



European
Processor
Initiative

MPSoC'22

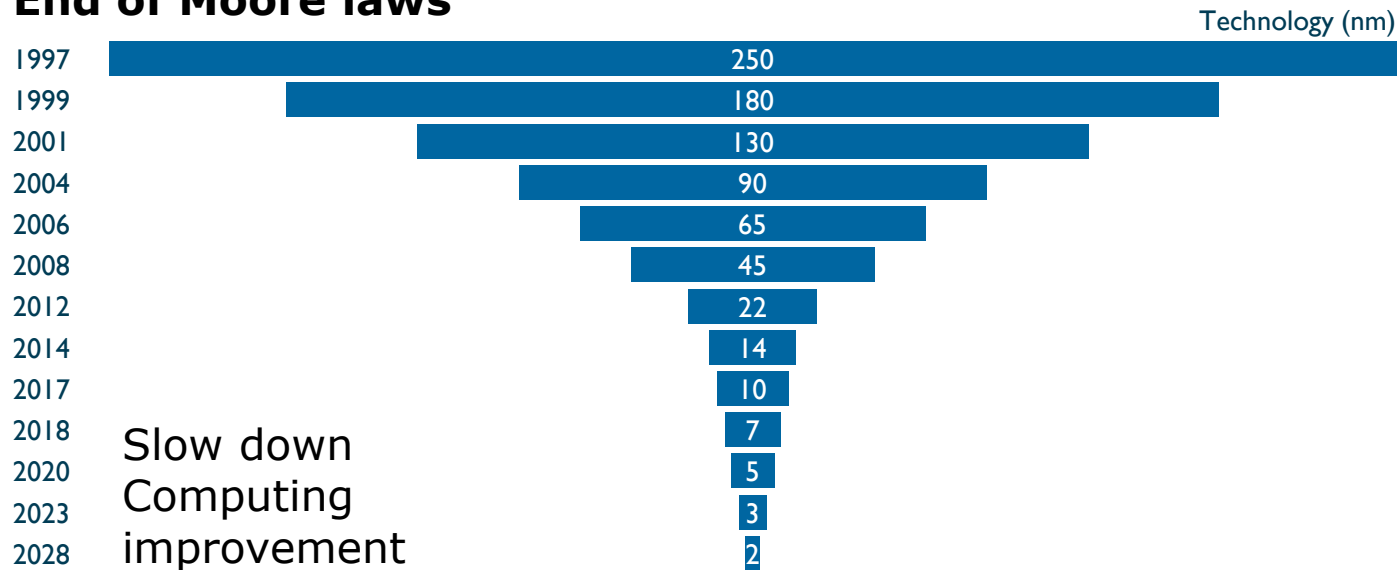
European Sovereignty for Cloud continuum and HPC



CLOUD CONTINUUM & SWARM COMPUTING

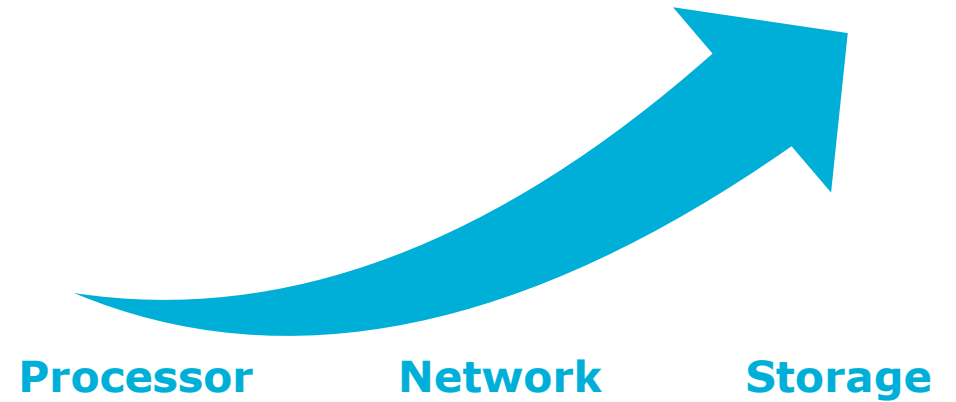
THE REALITY HAS TO FIT TECHNOLOGIES CAPABILITIES

