

News



Fast detection of cancer mutations with Smufin

The SMUFIN (*Somatic Mutations Finder*) method is capable of analyzing the complete genome of a tumor and identifying its mutations in a few hours.

[More information on page 3](#)



Science is tightening the net around 'Legionella'

A study has discovered that the bacteria releases the VipD protein when infecting human cells, thus preventing their destruction.

[More information on page 3](#)



BSC goes on the road this autumn

BSC showcases its latest results at the Society of Exploration Geophysicists Annual Meeting and the Supercomputing Conference 2014.

[More information on page 4](#)



BSC in Big Bang Data events

Several BSC researchers participated in the "Big Bang Data" talks organised by the CCCB.

[More information on page 4](#)



Mateo Valero takes part in Foro España Innova

During his presentation he highlighted the need for fundamental research to find practical applications which can be translated into innovation.

[More information on page 4](#)

Spotlight on...

"It's time to hand over the baton to younger people"

After almost ten years heading the Department of Earth Sciences, José María Baldasano is retiring as director to hand over the baton to younger people; it doesn't make sense to reach the end of H2020 as a 70-year-old! Baldasano has been awarded as a BSC Research Fellow reporting to the Directors, and he will continue supporting the Center. Francisco J. Doblas-Reyes is replacing him as head of department.

[More information on page 5](#)



Directors' View



The rate at which we are producing data is growing exponentially. In the past 18 months, humankind has generated more data than we had produced in the entire history of humanity up until that point. This is a trend which will continue and intensify.

[More information on page 2](#)

Events and Training



Nov 11 Big Data in Biomedicine. Challenges and Opportunities

11 Nov 2014, Barcelona

Nov 13 Transcardio14

13 November 2014, Barcelona

Nov 16 SC 2014

16 November 2014, New Orleans

[More events on page 2](#)

Inside BSC



In this issue:

- Newcomers
- 48h Open House Barcelona
- MIRI Severo Ochoa Scholarships
- Photo Competition: What's your view of BSC?
- Social Activity Plan
- Did you know...about the PDP process?

Directors' View

The rate at which we are producing data is growing exponentially. In the past 18 months, humankind has generated more data than we had produced in the entire history of humanity up until that point. This is a trend which will continue and intensify.

Until a few years ago, supercomputers and large scientific instruments were the main generators of most of this data. Currently, supercomputing applications for climate change, personalized medicine or simulations of the brain, as well as instruments like the LHC in Geneva and current and future radio telescopes such as the SKA continue to generate vast amounts of data.

In addition, a huge number of mobile computers, sensors, phones, tablets and others are now also generating enormous amounts of information, which needs to be stored and processed in order to get useful knowledge to further science and engineering. All of this has given rise to the loosely defined term "Big Data."

Supercomputing centres have to continuously adapt to new technologies and to the changing demands of society, and this area is no exception. In order to treat this vast amount of data, we need new research into the entire ecosystem. From applications to new hardware, via new algorithms, system software and new mechanisms for storing and accessing data, while bearing in mind energy constraints and the challenges of massive parallelism.

At BSC, we have established priority research lines in order to remain competitive in all supercomputing areas; Big Data is one area of strategic importance. We are currently undertaking valuable research in all of the layers in the stack in order to meet its challenges. Some examples of this diverse research are given below.

One example of the fruits of this research is the SMUFIN software developed by David Torrents and his group, which focuses on identifying genetic alterations responsible for the formation and progression of tumours. This has been done in the context of BSC's multi-disciplinary Severo Ochoa project where other technologies for Big Data such as Wasabi, Cassandra, COMPSS and PIMD are also being developed or extended.

Similarly, the recent renewals of contracts with our strategic industrial partners have also been focussing on Big Data. The Aloja project with Microsoft and led by David Carreras focusses on workload characterisation for Hadoop, and the 3-year continuation of our centre with Intel includes development of BSC performance tools for analysis of Big Data applications.

I am delighted to say that BSC has achieved excellent results in the first calls of the H2020 programme with seven projects already approved. These include various projects on Big Data such as GrowSmarter on smart cities involving Jorge Garcia and the BigStorage and IOSTACK projects which Toni Cortes's group participates in.

