



**Barcelona
Supercomputing
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Centro Nacional de Supercomputación



Software aspects of the road towards exascale in Europe

Prof. Jesús Labarta

BSC & UPC

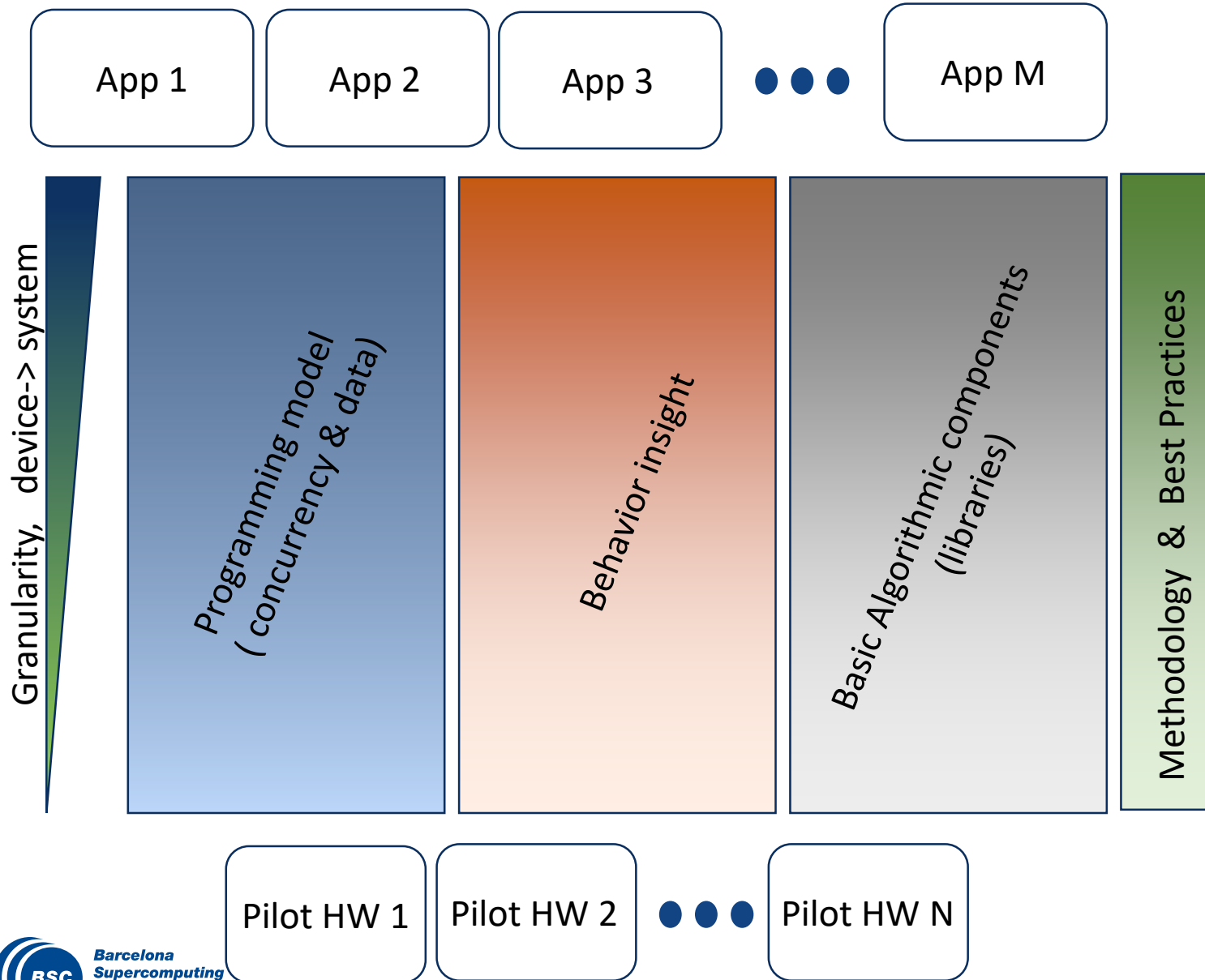
Co-Design Workshop. EuroHPC Summit Week 2019

