



AMBER

DXC'S AUTOMOTIVE DIGITAL COCKPIT'S PLATFORM SUPPORTING SOFTWARE-DEFINED PLATFORM TRANSFORMATION



“

The vehicle is not a car anymore; it's a software platform.

FROM ECU-CENTRIC TO SOFTWARE-DEFINED VEHICLES

As the industry shifts from ECU-centric architectures to software-defined vehicles, success depends on embracing virtualized, reusable software layers.



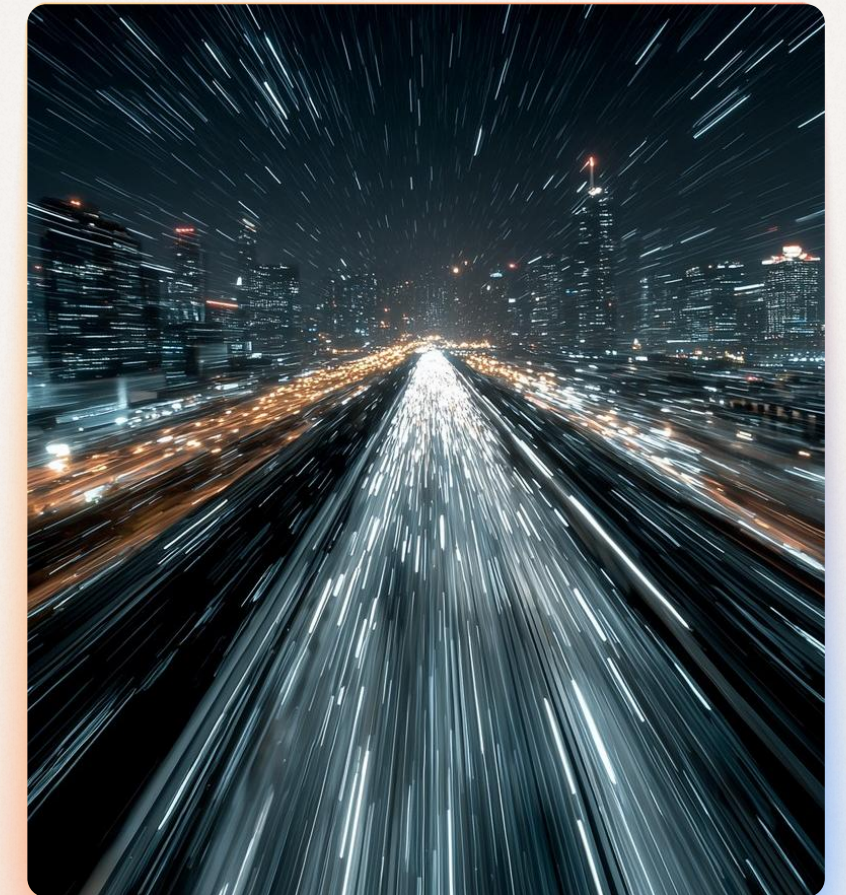
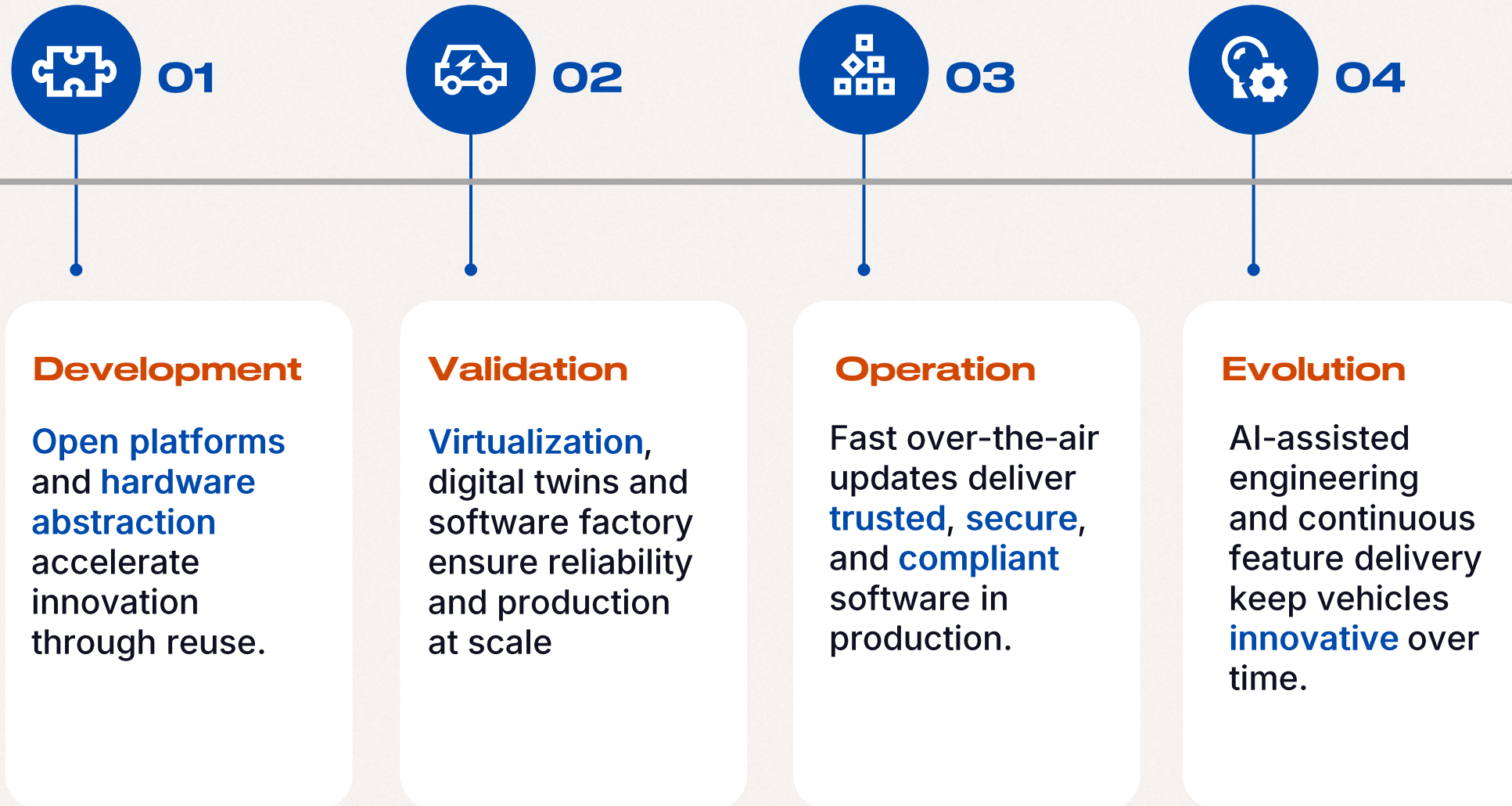
What's holding us back?