In addition to research, projects which allow us to create links to other stakeholders and ensure that the HPC sector is able to reach and remain relevant for the rest of the Big Data community are essential. The BSC-coordinated RETHINK big project is one such initiative. Led by Adrián Cristal and Gina Alioto, it is bringing together key European system architects and producers and consumers of Big Data to deliver a strategic roadmap for how technology advancements in hardware and networking can be exploited for Big Data analytics and beyond.

All of this activity is in addition to more established projects with Big Data content such as EUDAT, which is building a data infrastructure that provides a set of shared services for accessing and preserving research data, and RDA Europe, which facilitates research data sharing and exchange through the development of infrastructure, policy and standards. David Vicente is IP of both projects for BSC. COMPOSE, AXLE and Mont-Blanc are other Big Data related projects doing important work in the area.

We need to continue with this work and to promote even closer coordination between departments and groups. In today's environment, only centres which act strategically and are capable of effectively working in multi-disciplinary teams will prosper and be capable of offering solutions to current societal and technological problems. I can see that BSC is meeting the challenge, and I am confident that we will continue to do so in the future.

Mateo Valero, BSC Director

Calendar of Events and Training

- Nov 11** Big Data in Biomedicine. Challenges and Opportunities
11 Nov 2014, Barcelona
- Nov 13** Transcardio14
13 November 2014, Barcelona
- Nov 16** SC 2014
16 November 2014, New Orleans
- Nov 17** ScalA Workshop at SC14, 5th Edition
17 November 2014, New Orleans
- Nov 21** SC14 Workshop on Best Practices for HPC Training
21 November 2014, New Orleans
- Nov 28** SO Seminar: On-line coupling of volcanic ash and aerosols transport with multiscale meteorological models
28 November 2014, Barcelona
- Dec 9** Simulation Methods Used for the In-flight Icing Certification of Aircraft, Rotorcraft and Jet Engines
9 December 2014, Barcelona

- Dec 11** PATC Course: Earth Sciences Simulation Environments
11 December 2014, Barcelona
- Dec 19** SO Seminar: Enhanced molecular dynamics to understand the structural and energetics determinants of MEK1 pathological mutations
19 December 2014, Barcelona
- Feb 3** PATC Course: HPC-based simulations, Engineering and Environment
3 February 2015, Barcelona
- Feb 6** iPATC: HPC-based simulations for the Industrial Realm
6 February 2015, Barcelona
- Feb 11** iPATC: Petaflop System Administration; Marenostrum III
11 February 2015, Barcelona
- Feb 19** PATC Course: Programming Distributed Computing Platforms with COMPSS
19 February 2015, Barcelona
- Mar 12** PATC Course: Simulation Environments for Life Sciences
12 March 2015, Barcelona

News

Fast detection of cancer mutations with Smufin

A new computational method has made it possible to detect genetic changes responsible for the onset and progression of tumors in a simple, quick and precise way. The **SMUFIN** (*Somatic Mutations Finder*) method is capable of analyzing the complete genome of a tumor and identifying its mutations in a few hours. In addition, it is able to identify alterations which had previously not been revealed, even using methods which require the use of supercomputers over several weeks.

The prestigious journal *Nature Biotechnology* published an [article](#) describing the characteristics of SMUFIN, which has been developed by the computational genomics group at Barcelona Supercomputing Center (BSC). The team is led by David Torrents, **ICREA** Research Professor ICREA at the BSC, in collaboration with research groups at Barcelona's Hospital Clínic and the August Pi i Sunyer Biomedical Research Institute (IDIBAPS), the University Institute of Oncology of Asturias at the University of Oviedo (IUOPA), the European Molecular Biology Laboratory (EMBL, Heidelberg) and the Spanish National Genome Analysis Centre (CNAG, Barcelona).

Further information [here](#)



Science is tightening the net around 'Legionella'