End of Moore laws



Exponential energy cost to move data

1,000,000 times more energy to store than to compute

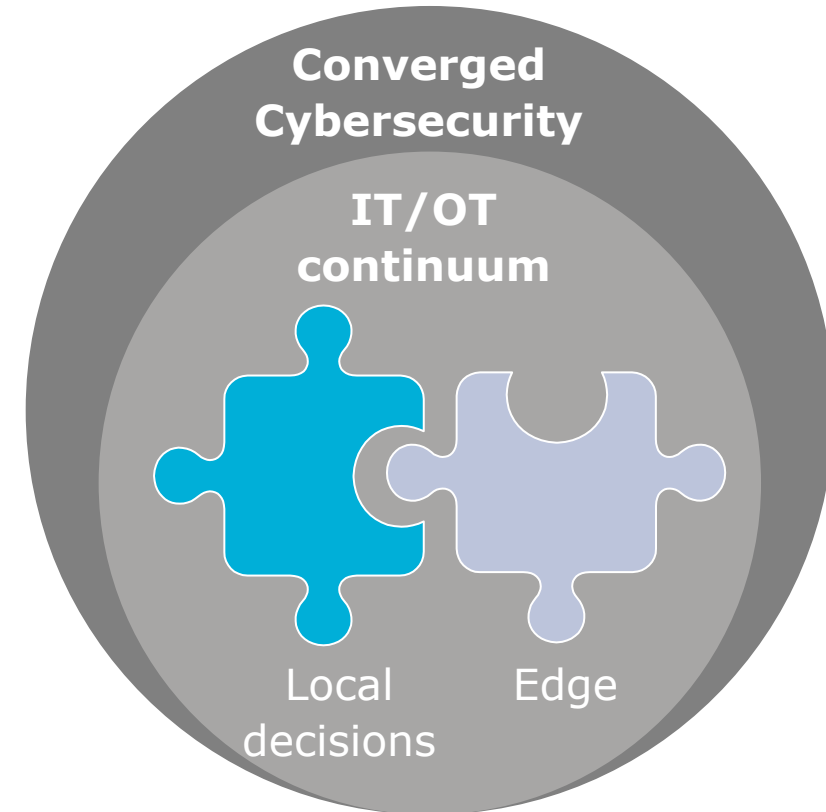
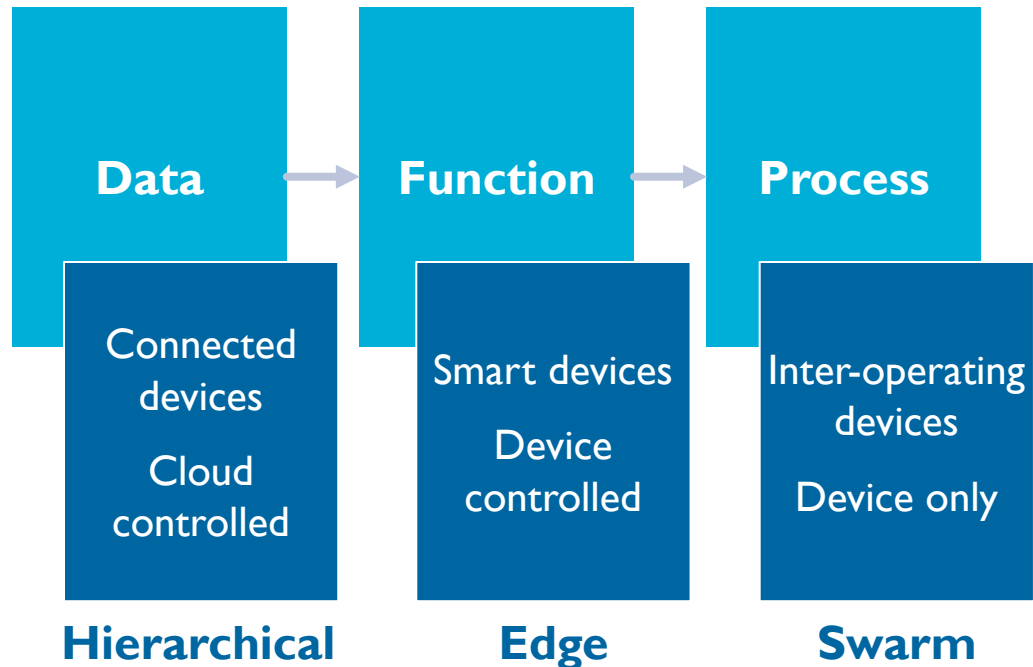


