Andes Help You to Succeed

Andes May Help Japanese High Tech Industry

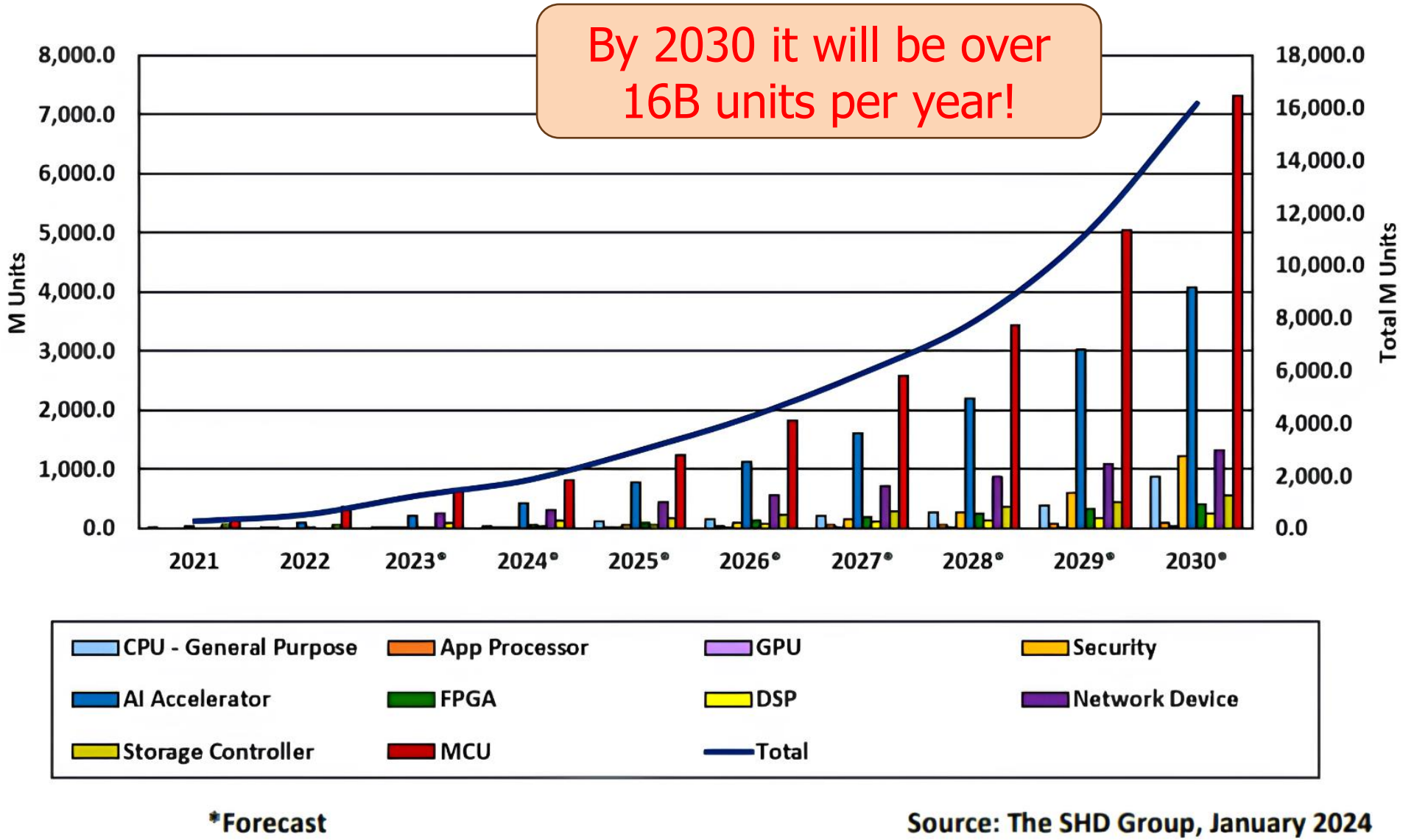
Frankwell Lin

Chairman & CEO of Andes Technology Corporation

BoD of RISC-V International Association

Chairman of RISC-V Taiwan Alliance

SHD Group: RISC-V Based Chip Shipment Grows Fast

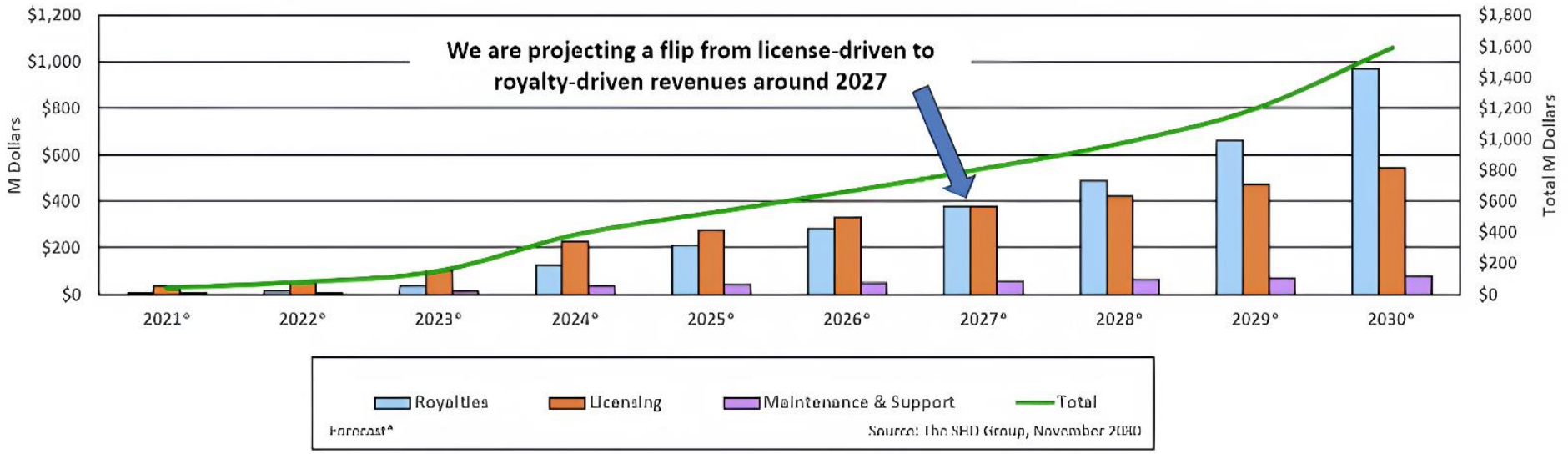


