

**IBERGRID**



# INFRASTRUCTURE AND USER COMMUNITIES

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LIP – Laboratório de Instrumentação e Partículas

INCD – Infraestrutura Nacional de Computação

Distribuída





Laboratório de Instrumentação e  
Física Experimental de Partículas  
*partículas e tecnologia*

## Reference institute for Experimental High Energy Physics in Portugal

LHC: ATLAS, CMS, Phenomenology

Structure of matter: Nuclear Astrophysics,  
COMPASS, HADES

Cosmic Rays: AUGER, AMS, LATTES

Neutrinos and Dark Matter: LUX, LZ, SNO+, NEXT

Detectors: Neutron, Resistive Chamber  
Plates, Gaseous Detectors, Liquid Xenon

Medical physics: RPC-PET, Orthogonal Ray  
Imaging, Gamma Cameras, PET

Space: Space Radiation, Instrumentation

Computer Science: infrastructures,  
distributed computing, big data

## INCD - Infraestrutura Nacional de Computação Distribuída

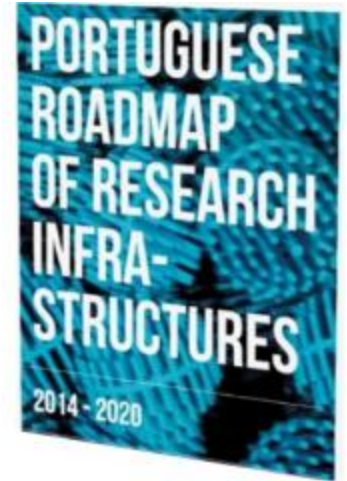


Services: computing, storage and data processing

Promote: resource sharing, common interoperable solutions

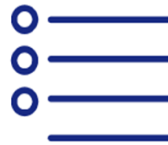
Target: scientific and academic community, R&D projects

Interface: with international e-infrastructures  
(WLCG, EGI, **IBERGRID**, ESFRIs, ...)



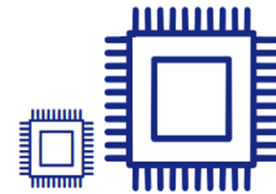
### Cloud Computing

computação  
em nuvem



### HTC Computing

computação de  
alto débito (GRID)