Capabilities to move and store data are diverging



THE RAISE OF COOPERATION AT THE EDGE

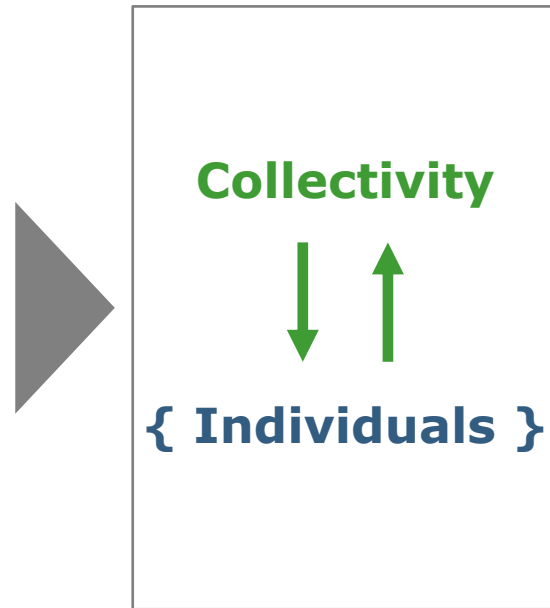
Vertical hierarchy to transversal cooperation



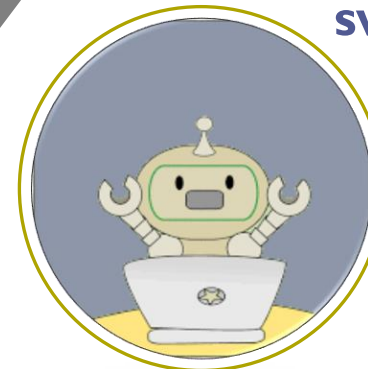
FROM ANIMAL SWARMS TO MAN MADE SWARMS



Animal swarms



Inspired by Nature



Customer Service Avatars

Industry 4.0



EUROPEAN PROCESSOR INITIATIVE

THE EU HPC TIMELINE

EPI 1

EPI 2




Mar 2017
EC launched the *EuroHPC declaration*

Nov 2018
EuroHPC JU

Sept 2020.
v. d. Leyen: State of the Union

- NextGenerationEU
- Europe's digital sovereignty
- investment of 8 billion euros in the next generation of supercomputers
- **European industry to develop our own next-generation microprocessor**