THE SDV PROMISE VS REALITY GAP



Everyone wants the benefits, but few can execute consistently.

INDUSTRIALIZING THE SDV



HOW IS THE MARKET RESPONDING TO THIS CHANGE?

Open platforms are on the rise

ECLIPSE S-CORE



Reusable features

Diagnostic, Fault management, application framework, etc... with a separation of concerns via a layered architecture & APIs



Process description

Compliant to relevant safety, quality and security standards



A reference implementation

S-Core modules, OS and BSP of established products in Automotive



Open

Open source, collaborative and modular



Source: Eclipsedev - score

Open frameworks are on the rise

GOOGLE SDV



Extends AAOS

To face poor portability, fragmented software and limited update capabilities issues



An automotive framework

A common framework for communications, diagnostics, and software updates



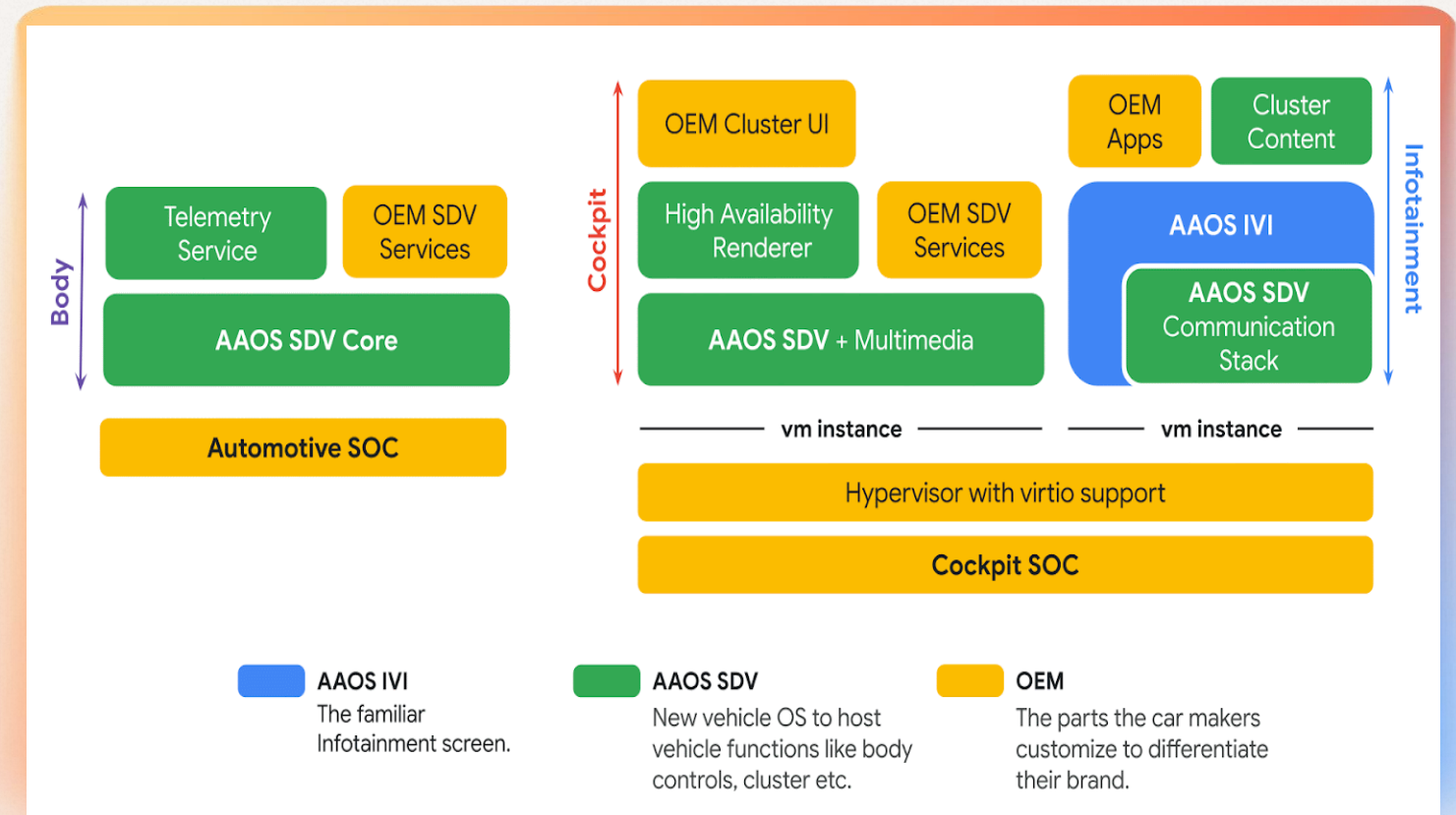