### HPC Computing

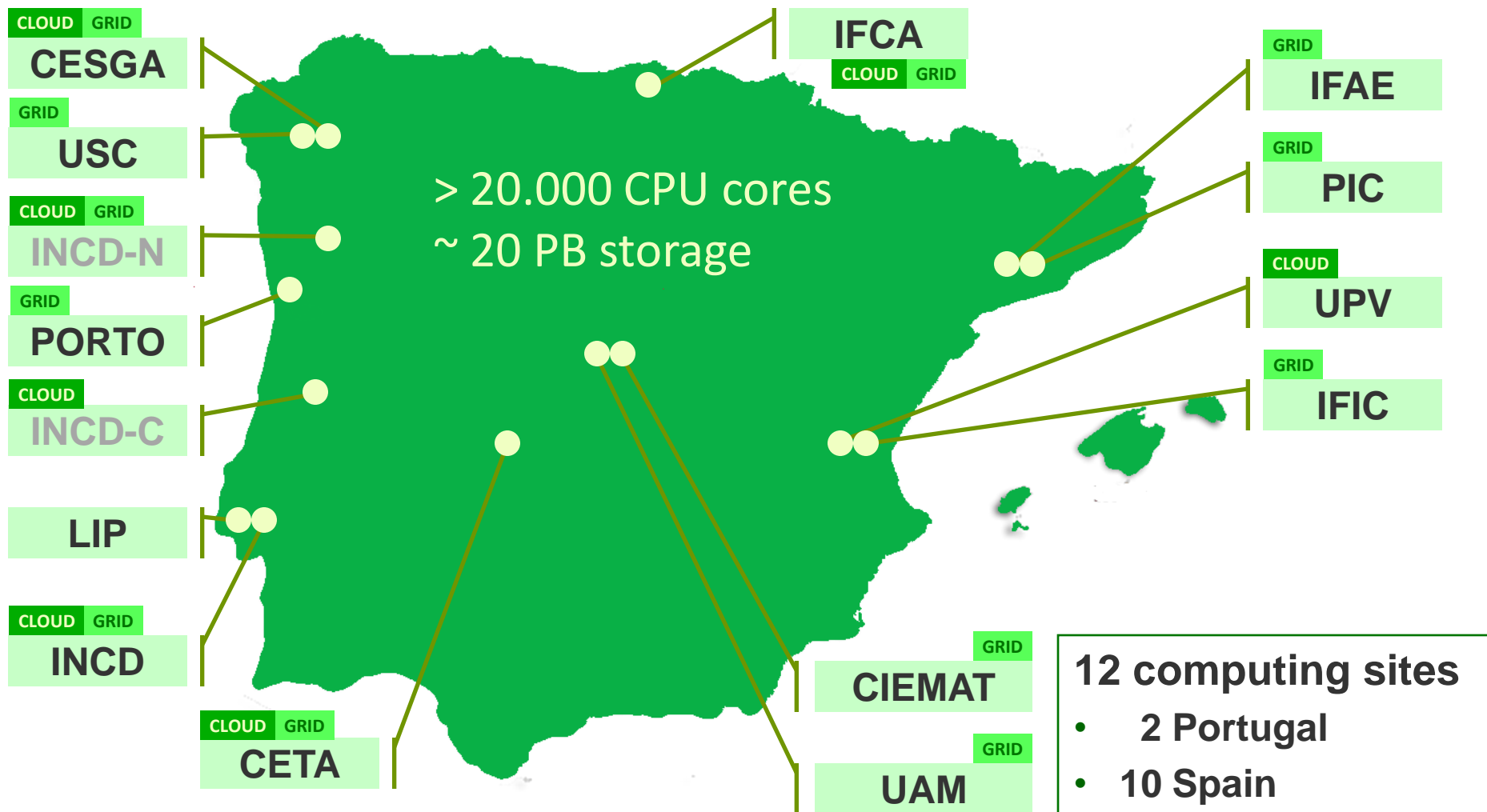
computação de  
alto desempenho

# Distributed computing infrastructure

- a) Federates infrastructures from Iberian research and academic organizations (PT + ES) mainly focused:
  - Grid Computing
  - Cloud Computing
  - Data Processing
- b) Enables a joint participation in the European Grid Initiative (EGI) and other initiatives (EOSC, ESFRIs, WLCG, etc);
  - Provides the regional operations coordination for the computing and data processing activities of several user communities;
- c) Forum for common activities and sharing of knowledge.
  - Participation in EU and cross-border projects both R&D and infrastructure oriented
  - Conferences and events



## Joins PT + ES cloud and computing farms:



## Core services

- Data catalogues
- Authentication  
Authorization  
and virtual  
organization  
membership

