



European Processor Initiative

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SIA CEA 5.0, Dec 5th 2018

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1. Genesis
2. Setup
3. Benefits of scalability
3. Roadmap
4. Challenges
5. Conclusions



2023

Exascale Supercomputers

1, 000, 000, 000, 000, 000, 000, Operations per sec.

10-20MW

Hundreds of Exa-Byte Data

From Supercomputers to Autonomous cars

(source = Gartner, July 2018)

	Class		
Compute, Data & Communication	3	4	5
Processing Capacity (TFLOPS)	40	80	120
DRAM (GB)	1	10	20
Non Volatile Storage GB)	100	300	500
data link interface (Gbps)	0,1	1	1

Only 10 Class 5 Vehicles in 2024 are equivalent to a current Top500 Supercomputer

compute power consumption (watts to reach processing power capacity)	3	4	5
35 Gflops/w (GPP exascale class proc >2023)	1 143 W	2 286 W	3 429 W
<i>What if ... 70 Gflops/w</i>	<i>571 W</i>	<i>1 143 W</i>	<i>1 714 W</i>
<i>What if ... 140 Gflops/w</i>	<i>286 W</i>	<i>571 W</i>	<i>857 W</i>
<i>What if ... 280 Gflops/w</i>	<i>143 W</i>	<i>286 W</i>	<i>429 W</i>

General Purpose (very) high-end processors in 2024

Accelerator high-end processors in 2024

Accelerator (Most) high-end processors in 2024

Likely unrealistic in 2024

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Amazon exec and Super Micro CEO call retraction of spy chip at

[Tim

The US Cloud Act v The EU's GDPR - Data Privacy & Security

Group of researchers showed how a Tesla car can be hacked and stolen in seconds using \$600 worth of equipment



Car hacking remains a very real threat as autos become ever more loaded with tech

NSA May Have Backdoors Built Into Intel And AMD Processors



A jet sale to Egypt is being blocked by a US regulation, and France is over it



HPC for

Citizens



Addressing major societal challenges of modern society (e.g. health, more efficient public services, cybersecurity, safer and greener transport)

Industry



- + innovative
- + efficient (resources and time)
- costly

Researchers and scientists



Underpinning innovation in almost all scientific disciplines
Deeper insights into unexplored systems of high complexity



Currently, **EU industry provides about 5% of supercomputing resources worldwide, but consumes one third of them.**



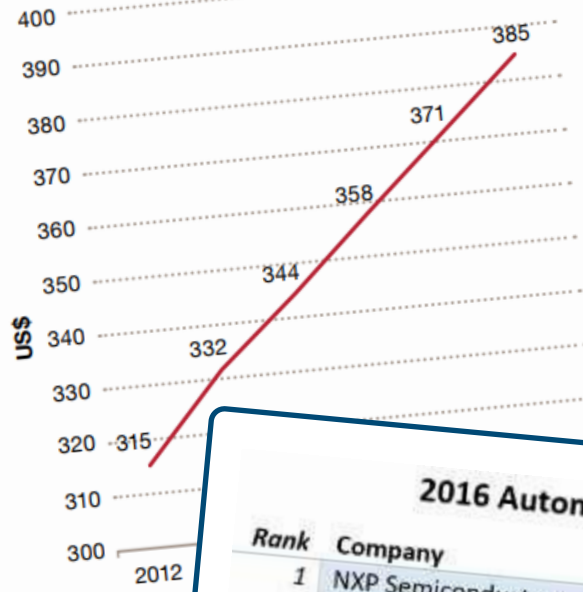
Compared to its competitors in the USA, China and Japan, **Europe is underinvesting in supercomputing, with an annual funding gap of €500-750 million.**²

But...



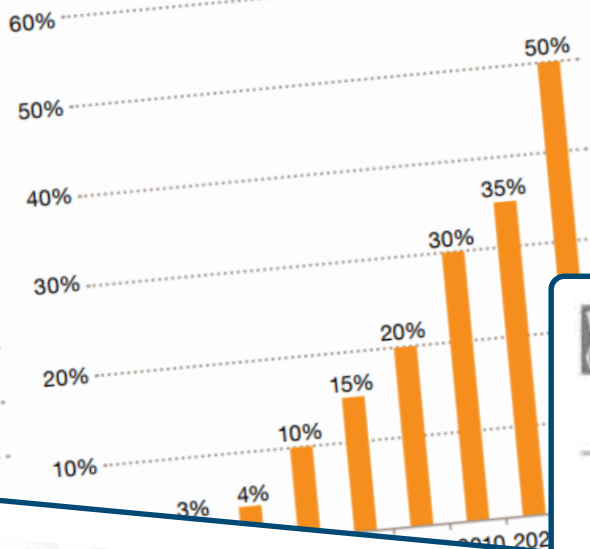
In June 2012, the EU had 4 machines in the global top 10 supercomputers. Today **the fastest system in the EU ranks 13 on the global list** – about 10 times slower than the world's fastest machine.¹

