



# SIPEARL

## Developing Rhea, the SiPearl European High-Performance Processor

Linaro Connect, Sept 2020



# SIPEARL CORPORATE OVERVIEW

## The European Server Processor Solution



- HQ: Maisons-Laffitte (Paris), France
- Design centers: Maisons-Laffitte, FR & Duisburg (Düsseldorf), GE
- CEO and Founder, Philippe Notton
- Seed Money: 7.4 M euros via Horizon 2020
- Headcount: 22 employees from ST, Intel, Atos, Marvell, Mstar-Mediatek
- Architecture based on Arm Neoverse (Zeus cores)
- Cornerstone of EU Pilot machines, and soon Exascale machines

» *Founded in 2019 as the production hand of the European Processor Initiative (EPI), SiPearl holds a central position in the EPI for Exascale Processor Development and EuroHPC Pilot Applications.*



# SIPEARL VALUE PROPOSITION

## High Performance Arm Server Processor

Arm Neoverse Zeus cores,, NOC, acceleration...

## Security/Safety/Data Protection

## Flexible Common Platform

Processing + Acceleration

## EU Sovereignty

Founded through EU commission, 27 partners in EPI

» P3S: Performance, Security, Safety, Sovereignty



# SIPEARL TARGET MARKETS

## High Performance Computing

SiPearl core business. EuroHPC ecosystem

## Centralized Cloud

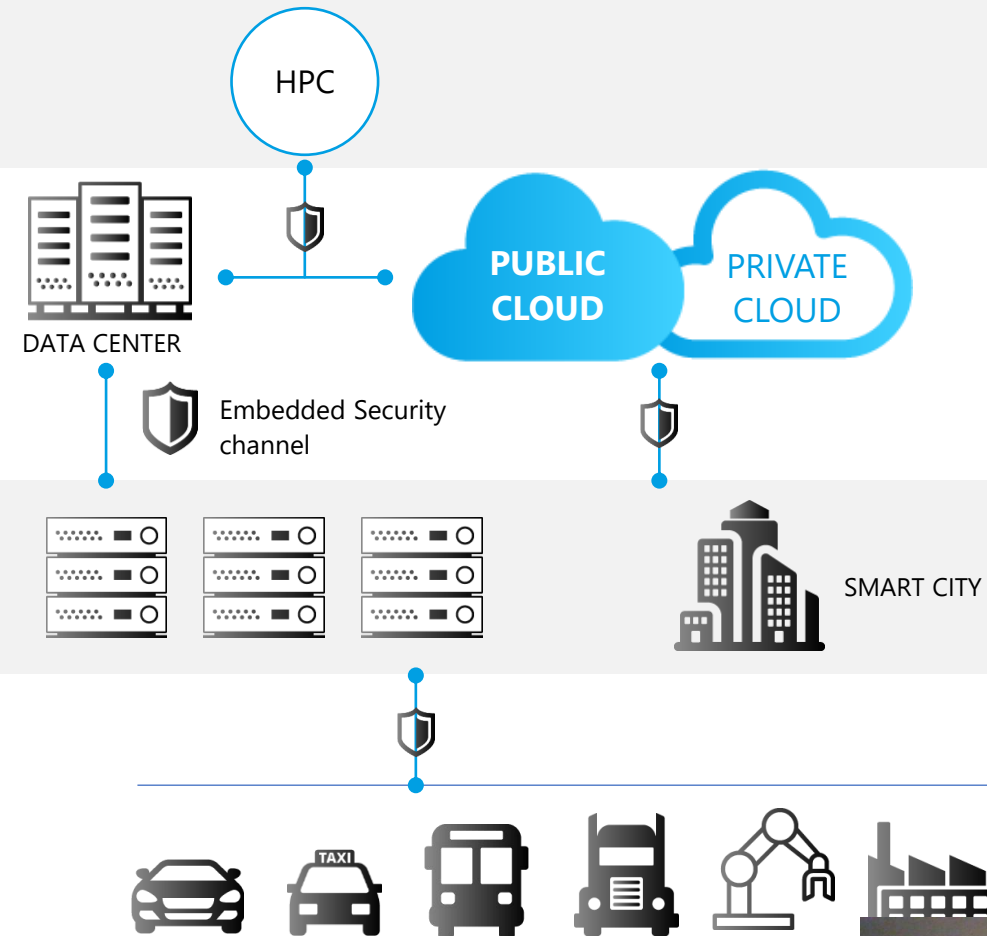
DataCenters, Private and public cloud

## Edge Computing & Infrastructure

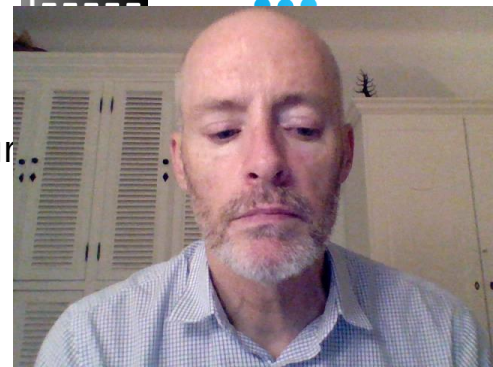