### INCD

LFC

VOMS

LIP

web

wiki

LFC

VOMS

Accounting

CESGA

ARGUS

LFC

VOMS

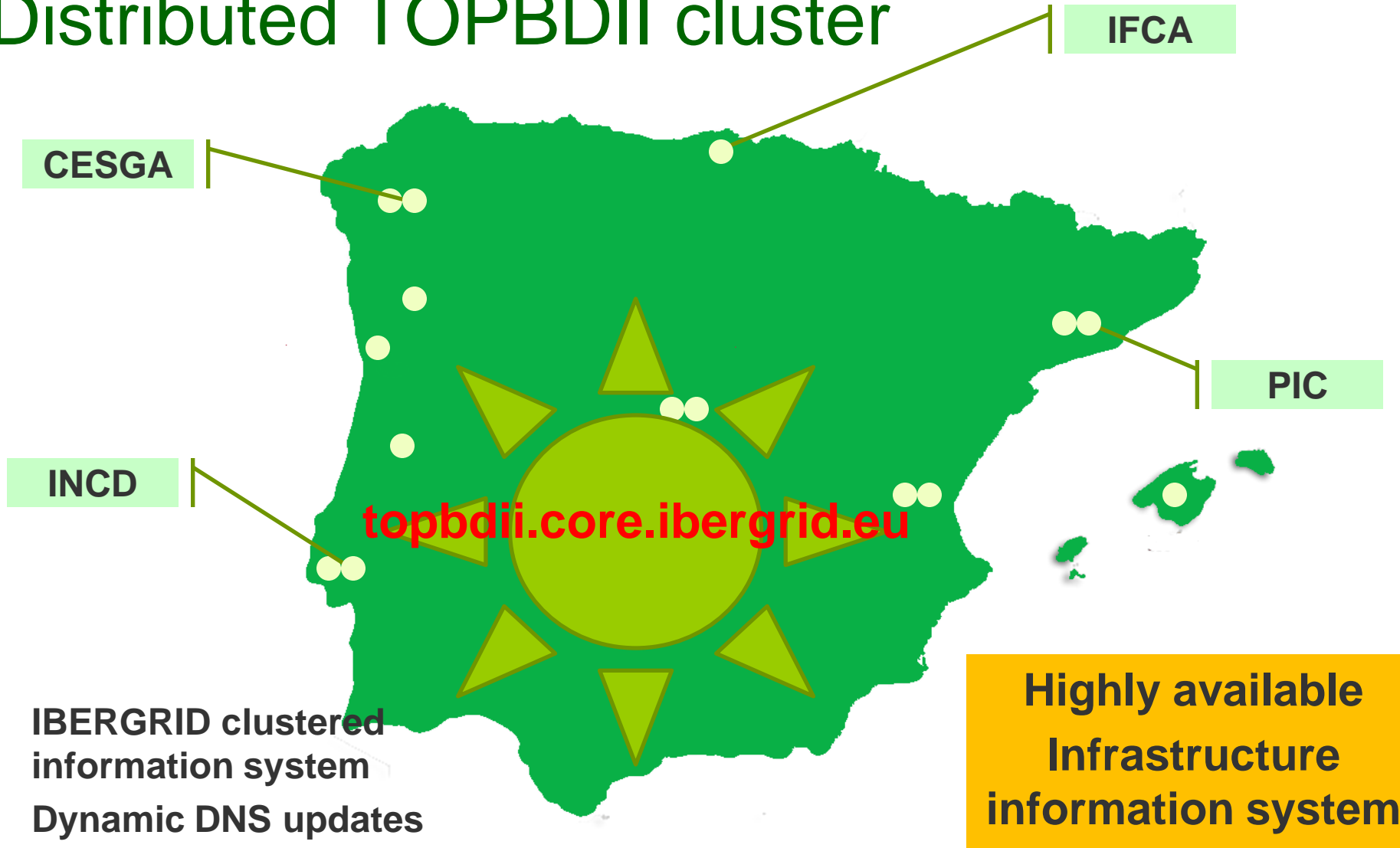
IFCA

VOMS

CIEMAT

Data replication for  
critical infrastructure  
services

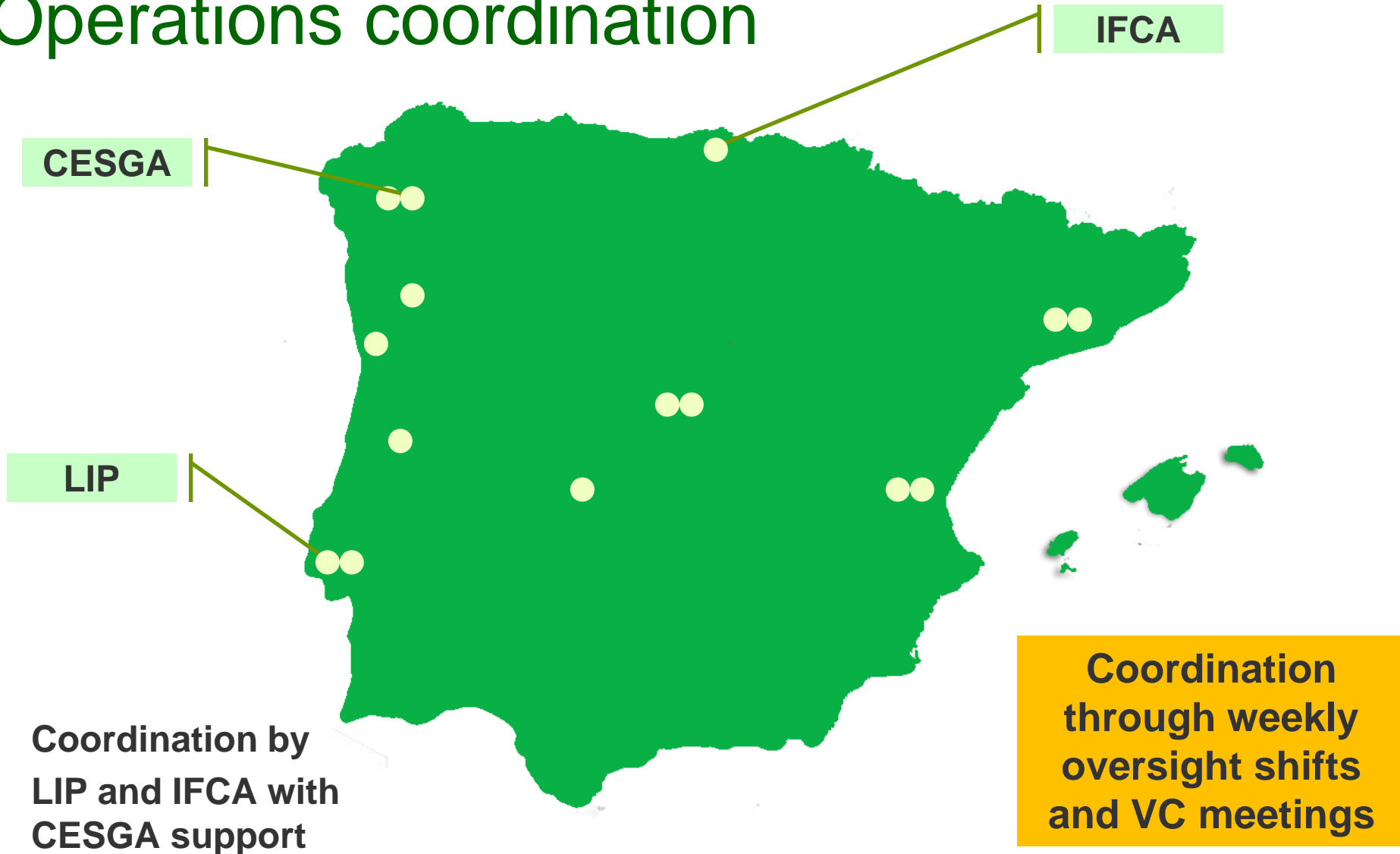
## Distributed TOPBDII cluster



- IBERGRID clustered information system
- Dynamic DNS updates