Jul 2021.
EU Council established new EuroHPC JU



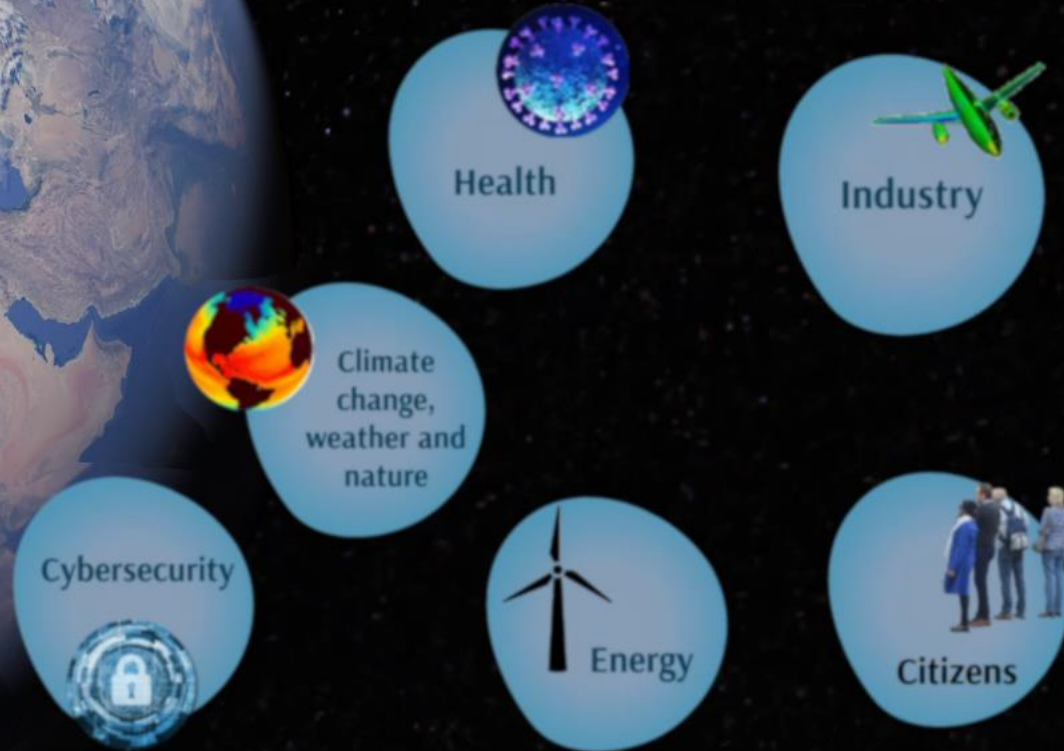
Sept 2021.
v. d. Leyen: State of the Union
new European Chips Act
T.Breton
supercomputing is at the forefront of