Industrial computing from Shelters to Small Datacenters

## Automotive / Industrial Edge

Whole range of embedded computing devices. Industrial , automotive, robotics



SiPearl will cover the full range of advanced computing from high-end HPC to edge devices and will secure network with Secure Room in Secure Chip (SRSC) technology for End-2-End security



# ARM SERVERS WW

Most widely used ISA on the planet with over 200B processors sold.

Multiple Processor companies,  
HPC OEM, 2 large CSPs,  
Sandia "Astra", Stony Brook  
University

CPU manufacturer,  
HPC OEM,  
HPC systems at CEA,  
UK, MontBlanc, EPI



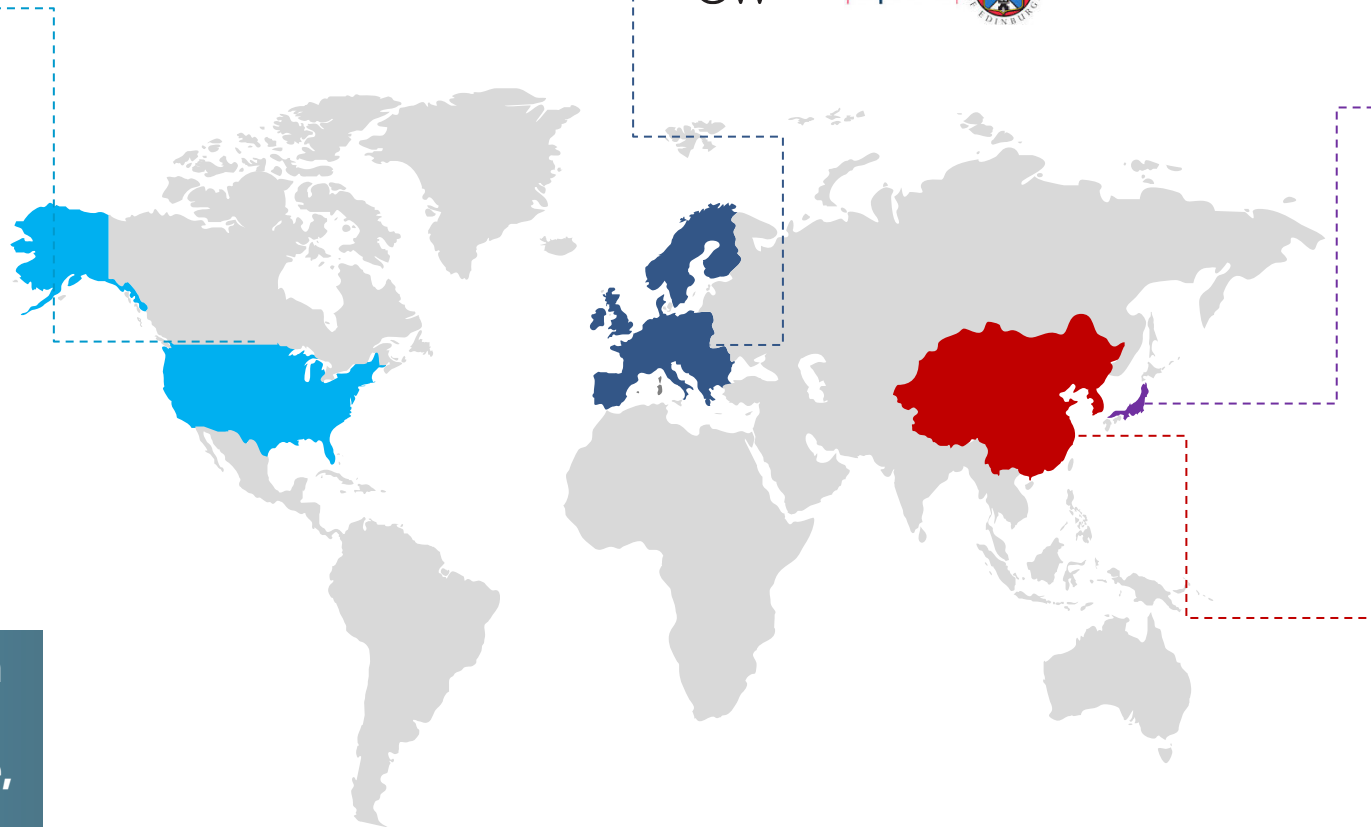
CPU & server  
manufacturer,  
"Fugaku" system