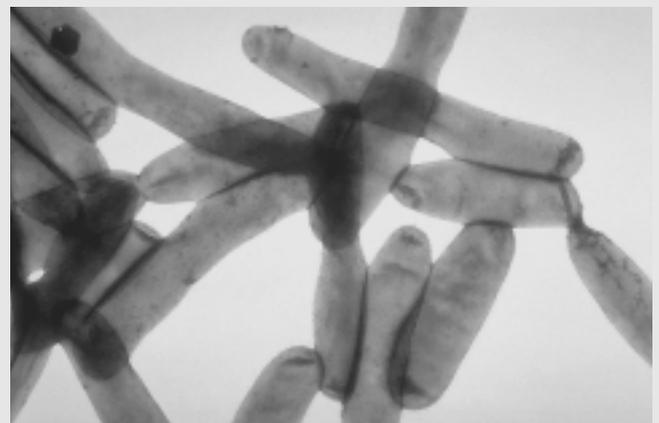
A study conducted by the Basque Center for Cooperative Research in Biosciences, CIC bioGUNE, in collaboration with the National Institutes of Health (NIH, USA) and Barcelona Supercomputing Center, has discovered that *Legionella pneumophila* bacteria release the VipD protein when infecting human cells, thus preventing their own destruction. This protein could become a target for future drugs to prevent the bacteria from causing infection.

The *Legionella pneumophila* bacterium is responsible for legionellosis, a disease that can cause pneumonia, very high fever and, in extreme cases, death. *Legionella* lives in stagnant water and enters our body through the airways when microscopic drops of contaminated water are inhaled.

Under normal circumstances, human cells would "eat" and destroy the bacteria when it enters the body, but CIC bioGUNE, NIH and BSC have discovered that the *Legionella* bacteria releases the aforementioned protein, which impedes the development of a cell's "digestive system".

In the study, which was published in the US scientific journal *Proceedings of the National Academy of Sciences* recently, researchers identified the molecular structure of VipD protein by X-ray crystallography.

Further information [here](#)



News

BSC goes on the road this autumn

Over 400 people visited the BSC booth at the [Society of Exploration Geophysicists \(SEG\) Annual Meeting](#), which took place in Denver from 26 to 29 October. During this edition BSC presented a new project, named Aurora.

In addition, as in previous years, BSC will be actively participating in the [SC14 \(Supercomputing 2014\)](#) conference. Due to last year's success in the educational programme, this year BSC is participating in two workshops. The Mont-Blanc project, coordinated by BSC, and DEEP project will be at a shared booth with other European Exascale projects. The DEEP project will also be taking part in the Emerging Technologies exhibition.

Further information about SEG [here](#) (in Spanish) | Further information about SC14 [here](#)



BSC participates in Big Bang Data events

Big data has been the guiding theme throughout the programme of events organised by the [CCCB \(Barcelona Contemporary Culture Centre\)](#) under the name [Big Bang Data](#). In parallel with the exhibition on this theme, several talks were organised covering big data in different areas, including presentations by a number of BSC researchers. On 9 September, Mario Macías spoke about the [Technology behind Big Data](#), Mariano Vázquez; Fernando Cucchiatti and Francesc Carreras (of Hospital de Sant Pau) gave a presentation on [Supercomputing and Cardiology](#) on 30 September; Fenando Cucchiatti took part in the [Creative Programming Meeting](#) on 3 October; on 7 October, Xavier Rubio participated in a presentation about [EPNet: Big Data and History](#); finally, Modesto Orozco participated in the [Genomics and Big Data](#) event on 15 October.

You can see photos from the talks on the [BSC website](#).



Mateo Valero takes part in Foro España Innova

On 29 September 2014, BSC Director Mateo Valero took part in the [Foro España Innova](#) (Spain Innovates Forum) platform. Valero was introduced by Carmen Vela, the Spanish Secretary of State for Research, Development and Innovation.

During his presentation he highlighted the need for fundamental research to find practical applications which can be translated into innovation. While he recognised Europe's research capacity and the effort put into research and development (R+D), he commented that 'we are still not working well in the area of converting ideas into money'.



- Photos from the event can be viewed on the [BSC Facebook page](#)
- A video of the conference is available to view on [YouTube](#)
- Further information [here](#) (In Spanish)

Spotlight on...

“It’s time to hand over the baton to younger people”

After almost ten years heading the Department of Earth Sciences, José María Baldasano is retiring as director ‘to hand over the baton to younger people; it doesn’t make sense to reach the end of H2020 as a 70-year-old’. He will maintain his connection to the centre as a fellow. Francisco J. Doblas-Reyes is replacing him as head of department.



José María Baldasano

- How would you evaluate your time as head of department?

Time has gone by very quickly, which means that we have been very busy. I am very grateful to have been a part of BSC and of a project which has allowed Spain to take its place on the international scientific stage in the area of supercomputing-based earth sciences. This work has benefited society in matters relating to the environment, in particular by improving air quality and, as a result, public health.