our digital sovereignty, encompassing industrial, technological and scientific challenges



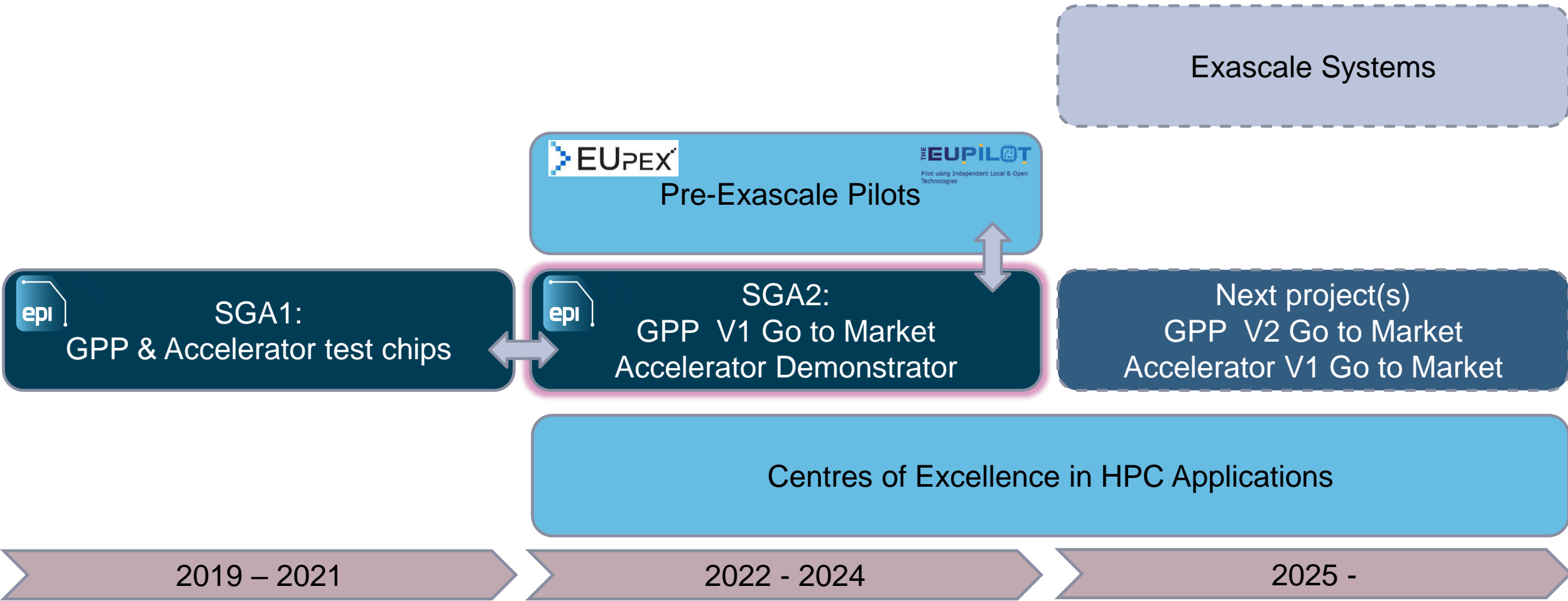
Serve EuroHPC objectives: Building a leading European HPC ecosystem

