Software-defined Hardware Design Relies on AI and Intelligent Verification

DVCON India 2025
Vision Talk

Jean-Marie Brunet
VP & GM
HAV Siemens EDA

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Our world depends on semiconductors and electronic systems

And our dependency is accelerating…

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Global factors making semiconductors and electronic systems critical to society

Shift away from general-purpose computing platforms to **workload-optimized computing**

Data centers, automotive, AI, and other segments designing chips

Software **differentiates the product** and must be created, tested, and optimized in parallel with semiconductor designs

Software

Software-defined, Silicon-enabled

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CARS YACHTS AVIATION WATCHES STYLE HOME FOOD & DRINK TRAVEL GIFT GUIDE VIDEOS

MOTORS / CARS APRIL 13, 2023

Mercedes-Benz Wants to Become a Software Company, the CEO Says

At a recent briefing in Northern California's Silicon Valley, the marque's top executives discuss what's soon to roll out on the tech front.

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Global factors making semiconductors and electronic systems critical to society

Shift away from general-purpose computing platforms to **workload-optimized computing**

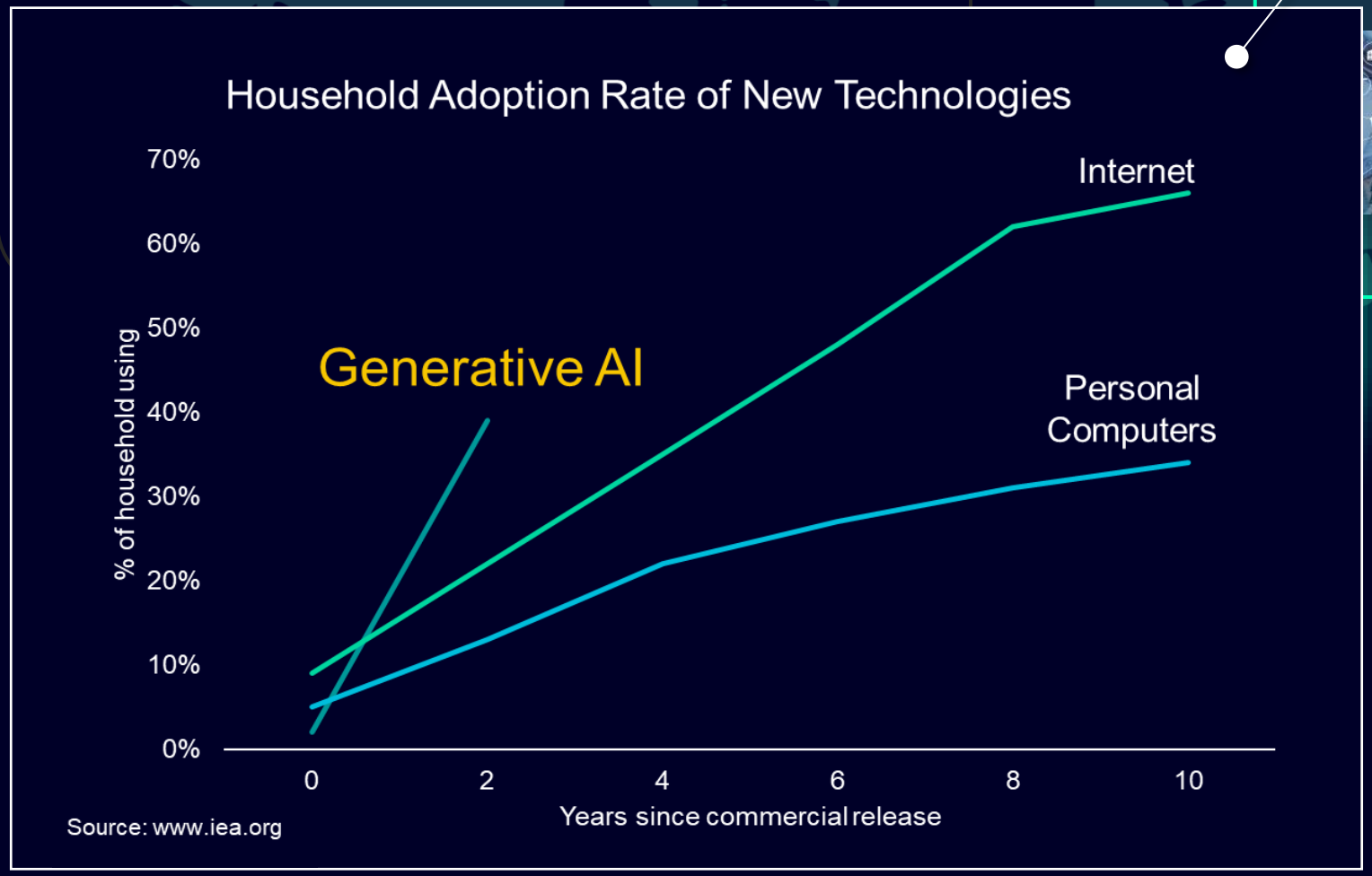
Software

Artificial Intelligence

AI will **enable new possibilities and transform industries**

AI introduces **new technology and scaling challenges** for semiconductor

AI everywhere will drive **increased semiconductor consumption**



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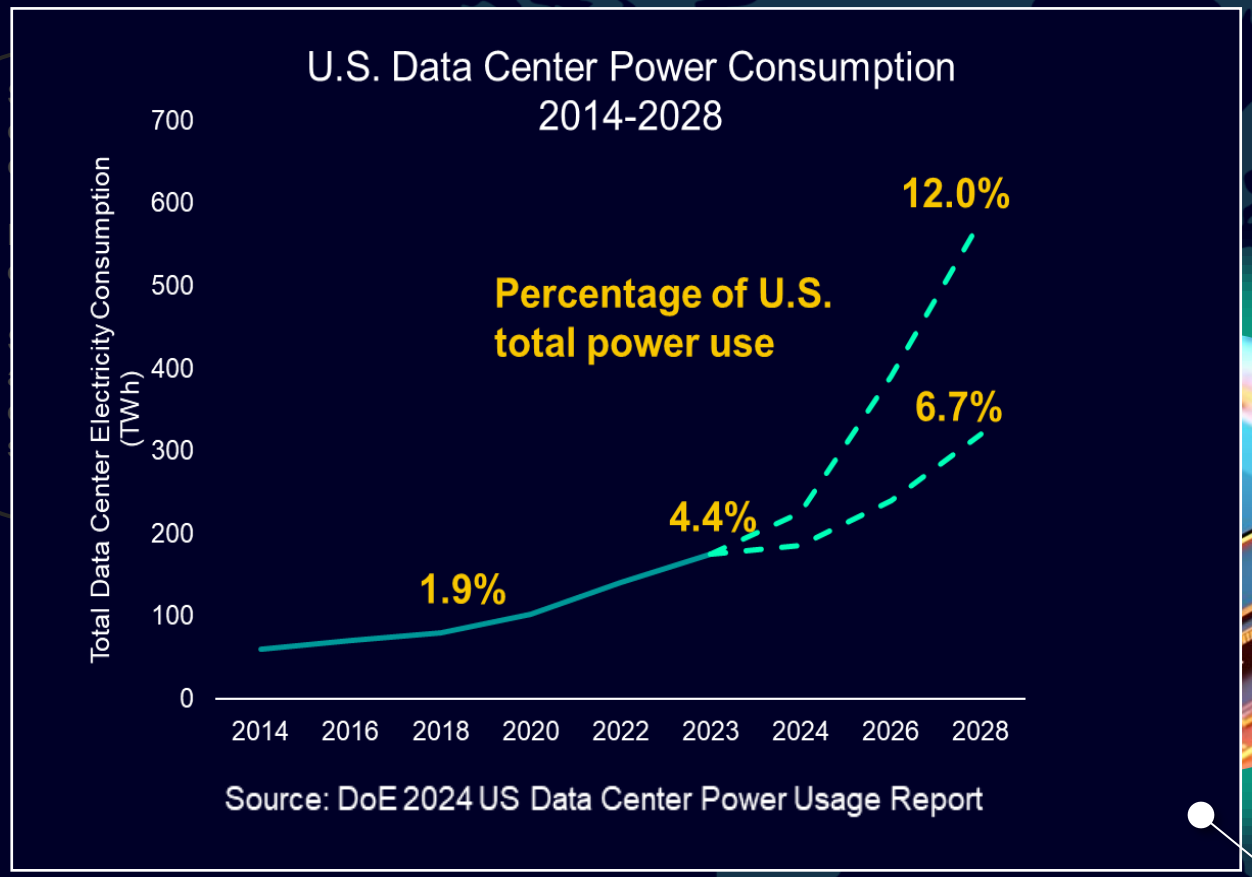
Global factors making semiconductors and electronic systems critical to society



Artificial Intelligence

AI will **enable new possibilities and transform industries**

AI introduces **new technology and scaling challenges** for semiconductor

AI everywhere will drive **increased semiconductor consumption**

Sustainability

Society is demanding more **responsible corporate management**

Companies must **balance societal responsibility with cost**

Semiconductors are the **foundation of sustainability**

Sustainability will **drive semiconductor volume**

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Global factors making semiconductors and electronic systems critical to society

Software

Shift away from general-purpose computing platforms to **workload-optimized computing**