- Developed by LIP

**Highly available  
Infrastructure  
information system**

## Operations coordination



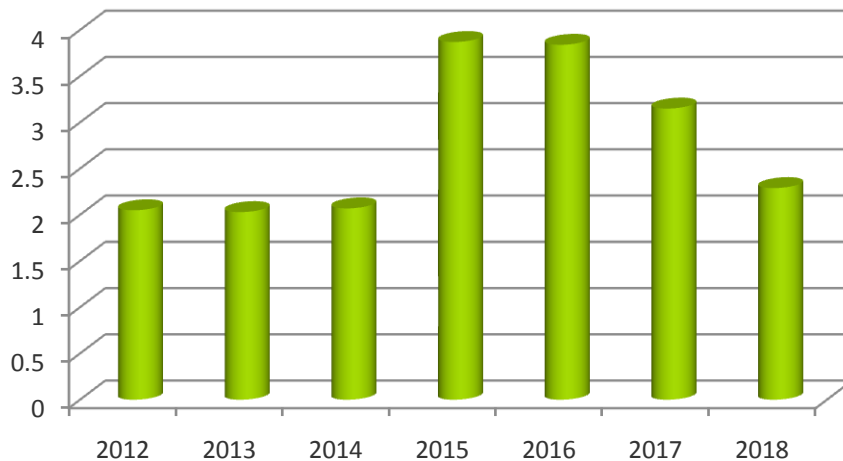
- Coordination by LIP and IFCA with CESGA support



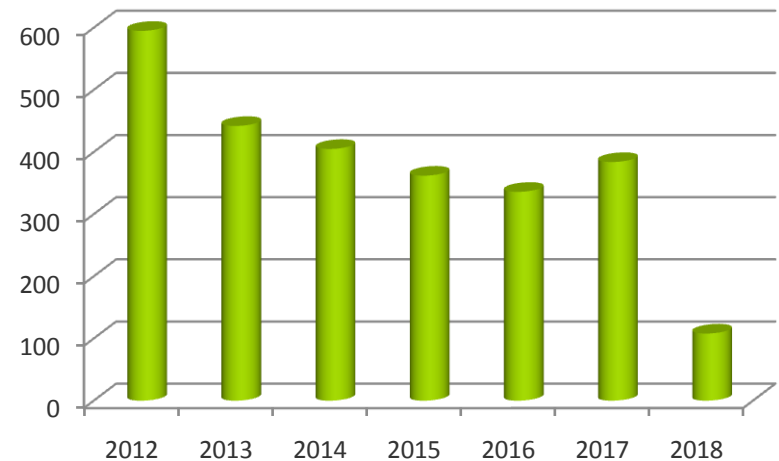
## Infrastructure operations

- More than 300 tickets per year
- Helpdesk: EGI GGUS

Average response time [days]