*Forecast

Source: The SHD Group, January 2024

“Andes Currently Has Over 30% SOM by Unit Volume…”

RISC-V IP Market Revenues to Grow



We estimate Andes currently has over 30% SOM by unit volume

RISC-V vendors in shipping SoCs

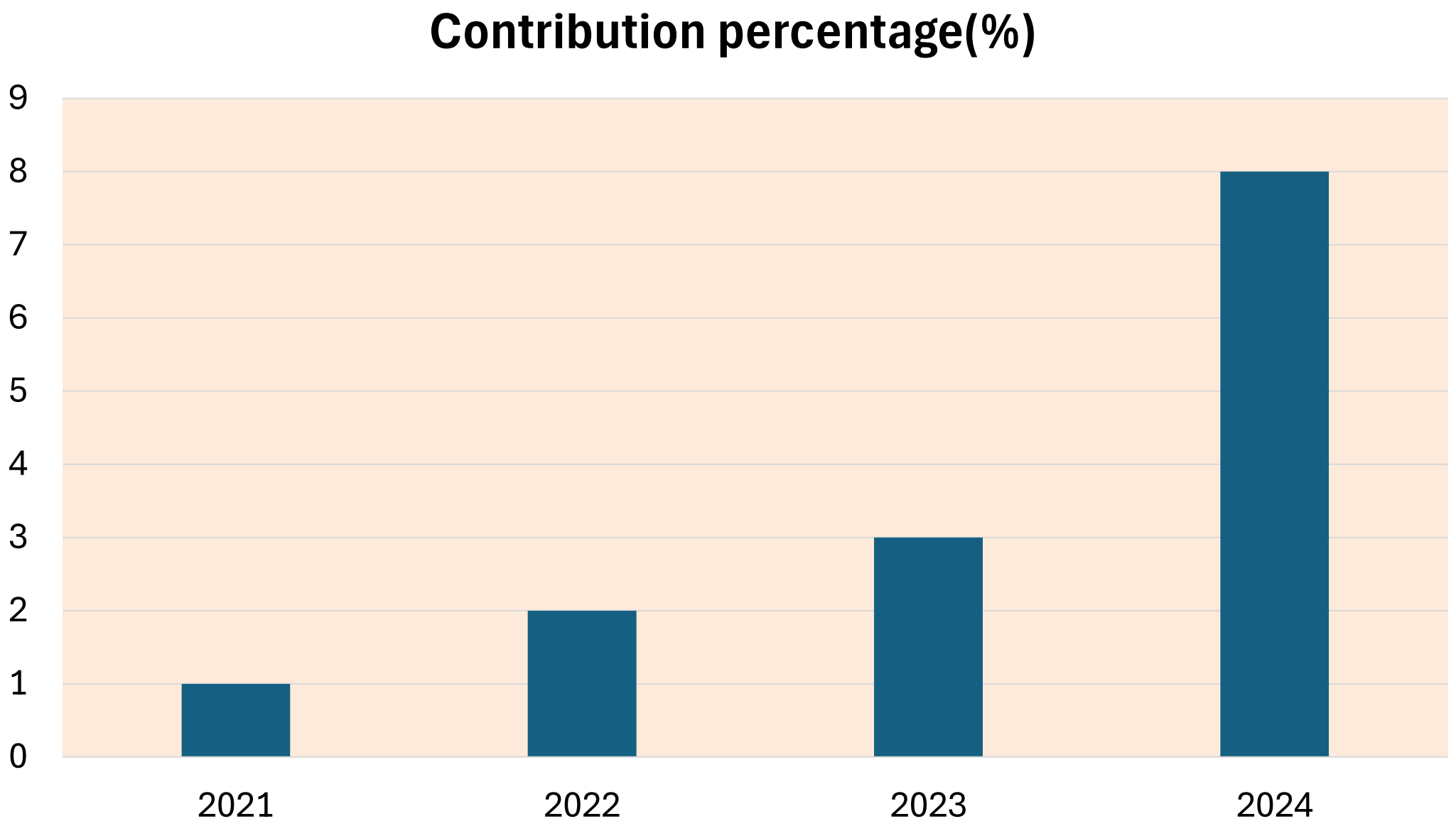
- Andes Technology
- Codasip
- DIY (home grown RISC-V)
- SiFive
- T-Head