Data centers, automotive, AI, and other segments designing chips

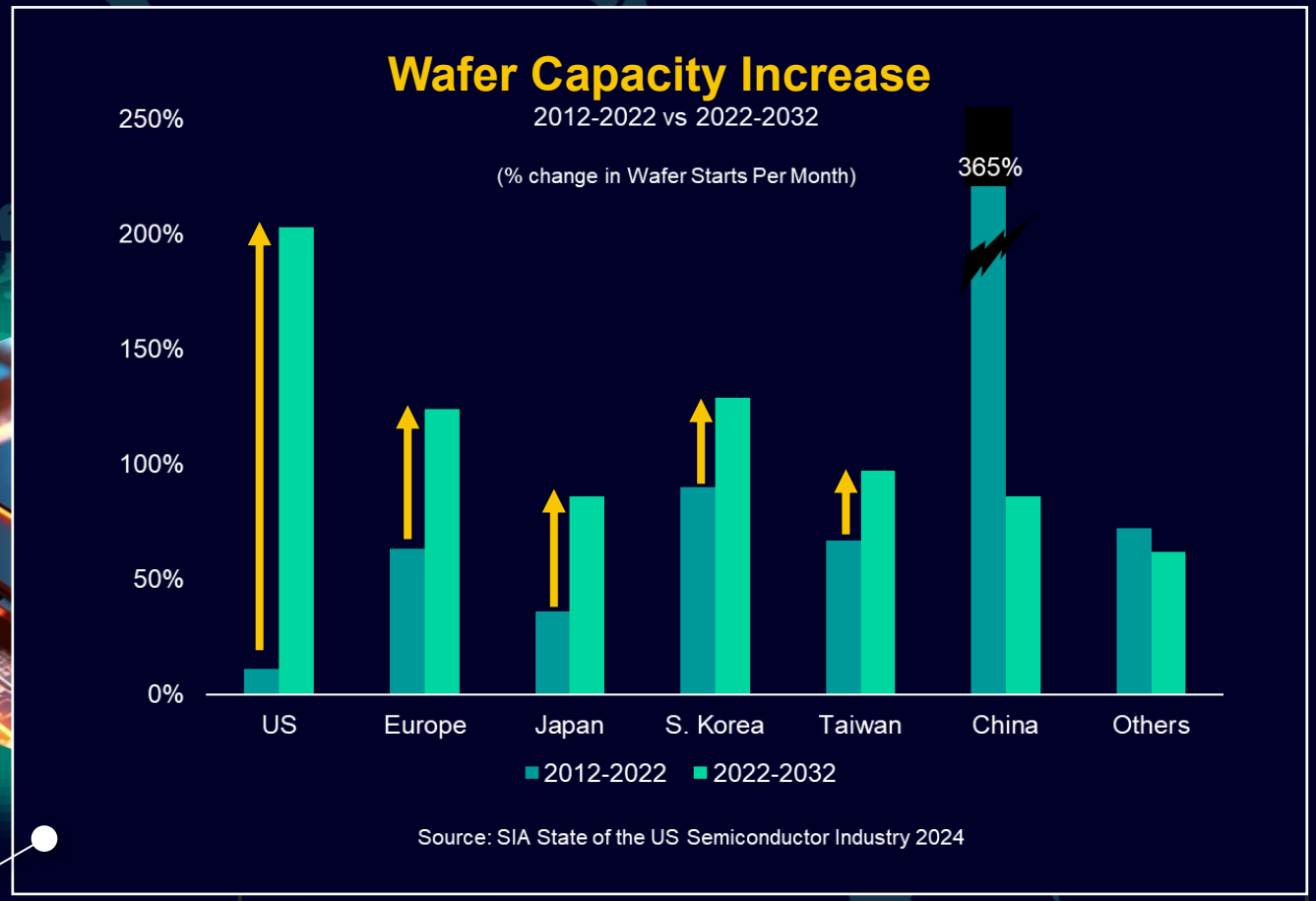
Software **differentiates the product** and must be created, tested, and optimized in parallel with semiconductor designs

Silicon Nationalism

Semiconductors are at the heart of a **new era of trade wars**

Supply chain fragility exposed with Covid-19 and visibility amplified with global dependence on semiconductor-related products

Semiconductor **nationalism** is driving new investments



Sustainability

Sustainability will **drive semiconductor volume**

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"

Software is
eating the world

Marc Andreesen
Founder, Netscape &
Andreessen Horowitz

"

Software is eating the world, but **AI is going to eat software**

Jensen Huang
President & CEO, Nvidia

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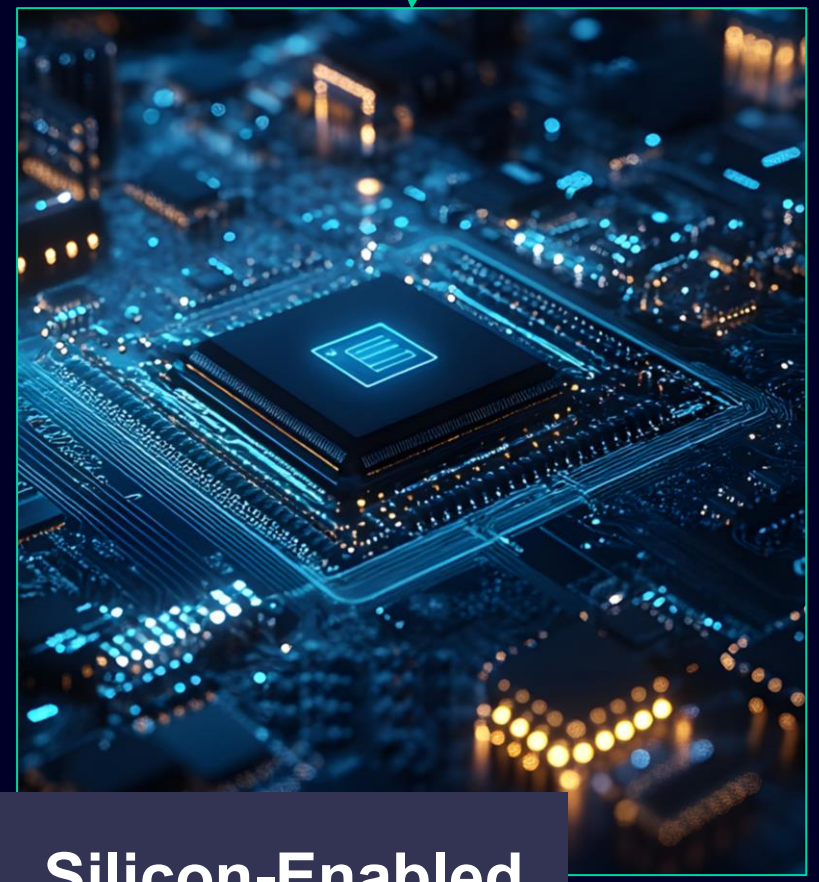
Software-Defined

AI-Powered



Silicon-Enabled

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AI powered software workloads are exploding

Enhanced intelligence in software drives a sharp increase in workload **SCALE** and **DIVERSITY**.

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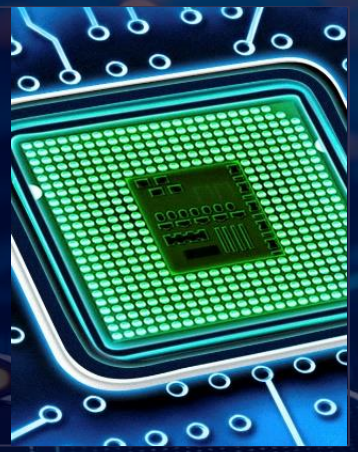
Impacting all the industries we serve…

Hyperscalers

Custom AI accelerator chips deployed at scale

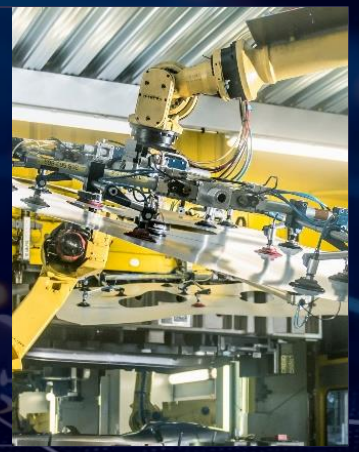


Automotive

Software-defined vehicles with enhanced safety

Industrial

AI-powered robotics connected industrial internet of things

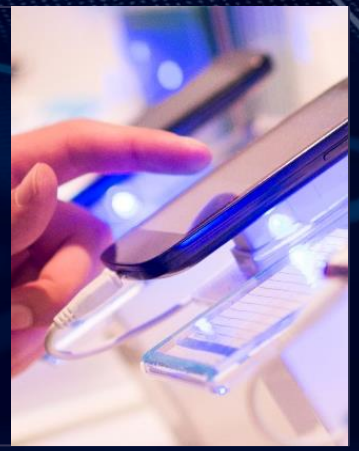


Healthcare

Surgical robotics, drug discovery platforms

Consumer Electronics

Gaming consoles, security cameras, virtual assistant



Aerospace and Defense

Software-defined radios, AI-powered drones

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Software: The Ultimate Differentiation for Every Industry

Mercedes Benz wants to become a software company

Ola Källenius, CEO

We have about 60,000 engineers at Lockheed Martin. 10,000 of those are software engineers

Jim Taiclet, CEO

LOCKHEED MARTIN

The future of warfare will be superficially hardware-driven, with a buttload of software smarts under the hood

Parmer Luckey, Founder

ANDURIL

10% of the company's annual revenue will come from software by 2030

John May, CEO

JOHN DEERE

For quite some time now, Bosch has also been a software company

Stefan Hartung, Chairman

BOSCH

Software will define containers moved by Maersk, which is ~20% of global container trade

Søren Skou, Former CEO

MÆRSK

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AI: Supercharges Software Experiences & Outcomes

AI helps to deliver "premium ADAS features at mass market prices" – smarter object recognition, hazard anticipation & surround sensing

mobileye

It takes 10 years and billions of dollars to design a drug. With AI, we can may be reduce that down from years to months or even weeks

Demis Hassabis, CEO
2024 Nobel Laureate

Google DeepMind

20%-30% of the code that is inside of our repos today and some of our projects are probably all written by AI

Satya Nadella, CEO

Microsoft

AI/GenAI solutions will help SAP cut $100 million in costs during FY24 (HR, finance, supply chain, contracts & docs etc.)

