

SOFTWARE DEFINED VEHICLES:

Advancing a new software paradigm for autonomous driving.

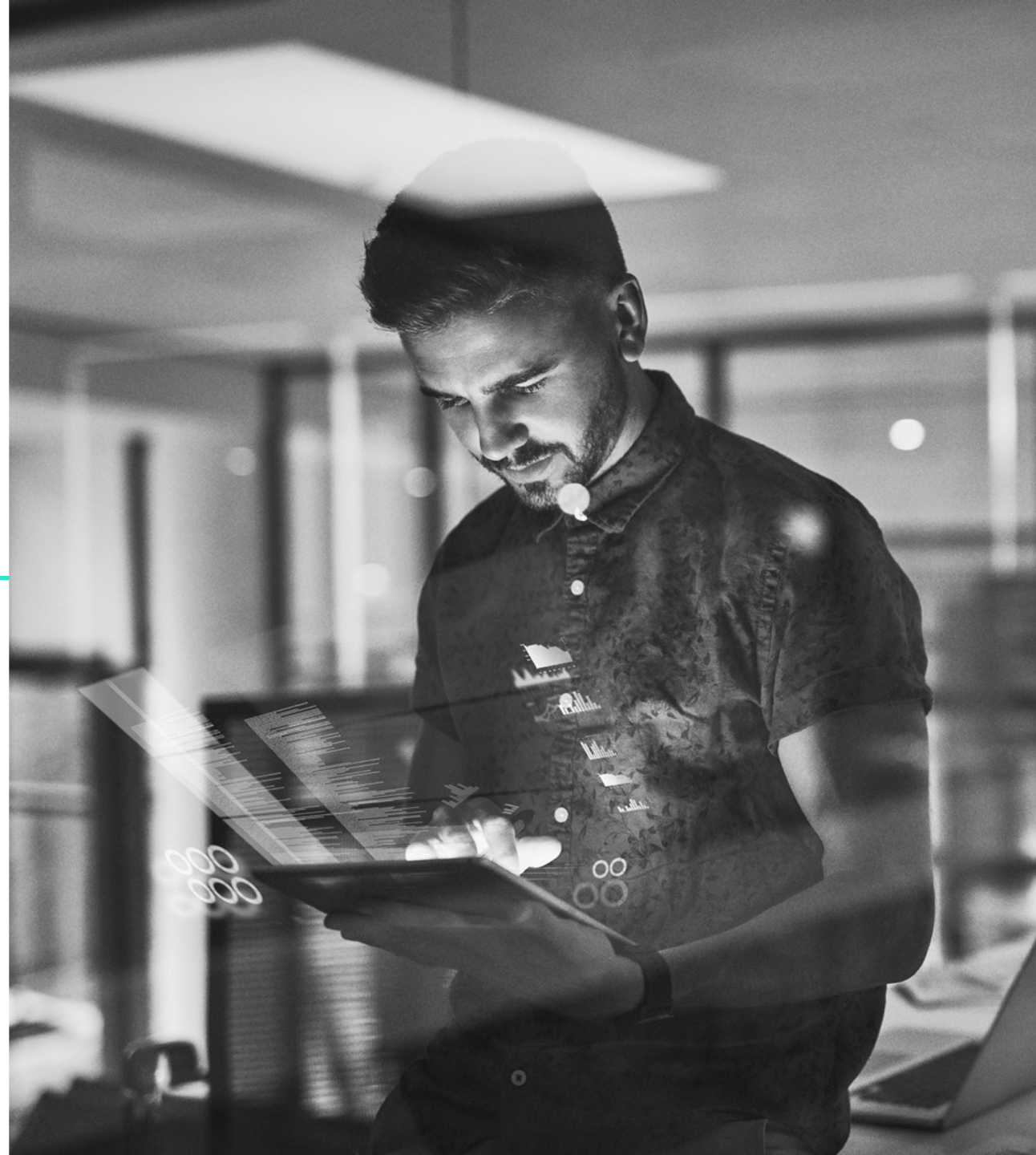
Diego Buffa – Field application engineer