New sources of RISC-V IP expanding the market

- Imagination Technologies
- Synopsys
- Tenstorrent
- Ventana Microsystems
- others

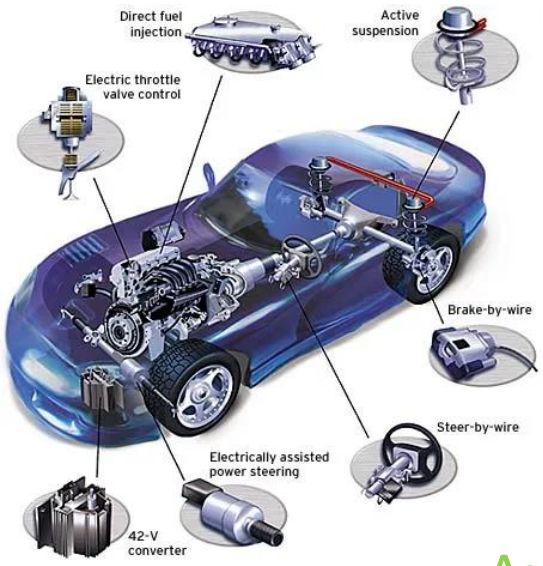
the SHDgroup

Automotive Application Contribution to Andes



Automotive Trends

x-by-wire



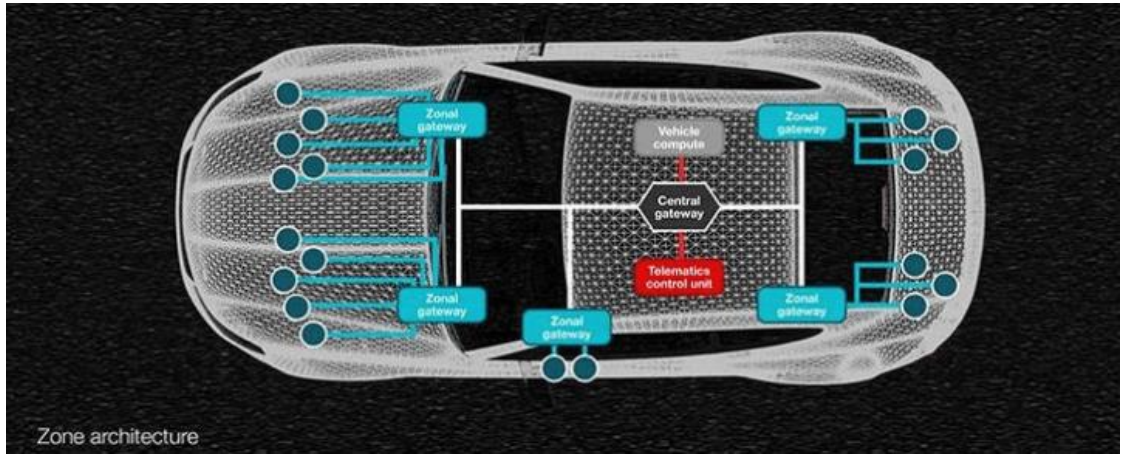
V2X

Electrification

Autonomous Driving

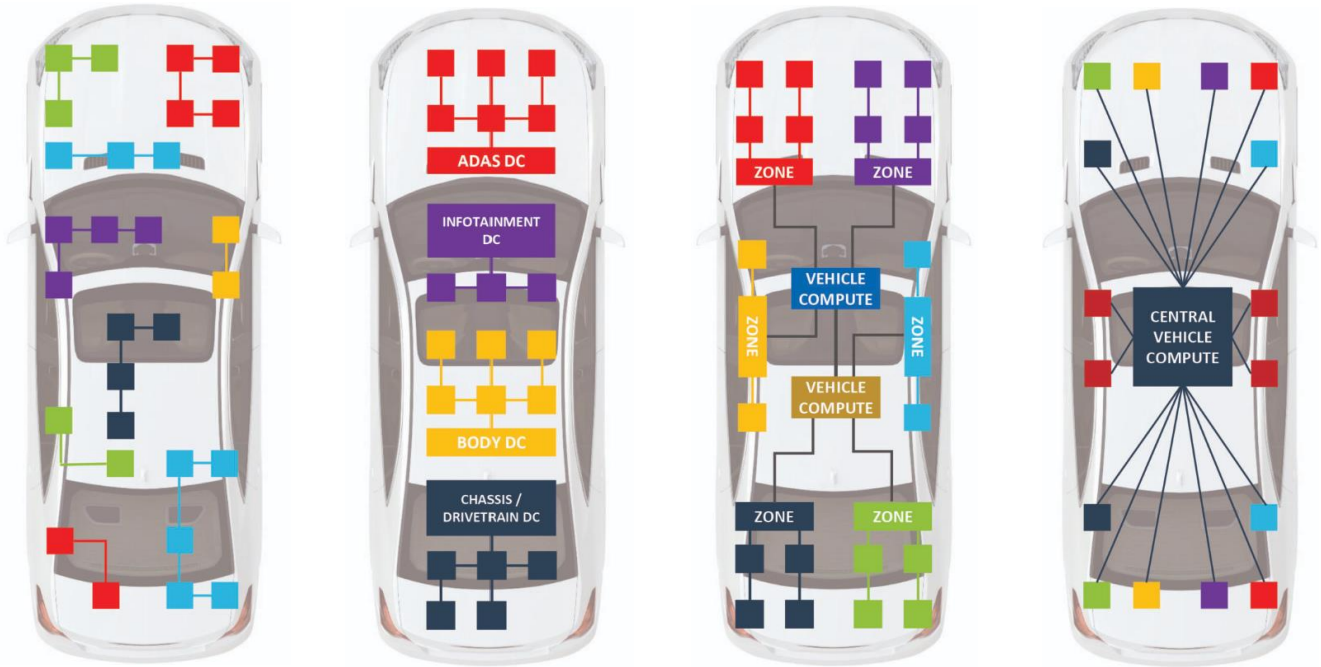
https://www.acrosser.com/en/Solutions/Autonomous-Driving-Servers/