Christian Klein, CEO, SAP

SAP

We used Gen AI to crunch 850M product data points and improve customer experience – and it was 100X more productive

Doug McMillon, CEO

Walmart

Our AI robot dog literally walks around the plant all day long… it can see and hear and look for error states well before a human being could

Kumar Galhotra, COO

Ford

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Purpose Built Silicon: The Competitive Edge for Every Industry

Custom silicon provides better price performance on training & inference

Andy Jassy, CEO

amazon

Custom SoC projects are a broad trend across all industries for compute & efficiency demands

Dermont O'Discoll, VP

arm

Google Expands In-House Chip Efforts in Costly AI Battle

WSJ with Amin Vahdat, VP

Google

We built custom silicon that to handle inference for our ranking & recommendations

Mark Zuckerberg, CEO

Meta

Apple silicon will make the Mac stronger and more capable than ever

Tim Cook, CEO

At this point, it's clear as day, you need to have silicon capability

Satya Nadella, CEO

Microsoft

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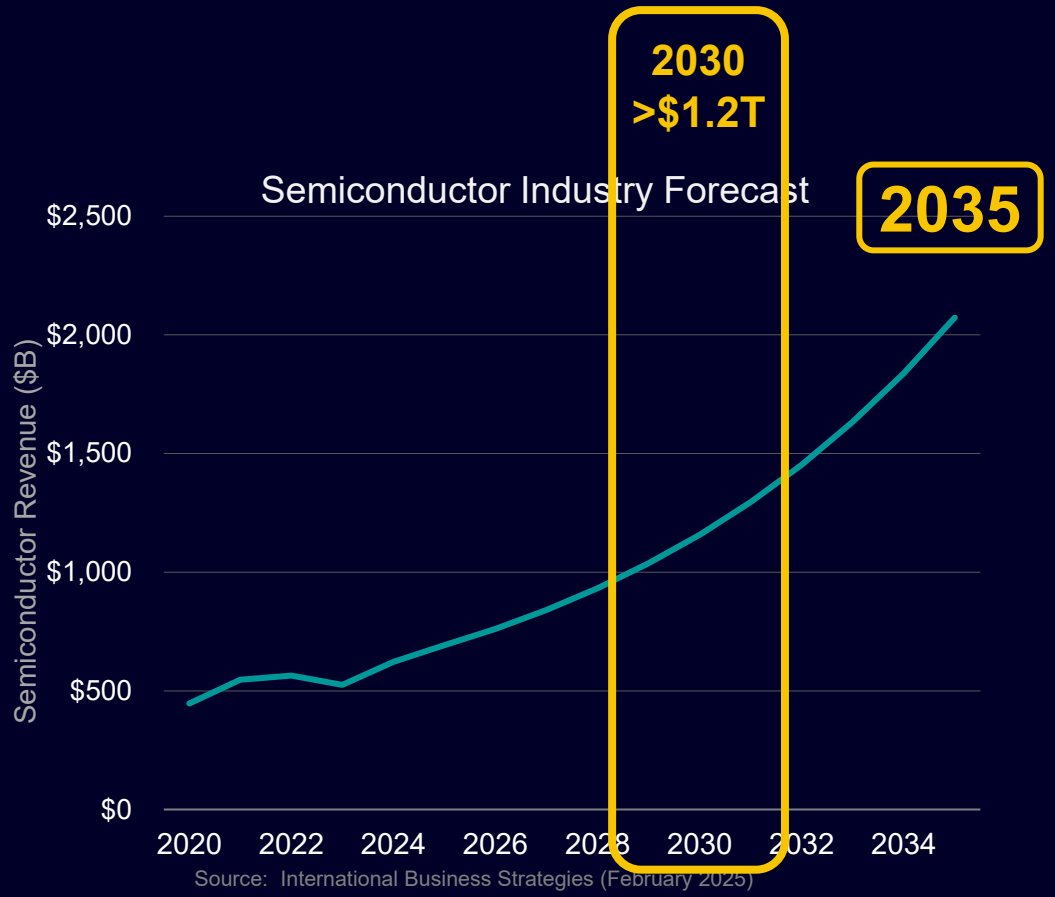
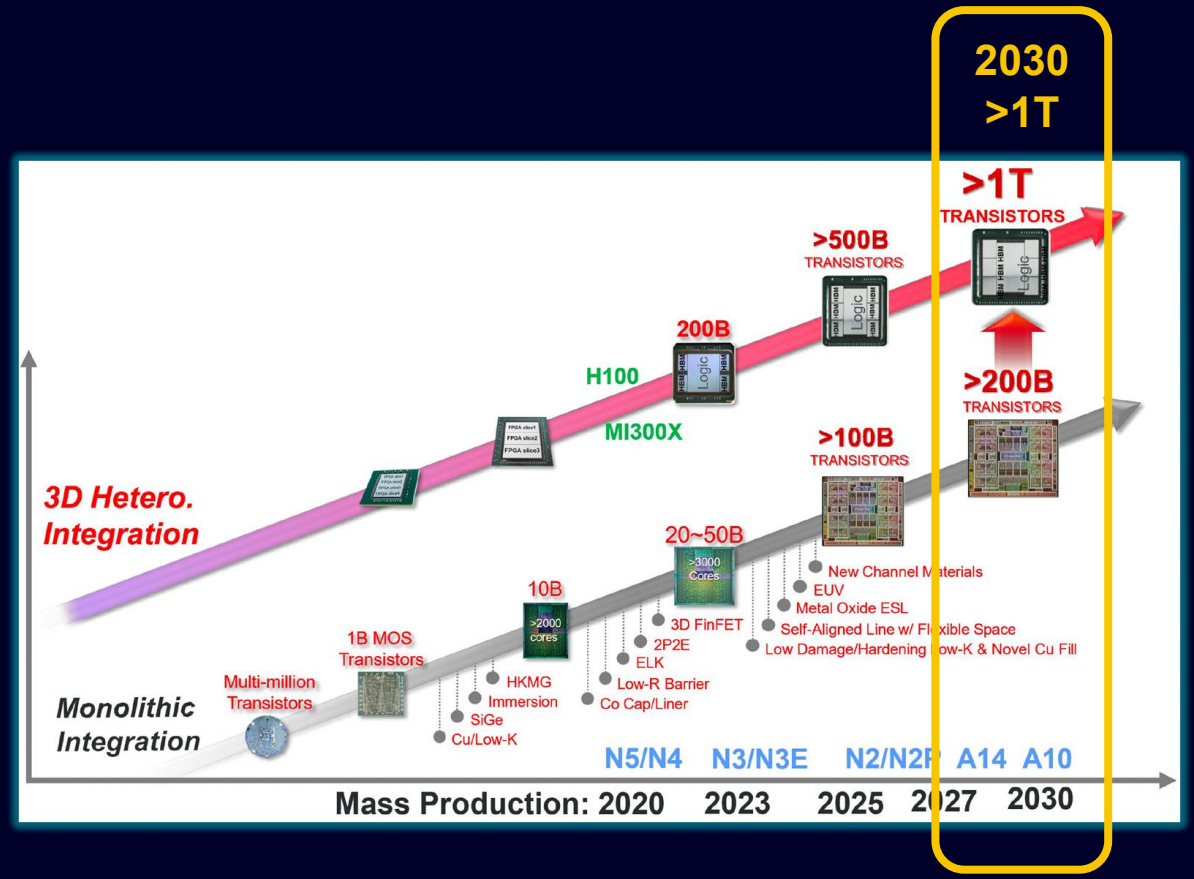
Creating the TRILLION opportunity-challenge





With an accelerated velocity of change

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AI-powered software workloads demand a leap of compute efficiency

