

RISC2



Future EU-LATAM collaboration on HPC - Policy makers event

Prof. Mateo Valero, BSC, Director, Barcelona, Spain

Welcome

Welcome everyone. I am unfortunately retained in Spain for unexpected important institutional commitments, but I wish to confirm my personal and BSC full commitment to scientific collaboration with LATAM especially on HPC of which this RISC2 project is an excellent example.

In this particular geopolitical moment, collaboration between the LATAM region and the EU is even more important than ever.

The EU is investing big in HPC with the EuroHPC Joint Undertaking. I am part of the advisory committee to this endeavour and BSC is one of the first major sites of the EuroHPC procurement action in Europe. In this role I am a big advocate of international cooperation with friend regions such as LATAM.

This is not new for BSC and myself. I have a long tradition of collaboration with LATAM, teaching and giving lectures, participating in various national advisory boards, hosting collaboration with LATAM institutes and colleague scientists. Specifically on HPC architecture development, I am happy and proud of the collaboration with Mexico in the development of open hardware processors, especially designed for HPC.

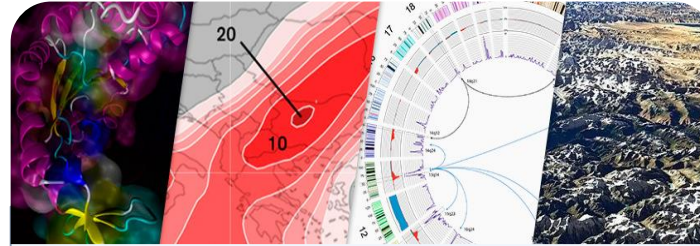
In the following slides a little history of BSC collaboration with LATAM.

Barcelona Supercomputing Center Centro Nacional de Supercomputación

BSC-CNS objectives



Supercomputing services
to Spanish and EU researchers



R&D in Computer, Life, Earth and
Engineering Sciences



PhD programme, technology
transfer, public engagement

BSC-CNS is
a consortium
that includes

Spanish Government

60%



Catalan Government

30%



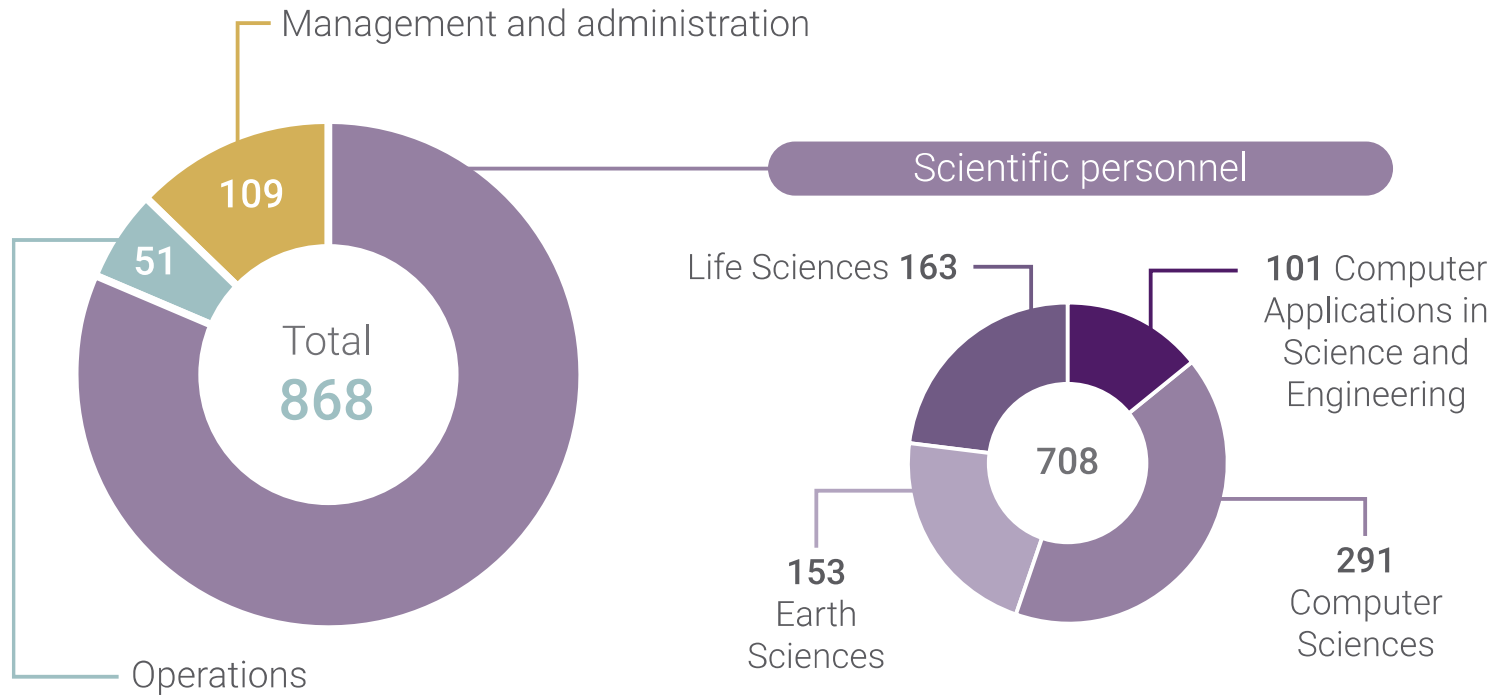
Univ. Politècnica de Catalunya (UPC)