Forecast average semiconductor content per light vehicle



Source: PwC

Automotive electronics cost (% of total car cost)



2016 Automotive IC Vendor Market Share

Rank	Company	2016 Market Share	2015 Market Share
1	NXP Semiconductors	14%	13.6%
2	Infineon Technologies	10.7%	9.9%
3	Renesas Electronics	9.6%	9.3%
4	STMicroelectronics	7.6%	7.3%
5	Texas Instruments	6.9%	6.4%
6	Robert Bosch	5.9%	5.0%
7	ON Semiconductor	4.4%	4.0%
8	Microchip Technology [including Atmel]	2.9%	3.0%
9	Toshiba	2.6%	2.6%
10	Rohm Semiconductor	2.5%	2.3%
Top 10 Total		67.1%	63.4%
Others		32.9%	36.6%

Source: Semicast Research

Worldwide Ranking of the Top-10 Suppliers of Semiconductors in 2017
(Ranking by Revenue in Millions of U.S. Dollars)

2016 Rank	2017 Rank	Company Name	2016 Revenue(\$)	2017 Revenue(\$)	Revenue Percent Change	Revenue Percent of Total	Revenue Cumulative Percent
2	1	Samsung Electronics	40,389	62,031	53.6%	14.5%	14.5%
1	2	Intel	54,980	61,406	11.7%	14.3%	28.8%
5	3	SK Hynix	14,699	26,638	81.2%	6.2%	35.0%
	4	Micron Technology	12,710	22,843	79.7%	5.3%	40.3%
	5	Broadcom Limited	14,979	17,375	16.0%	4.0%	44.3%
	6	Qualcomm	15,405	16,872	9.5%	3.9%	48.3%
	7	Texas Instruments	12,836	14,525	13.2%	3.4%	51.7%
	8	Toshiba	9,904	11,864	19.8%	2.8%	54.4%
	9	NXP	9,306	8,864	-4.7%	2.1%	56.5%
	10	nVidia	6,030	8,578	42.3%	2.0%	58.5%
Top 10 Companies			191,238	250,996	31.2%	58.5%	
All Others			161,356	178,112	10.4%	41.5%	
Total Semiconductor			352,594	429,108	21.7%	100.0%	

S Market Q1 2018 Competitive Landscaping Tool

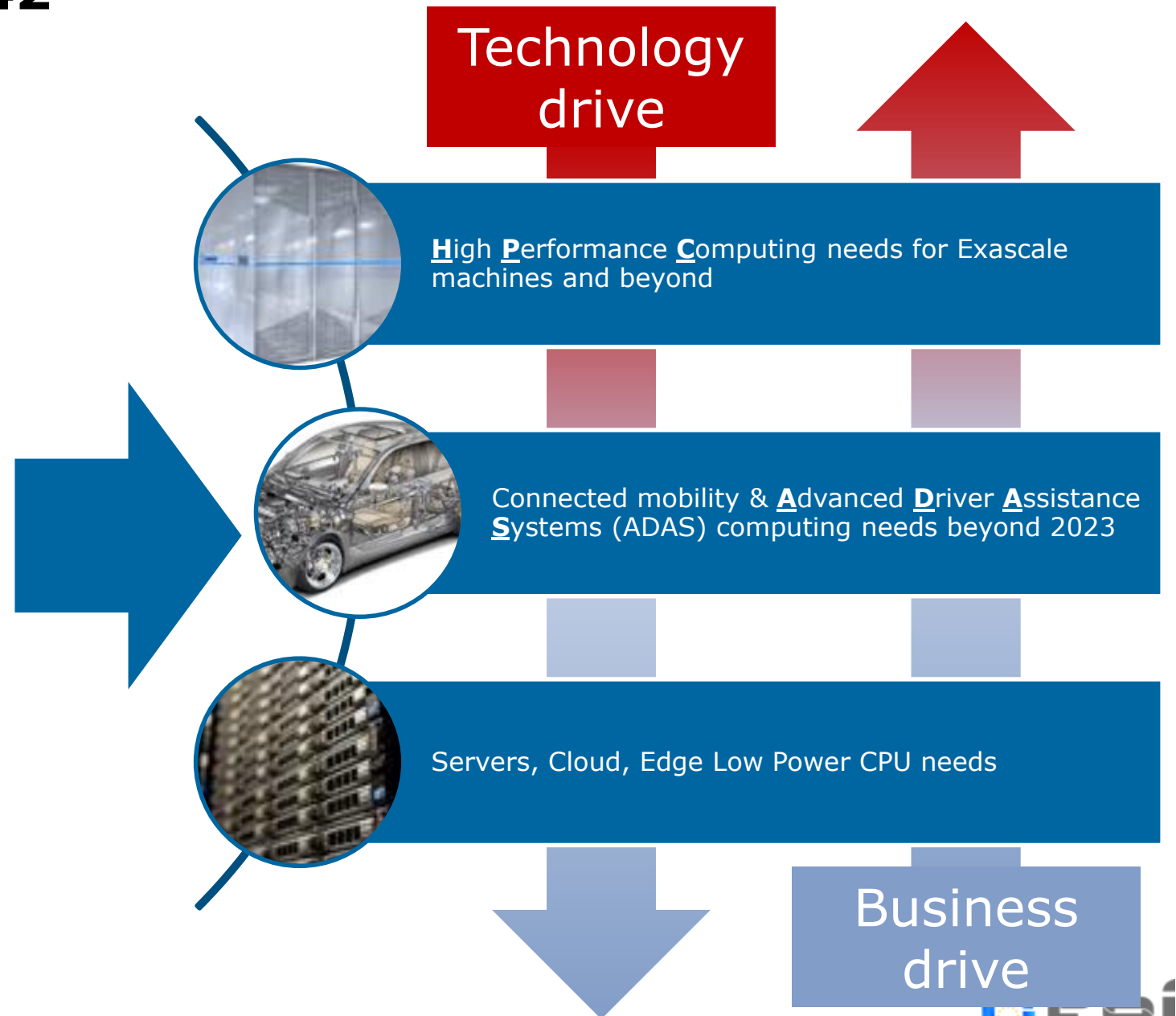
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EC expectations from ICT-42 & EPI value proposal