More AI workloads =
more compute capacity

Sophisticated AI demands
higher performance

AI's high-power demands
challenges power infrastructure

Fast-changing AI workloads
require **future-proof** designs

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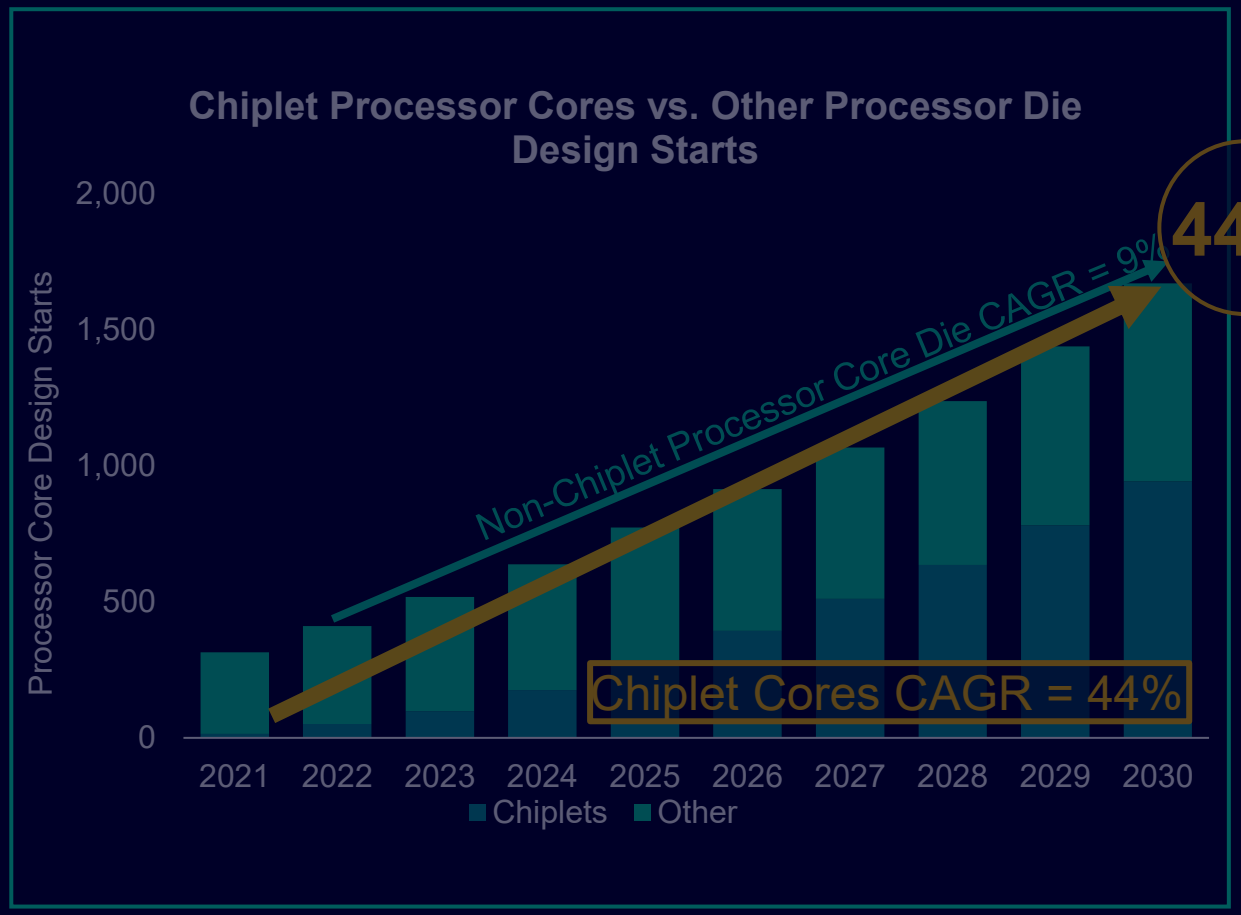
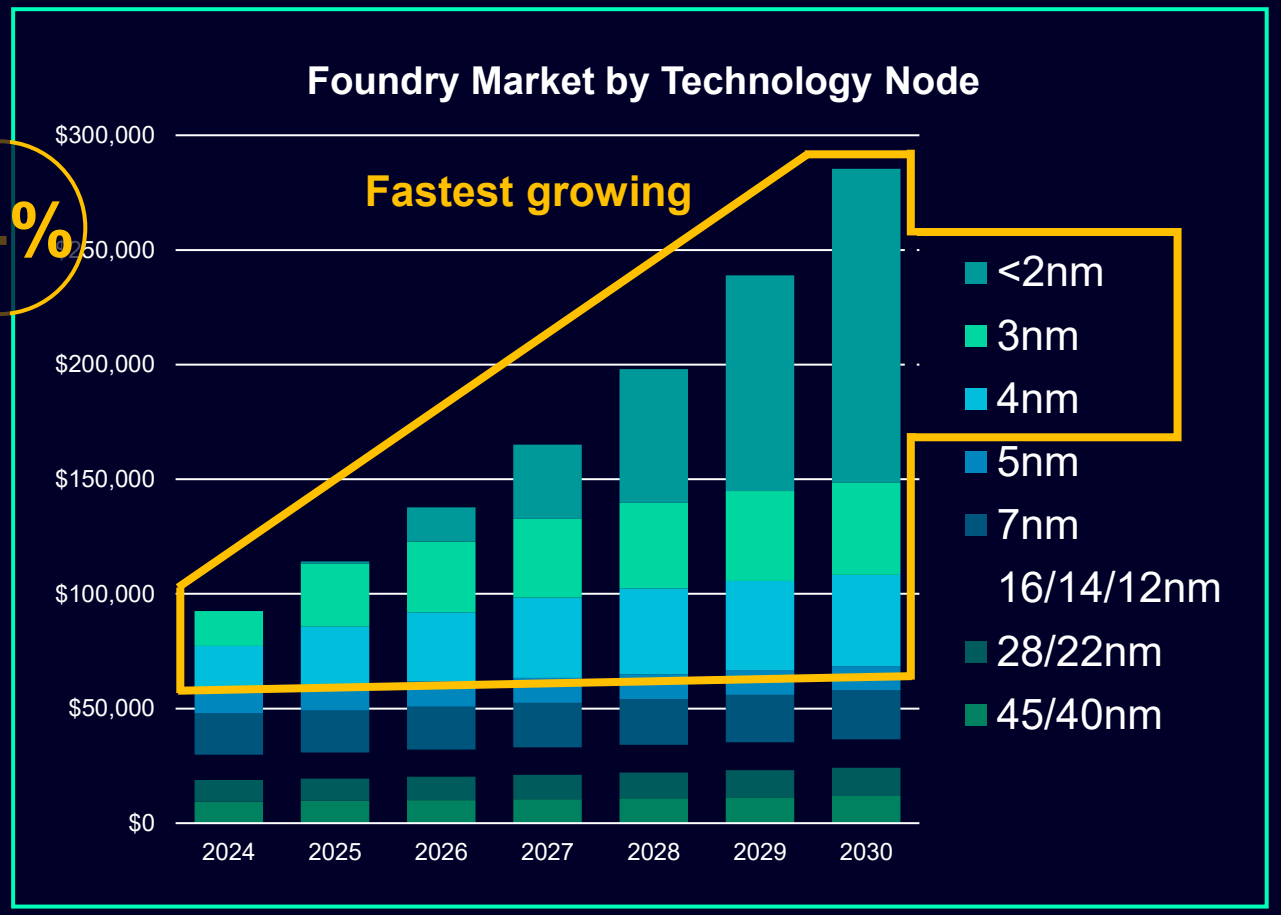
Built on a 3D IC foundation using Advanced Node technology





IBS, December 2024

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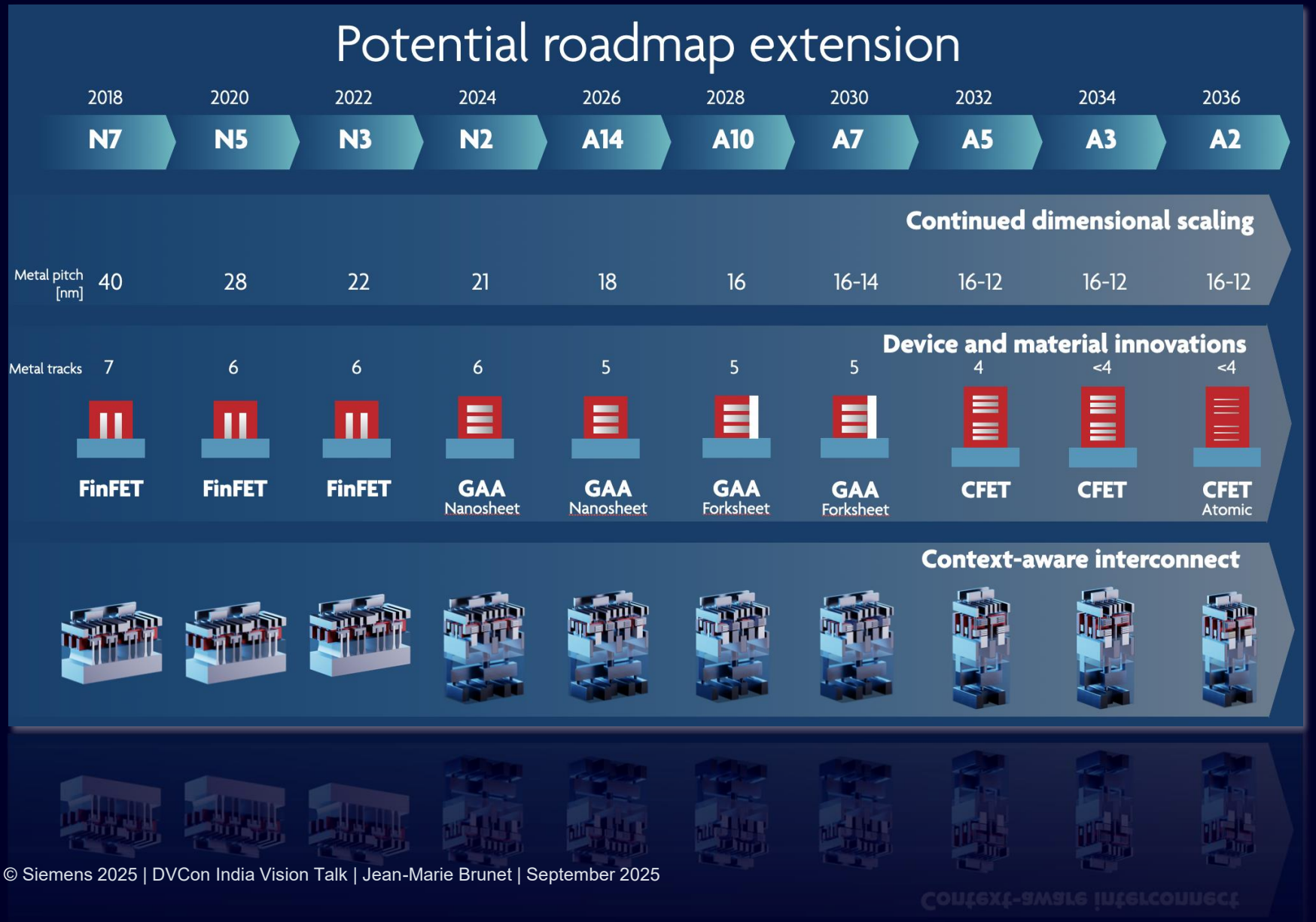
and Advanced Node technology will continue to evolve…