10%



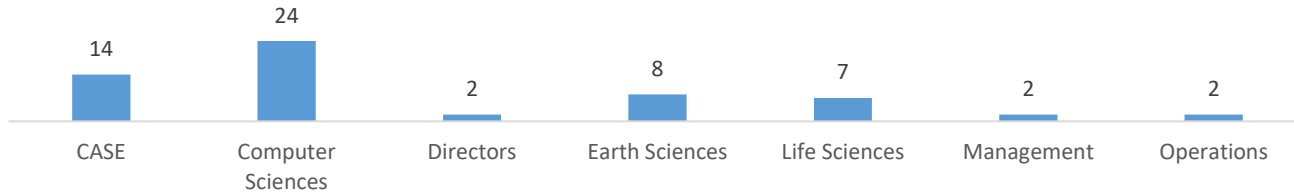
BSC in May, 2023

People



Personal Latinoamericano

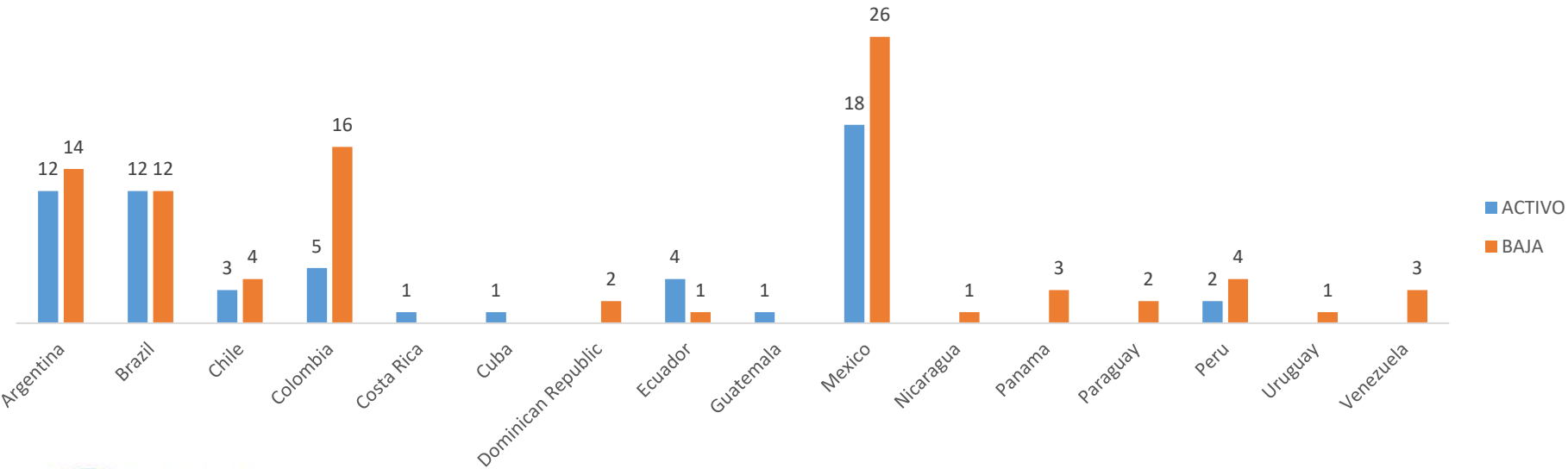
Personal Activo en el BSC en Junio 2023 por Departamento



