EUROPEAN PROCESSOR INITIATIVE:
The Industrial Cornerstone of EuroHPC for Exascale Era

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is all about this !!

THE STRATEGIC INTERPLAY

EPI: CORNERSTONE OF EU EXASCALE HPC STRATEGY

- H2020 : Framework Partnership Agreement in European low-power microprocessor technologies

- March 2017, Rome: EC launched the *EuroHPC declaration*

- November 2018, EuroHPC Joint Undertaking, a 1 billion Euro joint initiative between the EU and European countries to develop a World Class Supercomputing Ecosystem in Europe
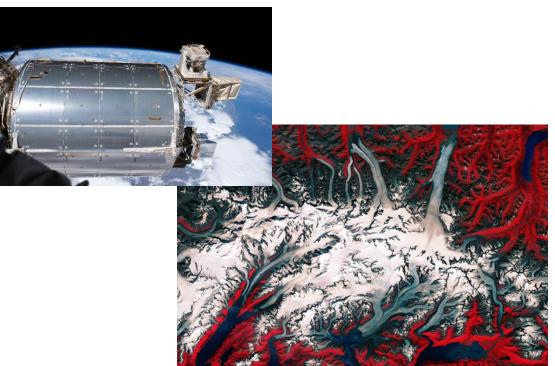
- March 2020: 29 member countries

DRIVERS OF THE EPI PROPOSAL

Societal challenges

- Climate change

- Cybersecurity

- Increasing energy needs

- Intensifying global competition

- Aging population

- Sovereignty (data, economical, embargo)

Image: https://www.compbiomed.eu/services/software-hub/

DRIVERS OF THE EPI PROPOSAL

- Connected mobility & *Autonomous Driving computing needs beyond 2023*

- Develop customized processors able to meet the performance needed for autonomous vehicles that would offer:

  - implementation of vehicle perception tasks in real-time in a fail-operational manner

  - increased computing performance, fail-operational, functional safety, cyber-security and real-time behaviour (RT)

  - compute resources with the same characteristics as their "big brothers" in exascale class supercomputers

- Sovereignty (data, economical, embargo)

- EU car manufacturing supremacy

MERGE OF HPC AND AI

8

**Cambrian explosion
Achieving performance through specialization**

Courtesy Steve Scott
Cray CTO

TOP10 OVER THE LAST 10 YEARS

	2009 – Nov.	2014 – Nov.	2019 – Nov.	(Post) Exascale
CPU only	9	5	2	0
CPU + ACC.	1	5	8	10

PARTNERS

MISSION

- European independence in High Performance Computing Processor Technologies
- EU Exascale machine based on EU processor by 2023
- Based on solid, long-term economic model, go beyond the HPC market
- Address the needs of European Industry (Car manufacturing market)
- End-to-end security