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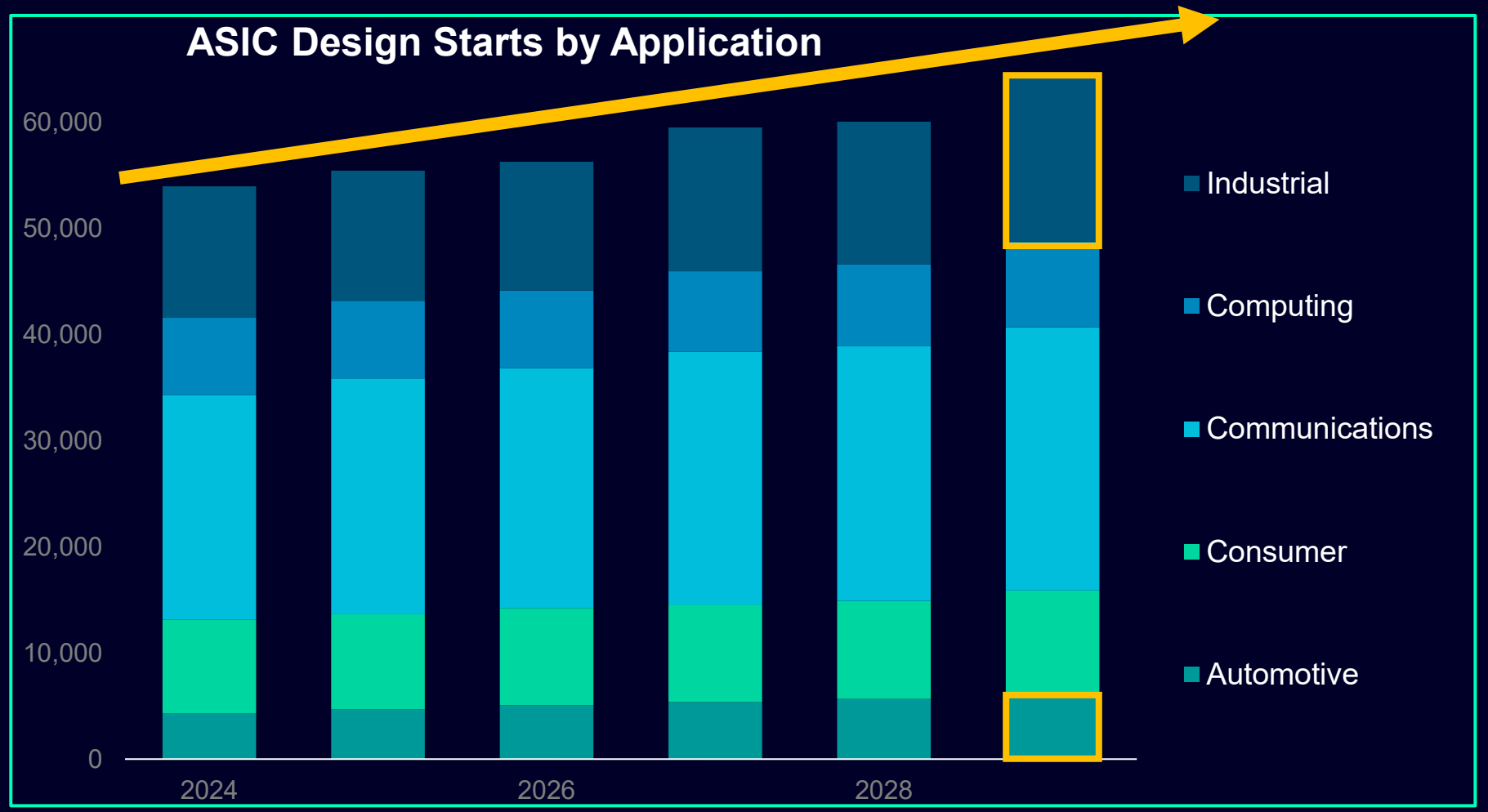
Semiconductor design volume is ramping



Innovative designs are fueling market growth

Mature Markets grow due to:

- AI
- HPC
- Data Centers
- Auto electrification

Source: TechInsights, August 2024

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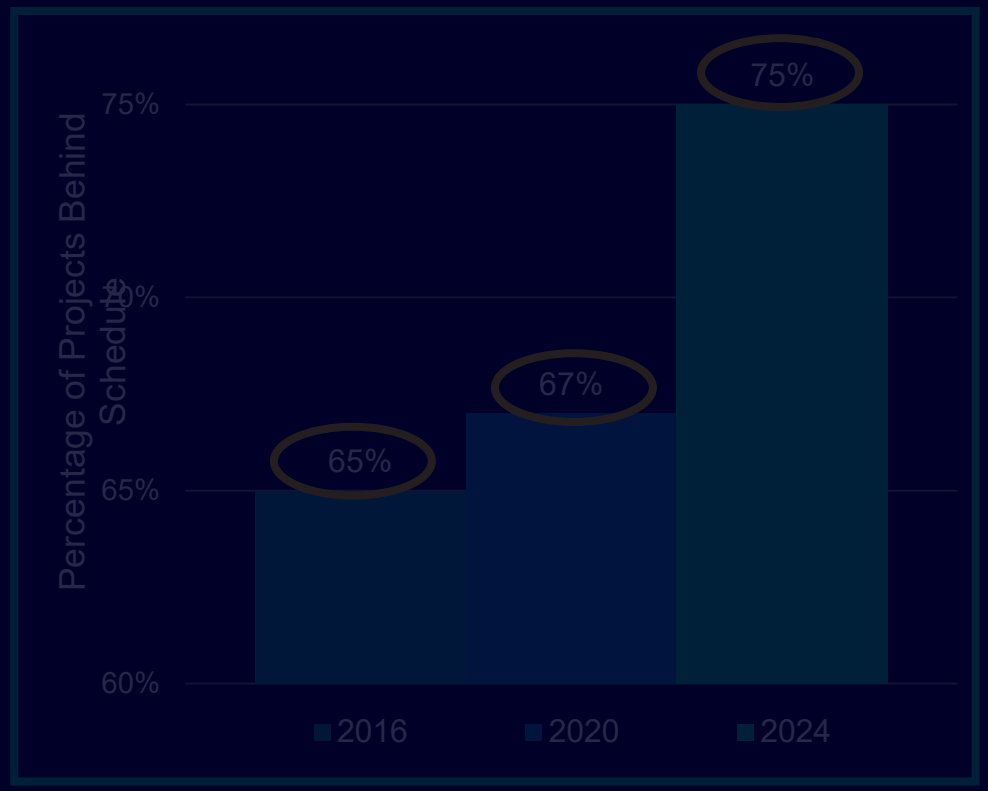
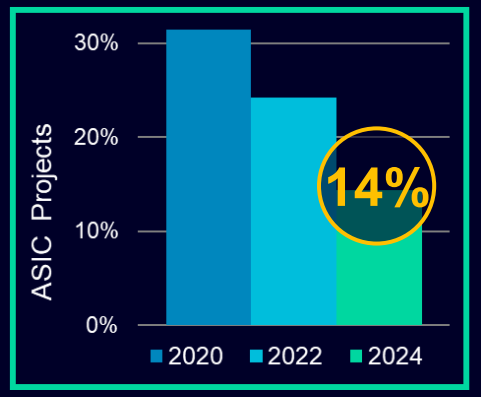
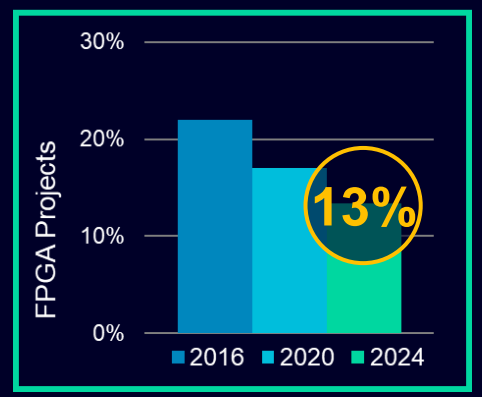
Semiconductor and system complexity is exploding

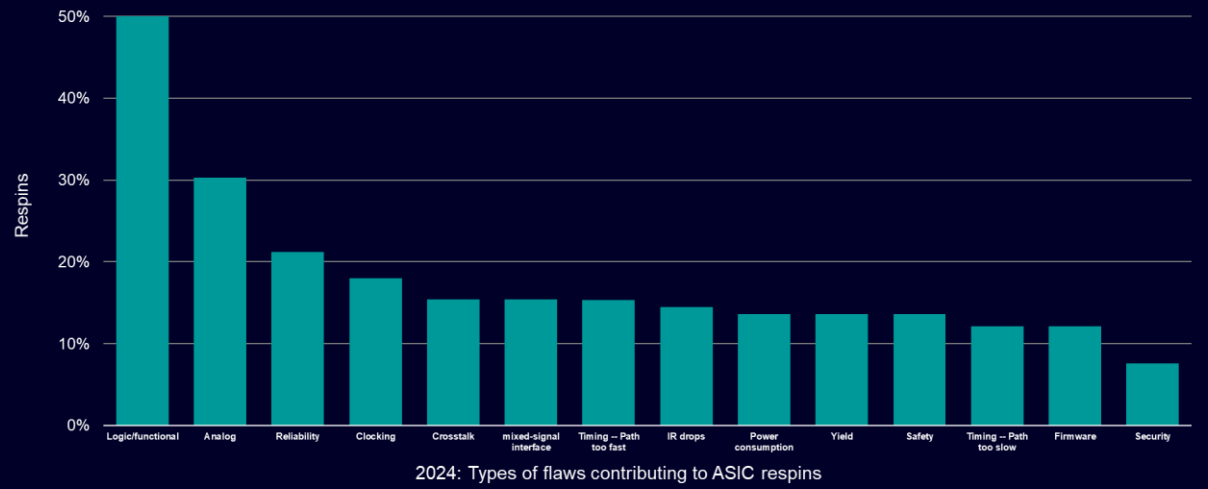
More missed schedules



Decline in 1st Silicon Success







2024: Types of flaws contributing to ASIC respins

Source: Siemens EDA and Wilson Research Group, 2024 Functional Verification Study