CPU & server  
manufacturer



Fully fleshed ecosystem  
is growing organically  
across HPC, Cloud; Edge,  
IOT, Automotive...





FROM **IP** TO **PRODUCTS**  
FROM **EPI** TO **SIPEARL**

## European Processor Initiative

- High Performance General Purpose Processor for HPC
- High-performance RISC-V based accelerator
- Computing platform for edge and autonomous cars
- Will also target the AI, Big Data and other markets in order to be economically sustainable

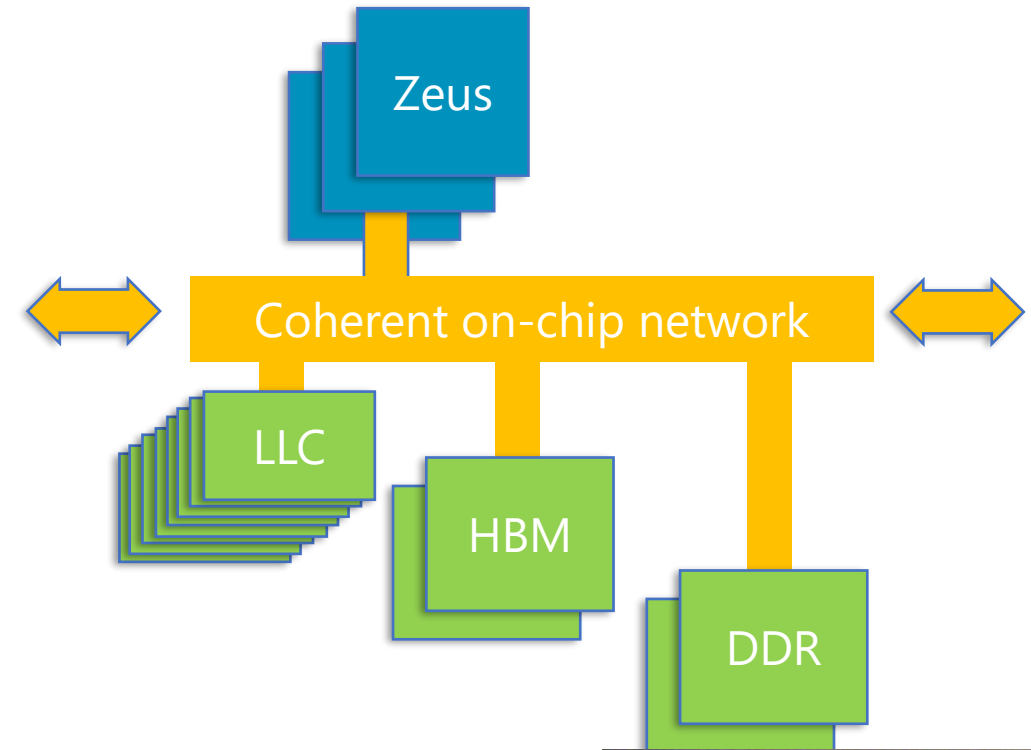
### EPI Objective

Develop a complete EU designed high-end microprocessor, addressing  
Supercomputing and edge-HPC segments