As with everything in life, there have been positive and negative aspects – the important thing is to remember the positives. The best things have been working scientifically at the highest level, building a highly competent team, working in a climate characterised by the pursuit of excellence and being able to offer top-quality professional development. Another positive is that people who have previously worked at BSC are now working in other world-famous centres, such as NASA, the University of Oxford, etc., and that we too have become a sought-after centre.

I would particularly like to take advantage of this opportunity to thank the many people at BSC with whom it has been a pleasure to work, and who have aided me during this stage of my career.

- What are you most proud of?

From the scientific perspective, the opportunity to manage a project which made it possible to develop a system in Spain to forecast air quality – the CALIOPE project, which is a global benchmark. Second, all our work on the modelling of mineral-dust transport, which has led us to become a world leader in this area, which in turn has brought two international centres from the World Meteorological Organization to BSC, in collaboration with the AEMET, the Spanish national meteorological agency.

- What do you think were the department’s strong and weak points?

With regard to the strong points, apart from the hourly air-quality forecasting and the mineral-dust modelling already mentioned, the department has developed the capacity to evaluate operational results in ‘near real time’, as well as to manage big databases. Another strong point is the opportunity to work and to develop complex code in a parallel-computing setting where results can be visualised and analysed, all undertaken by a highly prepared and very well-trained group. There were also weaknesses; in particular, it has not been possible to advance sufficiently in climate modelling, despite all our efforts, and there is a need to strengthen certain structures.

- Francisco J. Doblas-Reyes is replacing you as department head. What challenges do you think he has ahead of him?

The new director has been chosen through an international selection process from 23 candidates from all over the world, who were assessed by an international committee of experts at the highest level; he is therefore worthy of a high level of trust. In addition, he brings a proven track record of experience in research and the use of computing resources, particularly in climate modelling. I wish him every success.

Among others, he will have the challenge of integrating into BSC’s professional culture, with everything which that represents.

Francesc Subirada, Associate Director of BSC:

“We are confident that Dr Doblas will be an important asset to the centre, which will benefit from his proven talent and considerable experience. We would also like to congratulate him on his new position and wish him every success, and we’ll all support him towards this”

New Earth Sciences Director

Francisco J. Doblas-Reyes is ICREA Research Professor at [Catalan Institute of Climate Sciences \(IC³\)](#). His main research interests are climate variability, modelling and prediction for the development of climate services on time scales ranging from one month to several years.

An Earth system model as well as results from all the operational climate forecast systems available worldwide are used to explore the limits of the forecast quality of relevant climate variables over different parts of the globe, in particular over Africa, South America and Southern Europe. Improving the application of this action-oriented climate information to different socio-economic sectors is the final target. He is a member of several committees of the World Climate Research Programme and World Weather Research Programme, as well as a lead author of the last Assessment Report of the Intergovernmental Panel for Climate Change.

Inside BSC

BSC Newcomers

We would like to welcome staff who have joined the centre over the last few months and we take this opportunity to inform you that we have begun distributing the Welcome Manual to all newcomers. The electronic version of the Welcome Manual is available for download on the intranet: <https://intranet.bsc.es/en/node/2212>



AARON CALL
Support Engineer
Computer Science Dpt.



BORJA ARIAS
User Support
Operations Dpt.



**ALEJANDRO
SANCHEZ**
*Performance
Technician*
Operations Dpt.



**HUGO DANIEL
MEYER**
Junior Researcher
Computer Science Dpt.



DIEGO NIETO
Support Developer
Computer Science Dpt.



FELIP MOLL
System Administrator
Operations Dpt.



JORGE CARO
Junior Developer
CASE Dpt.



LISANDRA SOUZA
General Assistant
Management Dpt.



**JEAN MARC
MONTANIER**
*Postdoctoral
Researcher*
CASE Dpt.



ABEL GARGALLO
Junior Developer
CASE Dpt.



LAURA AUTON
*Performance Tools
Developer*
Computer Science Dpt.



YEVGENIY GRUBER
Junior Researcher
CASE Dpt.



**ODDUR OSKAR
KJARTANSSON**
Engineer
CASE Dpt.



**CONSTANTINO
GOMEZ**
Master Student
Computer Sciences Dpt.



DAVID TRILLA
Master Student
Computer Sciences Dpt.



DANIEL GALLART
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LUNA BACKES
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ALICE VALENTINI
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MARCOS MAROÑAS
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Computer Sciences Dpt.