VISION

- High Performance Computing needs for Exascale machines beyond 2022
- Connected mobility and Autonomous Driving computing needs beyond 2023
- Low power CPU needs for Servers and Cloud
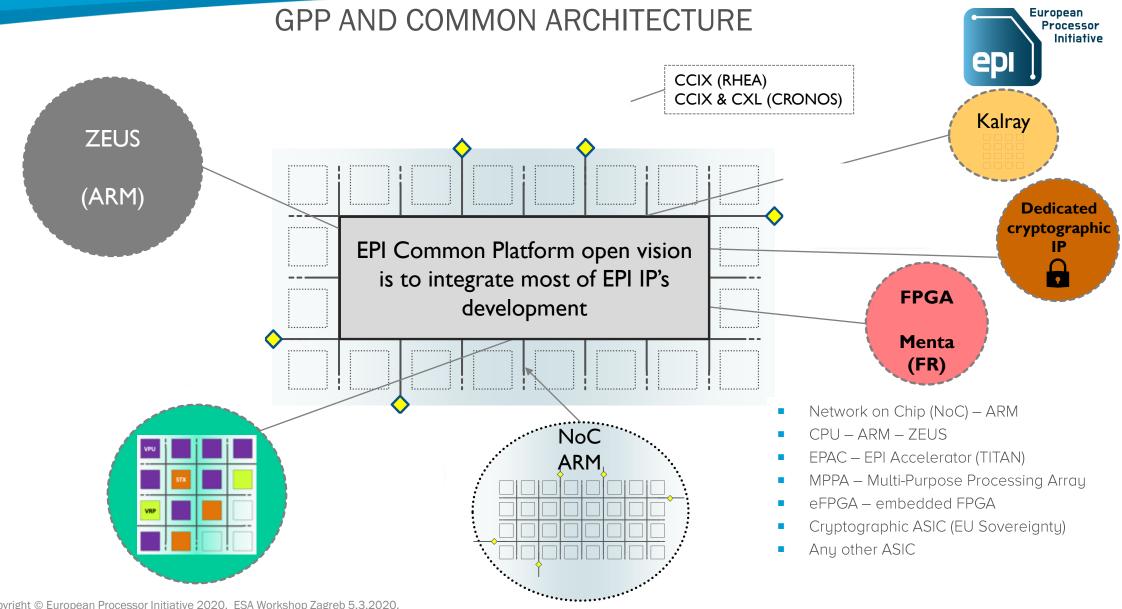- Other markets under exploration (Server, Cloud)

IMPACT

- Strengthening the competitiveness and leadership of European industry and science
- European microprocessor technology with drastically better performance/power ratios
- Tackling important segments of broader and/or emerging HPC and Big-Data markets

THE TECHNOLOGY:
COMMON PLATFORM

GPP AND COMMON ARCHITECTURE

CCIX (RHEA)
CCIX & CXL (CRONOS)

ZEUS

(ARM)

Kalray

Dedicated cryptographic IP

EPI Common Platform open vision is to integrate most of EPI IP's development

FPGA

Menta
(FR)