3 November 2022

WINDRVR

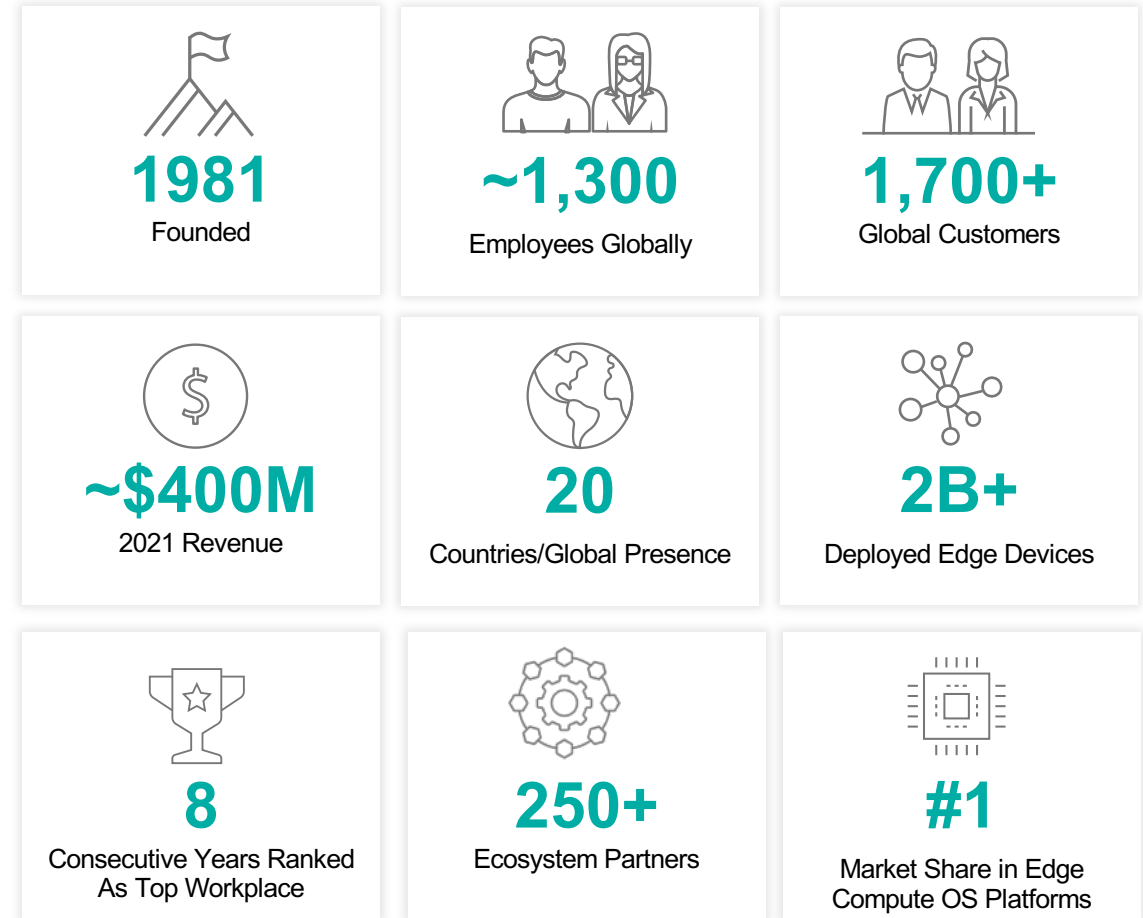
Wind River Systems

... not just that VxWorks Company



WIND RIVER AT A GLANCE

- 1** Global leader in delivering software for intelligent connected systems, offering a comprehensive, edge-to-cloud software portfolio
- 2** Technology and expertise that enable the **development, deployment, operations, and servicing of mission-critical intelligent systems**
- 3** Wind River technology found in **more than 2 billion products**
- 4** Award-winning customer support, a broad partner ecosystem, and world-class professional services
- 5** Headquartered in Alameda, CA, with **~1,300 employees, including 460 in R&D and 235 in GTM**