# SIPEARL RHEA HYPERSCALE CONFIGURATION

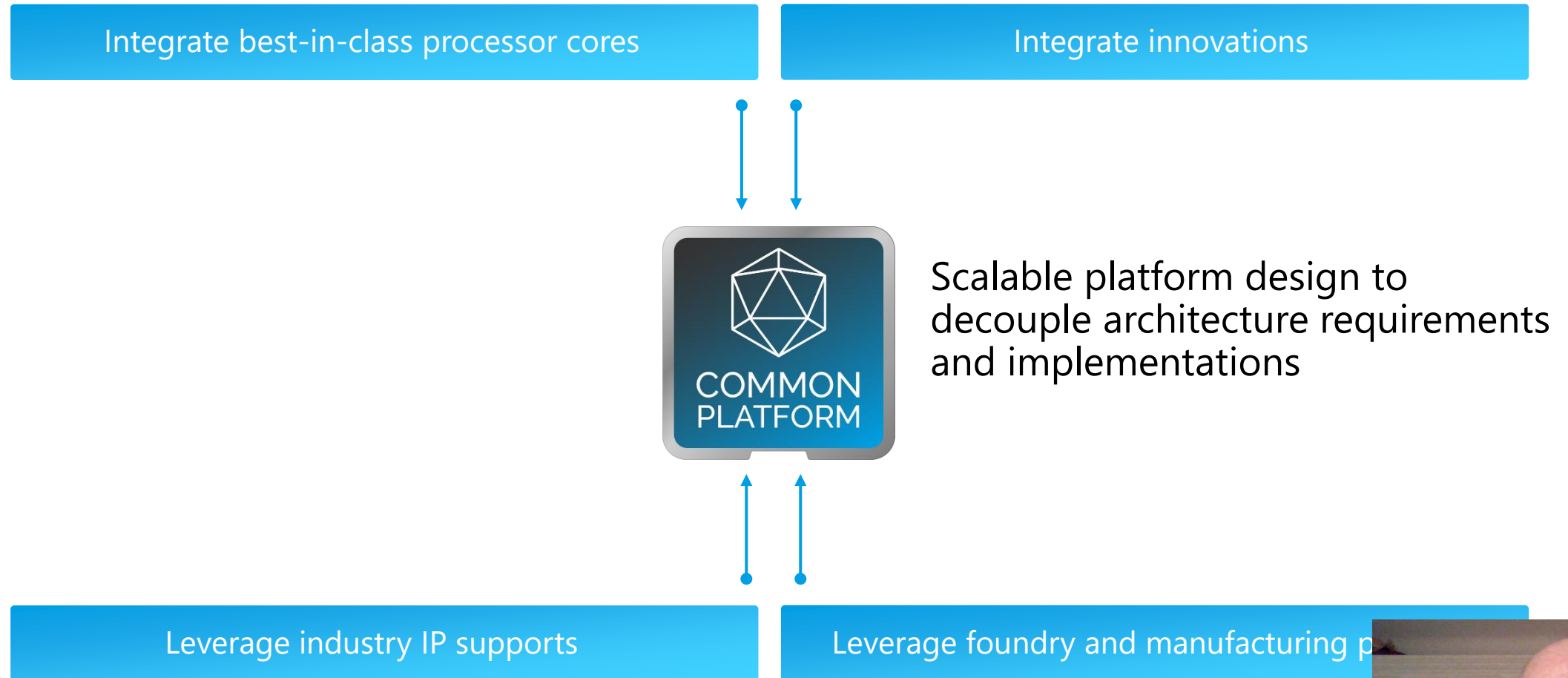
- Zeus CPU core as compute unit building blocks
  - Performance computing and intelligent memory subsystem
  - General-purpose processor with rich software ecosystem(s)
- Memory-coherent on-chip network
  - Topology-aware design for scalability and flexibility
  - Distributed last-level cache to memories with reconfigurable NUMA domains
  - Isolation between computing units
  - Coherent SMP between chip domains
- HBM and DDR for both bandwidth and capacity
- Latest PCIe/CCIX links to interconnect and accelerators
- Low-power - low latency links for die-to-die or chip-to-chip connections