VPU · STX · VRP

NoC
ARM

- Network on Chip (NoC) – ARM
- CPU – ARM – ZEUS
- EPAC – EPI Accelerator (TITAN)
- MPPA – Multi-Purpose Processing Array
- eFPGA – embedded FPGA
- Cryptographic ASIC (EU Sovereignty)
- Any other ASIC
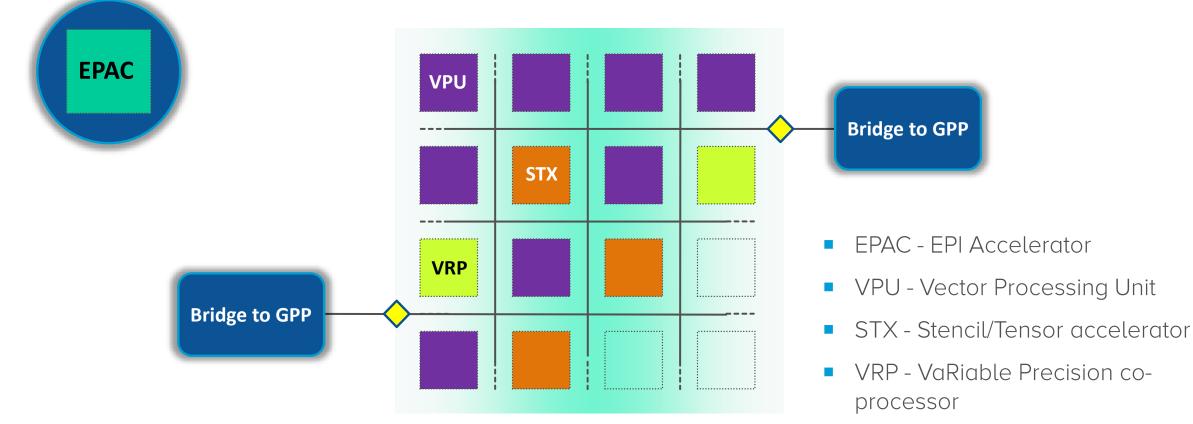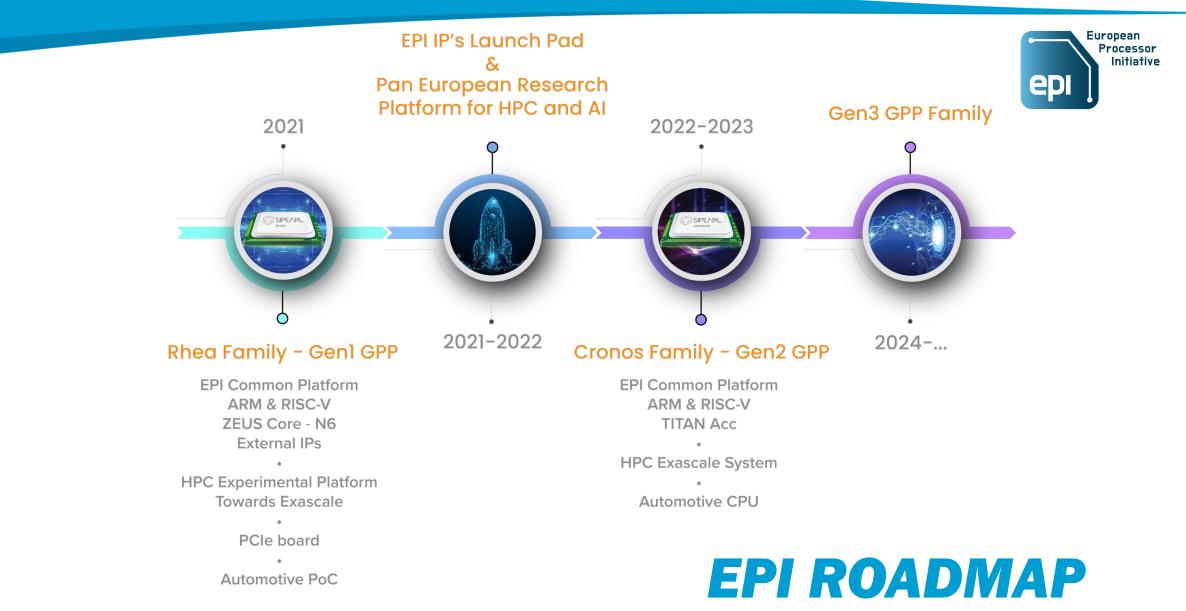
THE TECHNOLOGY: ACCELERATORS

EPAC – RISC-V ACCELERATOR FOUNDATIONS

EPAC

Bridge to GPP

Bridge to GPP

VPU

STX

VRP

- EPAC - EPI Accelerator
- VPU - Vector Processing Unit
- STX - Stencil/Tensor accelerator
- VRP - VaRiable Precision co-processor

EPI IP's Launch Pad & Pan European Research Platform for HPC and AI

Gen3 GPP Family

2021

2022–2023

Rhea Family – Gen1 GPP

2021–2022

Cronos Family – Gen2 GPP

2024–...

EPI Common Platform
ARM & RISC-V
ZEUS Core - N6
External IPs
•
HPC Experimental Platform
Towards Exascale
•
PCIe board
•
Automotive PoC

EPI Common Platform
ARM & RISC-V
TITAN Acc
•
HPC Exascale System
•
Automotive CPU

EPI ROADMAP

European Processor Initiative

TO CONCLUDE

- Use of HPC and AI is cornerstone of successful address of societal and global challenges

- Space related science, technologies and applications require processing of vast amount of data and there is a large need for efficient HPC

- HPC provides needed competitiveness for EU industry

- The European Processor Initiative aims to provide an EU HPC processor and system/application design that could further enhance future ESA activities

www.european-processor-initiative.eu

THANK YOU

1st EPI Forum
March, 16-17th, 2020

Q&A