Agenda

1
Increasing complexity to manage

2
New opportunities and new challenges

3
Product lifecycle management revisited

4
IT technologies in the edge device domain

5
Q&A

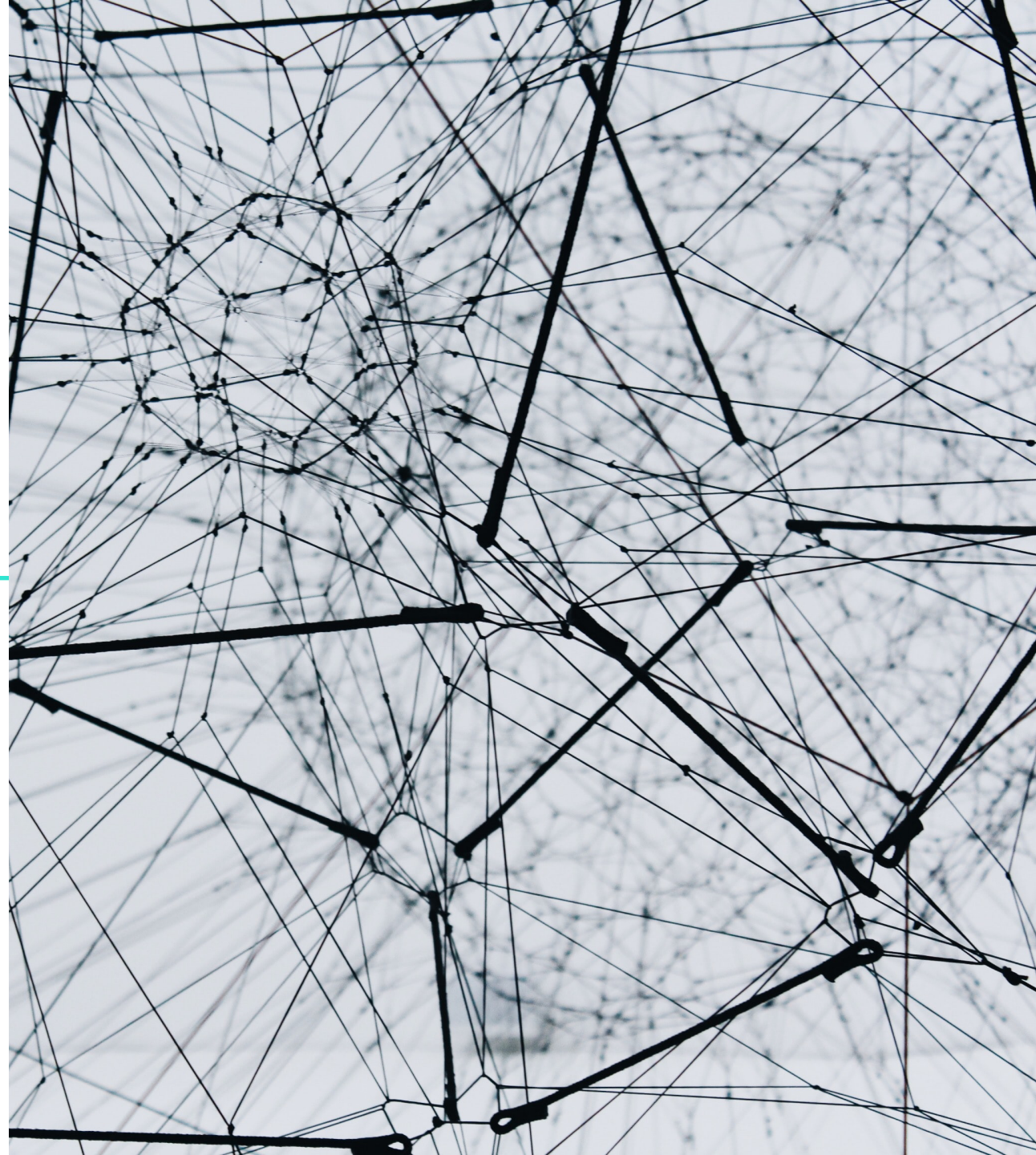
6
Conclusion

AUTOMOMOUS DRIVING IS ADDING COMPLEXITY TO THE AUTO INDUSTRY

~300M

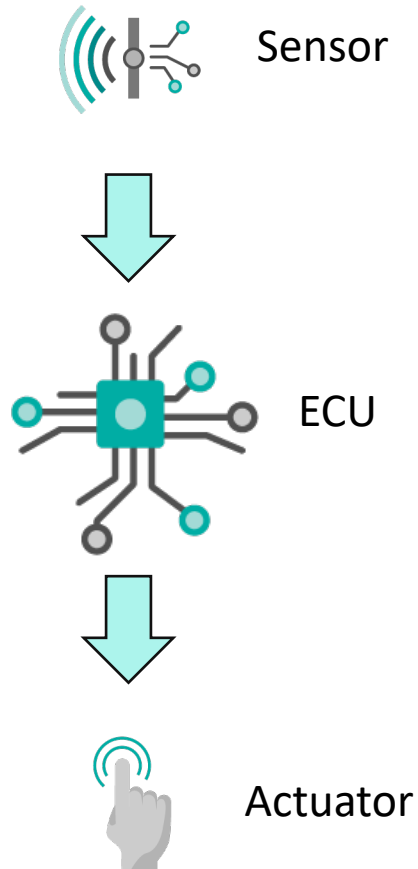
LINES OF CODE IN 2030

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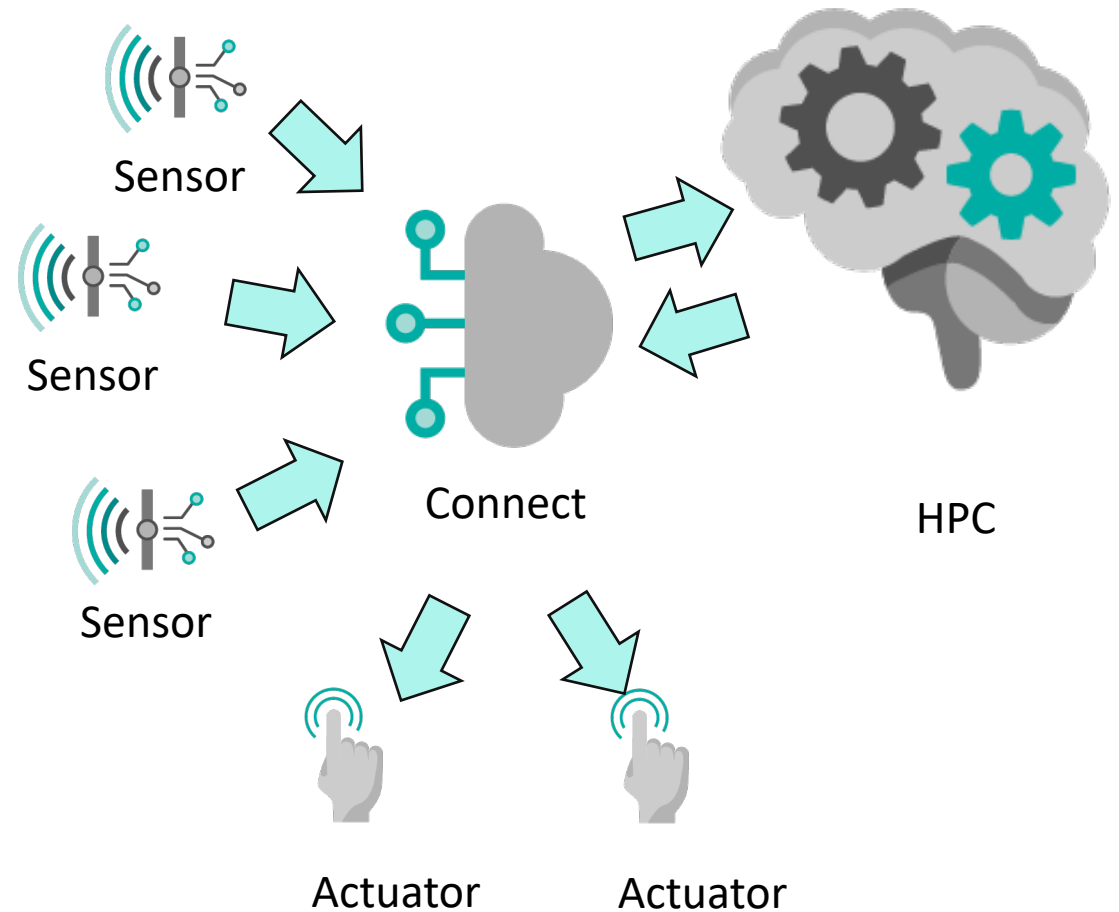


RE-DISTRIBUTING FUNCTIONS

- LOCALIZED CONTROL



- DISTRIBUTED CONTROL



FROM GEARS AND GREASE TO SILICON AND BITS

- Automotive technology is undergoing radical transformation from “**gears and grease**” to “**silicon and bits**”
- The static self-contained technology ecosystem is showing its limits
- Automotive manufacturers and OEMs need to **become software companies**
- **Software-Defined Vehicles (SDVs)** will unlock new features and more sophisticated autonomous driving capabilities which are critical to the continued **electrification/digitalization of transport**
- **New Architectural paradigms** need be implemented



FROM DISTRIBUTED TO ZONAL

EE architecture roadmap

Major EE developments and trends

The automotive industry moves towards centralized architectures to enable new features, reduce software and hardware complexity and cost

Illustrative

Distributed
(Established)



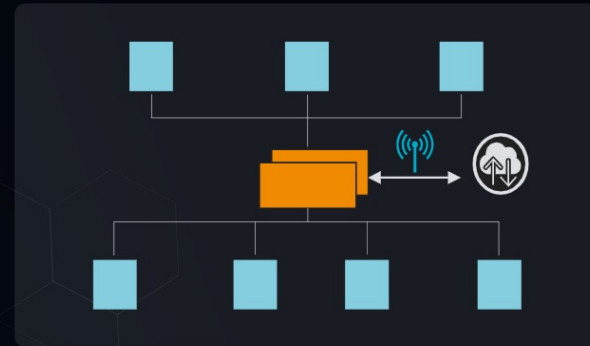
"One box - One function"

Domain centralized
(~2025+)



Domain consolidation

Central + zonal
(~2030+)



"Bifurcation"

Full abstraction of commoditized hardware

Value dominance of SoC and associated SW stack

■ Gateway
 ■ DCU
 ■ ECU/ sensors/actuators
 ■ Zonal ECUs (domain-independent)
 ■ Central/vehicle computer
 Cloud/backend

Source: Elektrobit, Bosch, Roland Berger

NEW SERVICES A CLICK AWAY

- No need to bring the car to the garage to add more horsepower (Tesla acceleration boost)
- MVP must be shorter and shorter (6 months across the industries)
- A/B testing must be possible
- ~300M lines of code in 2030 (18M in a Boing 747)*