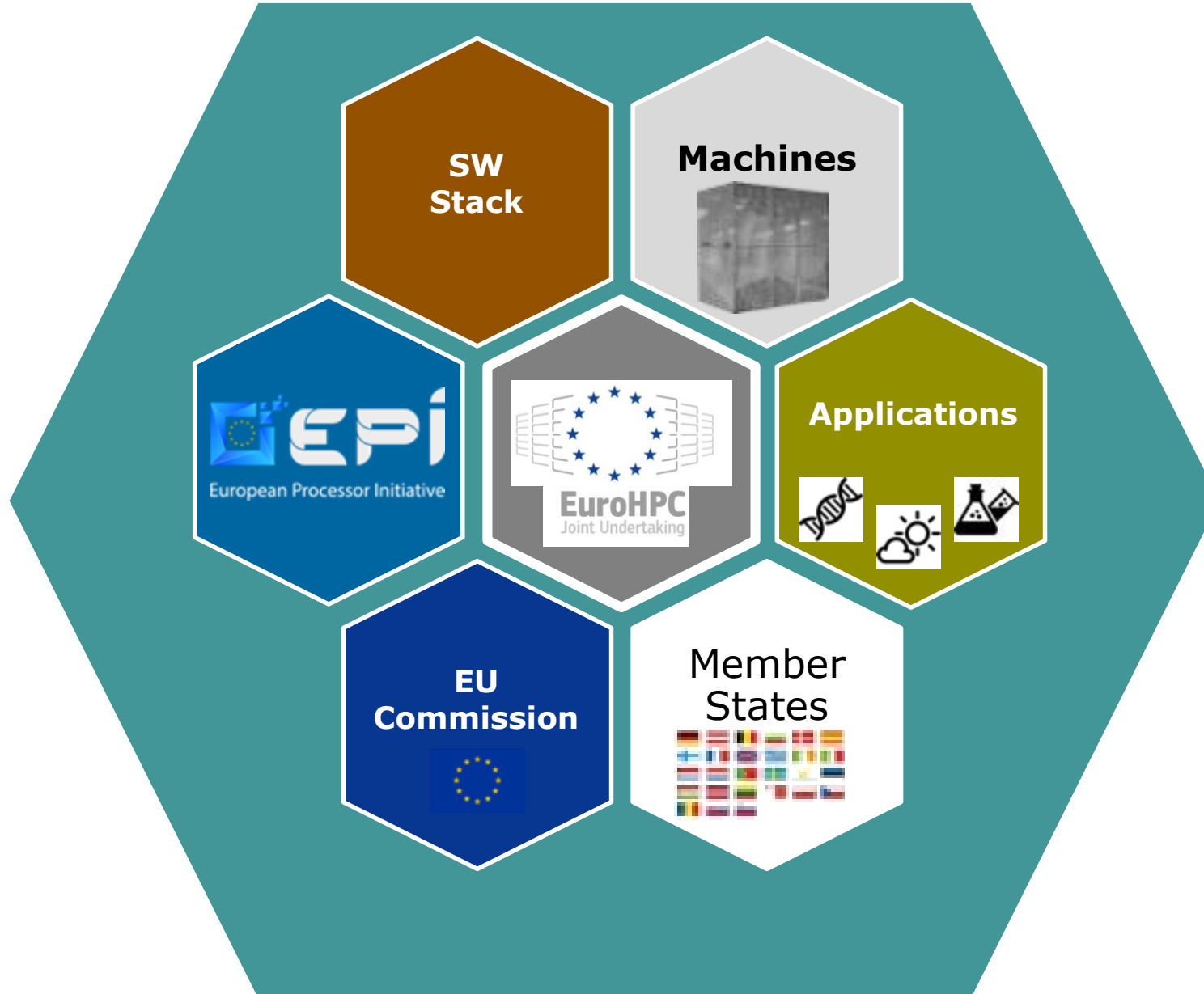
EPI expected impacts (as per EC request)

