or delayed open access that is provided through self-archiving) and 'Gold Open Access' (immediate open access that is provided by a publisher).

Chair of the Action:  
Prof Joanna KOLODZIEJ (PL)

Vice Chair of the Action:  
Dr Horacio GONZALEZ-VELEZ (IE)

Science officer of the Action:  
Dr Federica ORTELLI

Administrative officer of the Action:  
Mr Matthias KAHLENBORN



# cHiPSet

## High-Performance Modelling and Simulation for Big Data Applications

[www.chipset-cost.eu](http://www.chipset-cost.eu)

COST Action IC1406



## INFRASTRUCTURES

This Action will aggregate innovative hardware and software technologies for the computing and storage resources in data centres and virtualised environments, simultaneously supporting high access performance, availability, and confidentiality of stored data.

By coordinating and integrating research activities, this Action will nurture the integration of data-intensive processing stages, data-intensive workflows, and pipelines.

# Coordinating European Research

## MODELLING & SIMULATION + BIG DATA + HPC

Funded by the European Commission, this COST Action is to create a long-lasting, sustainable, reference network of research links amongst the High Performance Computing (HPC) and the multiple Modelling & Simulation research communities addressing Big Data problems. Such links will enable a novel permanent collaboration framework across HPC and Modelling & Simulation, covering both academia and industry in Europe.

### MAIN OBJECTIVE

Structure and co-ordinate research activity on HPC-enabled Modelling and Simulation for Big Data problems across Europe.

### FOUR CORE THEMES

1. Infrastructures
2. Parallel Programming
3. Life Sciences
4. Socio-Economical & Physical Sciences

# High Performance Modelling & Simulation for Big Data Applications

## PARALLEL PROGRAMMING

The Action will share best practices and research on novel data-aware programming models for parallel computing with a specific focus on simulation workloads. A key goal of the activity is to support both code and performance portability across different HPC platforms for problems requiring the management of massive data.

The Action will foster the improvement of the expressiveness of languages for model specification. Language expressiveness needs to consider aspects of efficient data-intensive management on HPC platforms.

## LIFE SCIENCES

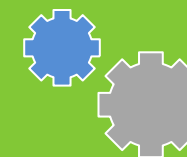
Application domains for life sciences will include the modelling of continuous and stochastic dynamics of biochemical phenomena, accounting for computationally challenging phenomena like noise, macromolecular crowding and spatial issues (e.g. tissue formation and tissue dynamics as in autoimmunity).

Related statistical approaches to stochastic analysis also rely on the replication of experiments, naturally calling for highly effective parallel simulation support.

## SOCIO-ECOMICAL & PHYSICAL SCIENCES

Physical science areas include weather and climatology, with a focus on climate change and its multi-dimensional variables and “whole Earth” realistic models to accurately estimate the likely impacts on nature and society.

The Action will seek the transfer and abstraction from the experiences of major physical research centres such as CERN, FAIR, and ITER in modelling and experiments for challenging astrophysics and plasma physics problems for better reuse of the developed models and technologies for solving general data-intensive scientific problems.



## INFRASTRUCTURES

- Big Data Systems Architecture
  - Cloud-based Middleware
  - Energy-aware Computing



## PARALLEL PROGRAMMING

- Data-Intensive Parallelism
- Structured Parallelism for Performance & Resiliency
- Parallel Models for Large Structured/Semi-Structured Datasets



## LIFE SCIENCES

- Data Analytics & Visualisation
- Large-scale Bioinformatics & Computational Biology
  - Data-intensive Computational Medicine & Bioengineering



## SOCIO-ECONOMICAL & PHYSICAL SCIENCES

- Information Discovery from Social Media Data
- Complex Financial and Economical Systems
- Healthcare/Medical Decision Support