*roland_berger_global_automotive_supplier_study_2018.pdf

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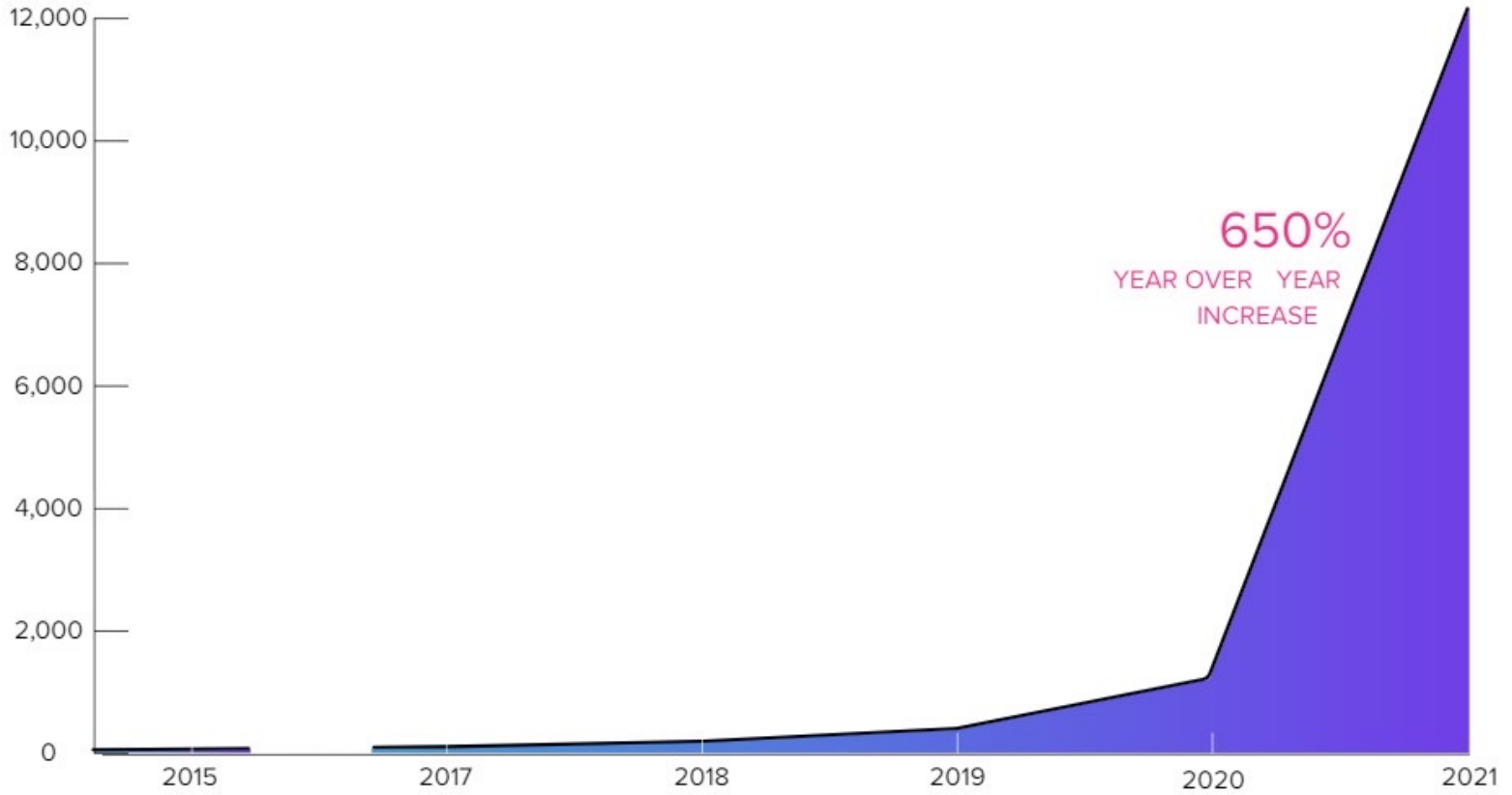
AUTOMOTIVE MUST DEAL WITH

- FUNCTIONAL SAFETY ISO26262
- SOFTWARE LICENSING
- LONG LIFECYCLE
- SUPPLY CHAIN
- CYBERSECURITY



CYBER SECURITY AND SUPPLY CHAIN

Next Generation Software Supply Chain Attacks (2015–2020)
Dependency Confusion, Typosquatting, and Malicious Code Injection



FULL LIFECYCLE MANAGEMENT FOR SOFTWARE DEFINED VEHICLE

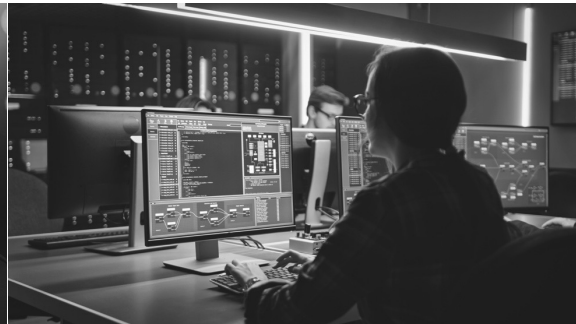
SINGLE PANE OF GLASS FOR COLLABORATION AS A MODERNIZED TEAM

DEVELOPMENT

DEPLOYMENT

OPERATIONS

SERVICES



- **REQUIREMENT** MANAGEMENT, DESIGN & CODING, VERSIONING, CODE SCANNING
- **SCALABLE BUILDS AND AUTOMATED** TESTING

- **AUTOMATE DEPLOYMENT** OF NEW SERVICES IN MINUTES

- **ANALYTICS** KEEP THE INTELLIGENT EDGE UP AND OPTIMIZED

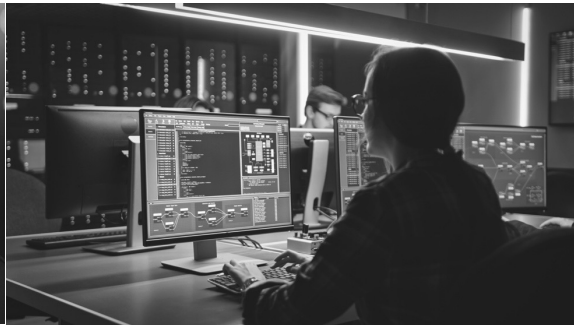
- **ACCELERATE** TO THE MACHINE ECONOMY THROUGH AUTOMATION, DIGITAL FEEDBACK LOOPS, AI, AND DATA INSIGHTS