- ▶ Get a world class processor for the Exascale machines supplied by EuroHPC in 2023
- ▶ Develop a sustainable economic model

EPI is an H2020 project but with industrial mindset & product delivery oriented



EPI is an essential part of EuroHPC



➤ **European High Performance Computing Joint Undertaking (EuroHPC JU):**

- Setup in Nov 2018 (operational until 2026)
- Composed of public and private members
- Budget of ~1B€ (50% EU, 50% participating countries)+400M€ from private entities
- Will provide financial support
- (public procurement, Research and Innov. Grants)

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23 partners: Wide expertise and excellent combo

BMW GROUP   Rolls-Royce Motor Cars Limited   **Barcelona Supercomputing Center**
Centro Nacional de Supercomputación  **AUTOMOTIVE FOCUS**

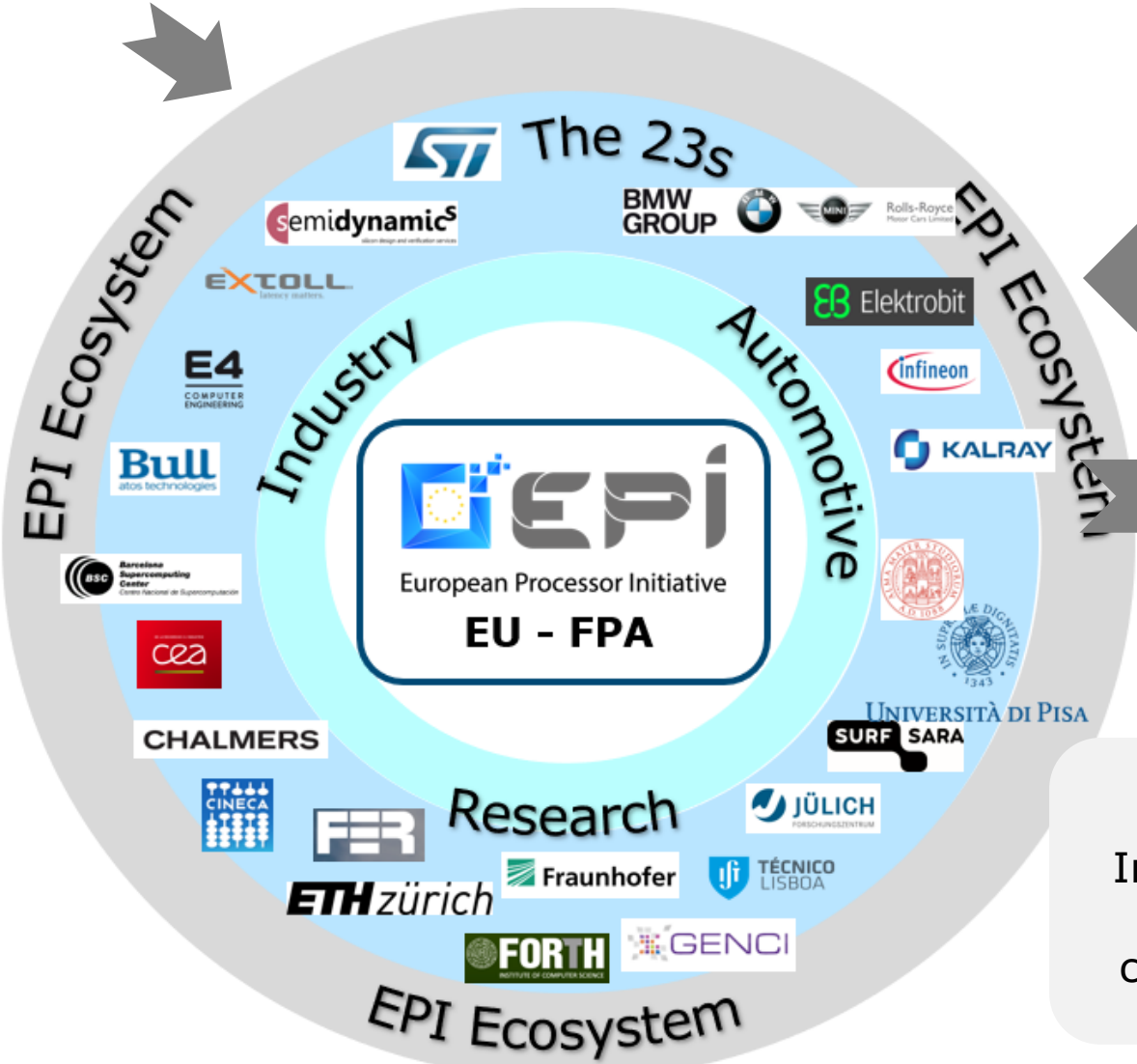
 **E4** COMPUTER ENGINEERING **ETH zürich**  **EXTOLL** latency matters.  **INDUSTRY FOCUS**