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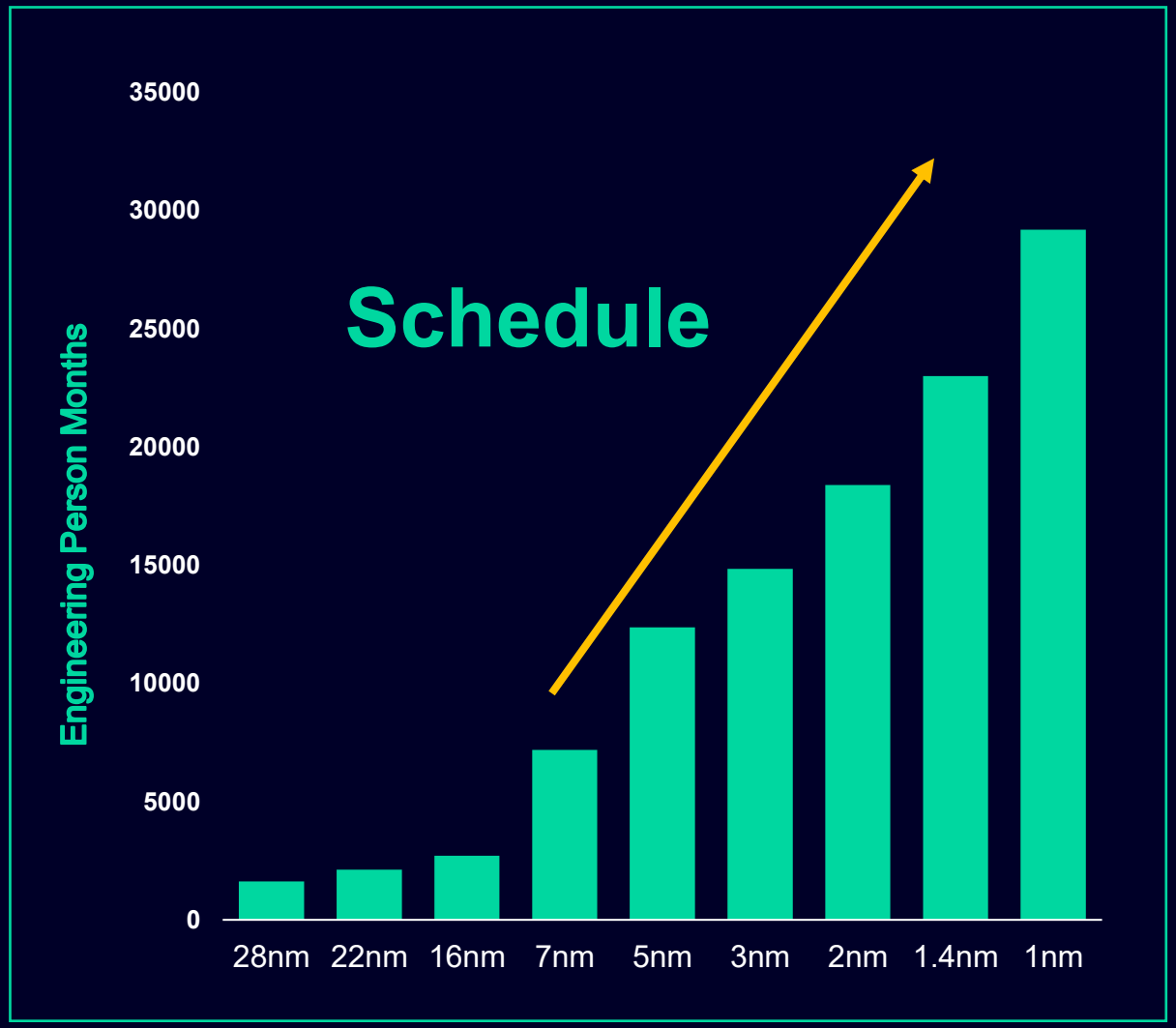
Semiconductor costs and schedules are skyrocketing



Source: IBS Analysis of Design Costs, Sep 2024

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Large Language Models (LLMs) scaling

2X training compute time every 6 months

100X

ChatGPT4 compute power versus its predecessor

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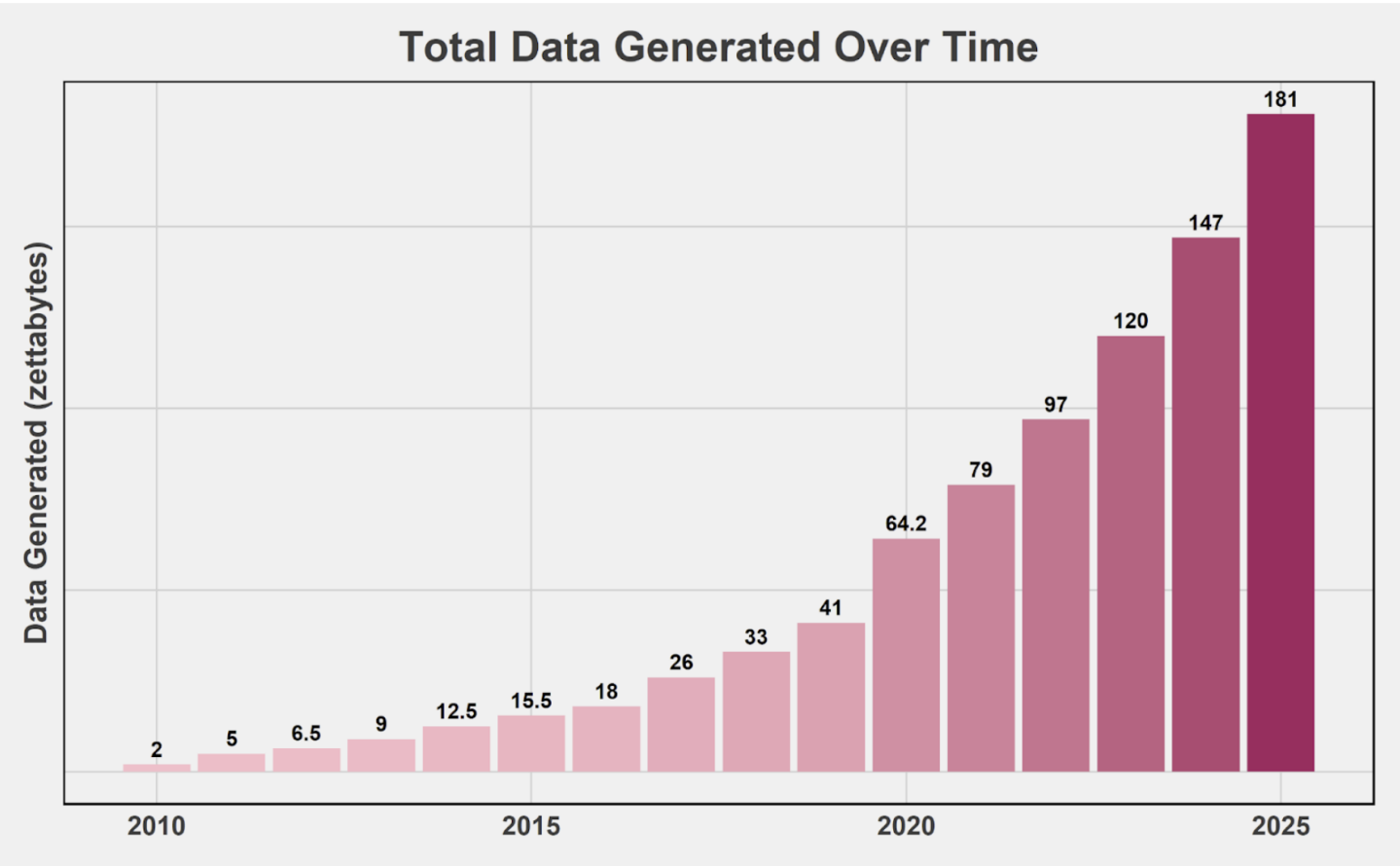
Data scaling



Source: IDC

32X

Growth of total amount of new data generated per year from 2010-2020

More data is now produced every month than existed in total just over a decade ago

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AI training and inference are power-hungry

Creating GPT-3, consumed 1287 MWh of electricity and 552 tons of CO_2

123 cars driven for a year

AI queries require about 10X the electricity of a traditional search over the web

Requirements for Software-defined, AI-powered, Silicon-enabled System of Systems

Architecture exploration and IP selection

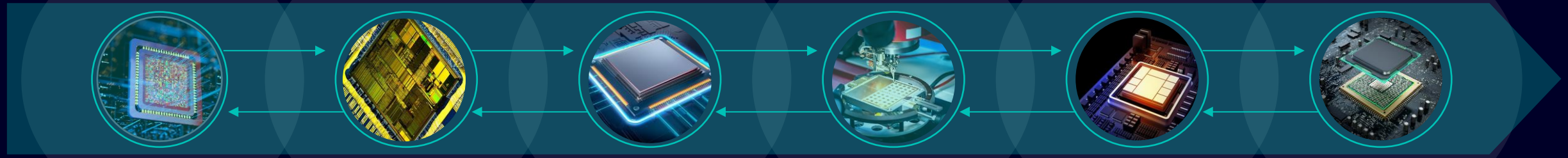
IC Functional Design & Verification

IC Physical Design & Verification

Advanced Node Design & Manufacturing

IC packaging, 3DIC and Chiplet Integration

Electronic Systems Design, Verification, & Manufacturing



Software | Functional IC | Physical IC | Manufacturing | 3D IC | Electronic Systems

AI
Address volume, complexity, talent gap

3DIC integration
Discretely match silicon platform to software workloads

System level & cross domain
Mitigate cross-domain conflicts - real time visibility /verification

Cloud-based design
backbone for collaborative innovation in ecosystem

Ecosystem Collaboration
EDA providers, foundries, IP providers & system companies

Semiconductor lifecycle management
Bridge isolated domains

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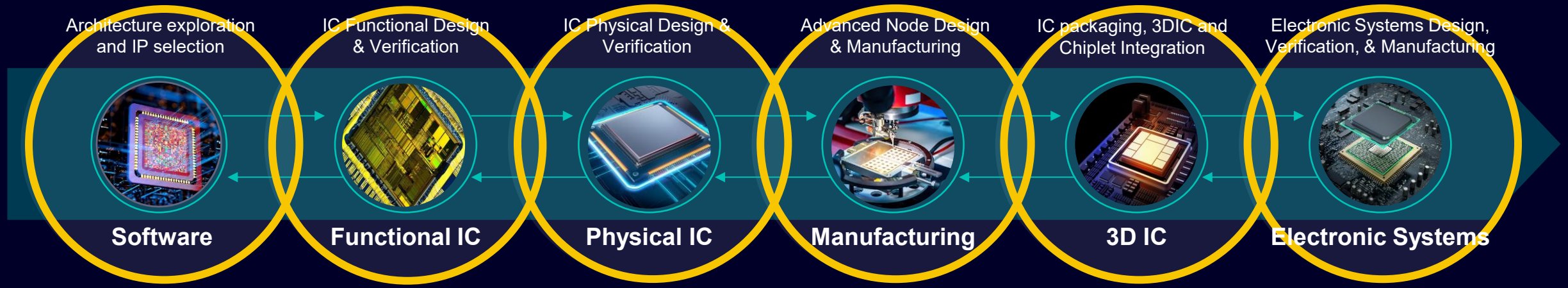
Siemens EDA

What are we doing to address those challenges ?