FULL LIFECYCLE MANAGEMENT FOR SOFTWARE DEFINED VEHICLE

SINGLE PANE OF GLASS FOR COLLABORATION AS A MODERNIZED TEAM

DEVELOPMENT

DEPLOYMENT



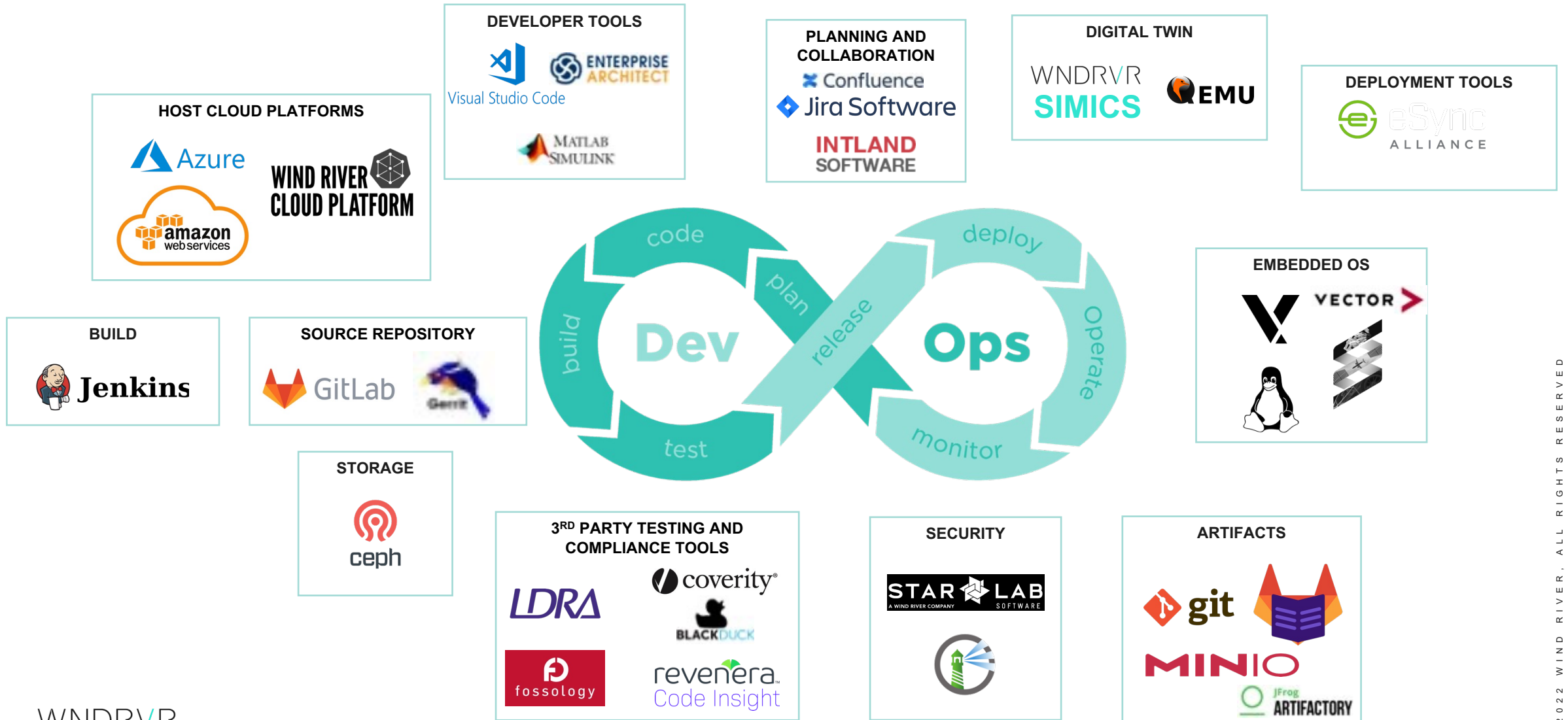
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DEVELOPMENT ENVIRONMENT

- Designed around cloud-native software development techniques to increase the efficiency of embedded software development
- Curated for and packaged with development licenses for marketing-leading products
- Based on open architecture
- Integrated tools for scan, build, debug, test automation, deployment and data management



FULL LIFECYCLE MANAGEMENT FOR A CLOUD-NATIVE WORLD



SECURITY LAYERED APPROACH

LAYER 1: SECURE SOFTWARE FACTORY AND BUILDING BLOCKS

LAYER 2: SECURE DEVICES AND INFRASTRUCTURE

LAYER 3: SECURE APPLICATIONS

LAYER 4: SECURE DATA

LAYER 5: MANAGED SECURITY SERVICES (SECURITY AS A SERVICE)

SOFTWARE FACTORY SECURITY CONSTRUCTS



Vulnerability Mitigation

- Proper risk assessment and vulnerability determination for effective mitigation