      **HPC & RESEARCH FOCUS**






  **SURF SARA**   

EPI 23 partners, from research to industry from consortium to EU high-tech fabless

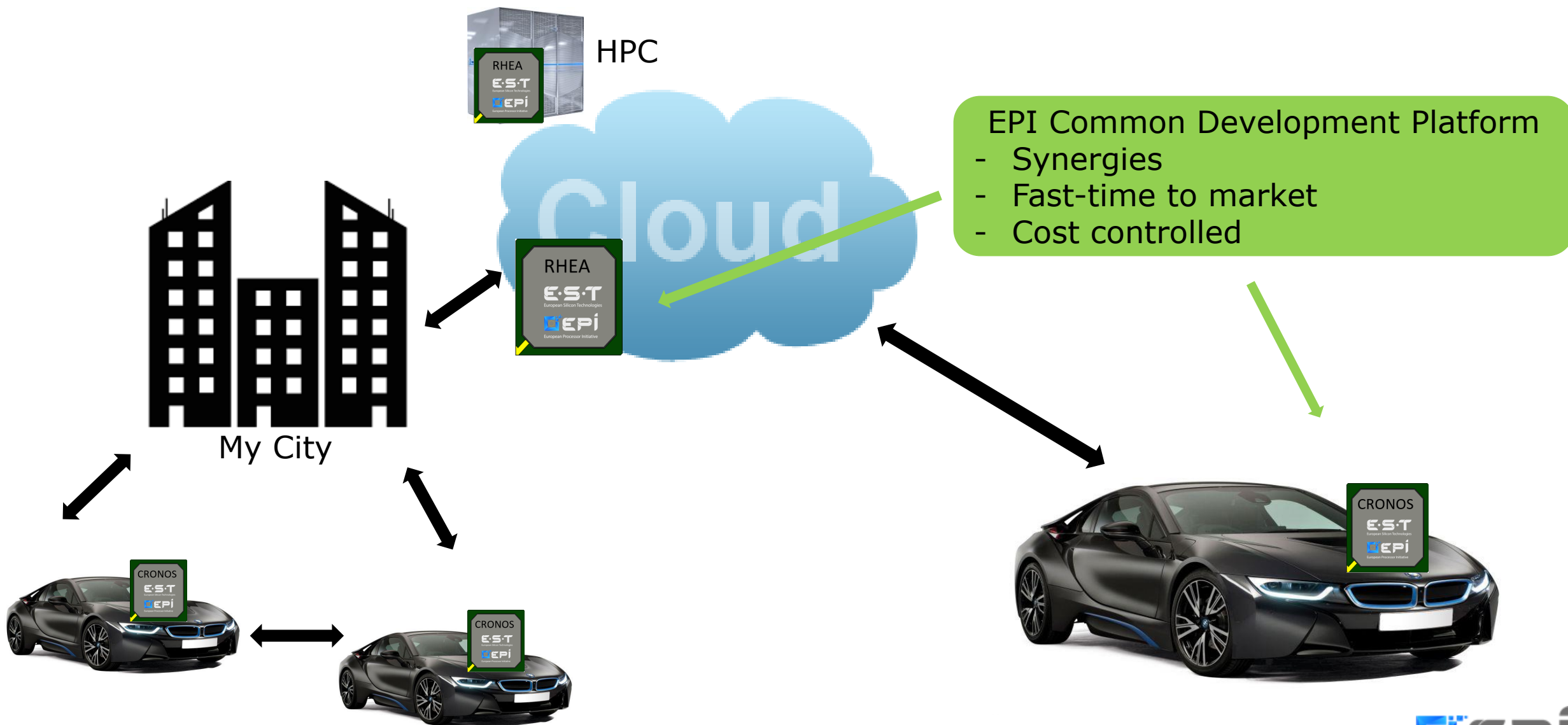
MONT-BLANC
EUROPEAN APPROACH TOWARDS ENERGY EFFICIENT HIGH PERFORMANCE



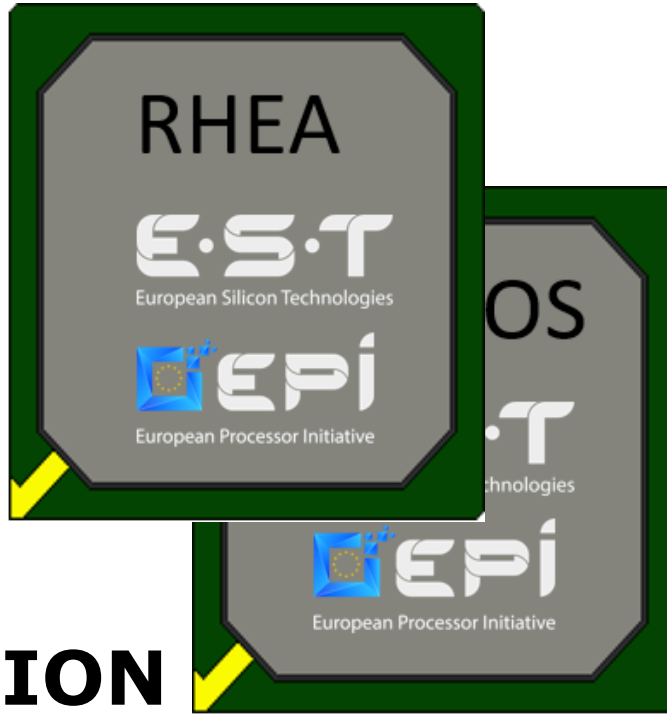
Fabless company
Industrial hand of EPI
Incorporated by a
couple EPI members

-  EPI Common Platform PCI card
-  EPI Mother Board
-  EPI HPC Blade
-  EPI BMW Adas demo
-  Sales to OEM's

EPI : End2End Solutions for both Servers and Edge



Unique in the universe of H2020 programs : From IP to Product/Solution



SOLUTION



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Scalability allows wide market potential coverage



Core Developments

Cost driven

Safety critical

HPC



eHPC
(Automotive)