Siemens EDA Key Investment Initiatives



Accelerated System Design

Supporting system **architecture** design, **verification** and **early software exploration**

Software

Advanced Node Design

Delivering unmatched **availability, productivity and quality** for advanced node designs

IC Manufacturing

Advanced 3DIC Integration

Enabling an era of more than Moore **through Chiplet Integration**

Chiplets

Complex System Implementation

Empowering digital transformation **with predictability in function, cost and schedule**

Electronics

AI for chip & systems

Closing the widening productivity gap as **schedules and complexity skyrocket**

Ai Industrial-grade AI

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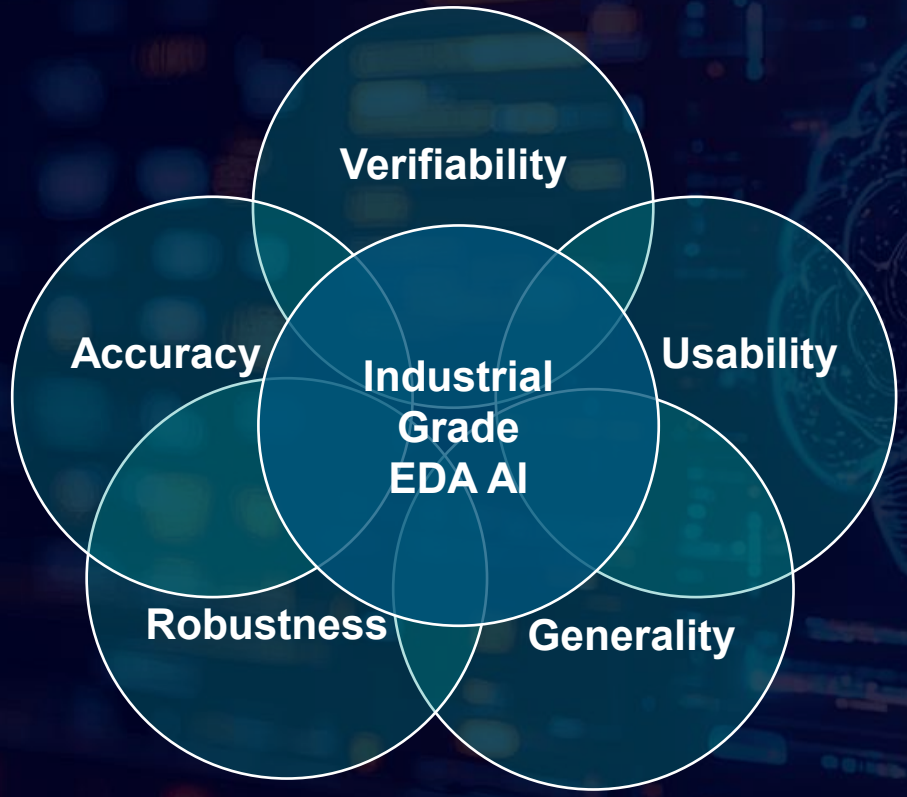
Adding AI to an app is easy, but adding AI to EDA workflows requires more…

Critical Elements for EDA



Verifiability
Correctness of the algorithms, and the integrity/quality of the data used

Usability
UI experience to achieve desired outcomes effectively and efficiently

Generality
Ability to perform across a variety of different inputs, conditions, etc.

Robustness
Ability to perform reliably under a variety of conditions

Accuracy
Ratio of correct predictions to total predictions made by the model

Siemens EDA has **invested over 20 years** to achieve industrial-grade AI maturity

solido DESIGN AUTOMATION

SIEMENS

Siemens EDA AI system delivers generative and agentic AI

Secure, on-prem / cloud, open, flexible, and integrated with all Siemens EDA tools

EDA AI System

IC and PCB design apps

AI model layer

AI data layer

Data sources

Integrated with Siemens EDA tools

Calibre | Questa | Tessent | Xpedition

Solido | Veloce | Catapult | Aprisa

Assistants | **Reasoners** | **Agents**

Large language models (LLMs)

Multimodal EDA data lake

Siemens EDA manuals, examples, glossary, customer data

Usage Modalities

Web-based interface

In-tool GUI interface

Command line interface

APIs

Secure - On prem or in cloud

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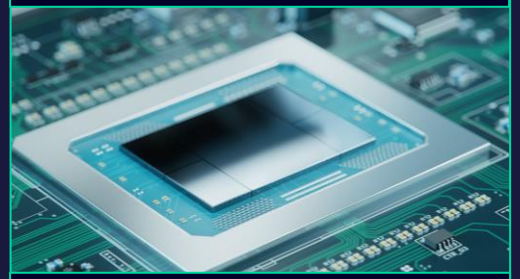
Siemens EDA unveils new AI-powered solutions:
Turbocharging semiconductor & electronic design with generative & agentic AI

Smart Connected Verification Solution



Questa One
...nounced May...

- Delivers ...ste...
- **10 to 100X reduction** in manual tests
- **Dramatic ramp** in debug productivity

RTL-to-GDS Digital Implementation

Aprisa AI
Announced June 2025

- Delivers **10X productivity** boost
  3X improved compute-time efficiency
- **10% better PPA** for RTL-to-GDS

Physical Verification

Calibre Vision AI
Announced June 2025

- **2X productivity boost** with early chip integration workflows
- **Fueling collaboration** across top level & block level owners

Custom IC Design & Verification

Solido generative and agentic AI
Announced June 2025

- **10X+ productivity** improvement
- **Natural-language powered** acceleration of custom IC workflows

Siemens EDA AI System
Announced June 2025

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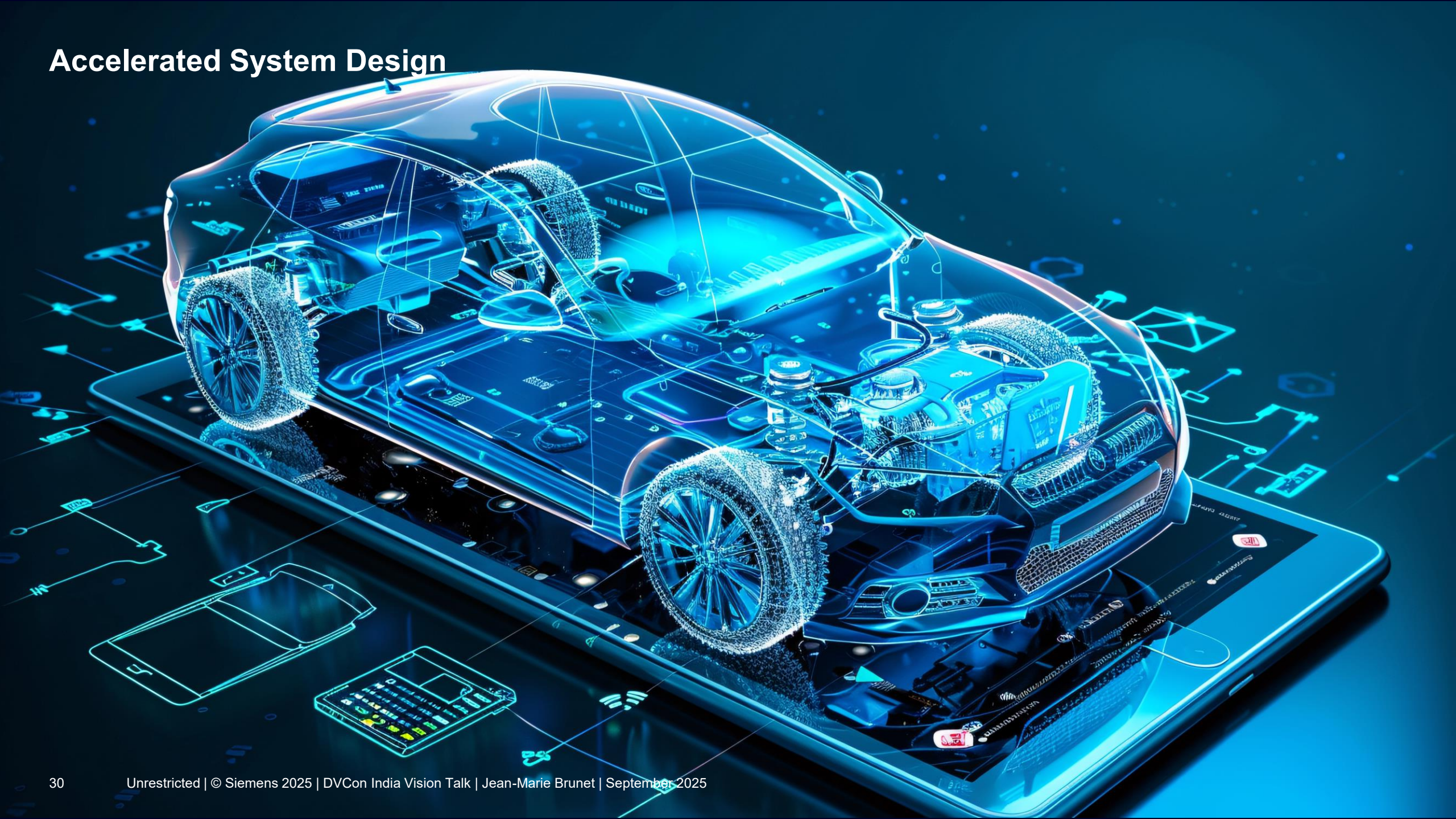
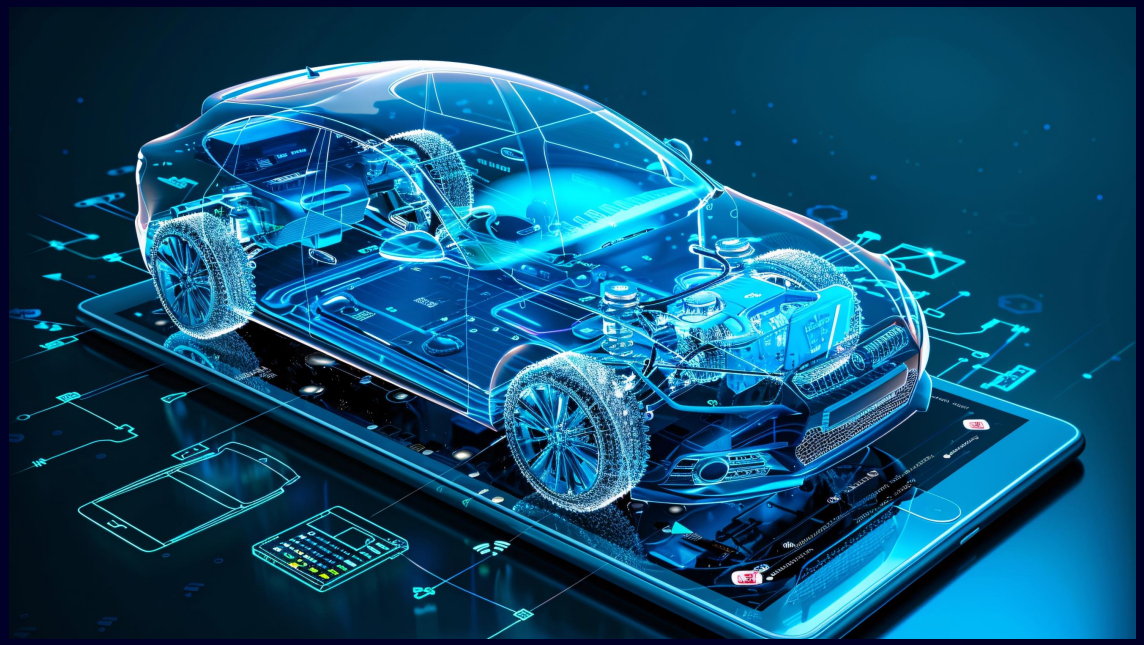
Accelerated System Design