Access Control Through IdAM

- Strong identification and access management with PAM

Security Log Management

- Effective security audit logging

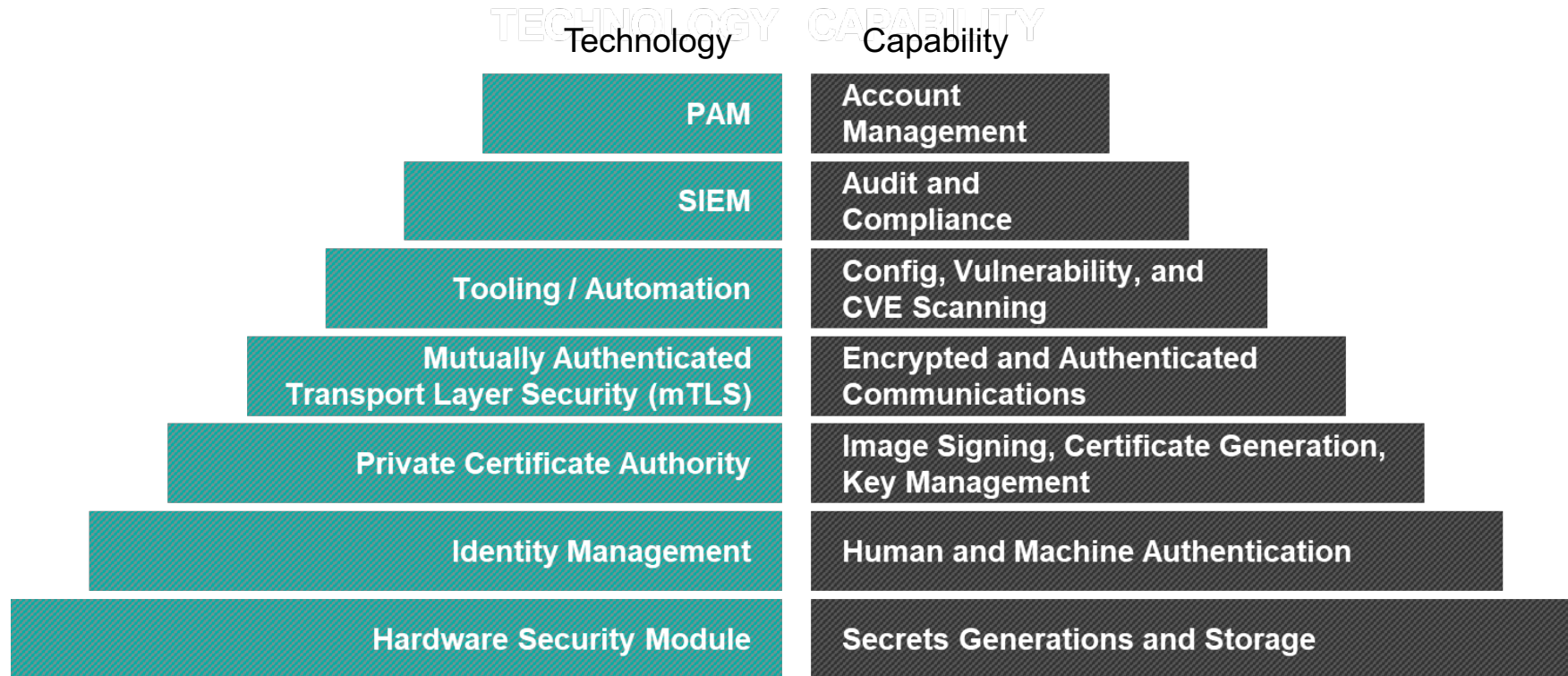
Effective Cryptography

- Key management and encryption best practices

Secure Communications

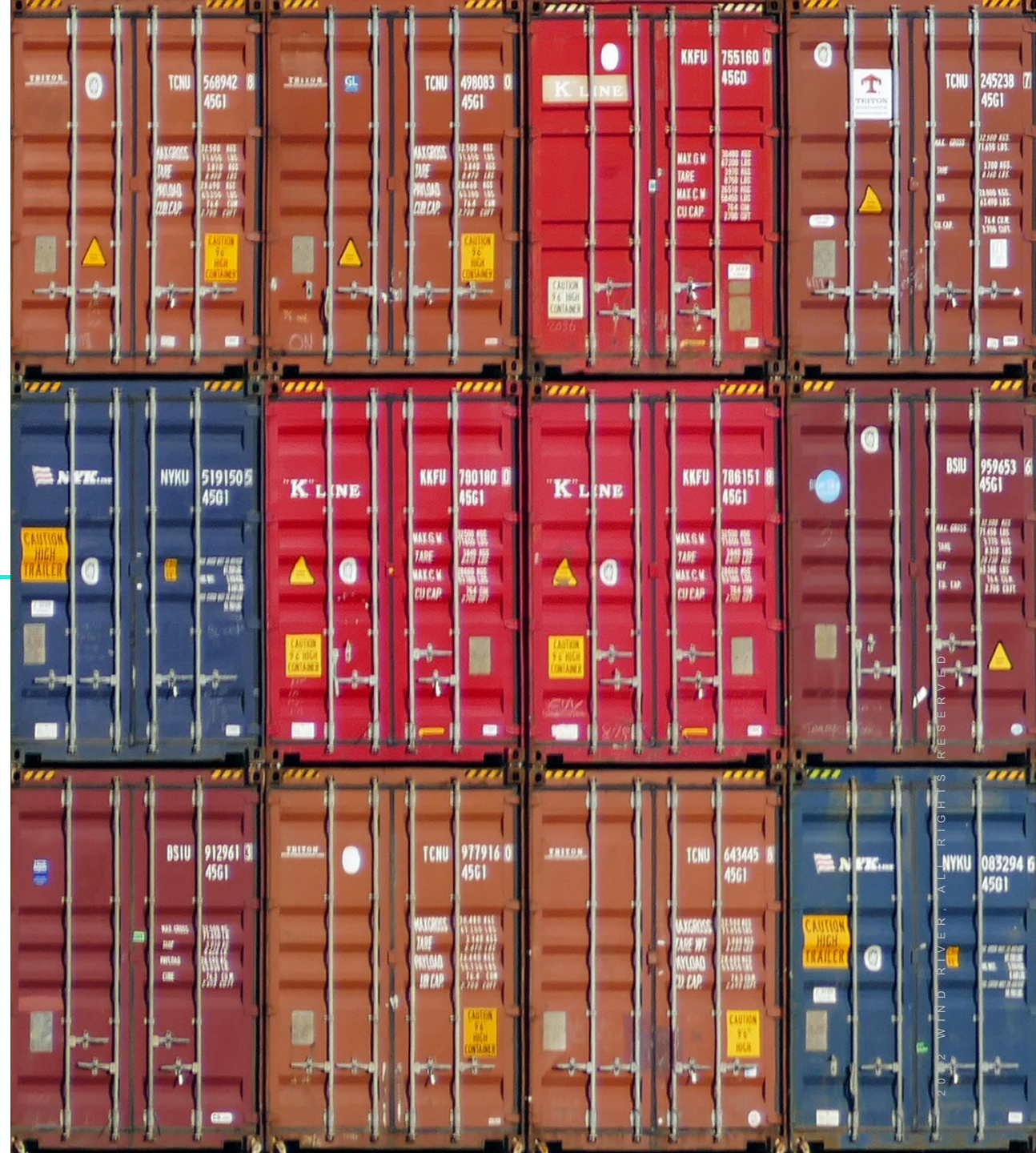
- Mutual authenticated intercommunication

MITIGATE VULNERABILITIES THROUGH INTEGRATED SECURE TOOLS AND PROCESSES



Studio Security Tools and Offerings Provide a Defense-in-Depth Approach to Mitigate Against Vulnerabilities

WHAT IS A CONTAINER?