SDV



Automotive E/E Architecture Evolution

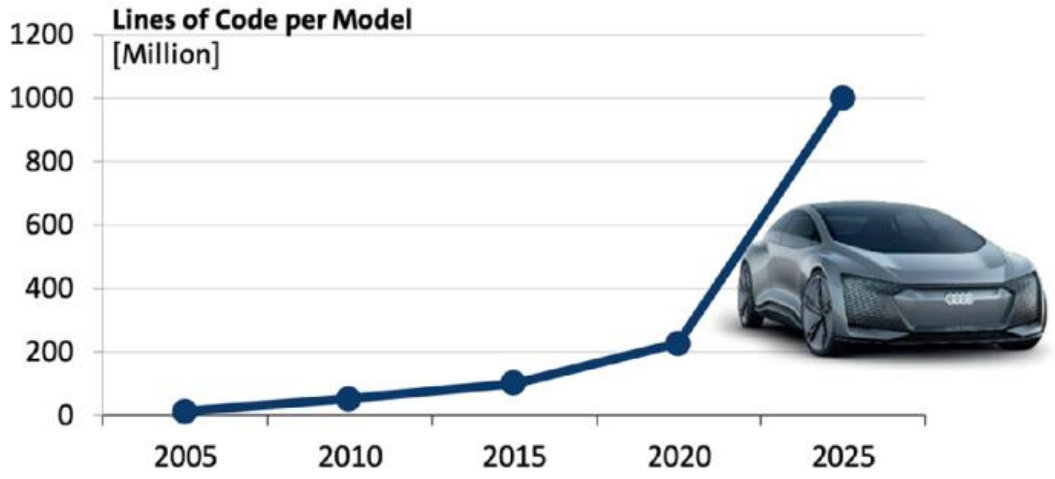
Moving from de-centralized to centralized



Legacy (Independent ECUs) | Domain Controller | Zone Controller | Central Vehicle Compute

Increasing SW Complexity

- > 200 - 300 million lines of code are expected
- Level 5 autonomous driving will take up to 1 billion lines of code



Source: Vision Digitised Automotive Industry 2030

Great fit for RISC-V!
Common architecture can be optimized **across use-cases**

Why Functional Safety?

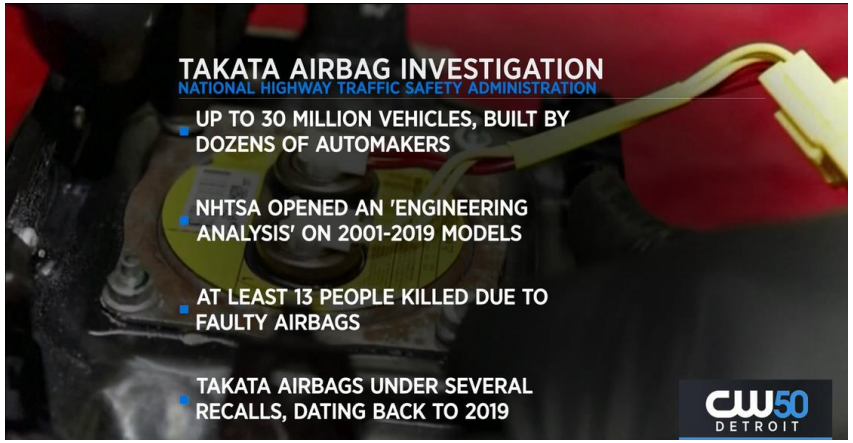
Toyota "Unintended Acceleration" Has Killed 89

A 2005 Toyota Prius, which was in an accident, is seen at a police station in Harrison, New York, Wednesday, March 10, 2010. The driver of the Toyota Prius told police that the car accelerated on its own, then lurched down a driveway, across a road and into a stone wall. (AP Photo/Seth Wenig) / AP PHOTO/SETH WENIG

Unintended acceleration in Toyota vehicles may have been involved in the deaths of 89 people over the past decade, upgrading the number of deaths possibly linked to the massive recalls, the government said Tuesday.