LLC : last level cache

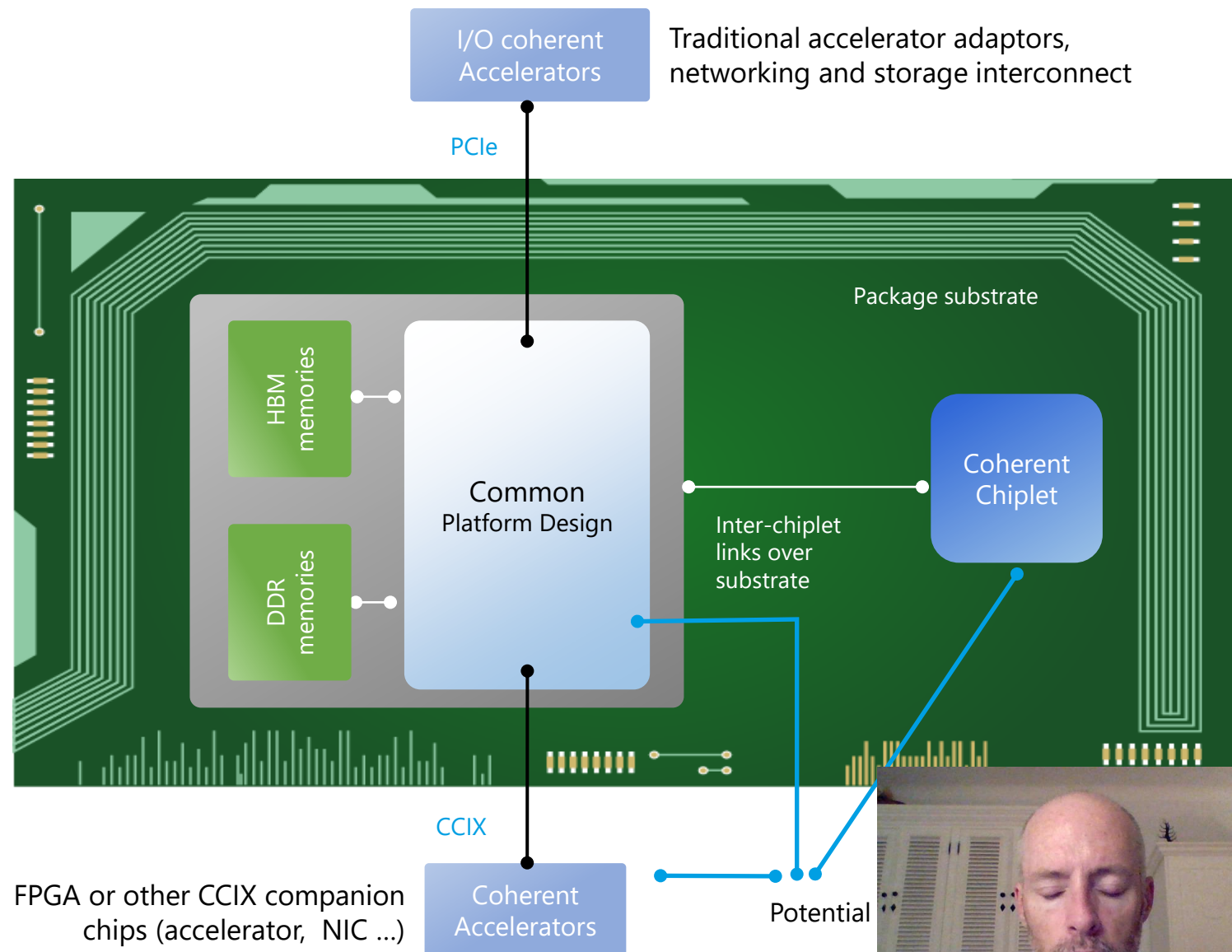


# SIPEARL COMMON