Poznan, May 15th 2019

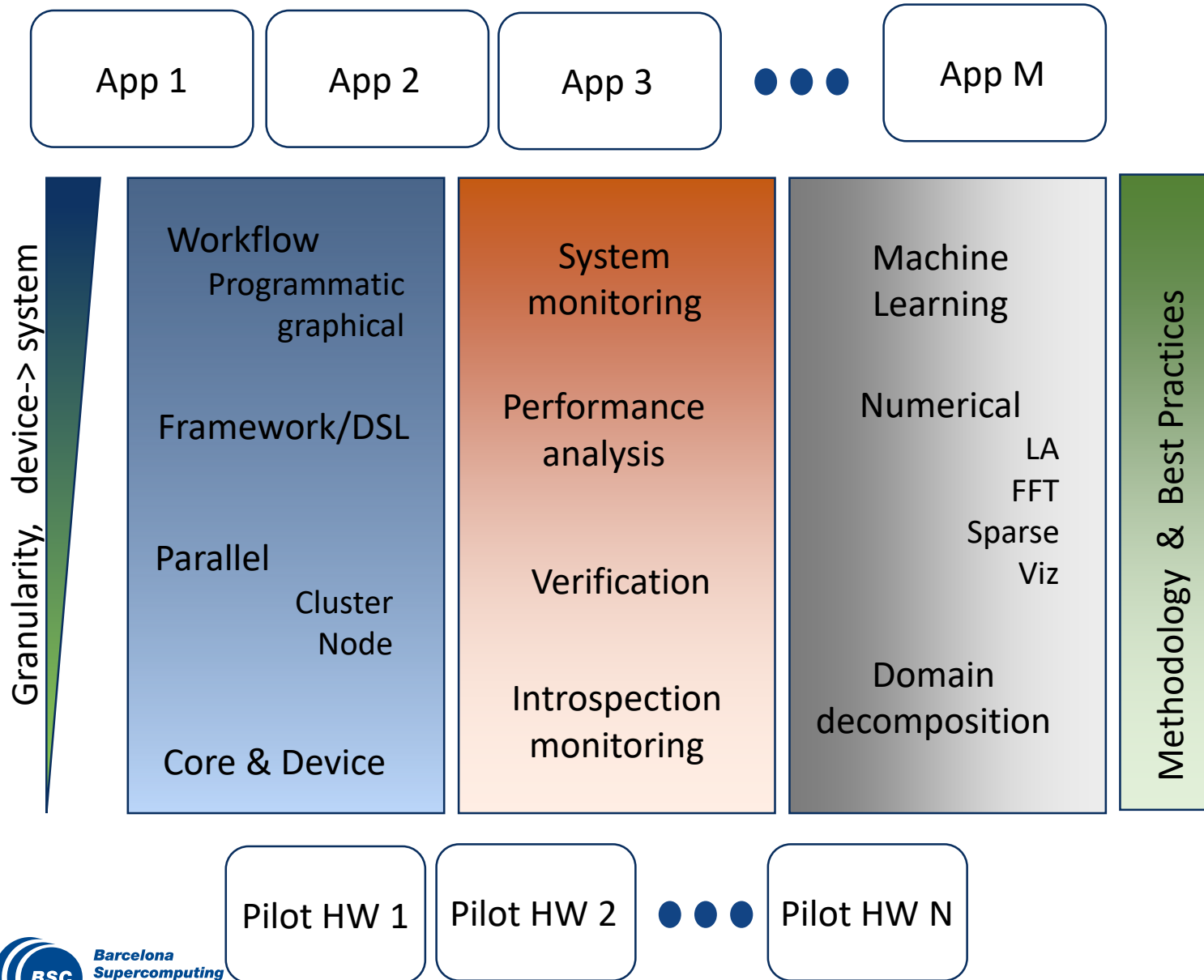
Objective towards “exascale”

- Productivity
 - Give hope to programmers, help them survive the exascale
 - The real revolution is about the programmers mindset
- Efficiency
 - at all levels:
 - System, Parallel, Core
 - For all resources:
 - Storage, memory, communication, core, functional units, power
- Leverage/promote EU developments