Cross-components

A headless native Android stack to power multiple software components across the vehicle



Open

Planned to be released and made publicly available and open source in the near future.



Source: *Beyond Infotainment: Extending Android Automotive OS for Software-defined Vehicles* (android-developers.googleblog.com)

ARE OPEN FRAMEWORKS ENOUGH TO GET AN SDV ON THE ROAD?

FROM OPEN FRAMEWORKS TO PRODUCTION REALITY

Carmakers win on software only if they can accelerate feature delivery by building on open software stack, but it is not enough.

Industrialization and long-term commitment are critical to turn this potential into scalable, production-ready outcomes.

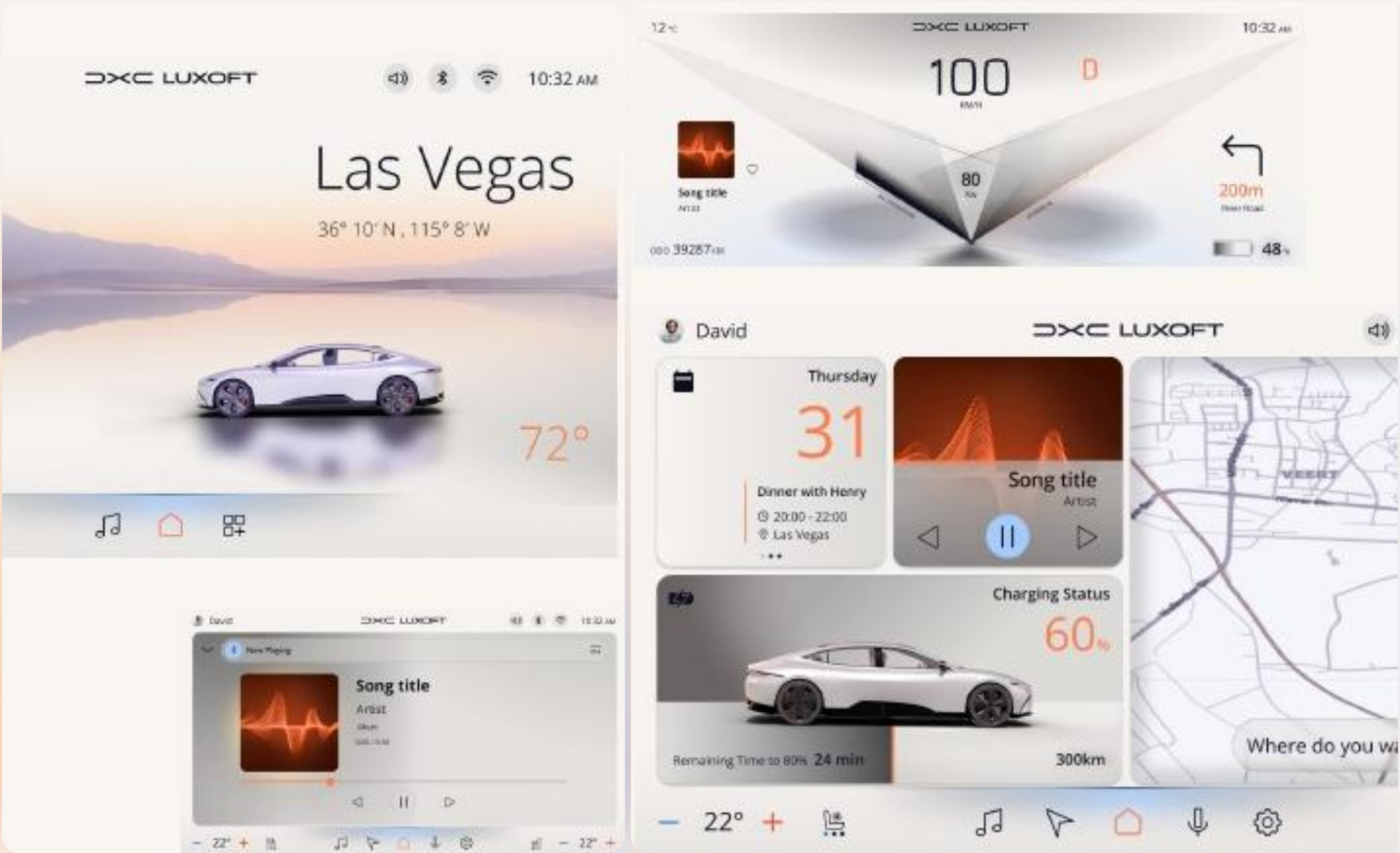
AMBER enables carmakers to use leading chip suppliers and open platforms, transforming them into fully integrated and validated systems to industrialize SDV.