PLATFORM

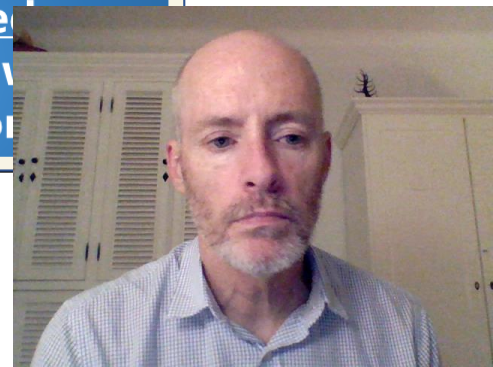
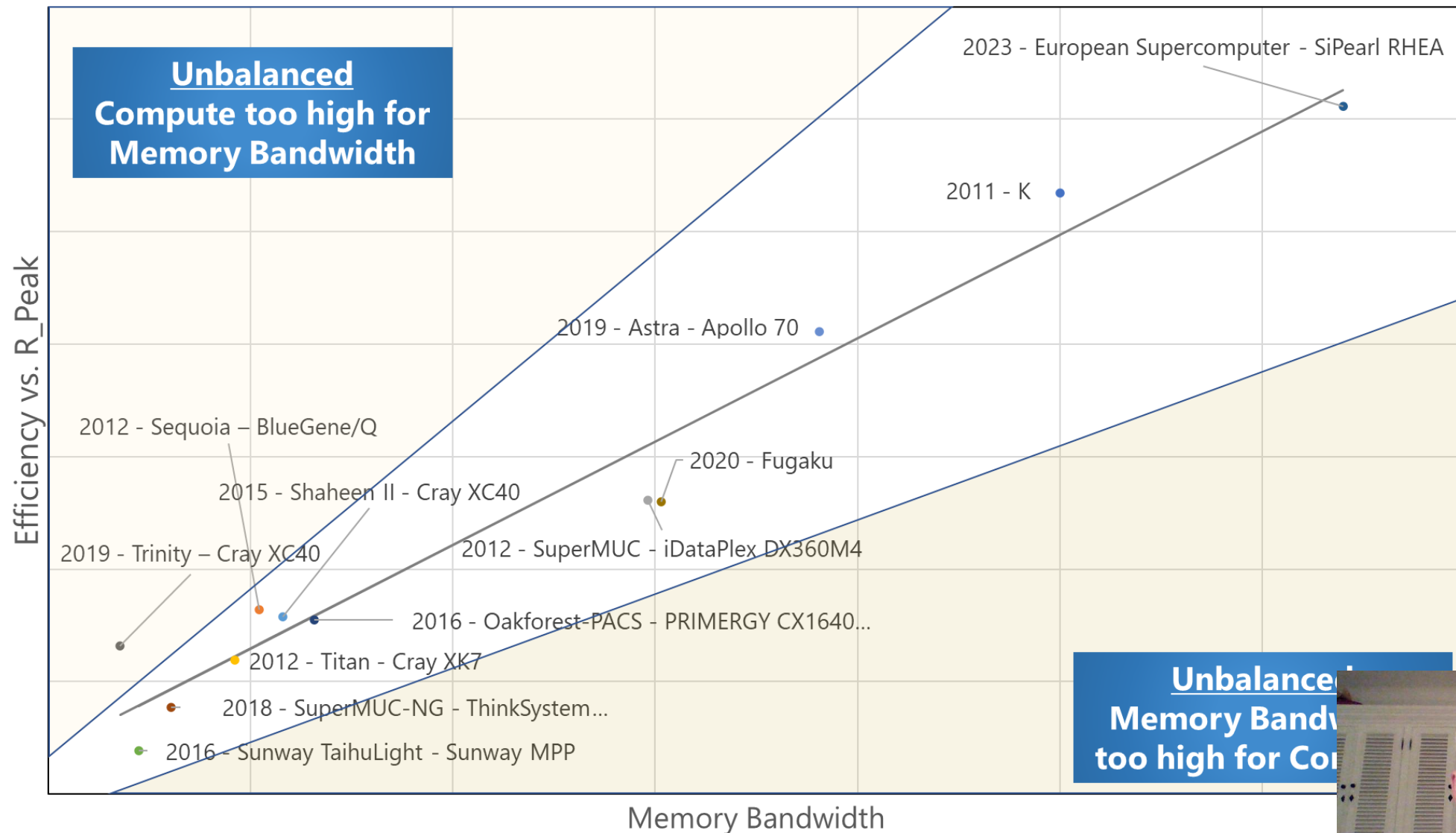