**MARIA ASTON
SERRANO**
PhD Student
Computer Sciences Dpt.



CRISTOBAL ORTEGA
Master's Student
Life Sciences Dpt.



LORENZO FILENI
PhD Student
Earth Sciences Dpt.



PAULA CORDOBA
PhD Student La Caixa
CASE Dpt.



VICTOR LOPEZ
PhD Student La Caixa
Life Sciences Dpt.



**JOSE ALEJANDRO
CORDERO**
PhD Student La Caixa
Computer Sciences Dpt.



**BERNARDO
RODRIGUEZ**
PhD Student La Caixa
Life Sciences Dpt.

FELLOWSHIPS



SHIMPEI FUTATANI
Senior Researcher
CASE Dpt.

Shimpei completed two independent PhDs at Kyoto University, Japan (2008) and the University of Provence, France (2009) based on his research of turbulent transport in fusion plasmas. After winning a prestigious Principality of Monaco/ International Thermonuclear Experimental Reactor (ITER) Postdoctoral Fellowship, which is awarded to only five candidates from across the globe once every two years, Shimpei joined the ITER Organization (www.iter.org) in 2010. At ITER Shimpei became an expert in the advanced non-linear magnetohydrodynamics (MHD) simulation code JOEK for improved physics understanding of plasma transport and stability processes in the particularly challenging environment of the plasma edge pedestal. In 2013 Shimpei joined the Ecole Centrale de Lyon in France where his research focused on the self-organization of fusion plasmas using the MHD description. Shimpei joined the Computer Applications in Science and Engineering (CASE) department at BSC in October 2014. At BSC Shimpei is continuing his fusion research in close collaboration with ITER.

Do you work at BSC but haven't yet visited MareNostrum?

You can register for guided visits for centre staff by emailing visits@bsc.es

Job Vacancies

If you know someone who wants to join the BSC team, he/she can submit a CV to one of our current vacancies or fellowships' calls:

www.bsc.es/vacancies-fellowships

For further information contact rrhh@bsc.es.

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Inside BSC

Around 350 people visit MareNostrum during 48h Open House Barcelona



On 25 October, BSC participated in the latest edition of [48h Open House Barcelona](#), which aims to raise awareness about the city's architectural heritage. Around 350 people visited the chapel in Torre Girona, where the MareNostrum

supercomputer is located. Four BSC researchers participated in the tours for this edition: Mario Macías, Xavier Rubio, Carlos Díaz and Antoni Artigues, who gave presentations about the centre and the scientific work undertaken here.

MIRI Severo Ochoa Scholarships



Since 2013, as part of the Severo Ochoa Programme, BSC has been offering scholarship grants for MSc students on the MIRI MSc programme at Barcelona School of Informatics at UPC (Universitat Politècnica de Catalunya) who have chosen the High Performance

Computing Specialization. This year, the students who have been awarded the Severo Ochoa Scholarship for MIRI HPC specialization are: Diego Dávila, Belén Bermejo, Sandra Macià, Pedro Benedicte, David Trilla, and Cristóbal Ortega.

Further information [here](#)

Photo Competition: What's your view of BSC?

The deadline for submitting entries to the internal photography competition "What's your view of BSC" has now passed, but you can still vote for your favourite image until 10 November. A jury formed of one director and one representative each from the HR and communication area will select 12 images to illustrate the 2015 BSC calendar, as well as the winning photo (which will be awarded a prize). The jury will take into account the popular vote when making their choices. Many thanks to everyone for participating!

To vote, visit the [photography competition page on the BSC website](#) (please note that you must be logged in).

Social Activity Plan approved

The Social Activity Plan has been approved by the BSC Management Board and the list of accepted proposals is available on the intranet: <https://intranet.bsc.es/en/node/1701>

From now until 14 November you can enrol for activities which interest you. We would like to encourage you to participate and take this opportunity to thank you for your collaboration.

Explain your research to the younger generation

Over the course of this school year, research staff will be participating in tours of MareNostrum and explaining their work to students. Come and help us show the human face of supercomputing.

Contact communication@bsc.es for further information

Did you know...

about the PDP process?

We will shortly be starting the PDP (Professional Development Plan) process. This consists of evaluating employees' performance on the basis of their objectives. Further information about the timetable will be available shortly.