AI & BigData



Cloud
& Servers



Space



Industry 4.x

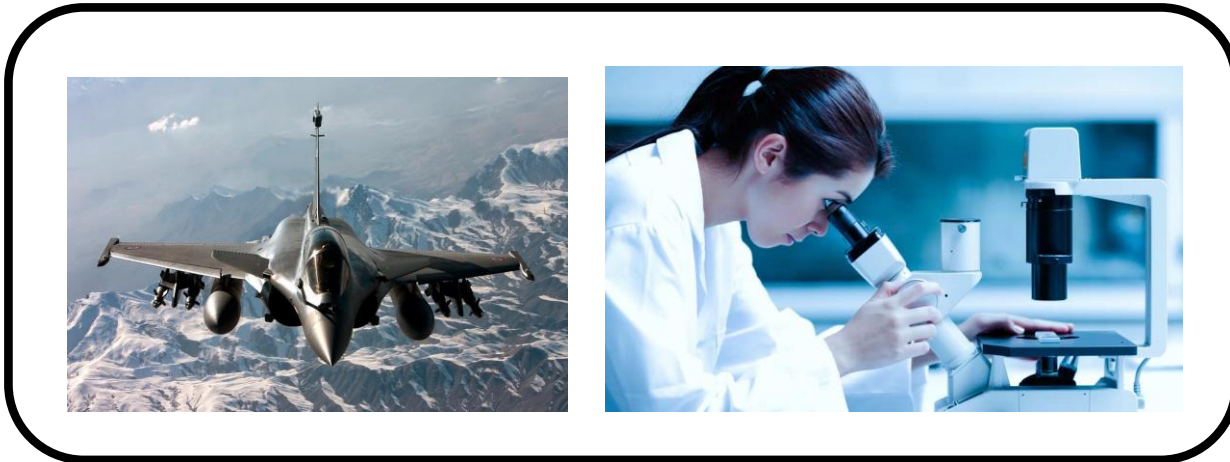


Committed

future

EPI technologies will be everywhere to protect you or your business

To control your autonomous car safely



To help National and European sovereignty, science and research