AMBER

Automotive made better

AMBER gives carmakers the freedom to innovate, accelerate delivery and stay future-ready.



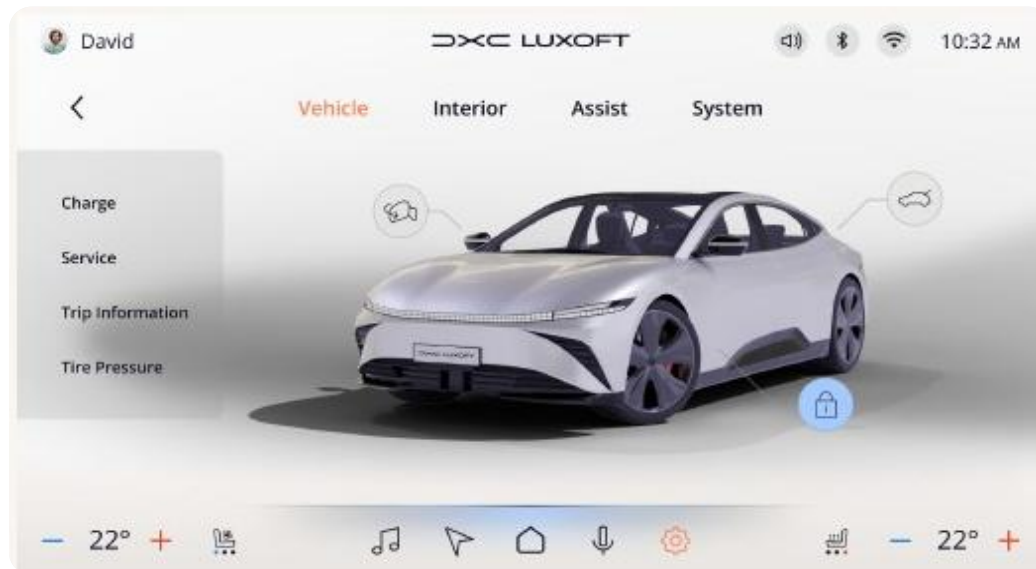
Automotive made better

POWERING SDV INNOVATION WITH AMBER

FROM OPEN PLATFORMS TO PRODUCTION REALITY

With capabilities to operate both **SW-Tier1** and **system integrator** roles, DXC has built the **AMBER platform** as tangible evidence of its capacity to deliver integrated, production-grade automotive software at scale.

Modular and interoperable by design, every asset follows a **plug-and-play** approach: ready to fit within existing environments, adapt as requirements shift, and keep pace with an evolving industry.



Compatibility by-design

Stay fresh and always compliant to upcoming open frameworks releases.



Built on open platforms

AMBER leverages open platforms like Google SDV and S-CORE as foundational layers, extending their value instead of replacing them.



From framework to production-ready vehicle

Transforms open platforms into fully integrated, validated, and OEM-grade systems ready for deployment at scale.



Tier-1 and system integration

Combine deep software ownership with end-to-end integration capabilities to deliver complete vehicle programs.

AMBER ECOSYSTEM

AMBER has a modular architecture that integrates leading chipsets and open platforms to build on best-in-class technologies and deliver production-ready SDVs.