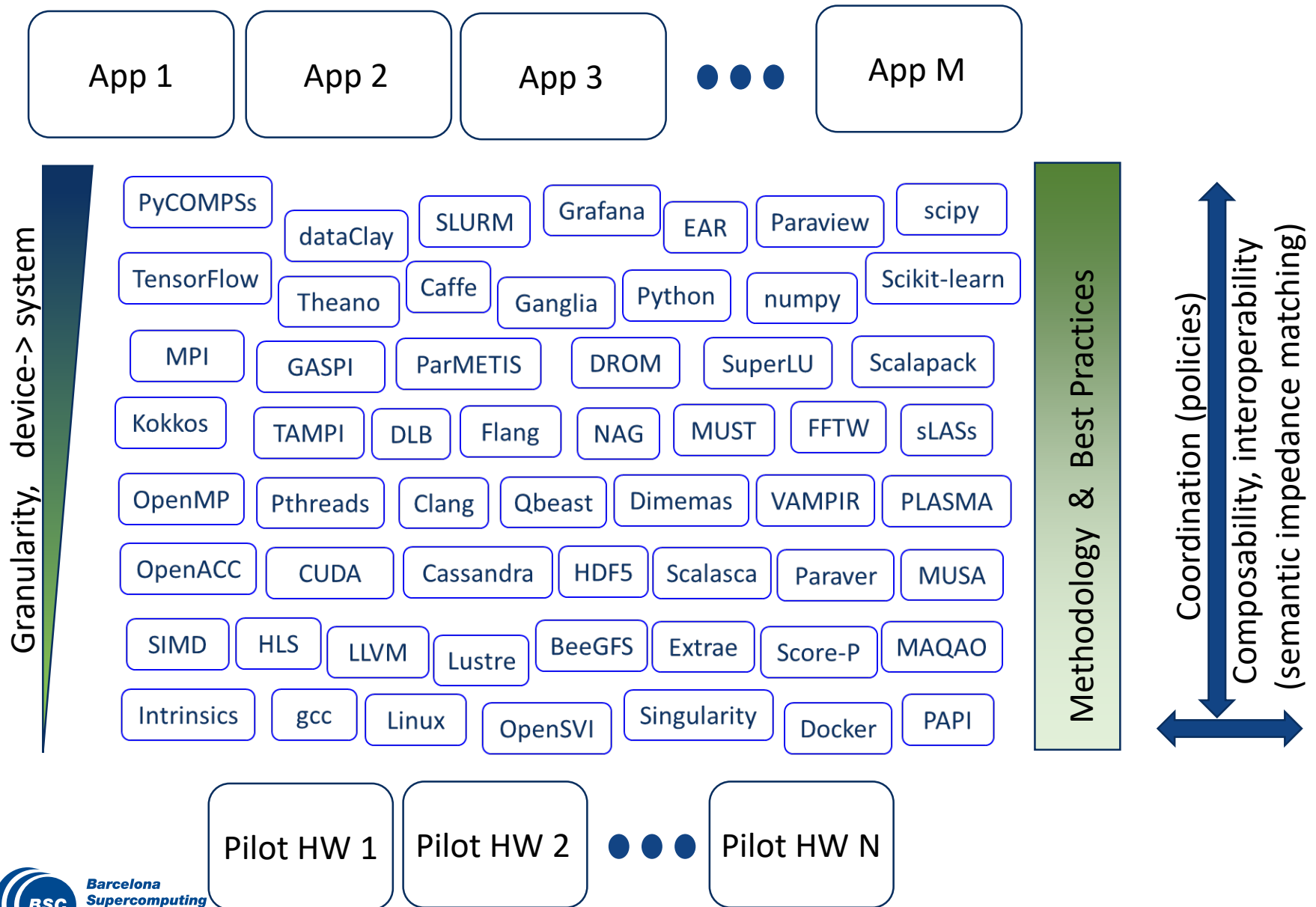
Structure



Structure



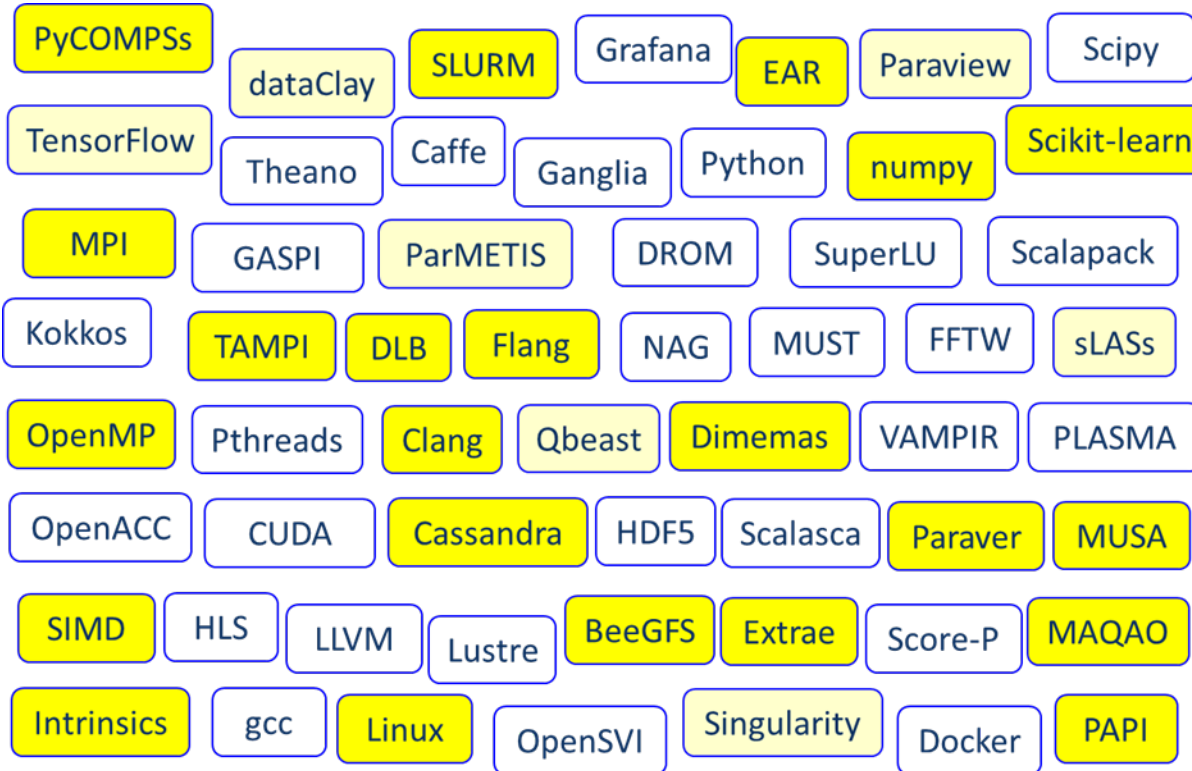
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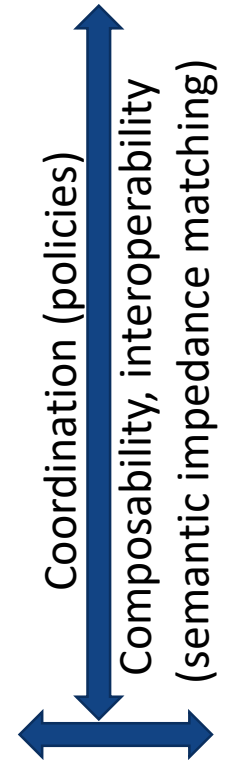
Pilots



Granularity, device → system



Methodology & Best Practices

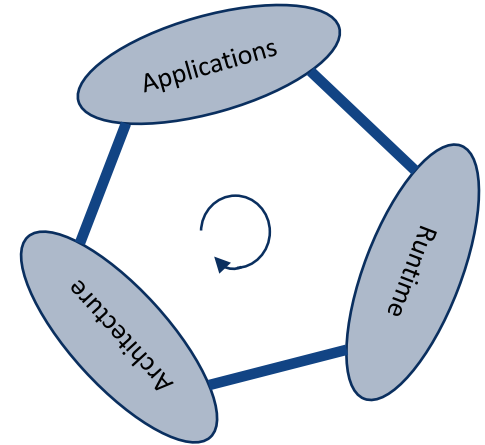


Pilots

- A vertically integrated traversal of the “components” space
 - With a **vision** on fundamentals and differentiation advantages
 - Important issues and how to address them
 - **Focused** : few components per level and functionality !!
 - **Specific** !!
 - Main Choice / Secondary choice
 - Must / may
- Commitment to the vision
- Early access
 - Open to external users when available
 - Attractive to as many as possible
 - Provide publicly available installations on all platforms,
- Co-design opportunity

Co-design

- Best place to address issues ?
 - Economic, elegant, forward looking place
- Fundamentals across multiple apps
 - Requires abstraction, broad vision
 - Work in general, ... particularly well in our systems
 - Consolidation: avoid multiple “local” implementations
 - “My trick”, same but different → my legacy
- Aspects
 - Co-design
 - → have to design
 - Co-specify, -require
 - Co-dimension, -procure



Context

- Can not ignore the context
 - ECP
 - ...
- Standards !!!
 - Take-up
 - Contribute
- “Coopetition”
 - With ECP ?
 - Contribute
 - use
 - Between Pilots
 - Coordination on common components

Roles

- Providers
 - Vendors ?
 - Research/Development
 - Academic
 - Operator of the Pilot
 - Users
- Attitude > "legal" status
- Commitment to the role, commitment to the vision

The process

- Inventory of components
- Important criteria
 - “Maturity” of technology status and development efforts
 - Core/pillars:
 - Proven strong technical quality
 - Still need continued development, adaptation, productization, hardening
 - Clear identification of developments to be done
 - “exploratory”
 - Realistic. “Completeness”
 - Commitment

The cultural challenge

- The real challenge is in the programmer/user mindset

- Best practices
 - Parallel programming
 - System usage

To exascale ... and before





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**EXCELENCIA
SEVERO
OCHOA**

Thanks