7% del total BSC actual

59 personas Actuales

Personal Activo en el BSC en Junio 2023 vs Personal histórico que ha pasado por el BSC



Total de 148 personas en el BSC (desde 2005)

Principal BSC Projects with Latin America

2011-2013



AIMS

- Identify research clusters for targeted research collaboration;
- Identify the needs of education and training in Latin America
- Produce a Green Paper on HPC Drivers and Needs in Latin America;
- Produce a Roadmap for HPC strategic R&D in Latin America;
- Enhance HPC R&D policy dialogue between policy makers and stakeholders



- Universidad Veracruzana
- Universidad Autónoma de Manizales
- Coppetec Fundação do Rio de Janeiro
- Universidad de Buenos Aires
- Universidad de Chile



- BSC
- CINECA
- UPM
- Menon
- Universidade de Coimbra

Principal BSC Projects with Latin America

2011-2013



The main goal of EUBrazilOpenBio was to deploy an e-Infrastructure of open access resources (data, tools, services), to make significant strides towards supporting the needs and requirements of the biodiversity scientific community funded by the EU and Brazil and led by BSC

[EU-Brazil Open Data and Cloud Computing e-Infrastructure for Biodiversity | EUBrazilOpenBio | Project | Fact sheet | FP7 | CORDIS | European Commission \(europa.eu\)](#)

Principal BSC Projects with Latin America

2019-2021



The ENERXICO project applied Exascale HPC techniques to different energy industry simulations of critical interest to Mexico. ENERXICO worked on solutions for the oil & gas industry in upstream, midstream and downstream problems, wind energy industry and combustion efficiency for transportation. The project brought together the main stakeholders of the energy industry and energy companies working in the Mexican market.



The ENERXICO project received funding from the European Union's Horizon 2020 Programme, grant agreement n° 828947, and from the Mexican Department of Energy, CONACYT-SENER Hidrocarburos grant agreement n° B-S-69926.

Principal BSC Projects with Latin America

2021-2023

RISC2



RISC2 created a network to support the coordination of High-Performance Computing research between Europe and Latin America. Exploring the real and potential impact on HPC, in coping with the growing environmental and scientific challenges and, therefore, in the economies of Latin America and Europe. Gathering key European HPC actors to encourage stronger cooperation between their research and industrial communities on HPC applications and infrastructure deployment.



CeNAT



Cinvestav



COPPE



National Laboratory of Scientific Computing



University of Buenos Aires



National Laboratory for High Performance Computing



University of the Republic



Industrial University of Santander



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101016478.



RISC2 mission

The **RISC2** European project ([RISC2 Project \(risc2-project.eu\)](https://www.risc2-project.eu)) 2021-2023, was established to promote more collaboration between EU and LATAM HPC communities and foster a policy dialogue among the respective funding agencies and authorities.

Most notable results so far:

- The White Paper on HPC RDI in Latin America at [White Paper on HPC RDI in LATAM - RISC2 Project \(risc2-project.eu\)](https://www.risc2-project.eu/white-paper)
- The HPC Observatory, available at <https://www.risc2-project.eu/hpc-observatory/>
- Policymakers event (Brussels, 18 July, 6:00-9:00 PM)
- Dedicated and policy-focused activities at CARLA 2022 (Porto Alegre, Brazil) and CARLA2023 (Cartagena de Indias, 18-22 Sep)



BSC Projects with Latin American Partners

2011-2013



EU-Brazil Open Data and Cloud Computing e-Infrastructure for Biodiversity

Brazil

2011-2013



Network to Coordinate EU-Latin American Supercomputing Research

Countries?