The National Highway Traffic Safety Administration said that from 2000 to mid-May, it had received more than 6,200 complaints involving sudden acceleration in Toyota vehicles. The reports include 89 deaths and 57 injuries over the same period. Previously, 52 deaths had been suspected of being connected to the problem. http://www.cbsnews.com/news/toyota-unintended-acceleration-has-killed-89/

https://users.ece.cmu.edu/~koopman/pubs/koopman14_toyota_ua_slides.pdf



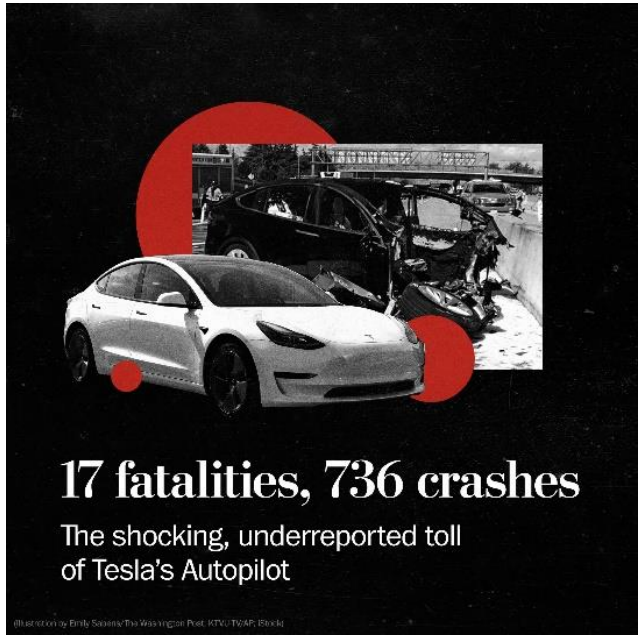
The New York Times

Takata, Unable to Overcome Airbag Crisis, Files for Bankruptcy Protection

PRODUCT RECALLS Published May 31, 2024 12:52pm EDT

Over 6M vehicles on road with Takata airbags, 10 years after recall

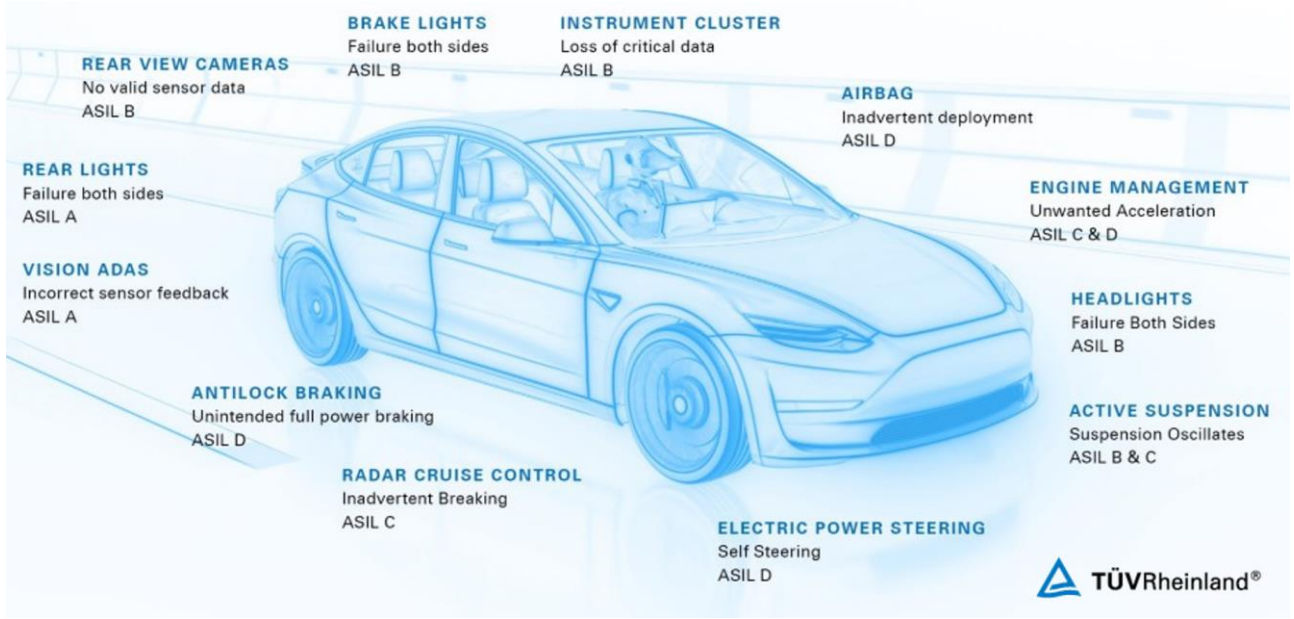
Over 100M Takata air bag inflators have been recalled worldwide over the past decade