- ✓ Contribute to the development of European supercomputing technologies that can compete on the global HPC market.
- ✓ Key ingredient of the EU to equip itself with a world-class supercomputing infrastructure.

Help to address science, societal and business challenges



THE ECOSYSTEM ROAD TO EU EXASCALE

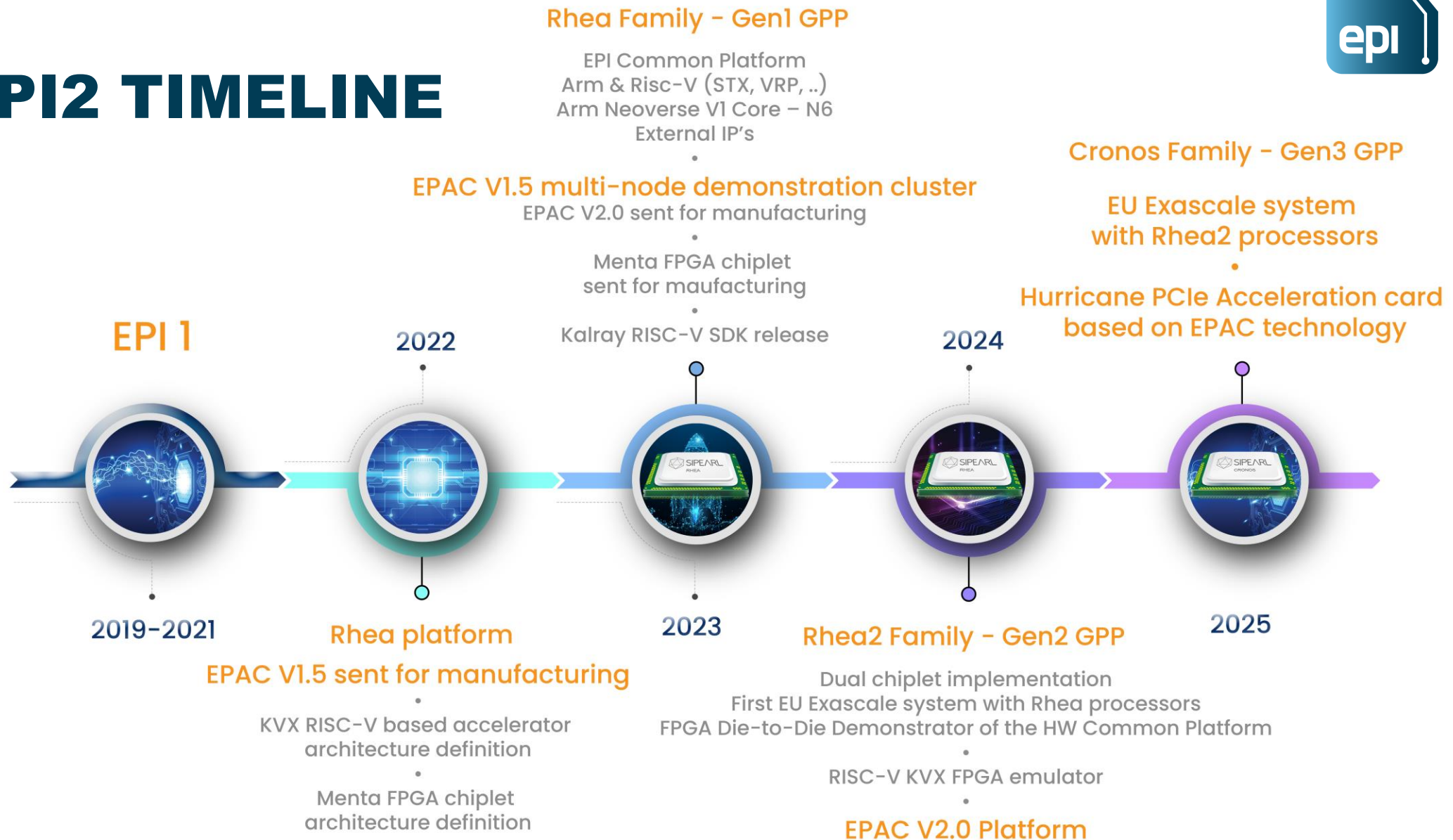


EPI PROJECT FACTSHEET

- Phase 1 successfully concluded (2019-2021)
- Currently in Phase 2 (2022-2024)
- Consortium of 30 European academic and industrial partners from 11 countries
- Funded by EuroHPC JU (50%) and co-funded by Croatia, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain, Sweden and Switzerland



EPI2 TIMELINE



Must have

Open/Standard HW interfaces (UCL, CXL, PCIe)

Must Have

Open/Standard SW interfaces (UCL, CXL, PCIe)

Must have

On-premise & in the Cloud

CPU's still matter. GPU's and ACC's don't fit all needs

CPU Core count is growing (fast).
What's the trade-off?