# SIPEARL AND THE EPI COMMON PLATFORM
























































- Allow integration of customized functions in chip, in package, on board, or over PCIe or network link
- EPI Accelerators to work in I/O coherent mode and share the same memory view;
- Targeting high Byte/FLOP ratio
- HBM, DDR and PCIe
- Coherent NoC with system level cache to keep data local
- D2D interface open to EPI (and beyond)



# RHEA DESIGN GOAL: BALANCED GENERAL PURPOSE PROCESSOR

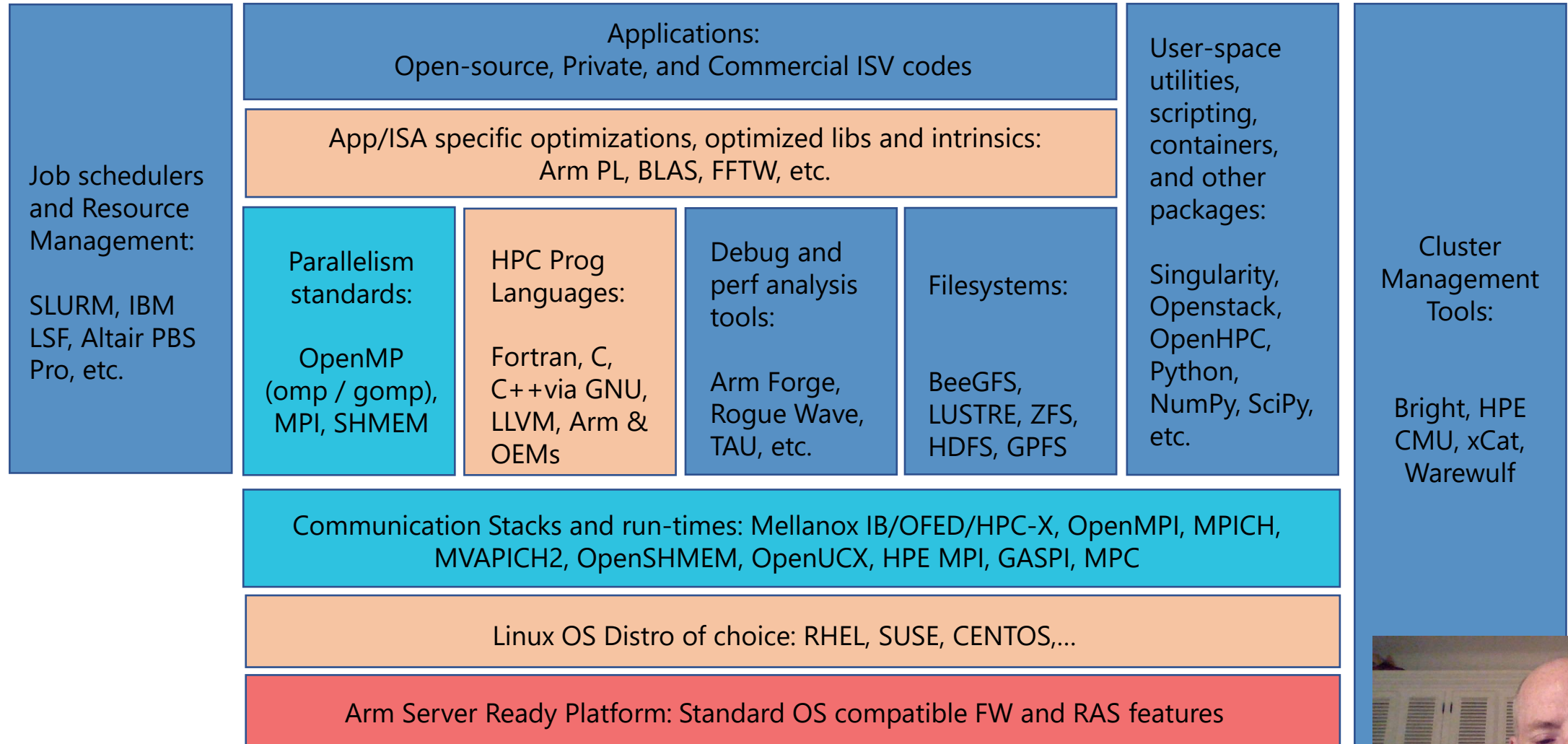


# ECOSYSTEM

	HPC	EDGE	CLOUD
Applications	 SchedMD  OpenFOAM  NEMO  WRF  Unified Model  NAMD  LAMMPS	 Apache Spark  Quantum Espresso  M  ceph	 KEYDB  MySQL  MariaDB  NGINX+  mongoDB
Languages & Libraries	 LLVM  GCC	 OpenJDK  GOLANG  Microsoft .NET	 python  node  NVIDIA
Middleware	 Lustre  PAPI  OPEN MPI	 openHPC  BeeGFS  docker  openstack	 KVM  Linaro  RANCHER  vmware  arm
OS & FW	 Red Hat Enterprise Linux 8  SUSE  CentOS	 fedora  FreeBSD  NetBSD	 THE LINUX FOUNDATION  debian  ubuntu  ORACLE
Networking & System	 OPNFV  NVIDIA  Mellanox	 Western Digital  SAMSUNG	 AKAMAI EDGE STACK  SK hynix  DPDK  SEAGATE



# HPC SW STACK





# We accelerate accelerators

**SIPPEARL SAS**

RCS Versailles Siren 851 434 365

[contact@sipearl.com](mailto:contact@sipearl.com)

[www.sipearl.com](http://www.sipearl.com)

Lan: +33 1 80 83 54 90

R&D in Paris / Sophia Antipolis / Duisburg (DE)