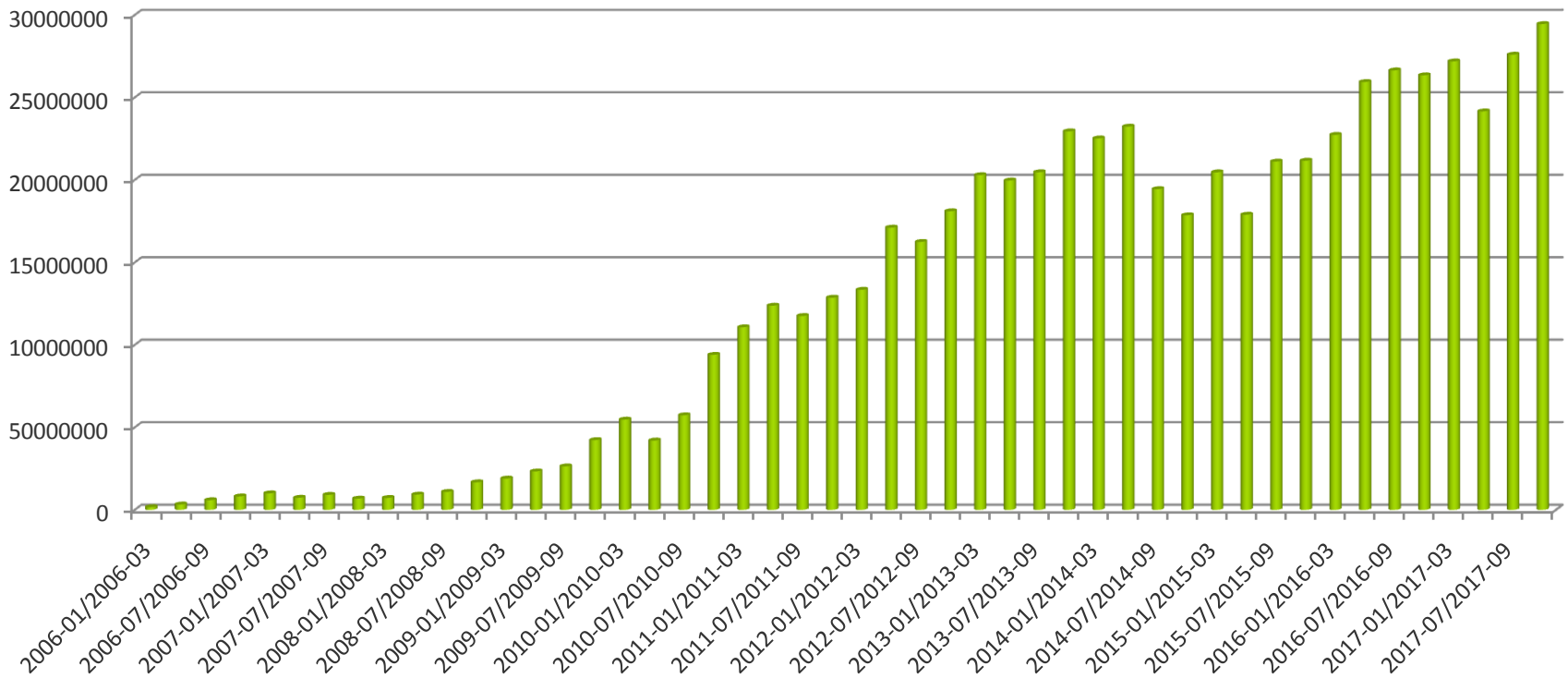


Number of tickets



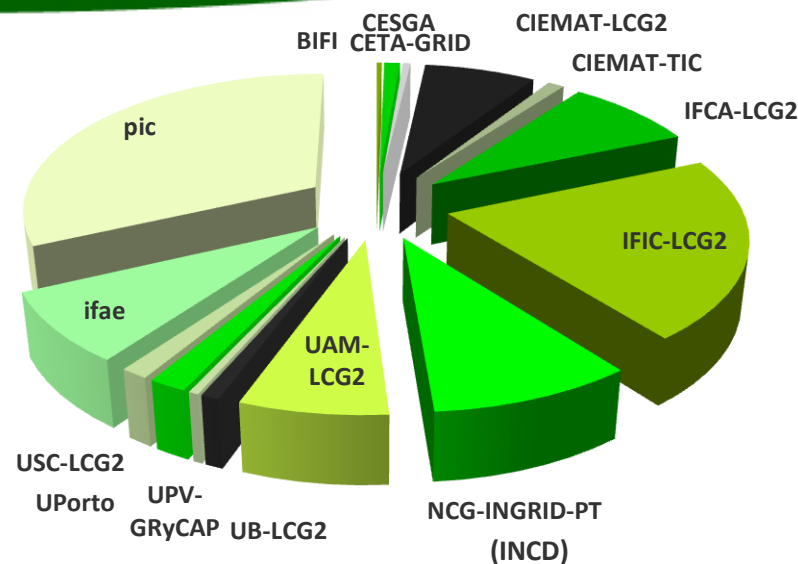
240 million jobs executed since 2006  
984 million processing hours

NGI\_IBERGRID normalized CPU time (HS06)