Rhea

General Purpose Processor family

- Neoverse V1 Arm cores
- Arm NoC
- Dedicated crypto IP
- EPI Common Platform

arm

xPU: (toward) a unified programming model

CPU: No time spent on optimization

Must Have
Global and unified memory

Must Have
Open/standard SW stacks

arm
HBM

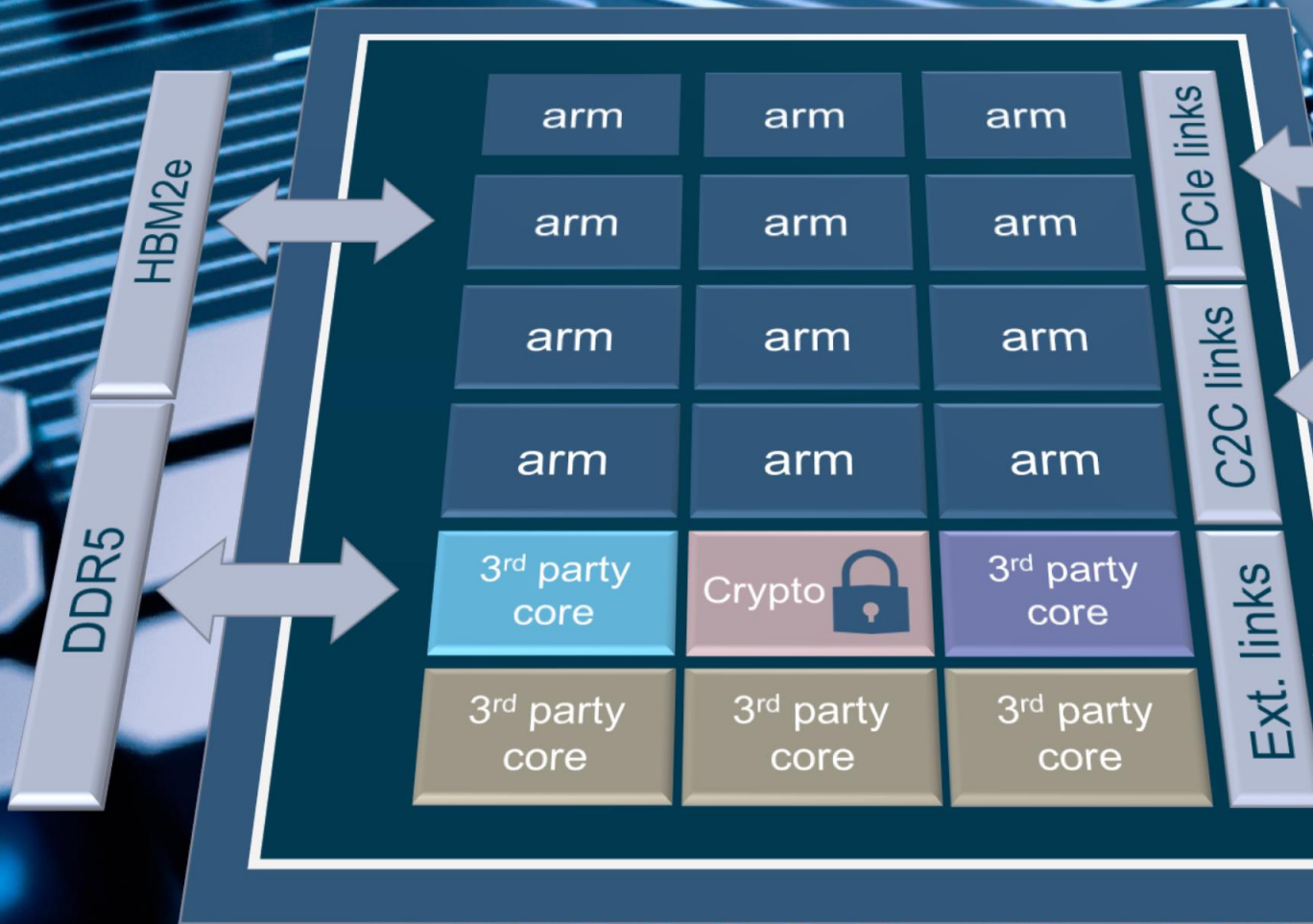
CPU bound → GPU's
MEM bound → CPU's

Bytes/Flops
Max mem BW → HBM

Slow memory only when required
→ DDR

Power efficiency (perf on real apps per watt) really matters
→ HPCG

Need new specific memory and energy profiling tools

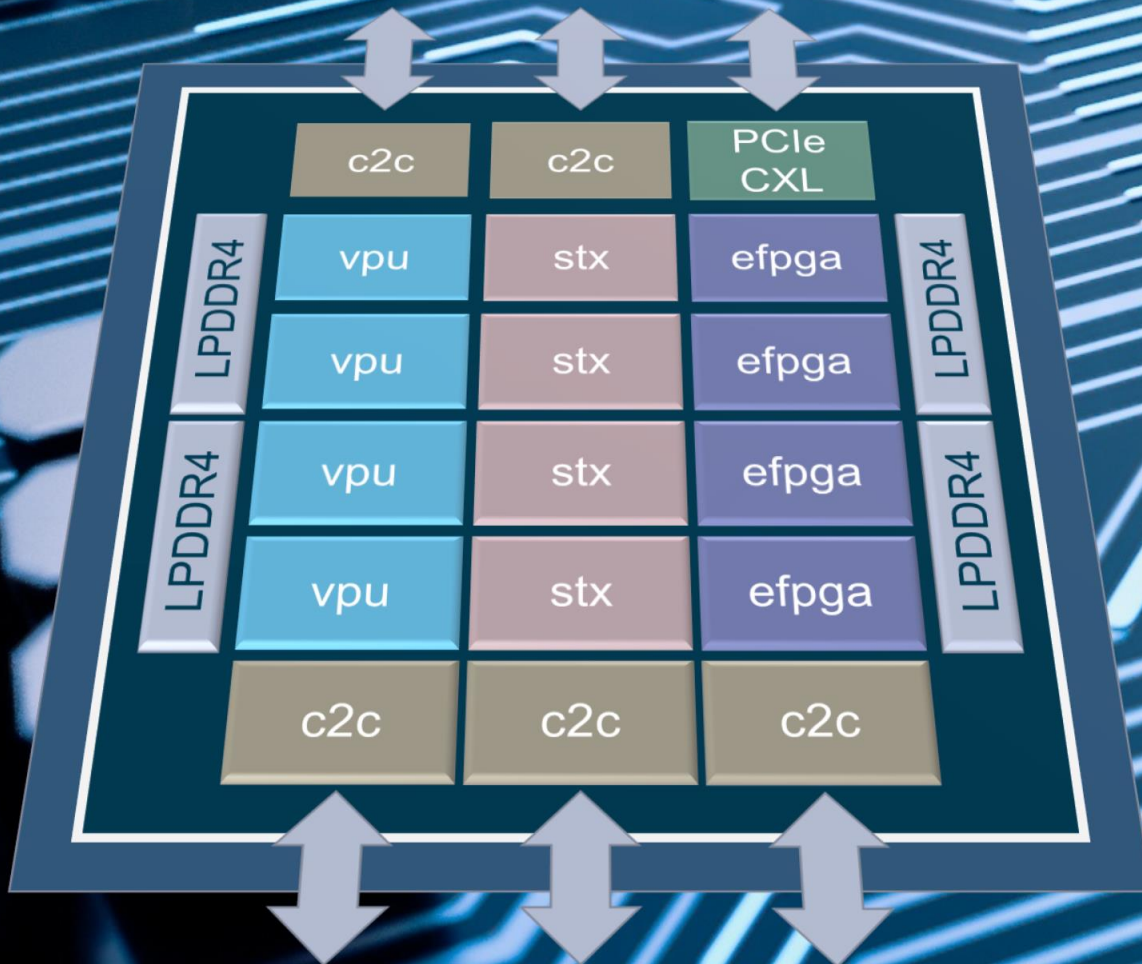


Core	<ul style="list-style-type: none"> - Arm architecture - Neoverse V1 cores - SVE 256 per core supporting 64/32/BF16 and Int8 - ArmVirtualization extensions
SoC	<ul style="list-style-type: none"> - Arm mesh fabric - Advanced RAS support including Arm RAS extensions - Link protection for NoC & high-speed IO - ECC support for selected memory
Cache	<ul style="list-style-type: none"> - Large L3 (Shared Level Cache) - RAS supported for all cache levels
Memory	<ul style="list-style-type: none"> - HBM2e - And DDR5 - ECC for memory and link protection for controllers
High Speed I/O	<ul style="list-style-type: none"> - PCIe, CCIX & CXL - Root and endpoint support
Other I/O	<ul style="list-style-type: none"> - USB, GPIO, SPI, I²C
Power Management	<ul style="list-style-type: none"> - Power management block to optimize perf/watt across use cases and workloads.
Security Block Support	<ul style="list-style-type: none"> - Secure boot and secure upgrade - Crypto - True random number generation - Made in Europe

EPAC

Accelerator Processor family Risc-V ISA based

- vpu - Vector Processing Unit
- stx - Stencil/Tensor accelerator





Atos

BullSequana XH

- the first generation of EPI GPP validated
- integrated into EU state of the art data centers
- exposed to customers



- Help EU digital sovereignty
- Seed an EU high-end processor industry (Arm & Risc-V based)
- Contribution to a Risc-V open ecosystem
- Address HPC and Big-Data markets.
- One of the foundations of the new EU Chips Act







European Processor Initiative is a cornerstone of EU digital agenda and EU digital sovereignty

THANK YOU



European Processor Initiative



-  www.european-processor-initiative.eu
-  [@EuProcessor](https://twitter.com/EuProcessor)
-  [European Processor Initiative](https://www.linkedin.com/company/european-processor-initiative/)
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