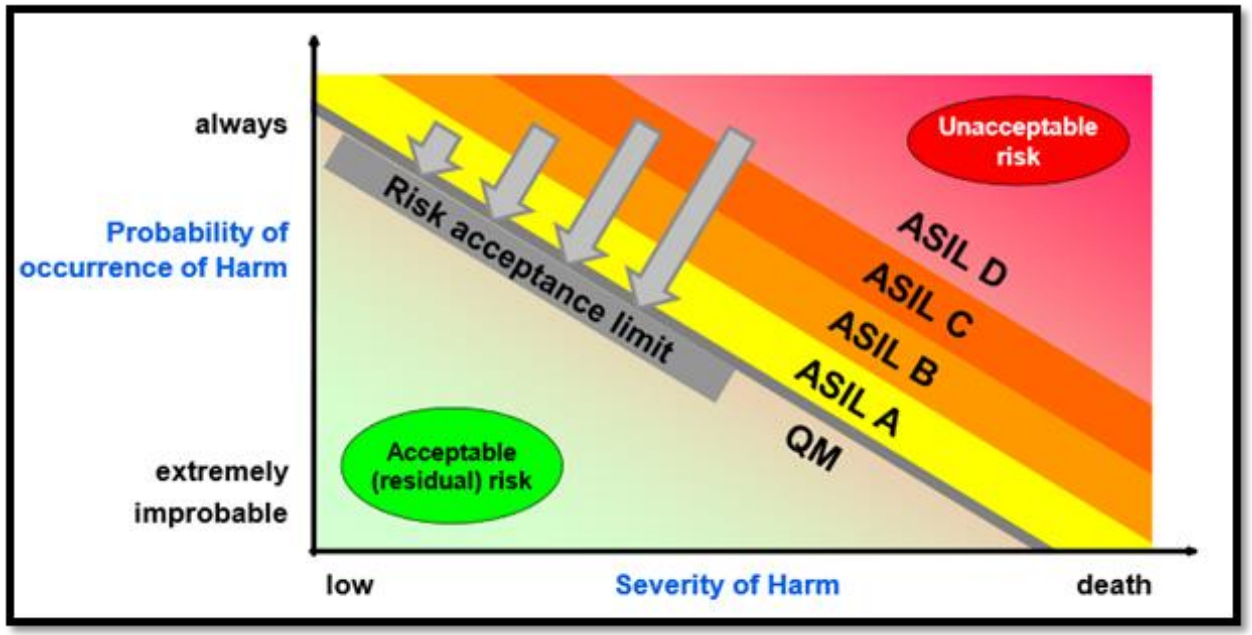


https://www.washingtonpost.com/technology/2023/06/10/tesla-autopilot-crashes-elon-musk/

ISO 26262 Automotive Functional Safety

- **What is Functional Safety?**
  - **Absence of unacceptable risk** due to hazards caused by **mal-functional behavior** of electrical and/or electronic systems and the interactions of these systems
  - **ASIL:** Automotive Safety Integrity Level

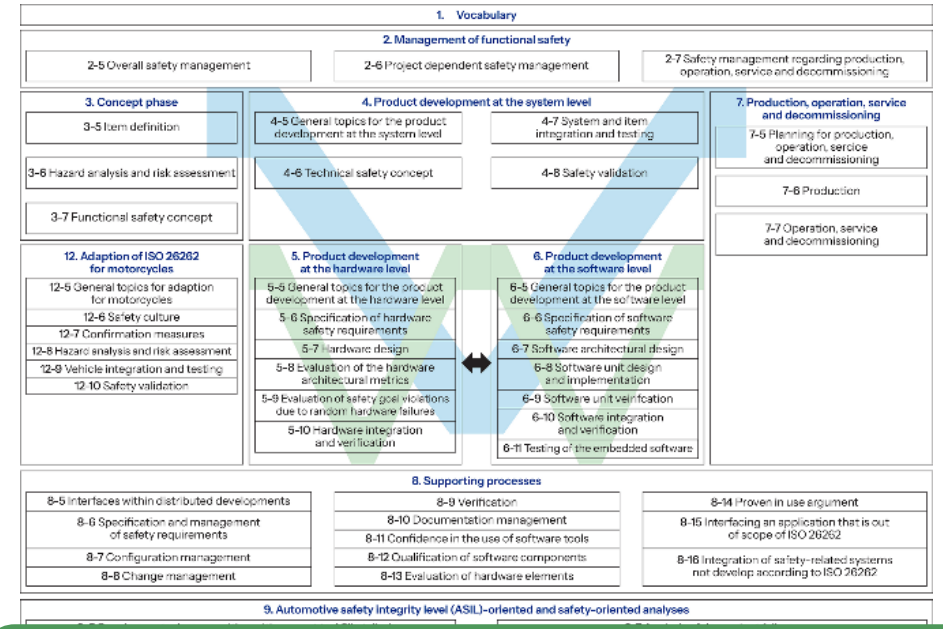




FuSa Failures

Systematic Failures (Preventable)

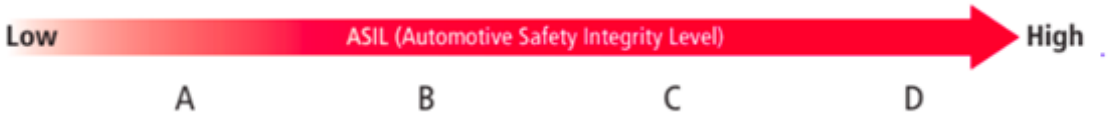
- Failure in design or manufacturing
- Solution: **Safety culture, safety** process and safety life-cycle management



Random Failures (Not Preventable)

- Soft errors, random defects
- Solution: detection and handling to a “safe state”

Failure merics for each ASIL level			
ASIL	Failure rate	SPFM(%)	LFM(%)
A	<1000 FIT	Not relevant	Not relevant
B	<100 FIT	90	60
C	<100 FIT	97	80
D	<10 FIT	99	90



*FIT = 10^9 hours > 100K Years

Both **systematic and random** failures must be addressed
vendor should be **Certified to be Compliant** by proper authority

Andes ISO26262 Safety Enabled (SE) Family

Performance & Functionality

Andes' Design Processes Certified ASIL-D Compliant

World's 1st Fully Compliant RISC-V IP

N25F-SE
ASIL-B

D25F-SE
ASIL-B

D45-SE
ASIL-D

CERT planned

A6x-SE
ASIL-D

ECU

DCU / ZCU

VCU

Customer's Product Safety Certificate

CERT 2H25

D23-SE
ASIL-D

Soon!