PAVE360 support for Arm Zena Compute Subsystems



PAVE360 virtual platform allows Arm partners to begin software development before silicon is available

- Significantly reduces development time for new software solutions
- Allows full vehicle system awareness
- Parallel development with hardware
- Enables continuous verification

Siemens Software Defined Vehicle framework

- Pave360
- Innexis™ software environment
- Veloce™ hardware-assisted verification and validation system
- Teamcenter® software for Product Lifecycle
- Polarion™ for Application Lifecycle Management (ALM)
- Simcenter™ Prescan and Simcenter™ Amesim™ software for simulation

"With the help of virtual platform solutions like PAVE360 from Siemens, Arm is enabling our partners to begin software development on Zena CSS before physical silicon is available, significantly reducing development time for new software solutions."

Suraj Gajendra, vice president of automotive products and software solutions, Automotive Line of Business, Arm

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ARM Zena CSS support

NEWS | JUNE 4, 2025

Automakers Can Launch AI-Defined Vehicles a Full Year Sooner – Powered by Arm Zena CSS

By Dipti Vachani, SVP and GM of the Automotive Line of Business, Arm

PRODUCTS

Siemens and Arm work together to build Digital Twin solutions for AI-Defined Vehicle

June 4, 2025 • 5 MIN READ

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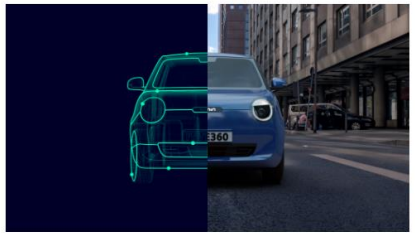
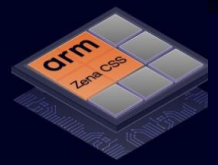
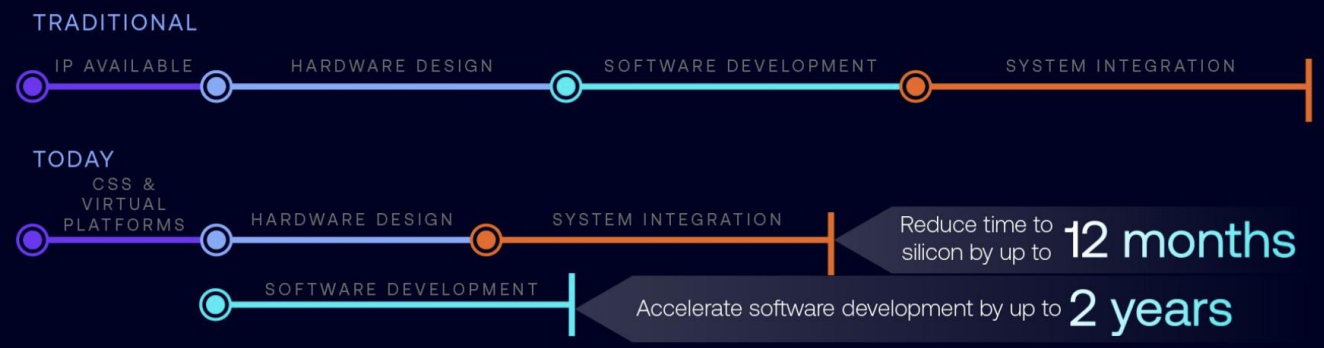


Meet Arm Zena Compute Subsystems (CSS)

Helping automakers deliver AI-defined experiences at least one full model year sooner





Arm at the center of innovation for AI-defined vehicles

Nearly **100%** of global OEMS use Arm

3x increase in Arm-based chip shipments to automotive in last 5 years

Top 15 automotive processor suppliers build on Arm

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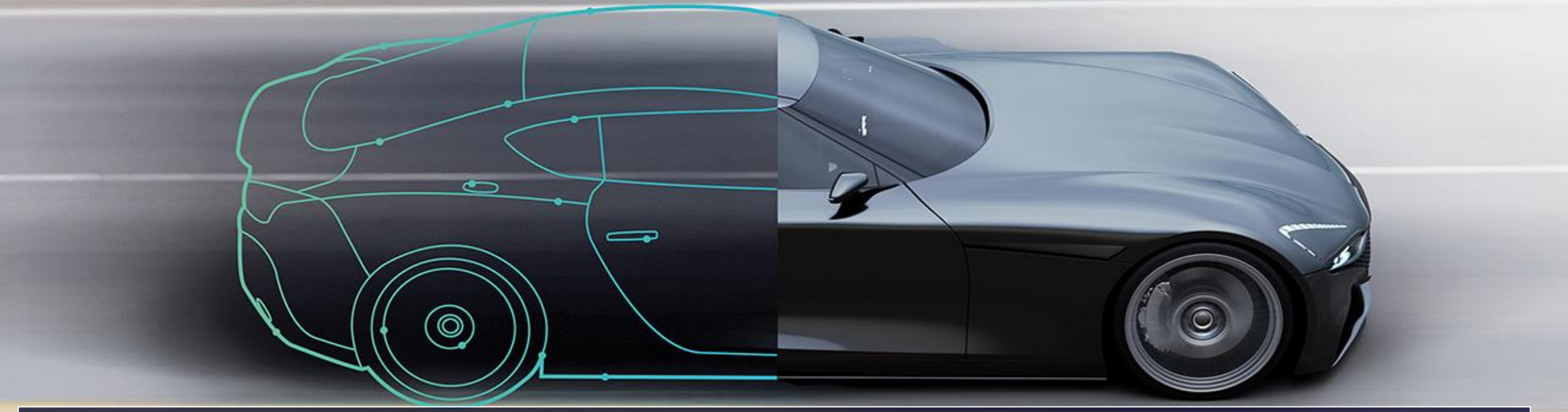
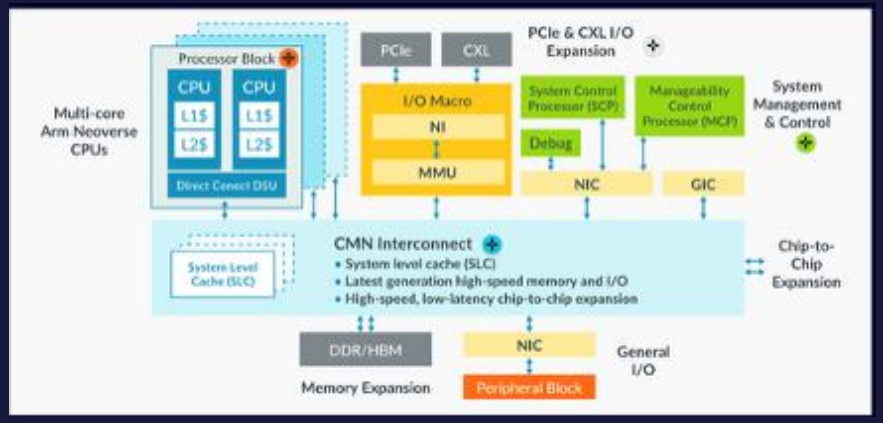
PAVE360 runs on AMD GPUs on Microsoft Azure cloud



"Our collaboration with Siemens and Microsoft allows automotive developers to leverage our leading AMD Radeon PRO GPUs and EPYC processors to power next generation ADAS and autonomous vehicle technologies. We are excited to support Siemens' PAVE360 on AMD systems to enable developers with advanced automotive digital twin environments and help accelerate SDV."

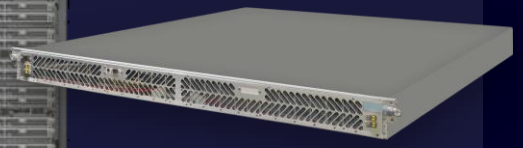
Salil Raje, senior vice president and general manager, Adaptive and Embedded Computing, AMD

Veloce CS Selected by Arm for Neoverse CSS Verification



Veloce Strato CS
4 Towers, 11 BG

Veloce Strato CS blade



Veloce proFPGA CS blade

Veloce proFPGA CS
10 blades

Veloce CS enables faster time-to-market for Arm's partner ecosystem through pre-validation and verification

Veloce Strato CS :

- High-performance emulation scaling from 40MG to 40BG
- Full visibility debug capability
- PCIe composite device for Arm Compliance Suite integration

Veloce proFPGA CS :

- Fast software prototyping scaling from single to hundreds of FPGAs
- Accelerated firmware, OS, and application development

"A core component of Arm Neoverse CSS is the pre-validation and verification, made possible by adopting innovative new tools like Siemens Veloce CS system, so that our partners can get their silicon solutions to market faster."
Karima Dridi, Head of Productivity Engineering, Arm

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We are ready

Siemens EDA is here to help

Thank You!

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