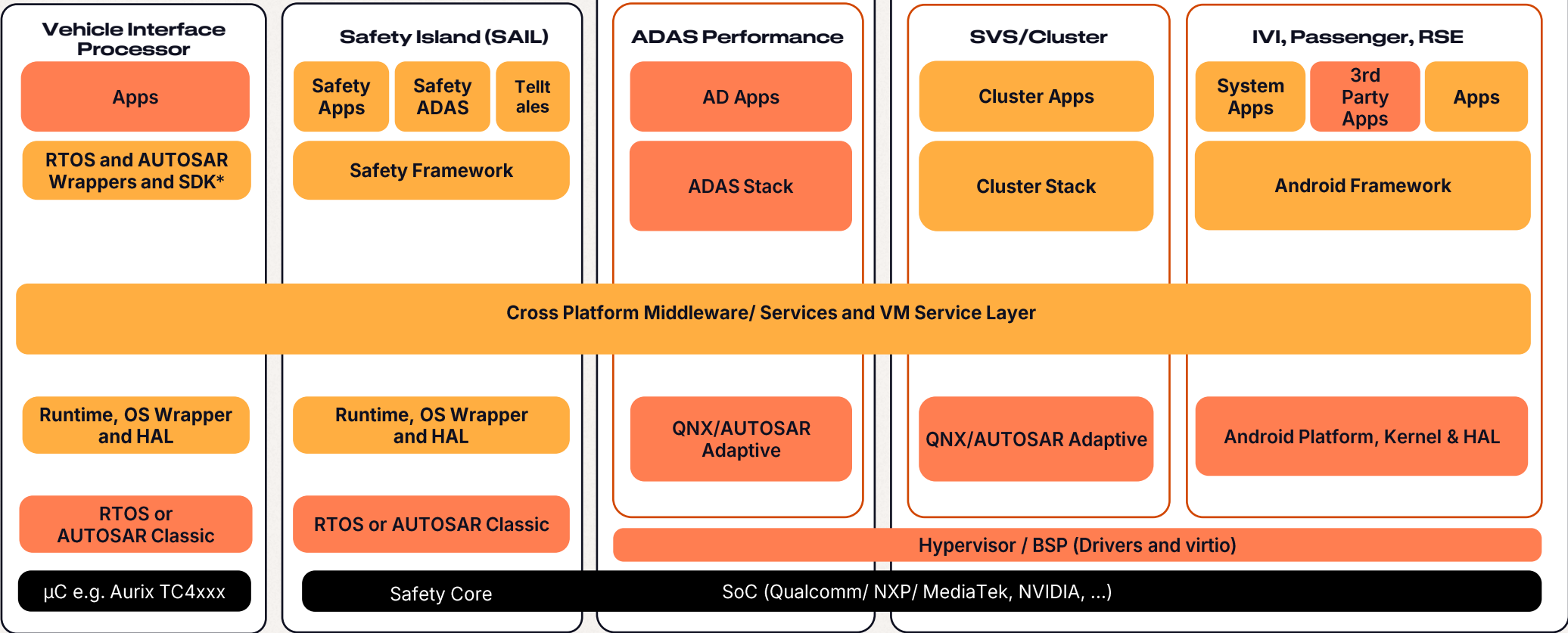
Qualcomm

MEDIATEK



ADAS Domain

Infotainment Domain



DXC Luxoft

Configuration & Integration

White Box Approach

Modular

Services Offered

AMBER PROFESSIONAL SERVICES CATALOGUE



CarPlay

Apple CarPlay connectivity with Seamless iPhone integration

Development & Integration



Android Auto

Google Android Auto projection. Smartphone mirroring

Development & Integration



Customer specific Middleware

Middleware layer
Vehicle services, data management

OEM specific MW Development & Integration (e,g S-Core).



Digital Cluster

Development Services

Safe Renderer, Cluster applications, FuSa pre-certifications Development & Integration



3rd Party IP Integration

Integration of 3rd Party IP for Navigation, Speech, AI Assistance, App-Store, AR, Audio/Video/Tuner

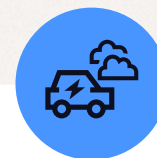
Development & Integration



AAOS Upgrade Service

Full AAOS upgrade service, incl. compliance testing

Service



Vehicle Emulator Cloud

Cloud-based vehicle simulation. Remote development environment

Development & Integration



Customer specific Software Factory

CI/CD pipeline, build automation. Test infrastructure

Development & Integration



OEM Certification Support

Support for OEM certification & compliance testing (AAOS, AA, CP). Documentation, test reports

Service



Integration & Maintenance

Support for OEM/Tier-1 Digital Cockpit + AD/ADAS platform integration & maintenance

Integration & Maintenance

AI ACROSS THE ENTIRE SDV LIFECYCLE

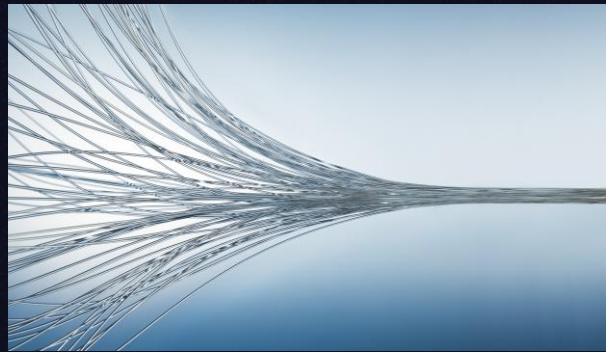
DXC AI CAPABILITIES



Governance & Compliance

Control and regulation

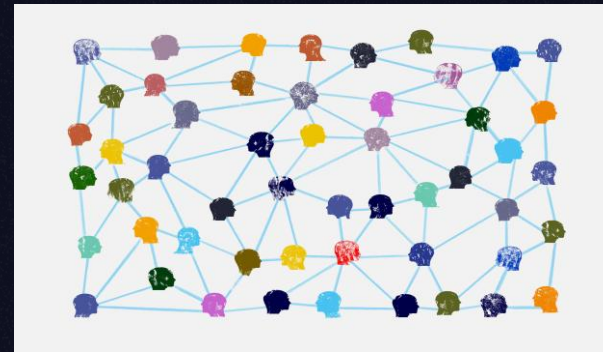
- AI governance, policies, guardrails
- EU AI Act
- ISO 42001, ISO 23894
- ASPICE for MLE
- Compliance inspection