To protect your digital life and your personal data's

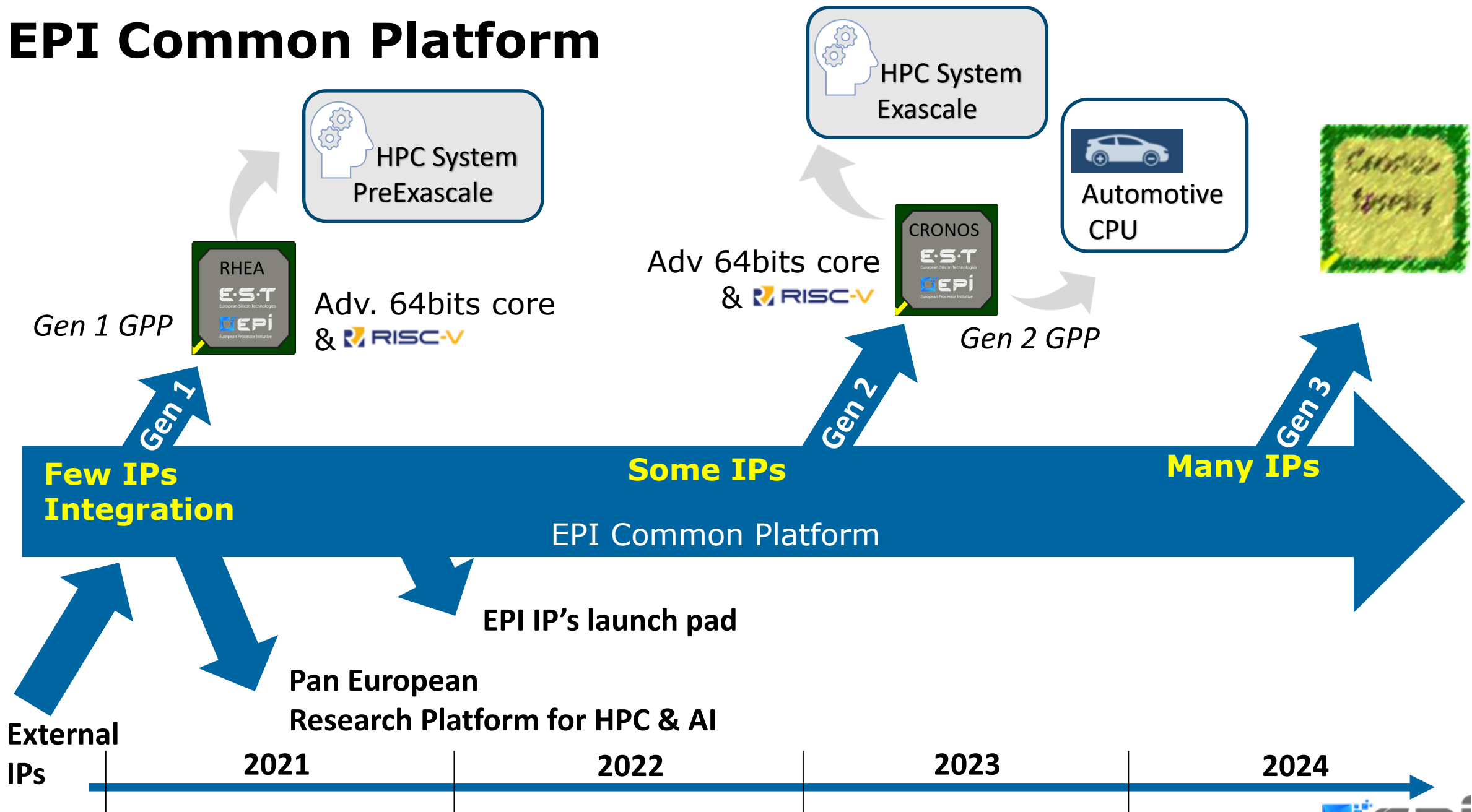


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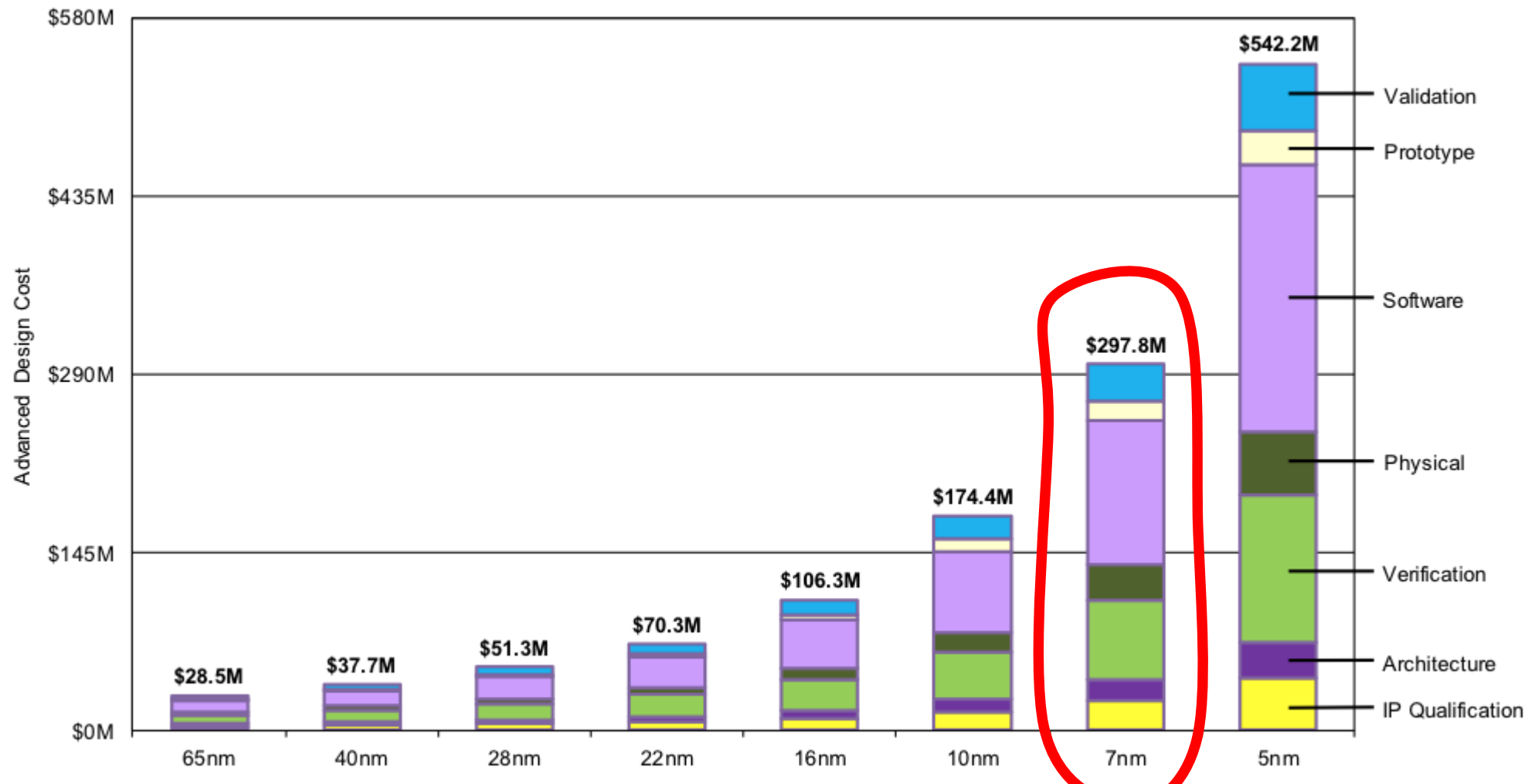
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EPI Common Platform