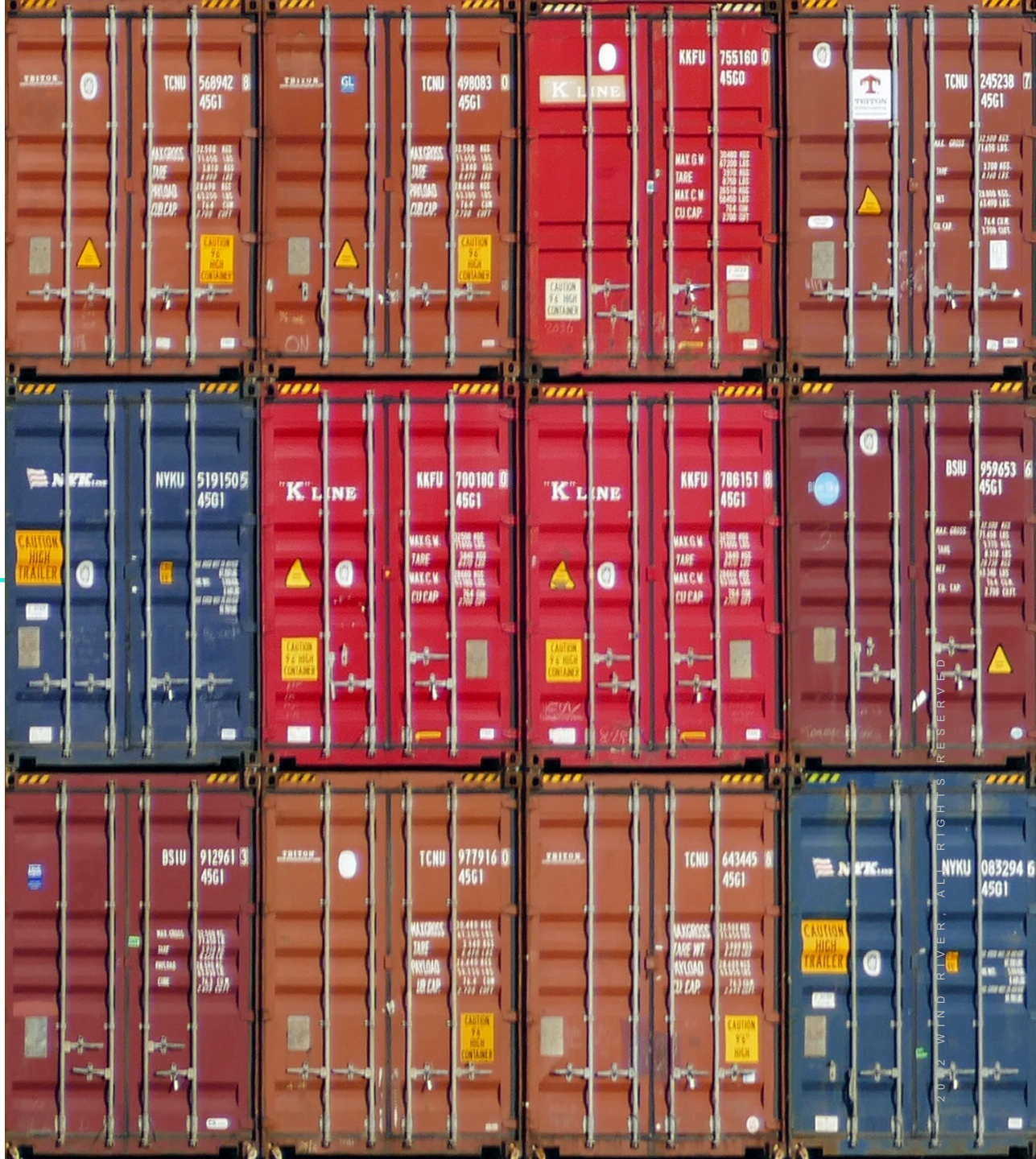
**A WAY TO ENABLE
SOFTWARE TO RUN
RELIABLY WHEN MOVED**