Platforms & Accelerators

Enablement and scalability

- AI Toolchain
- Lifecycle accelerators
- Xaltriq
- ADE/AMBER Pioneers



AI Engineering

System and feature development

As per ISO 8800

- AI system/SW development
- Physical AI
- ADAS and Autonomous features

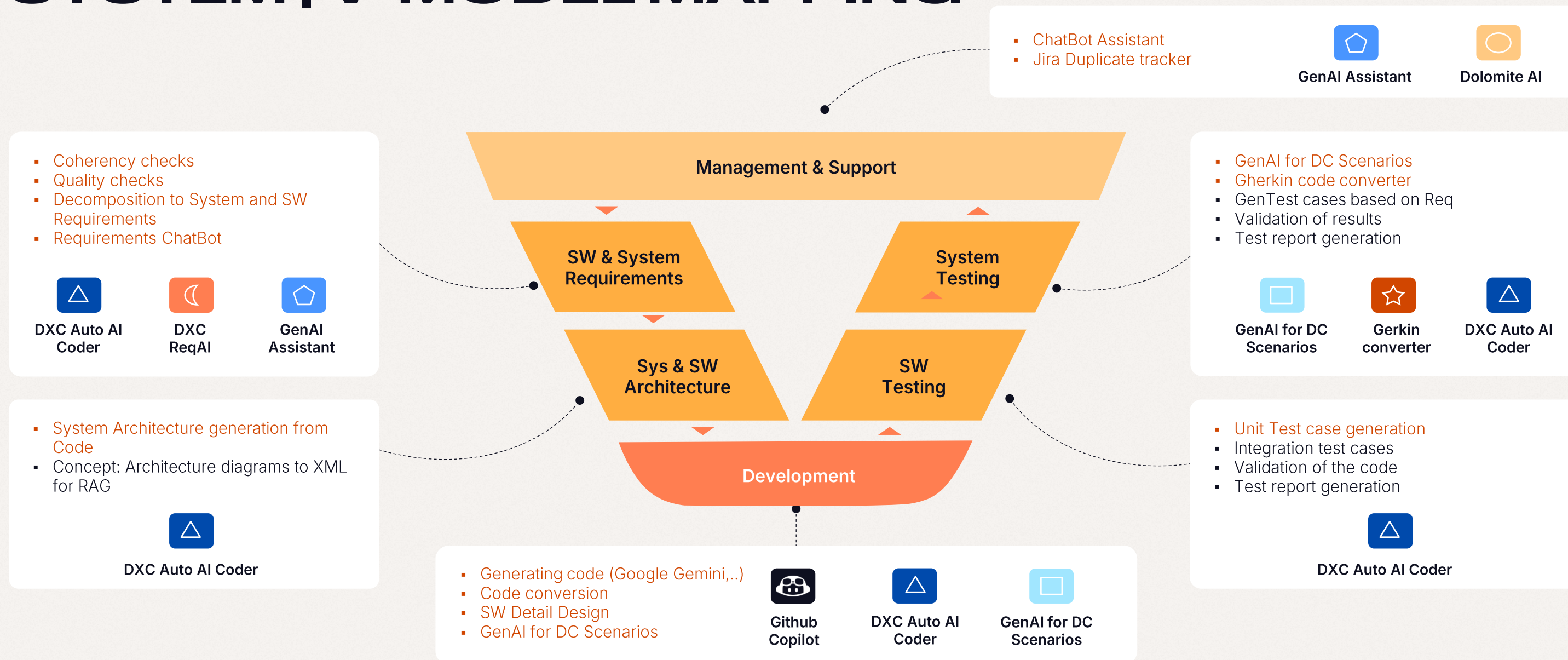


Validation & Operations

Assurance and monitoring

- Virtual testing and simulations
- Field monitoring
- Deployment feedback loops

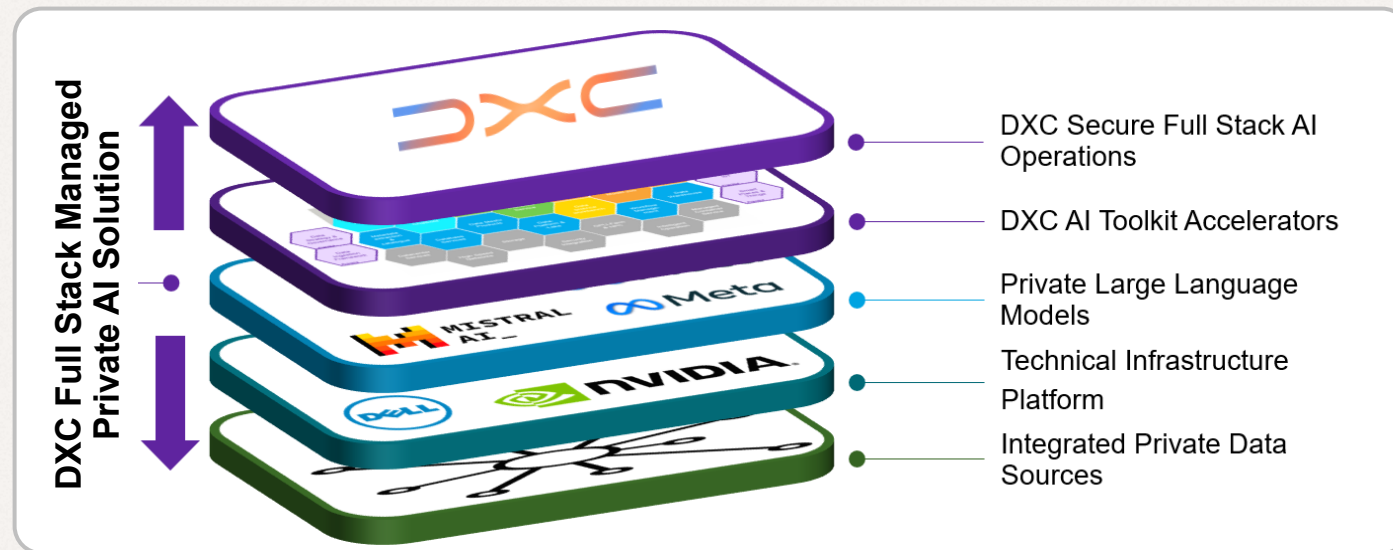
AI ACCELERATORS EMBEDDED SYSTEM | V-MODEL MAPPING



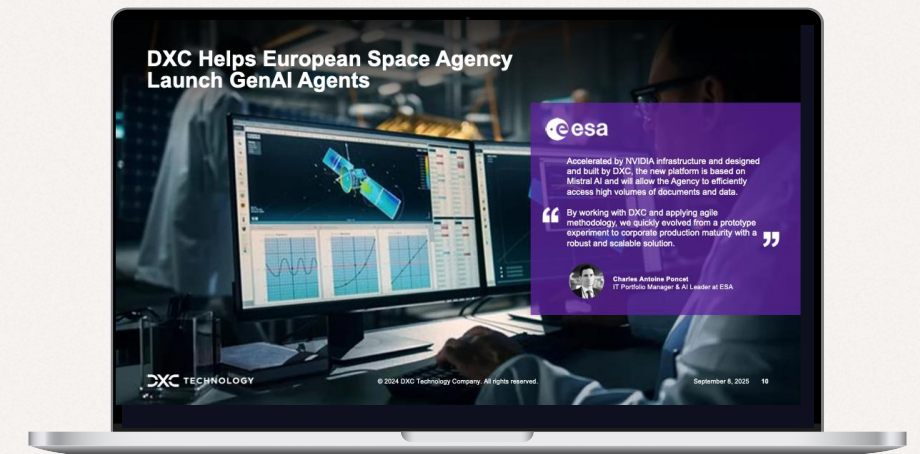
DXC PRIVATE AI CAPABILITY AND REFERENCES

DXC has unique capability to accelerate adoption of a full-stack private on-prem AI solution for large scale and security sensitive domains