2015-2017



Enhancing prediction of tropical Atlantic climate and its impacts

Brazil

2016-2017



Seasonal-to-decadal climate prediction for the improvement of EU Climate Services

Brazil

2019-2021



Exascale HPC techniques for energy industry simulations for Mexico

Mexico

2019-2023



Tropical and South Atlantic - climate-based marine ecosystem prediction

Brazil

2020-2023



Worldwide Analysis and Forecasting of Atmospheric Composition for Health

Chile

2020-2024



Land Use Based Mitigation for Resilient Climate Pathways

Colombia

2021-2023



Exploring the real and potential impact of HPC on Latin America and Europe

Countries?

RISC2

These projects received funding from the European Union's research and innovation programme

RISC2 major activities

Support to seven international HPC schools, 8 workshops, a webinar series and other events



3rd ACM Summer School (Barcelona)



7th CRHPC School (Costa Rica)



1st HPC system school (Santiago de Chile)



EuroHPC: towards European HPC technologies



EuroHPC-Ju members:

Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Montenegro, the Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and Turkey



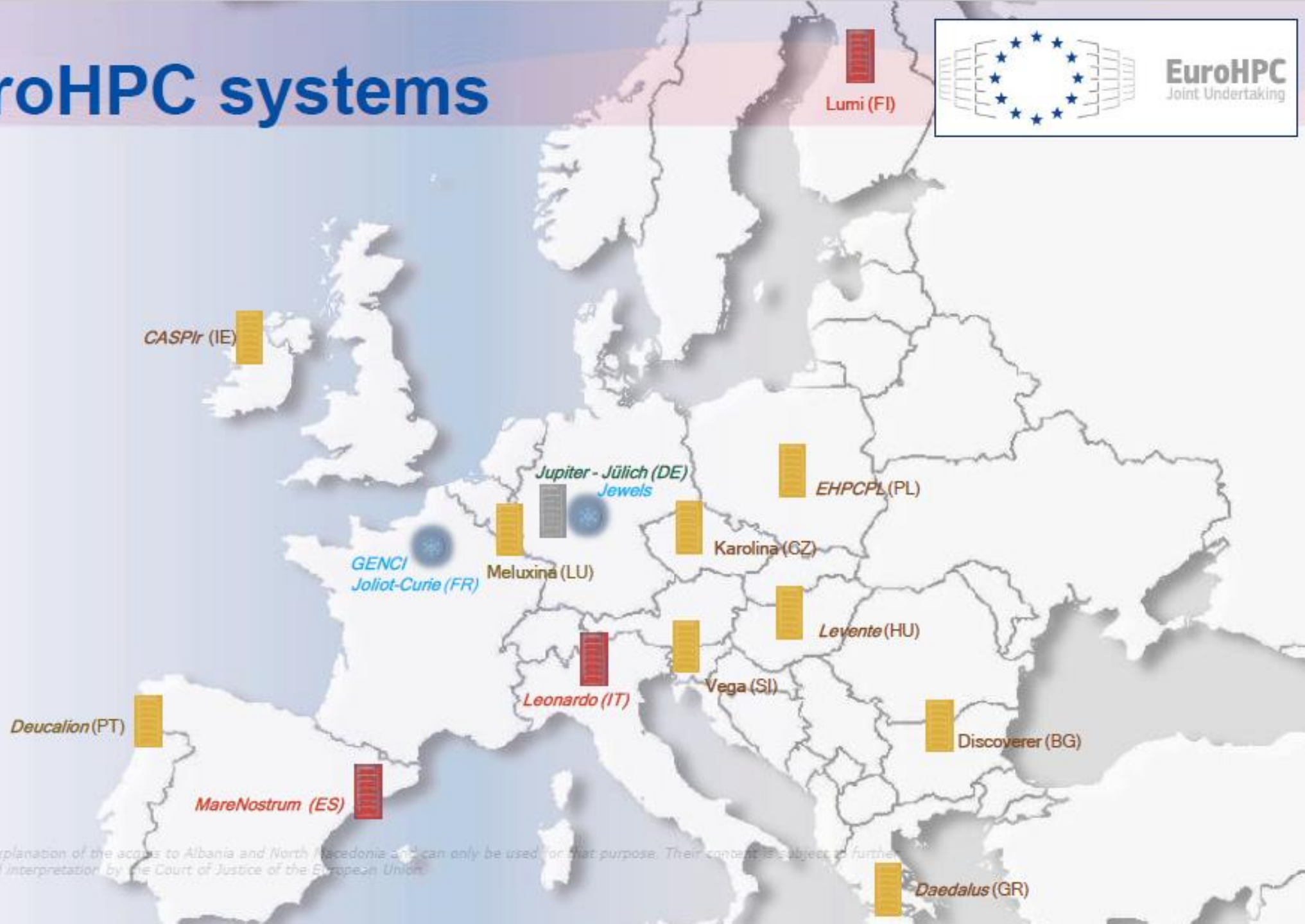
“A new legal and funding structure – the EuroHPC Joint Undertaking – shall acquire, build and deploy across Europe a world-class High-Performance Computing (HPC) infrastructure.