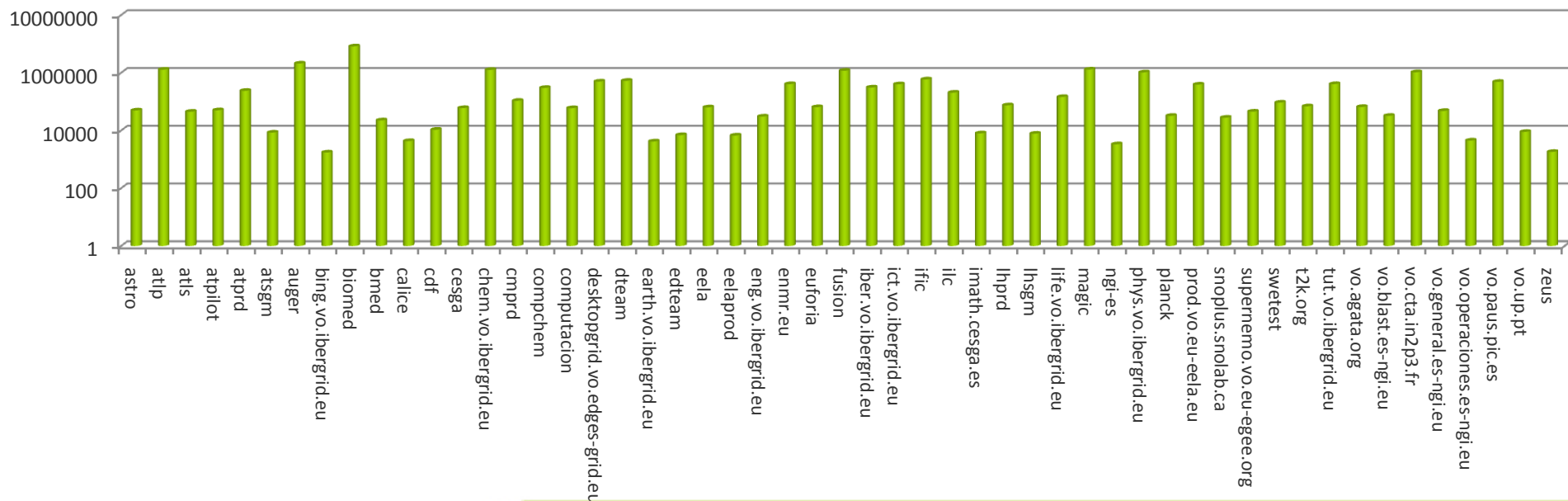


## Grid Jobs

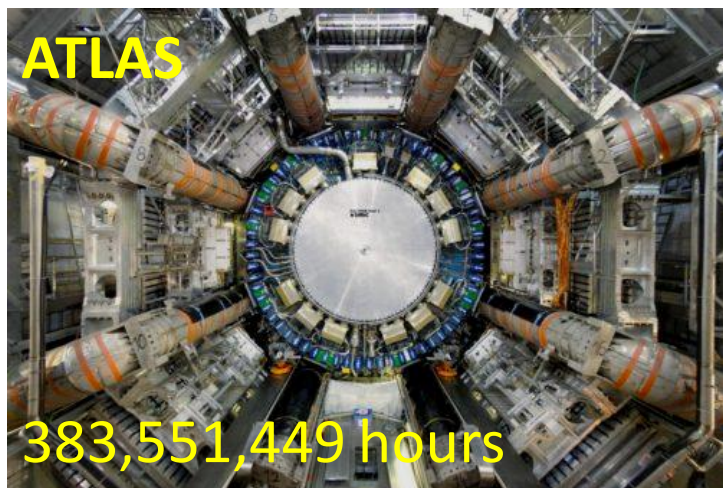
- By site and by VO
- From 2006 to 2017



Grid Jobs by VO



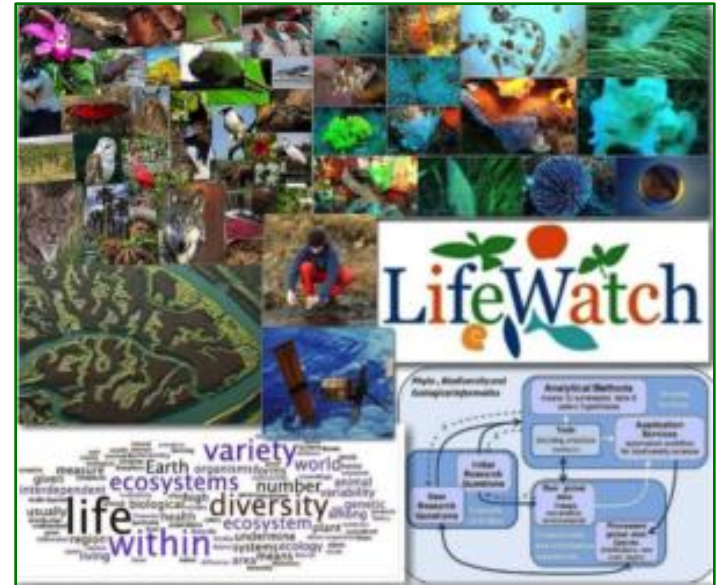
## CERN LHC simulation and data analysis





## LifeWatch ESFRI

- LifeWatch, is a distributed Research e-Infrastructure to advance biodiversity research and to address the big environmental challenges and support knowledge-based strategic solutions to environmental preservation.
- The services currently available for the biodiversity community are also available for wider re-use by other scientific communities.
- In the Iberian area the activity of Lifewatch is articulated via **IberLife**, which in turn relies on the support of **Ibergrid** for the deployment and operation of core services.



~2.000.000 hours in Cloud provided by IBERGRID last 12 months

## GBIF

- The Global Biodiversity Information Facility (GBIF) is an international network and research infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth.