Capability Overview



DXC References



AI Core

Focus on NVIDIA optimized LLMs for inference as NVIDIA NIM™.



AI Operations

Fully automated and monitored pipelines for data, features and models.



AI-toolkits

Providing the accelerated engines and workbenches harnessing the power of NVIDIA AI Enterprise.



Complex and high-volume workflows

Proven capability to process complex, high-volume workflows for moving and processing data.



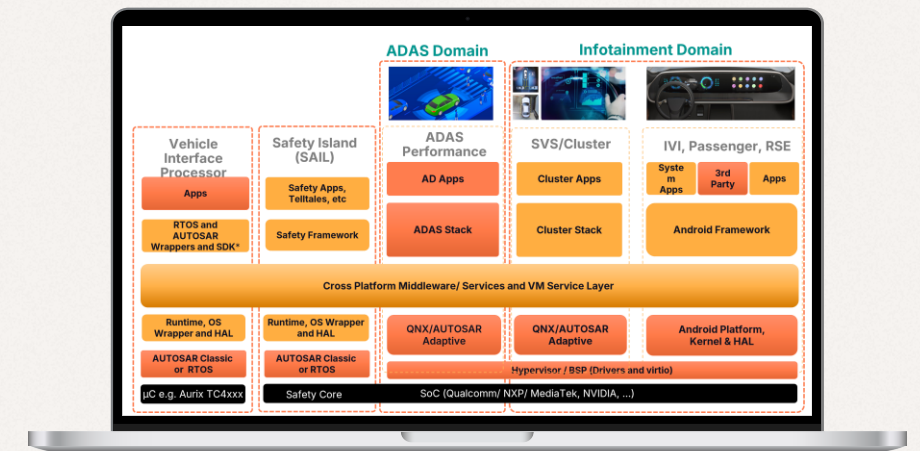
Data Management

SQL-, unstructured- and vector-databases, metadata extraction and management, search and raw data cataloging up to 100 PB volumes.