It will also support a research and innovation programme to develop the technologies and machines (hardware) as well as the applications (software) that would run on these supercomputers.”

EuroHPC systems



- Exascale
- Pre-exascale
- Petascale
- Qsimulator



GPP - General Purpose

Intel Sapphire Rapids

Peak performance: 45,4 Pflops
Sustained HPL: 35,4 Pflops

April 2023

NGT GPP - Next Generation

NVIDIA Grace

Peak performance: 2,82 Pflops
Sustained HPL: 2 Pflops

June 2023

MareNostrum5

InfiniBand NDR 200
Fat Tree

Spectrum Scale File System

248 PB HDD
2,81 PB NVMe
402 PB tape

January 2023

ACC – Accelerated

Intel Sapphire Rapids
NVIDIA Hopper

Peak performance: 260 Pflops
Sustained HPL: 163 Pflops

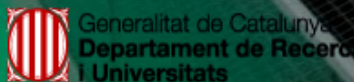
June 2023

NGT ACC - Next Generation

Intel Emerald Rapids
Intel Rialto Bridge

Peak performance: 6 Pflops
Sustained HPL: 4,24 Pflops

December 2023



The road ahead

- Strengthen scientific collaboration *between* LAC and the EU and *within* LAC.
- Foster **bilateral agreements**, following the example of the EU-Japan Digital Partnership.
- Establish **centres of excellence** in LAC focused on specific scientific applications, building upon the experience of the European HPC CoEs.
- Improve and coordinate **HPC infrastructure** throughout LAC, sharing HPC resources and following joint action plans.
- Leverage the **BELLA Programme** in the region and initiatives like RedCLARA and SCALAC.
- **Education is key!** Promote specialised degrees in HPC organised in cooperation between LAC and EU institutions, foster student exchange experiences and increase scientific mobility.



Lagarto RISC-V Tapeouts

2019

2020

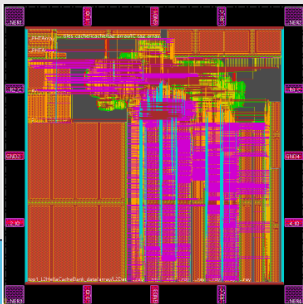
2021

2022

2023

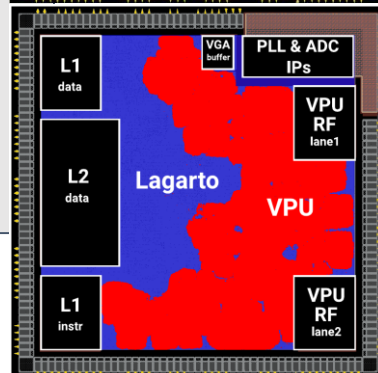
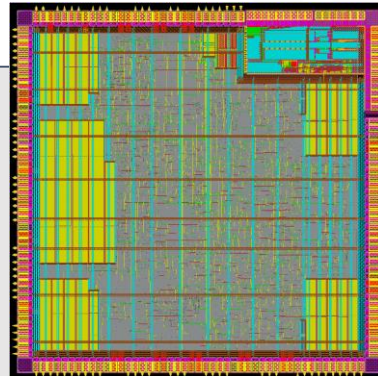
Lagarto (May'19)