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Challenge 1: Cost of Advanced Design SoC



9 digits budget....Building such a Product needs lots of cash...

Source [IBS & semiengineering.com](#)

While EPI is warming up, out there....

E [redacted] Reaps **\$58M** To Speed Development of Its 7nm AI Chip [redacted] Set to Raise **\$100** million by Intel Capital

C [redacted] Raises **US\$100** Million In Series A Funding [redacted] resident launches new [redacted] with backing from [redacted] Carlyle Group

Intel Leads **\$75** Million Investment in AI Chip Startup H [redacted]

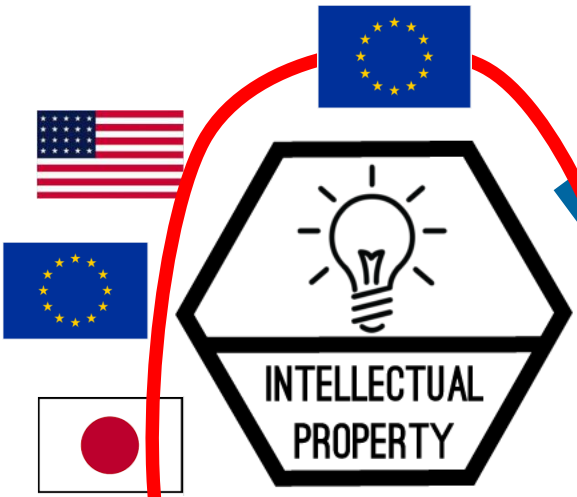
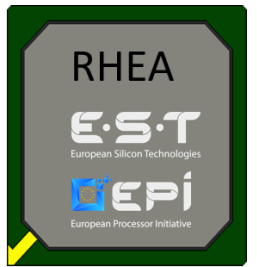
A stealthy startup called C [redacted] raised around **\$50M** Series C **\$25** million to build deep learning hardware Round [redacted]

Challenge 2: What is really European ?

Design Tools



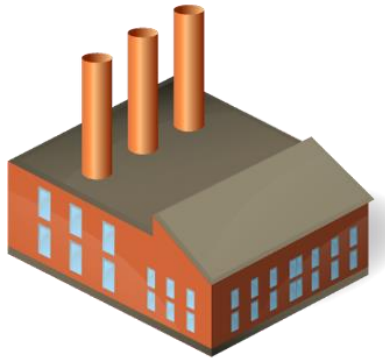
VC's



Architects & Design team



Backend / Packaging Sub-Contractors



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EPI Moon Shot



Airbus

(1969) → 2003 to take over Boeing

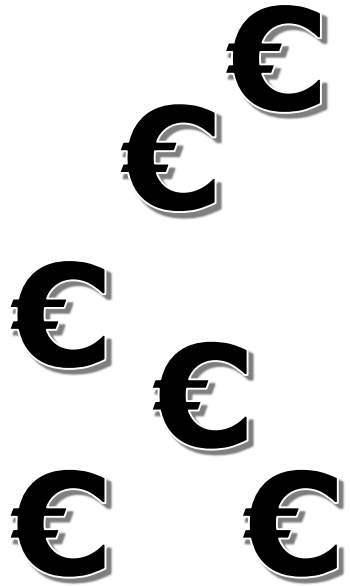
With EPI, Europe has the ambition to repeat the Airbus success



EPI program

(2018) → 2023 for ExaScale

To anticipate our 2019 Financial Roadshow



European Union Automotive

Artificial Intelligence

Cyber Security

Embedded Computing

HPC

Backdoor Free

Computing

ence



European Processor Initiative

is all about this !!

supercomputer

Deep Learning

Supercomputing

ADAS

THANK YOU



European Processor Initiative

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