Auto HSM

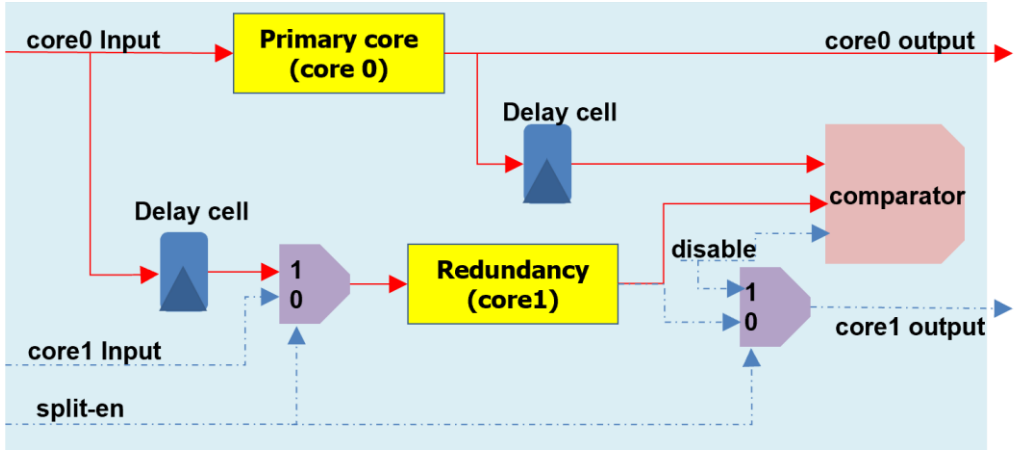
2020 ..... 2022 2023 2024 2025 2026

Andes SE Core Features

- **Baseline Safety Mechanisms**
  - Advanced ECC
    - Address Decoder
    - White Noise Protection
    - Error Status Indication
  - Core Trap Status Bus Interface
  - HW Stack Protection
    - StackSafe
  - NMI (Non-maskable Interrupt)
  - PMP / ePMP
- **Additional Safety Mechanisms**
  - Watchdog Timer
  - Bus Protection
  - STL (Software Test Library)