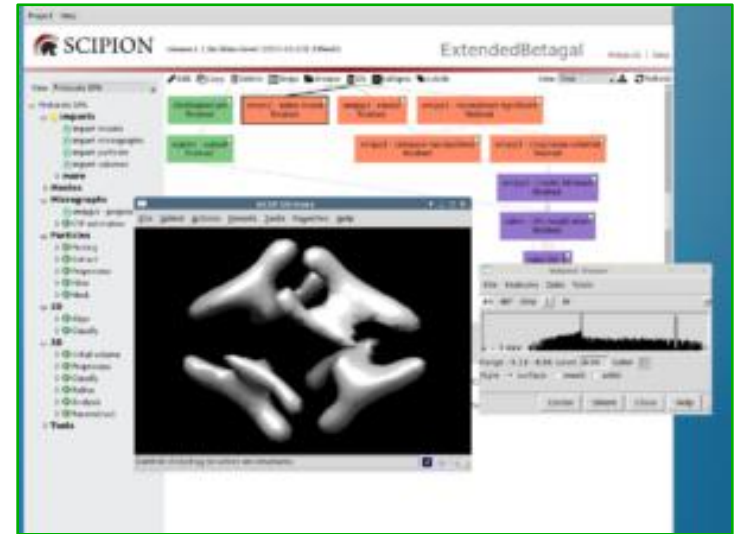


- GBIF nodes in Portugal and Spain are maintained in the scope of **LifeWatch** and **IberLife** and these activities are supported by **IBERGRID**.
  - [dados.gbif.pt](http://dados.gbif.pt)
  - [datos.gbif.es](http://datos.gbif.es)

Supported by IBERGRID Cloud resources

# INSTRUCT

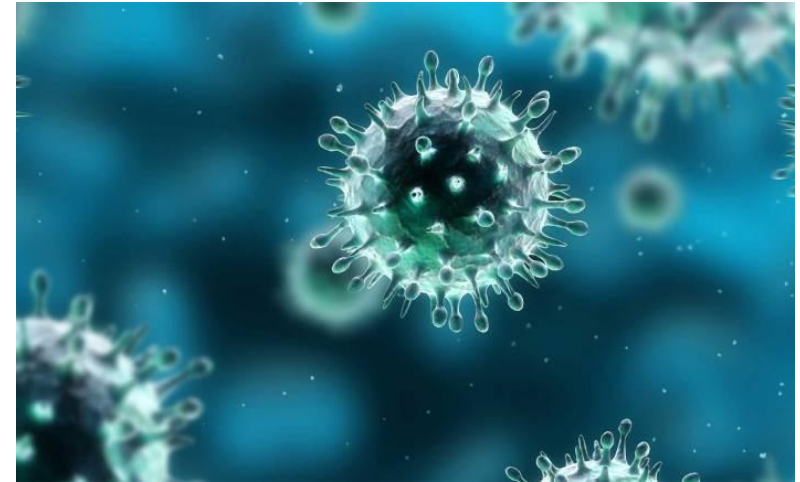
- Scipion is an image processing framework used to obtain 3D maps of macromolecular complexes using cryo Electron Microscopy, developed by the researchers of CNB-CSIC. This is a community self-developed solution that can be integrated for support in generic Clouds (public and private).
- Scipion is the solution offered by the **Instruct Image Processing Center (I2PC)** to European scientists accessing the European Research Infrastructure for Structural Biology (**Instruct**).



Supported on-demand in the IBERGRID Cloud via EGI AppDB

## WeNMR and MoBrain

- WeNMR provides an e-Infrastructure platform and Science Gateway for **structural biology**. WeNMR serves all relevant **INSTRUCT** communities in line with the ESFRI roadmap.
- WeNMR is part of West-Life virtual research environment for structural biology.
- The current challenges in the post-genomic era call for virtual research platforms that provide the worldwide research community with both user-friendly tools, platforms for data analysis and exchange, and an underlying e-infrastructure.



330,000 hours in IBERGRID since 2013

Cooperation on tools and packaging



## EuroBioImaging

- The Euro-BioImaging (EuBI ERIC) provides open physical user access to a broad range of state-of-the-art technologies in biological and biomedical imaging for life scientists.
- The EuBI consists of a set of 29 geographically distributed Node Candidates (specialised imaging facilities) that can grant access to scientists from all European countries and beyond.
- Supports collaboration between I3M at Universidad Politécnica de Valencia and Portuguese Brain Imaging Network (BIN) at INESC Porto.



New user community in IBERGRID

## AUGER

- On the vast Pampa Amarilla in western Argentina, the Pierre Auger Observatory is studying the highest-energy particles in the Universe, so-called cosmic rays.
- Cosmic rays with low to moderate energies are well understood, while those with extremely high energies remain highly mysterious. By detecting and studying these rare particles, the Pierre Auger Observatory is tackling the enigmas of their origin and existence.



7,842,375 hours in IBERGRID 2009-2017

# OPENCoastS

- OPENCoastS – On-demand Operational Coastal Circulation Forecast Services, is an innovative service providing on-demand circulation forecast systems as-a-service for the European Atlantic coasts.
- OPENCoastS builds on-demand circulation forecast systems for user-selected sections of the North Atlantic coast.
- OPENCoastS generates forecasts of water levels, 2D velocities and wave parameters over the spatial region of interest for periods of 72 hours, based on numerical simulations of all relevant physical processes.