**CONTAINER TECHNOLOGY
IS A METHOD OF
PACKAGING AN
APPLICATION SO IT CAN
BE RUN WITH ISOLATED
DEPENDENCIES**

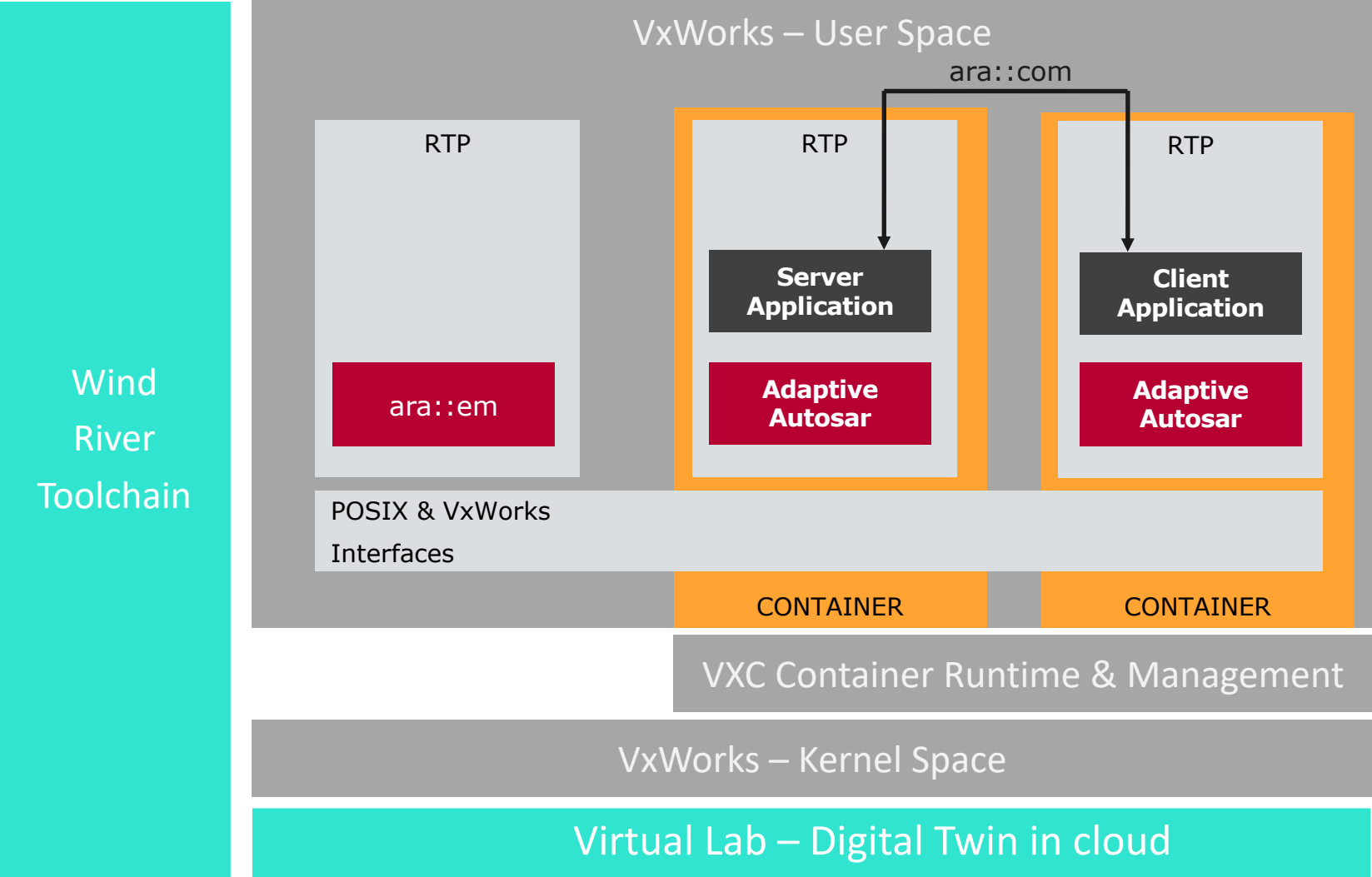
PERCENTAGE OF GLOBAL ORGANIZATIONS RUNNING CONTAINERIZED APPLICATIONS IN PRODUCTION BY 2025

85%

CONTAINER AND AutoSAR Adaptive

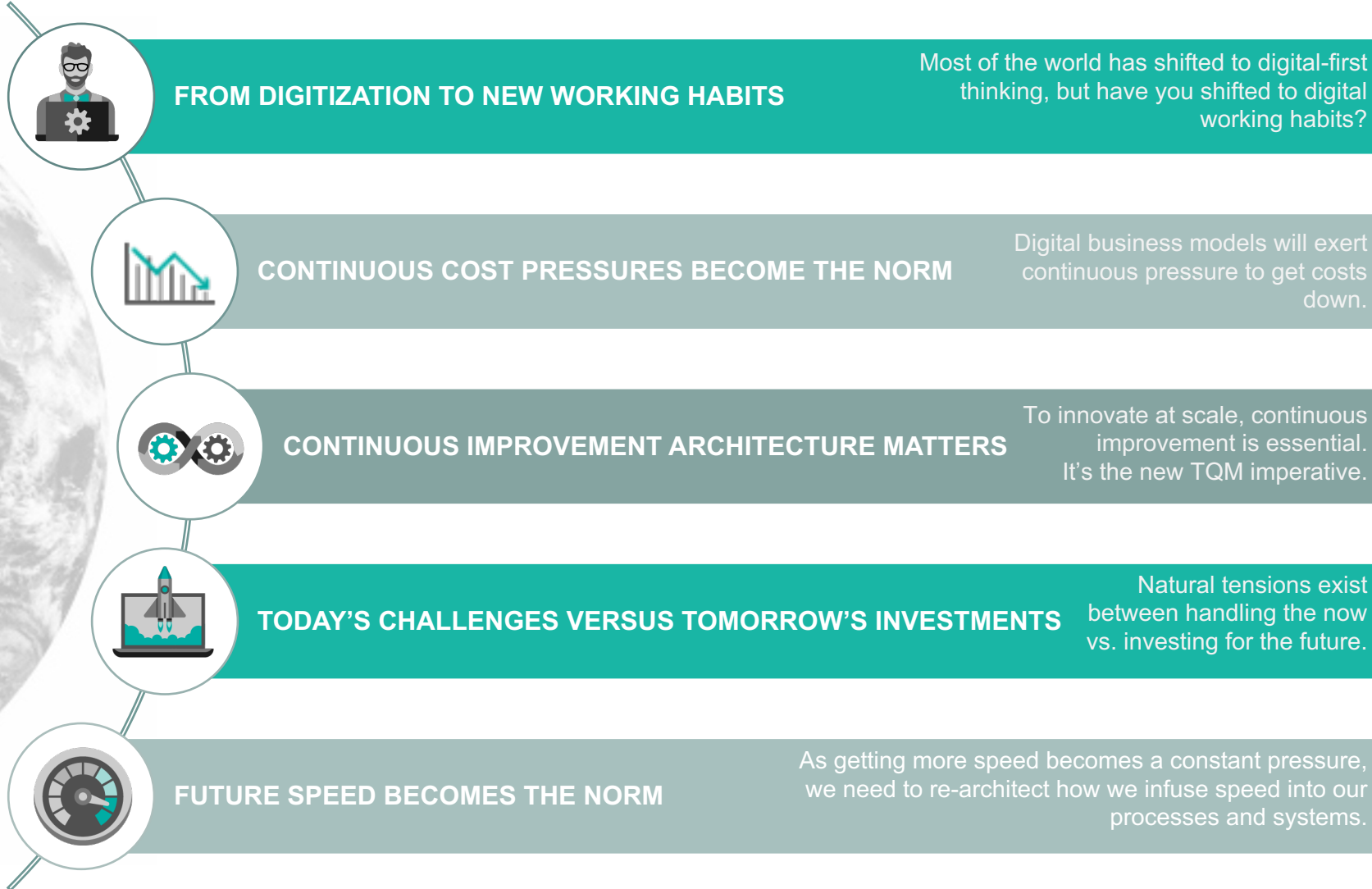


ADAPTIVE AUTOSAR AS OCI CONTAINER USING VXC CONTAINER RUNTIME



QUESTIONS & ANSWERS

THE FIVE DRIVERS OF AN EVOLVING WORLD



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