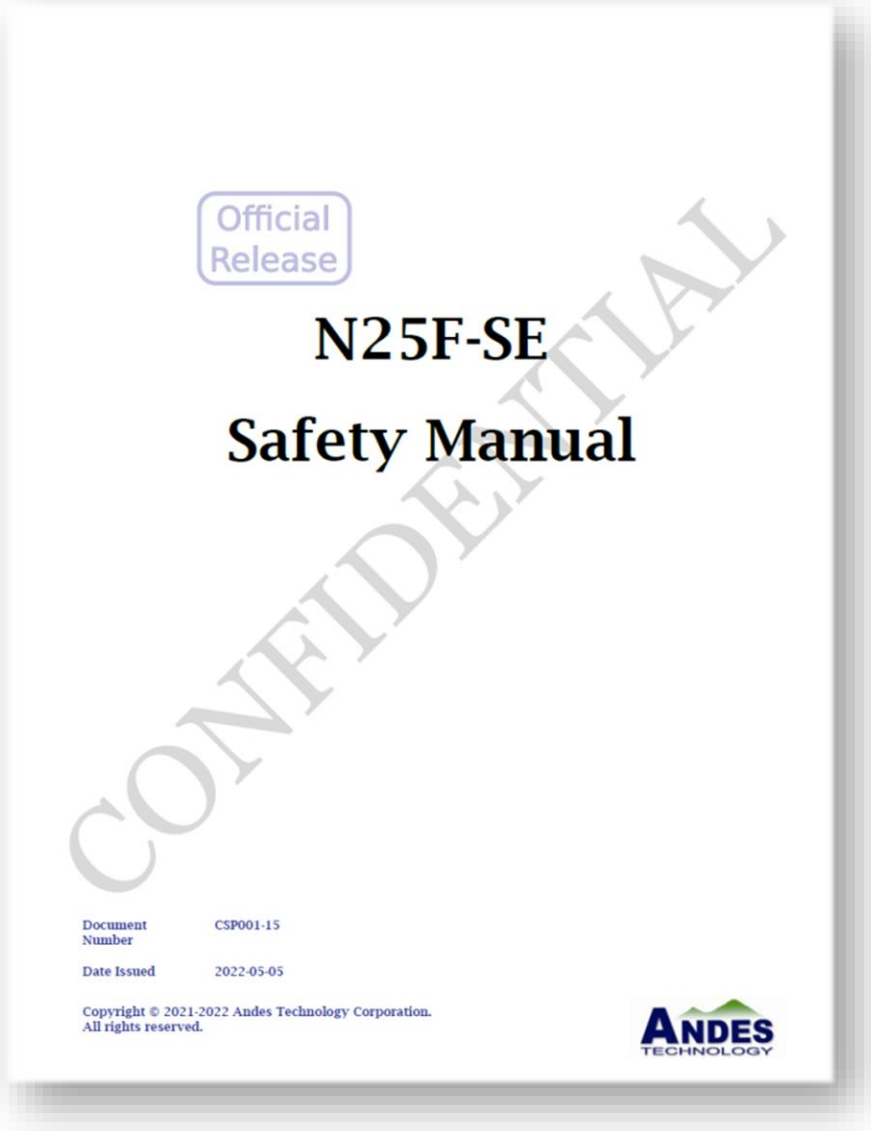
RESILTECH

- **Dual Core Lock Step (DCLS)**
  - For ASIL-D Implementations



Andes Safety Deliverables

- **Safety Manual**
  - Functional safety activities
  - Assumptions of use
  - Safety architecture overview
  - Fault detection and control mechanisms
  - Safety analysis results
- **Design FMEA Report**
- **Hardware FMEDA Report**
- **Development Interface Outline**



Andes Automotive Ecosystem

- ISO26262 Part 6: Product development at the software level must also be considered
- Andes' robust and active ecosystem

Safety RTOS

WITTENSTEIN
SAFERTOS

WNDRVR
VxWorks

Microsoft
Microsoft Azure RTOS

AUTOSAR

VECTOR
AUTOSAR

SIEMENS
Capital VSTAR
Nucleus SafetyCert

FPT Fpt Software
MaaZ AUTOSAR

Compiler / Debugger / Tool

iar
EWRISCV

Green Hills SOFTWARE
MULTI IDE/Compiler
RTOS

TASKING
Compiler

ASHLING
RiscFree IDE/Compiler

LAUTERBACH DEVELOPMENT TOOLS
TRACE32 Debugger

LDRA ASSURED
LDRA Tool Suite

PARASOFT
Parasoft C/C++ Test

Security

Rambus
HSM / RoT

SECURE-IC THE SECURITY SCIENCE COMPANY
Securyzr™ SE

Virtual Open Systems
VOSySmonitoRV

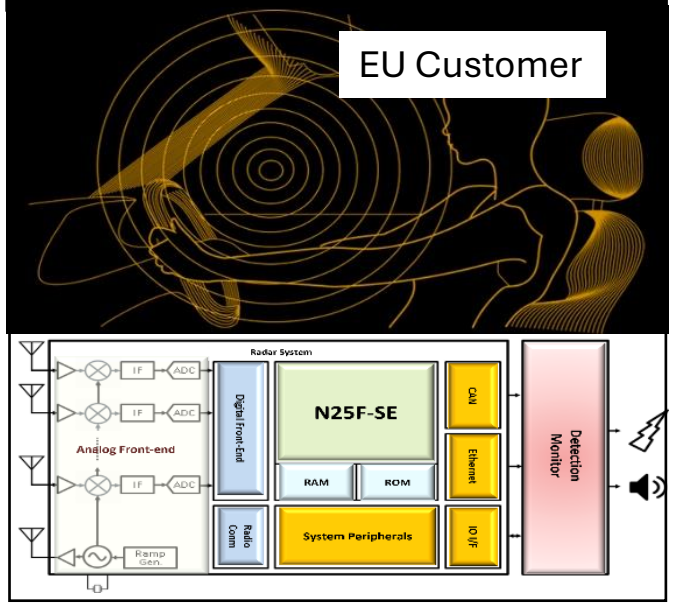
豆荚 Beanpod
KTrustKernel
TEE

Andes Automotive Customer Success

Display & Touch

Camera Sensor

In-Cabin Radar



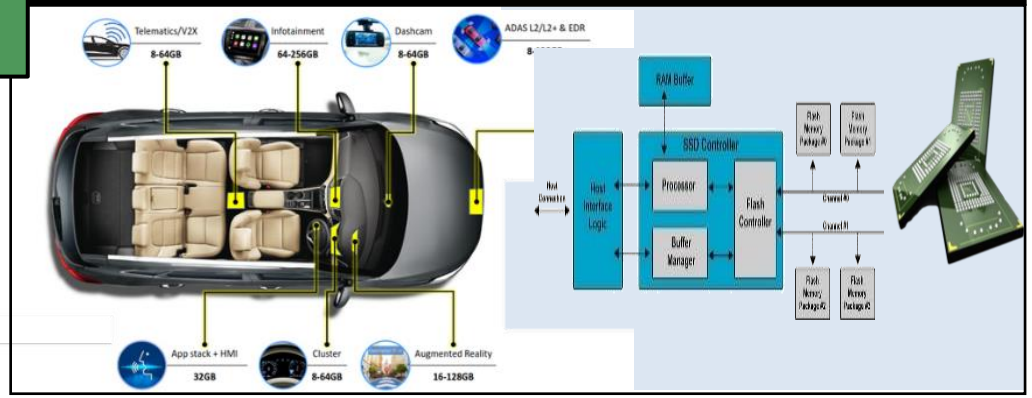
10+ SE core licensees

5+ mass production

2+ ISO26262 certified

Auto MCU

In-Vehicle Storage



2025 RISC-V Taipei Day

May 20-23 , 2025 | L0425, 4F, Nangang Exhibition Hall 1

Pavilion | A Four-Day Demonstration Pavilion at COMPUTEX 2025

Conference | A One-Day Technical Forum on May 21

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Thank You!

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