- Lagarto Hun 5-stage in-order
- 150MHz (external)
- TSMC 65nm
- 2.5mm²



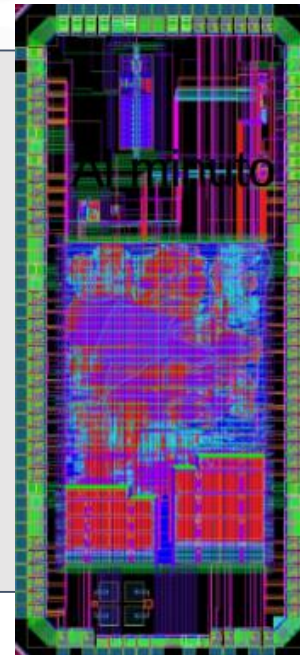
DVINO (Apr'21)

- Lagarto Hun in-order
- VPU
- PLL 600 MHz
- SDRAM mem cont
- HyperRAM
- VGA
- ADC
- TSMC 65nm
- 8mm²



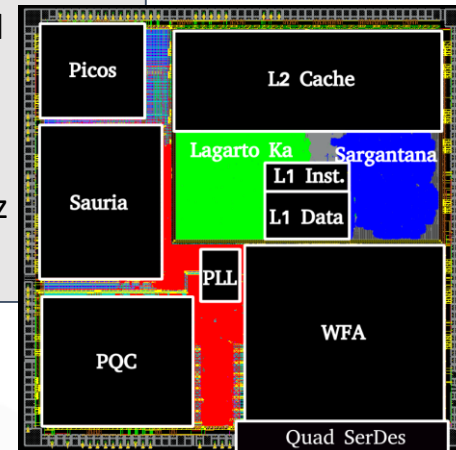
Sargantana (Feb'22)

- Sargantana 7-stage in-order
- PLL 1.2 GHz
- Custom extensions
- SDRAM
- Prototype analog
- IPs: SerDes 8GHz
- GF 22nm
- Area: 2.9mm²



Kameleon (Dec'22)

- Lagarto Ka 11-stage ooo
- PLL 1.2 GHz
- Automotive Accel
- Crypto Accel
- Genomic Accel
- PICOS Accel
- SerDes 8GHz
- GF 22nm
- Area: 9mm²



SC2

EuroHPC and International Collaboration

EuroHPC has established a policy to follow the signature of **Digital Partnership Agreements** between the EU and outside the EU countries with specific calls for HPC infrastructure access and the development of **bilateral scientific collaborations**.

- The first one is with **Japan** following the signature of the EU-Japan Digital Partnership on May 12th, 2022.
- **India** and **Singapore** have signed similar agreements. Related calls are expected in the near future.

*“The EU and Japan have so much in common. Our values of course – democracy and the rule of law. Our economic model. As well as a certain vision of the world. We both promote a multilateral global system, based on rules designed to protect and benefit all. And it is precisely because this vision is so often challenged today, that **the EU is looking to strengthen its relationships with like-minded partners**”.*

*Ursula von der Leyen,
President of the European Commission*



[EU-Japan Summit: strengthening our partnership | Shaping Europe's digital future \(europa.eu\)](#)

Proposal for the EuroHPC & Japan call

The Barcelona Supercomputing Center (BSC) participates in a consortium coordinated by the French Alternative Energies and Atomic Energy Commission (CEA).

Proposed actions

- Foster collaboration projects in priority areas –selected by the European Commission and Japanese authorities- coordinated by the EU HPC Centres of Excellence (CoEs):
 - **Material Science**
 - **Climate Change**
 - **Biomedical Science**
- Organize topical **schools and workshops** for PhDs, postdocs, and researchers, coordinated by the EU pre-exascale HPC centers with ongoing collaborations with Japan.
- Support **researchers' mobility** between the EU and Japan.



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Thank you and best wishes for this event

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