Being integrated into IBERGRID and EGI as an EOSC thematic service  
Collaboration LIP, LNEC, INCD, UNICAN, CNRS, CSIC

# Computational Chemistry

- a) Pioneering a way to produce high-quality, carbon-neutral methane gas using industrial waste carbon dioxide. Study **recycling a pollutant to produce a high-quality methane in a carbon neutral circular economy** scheme.
- b) Chemical reactions are at the core of everything that happens in the Universe. **Compute accurately the efficiency of molecular processes** in which molecules collide to react, dissociate, exchange energy and deform.



5,833,019 hours in IBERGRID since 2007

# Genetics

- a) **Self-fertilization can improve resilience to extinction of plant species.** If the species survives, the surviving individuals will have less deleterious mutations and the end result is a more robust and resilient population.
  
- b) Industrial landscapes often leave a trail of ecological catastrophe on their wake, but a new study on genetic diversity shows that old spoil heaps from **coal mining can be paradise for natterjack toads.**

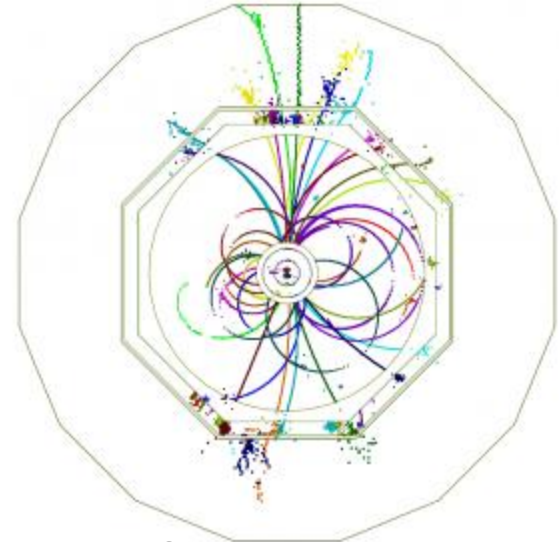


18,556,508 hours in IBERGRID used by BIOMED since 2006



## ILC and CLIC

- The next big adventure in particle physics. Currently at the planning stage, it would complement the Large Hadron Collider at CERN and shed more light on the discoveries scientists are likely to make there in the coming years.
- The linear collider aims at providing a view of energies trillion times beyond its own energy realm where nature's force might become unified.
- R&D towards the a future linear collider beyond the LHC.



Simulation of a collision event at the ILC.

763,963 hours in IBERGRID since 2015

## EMSO

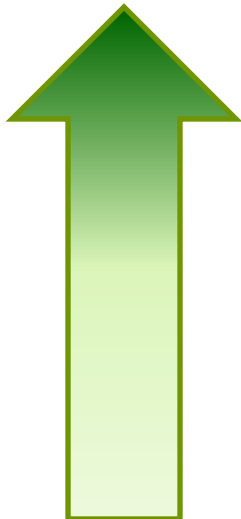
- EMSO is a large-scale research infrastructure of seafloor & water-column observatories, set up to monitor long-term environmental processes and their interactions.
- Collecting and analyzing ocean data on a day-to-day basis is crucial to monitor environmental processes.
- EMSODEV developed the DMP platform on top of the EGI Federated Cloud. The DMP is now being deployed and tested.



New community starting in the IBERGRID Cloud  
IBERGRID, Italian NGI, INGV, IPMA, CSIC

## IBERGRID conference series

- Started in 2007
- Santiago, Porto, Valencia, Braga, Santander, Lisboa, Madrid, Aveiro
- Joins computer centres, user communities and developers
- 9<sup>th</sup> Edition in 2018 will be held in Lisbon co-located with DI4R





## Digital Infrastructures for Research Conference (DI4R) and IBERGRID 2018, Lisboa, ISCTE, Oct 2018

**SAVE  
THE  
DATE**

**DIGITAL INFRASTRUCTURES  
for RESEARCH 2018**

Serving the user base

9-11 October 2018

Venue: ISCTE

University Institute of Lisbon, Portugal

[www.digitalinfrastructures.eu](http://www.digitalinfrastructures.eu)

Europe's leading e-infrastructures invite all researchers, developers and service providers to participate to the third edition of Digital Infrastructures for Research conference, in Lisbon, from **9 to 11 October 2018**. The conference is jointly organized by **EOSC-hub (EGI+EUDAT+INDIGO)**, **GÉANT**, **OpenAIRE** and **PRACE**.

**Local organizer LIP + INCD + IBERGRID**

Iberian Distributed Computing Infrastructure

## Further information

- <http://www.ibergrid.eu/>

**Thank You**