Infrastructure, Datacenters and Server-farms

Extension to our proven capability of managing datacenters, IT infrastructures, server farms, storage and HPC systems.



REFERENCE STORIES

SMART COCKPIT – ENTRY/MID

AMBER Entry/Mid configuration

→ AMBER on Qualcomm 8155P/7255P/8255P

Infotainment and Connectivity

- › Media (USB, BT Audio, Streaming)
- › BT Call
- › Radio (AM/FM/RDS)
- › Projection (CarPlay & AA)
- › Speech recognition
- › Navigation

In cabin features using NPU

- › *Harmony (stress detection)*
- › *Virtual sensor (Seat occupancy app)*
- › *Offline Edge Voice Assistance*

Driver Assistance & Monitoring

- › *Surround View System*
- › *Driver Monitoring System*

Cluster

- › CAN based Vehicle inputs
- › Speedometer & Tachometer/Energy meter gauges
- › Driver Information (ex. Odometer, Trip meter, distance to empty etc.)
- › Telltales(include Left/Right indicators)

Safety Use cases

- › Android VM Crash
- › Safety core overload

Reusability and Privilege app

- › *SoftSKU*
- › *Camera apps*
- › ...

Additional Features from AMBER platform

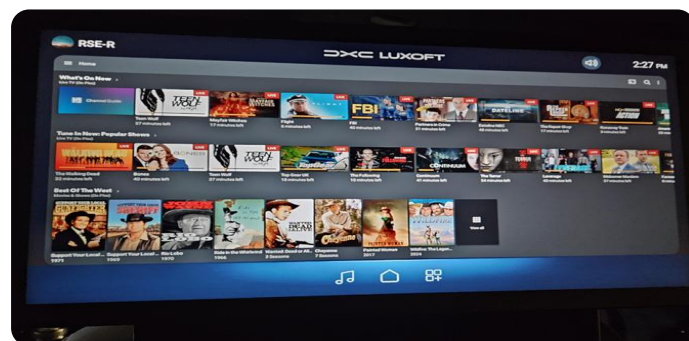
- › Theming
- › Personalization
- › DOM
- › SW Update (OTA)
- › App Store
- › Navigation SDK
- › AI Features
- › Multi BT Calling
- › Internet Radio



SMART COCKPIT - MULTI-DISPLAY

AMBER CAR INTEGRATION

- AMBER currently support up to 5 displays, including many 3P applications, Xbox gaming along with Satellite Audio Entertainment



KEY FEATURES

- **Multi-display HMI with IC**, Driver display, Passenger display and 2 RSE's
- **Mixed Criticality demo with QNX Hypervisor** and AAOS (16, 17) running on single HPC – Qualcomm 8295
- **3P media application like Satellite Streaming solution**, Spotify, TuneIn, Radio Player, Amazon Prime, YouTube and Plex
- **3P Games and Xbox applications**
- **Supports Apple CarPlay** and Android Auto
- **Control center** support
- **Sound hound AI Voice assistance** integrated
- **UI/UX design, theme, vehicle settings, Ambient light** and other features
- **QNX RTOS running** on Instrument Cluster
- **Integrated Here map** for Navigation
- **HVAC application**, BT phone connectivity
- **Access car app** integrated



FAST-TRACK AAOS VERSION UPGRADE

- **AMBER** stays always fresh on top of latest AAOS Google release.
- The **Virtualization platform** does **AMBER migration** first on Cuttlefish and Trout environment.
- As soon HW BSP is available, migration to the **BSP HW platform** is done in quick time.
- **AMBER** is closer to AAOS standards thereby **resulting** in quick version upgrade timeline.
- The changes are done **strategically in vendor** and product partitions for faster upgrades.
- **AMBER** is **agnostic to HW platforms**, recently migrated from Qualcomm 8295 platform to 7255 and 8255 RideX platform within 1-2 months.
- Versions migrated from **AAOS v14, v15 and v16** based on customers requirements.
- **Migration to AAOS v17** started on **Cuttlefish** environment and later to HW once BSP available.



android-14.0.0_r22

↪ **android-automotiveos-15.0.0_Its2**

↪ **android-16.0.0_r4**



IMPOSSIBLE. DELIVERED.

DXC LUXOFT SOFTWARE FACTORY PLATFORM

ALM



Projects

Android 



In-vehicle infotainment (IVI)

Mixed criticality (IVI+AD)

Tools



TAP (Workbench)

Virtual Test Benches

HW Test Benches

Infrastructure

AWS (RDS, S3, EBS, EFS, VPC, ...)

On-Prem (DXC)

IaC (Pulumi), K8s

Disclaimer: DXC Luxoft uses the above third-party party tools for SW development (incl. AMBER development).

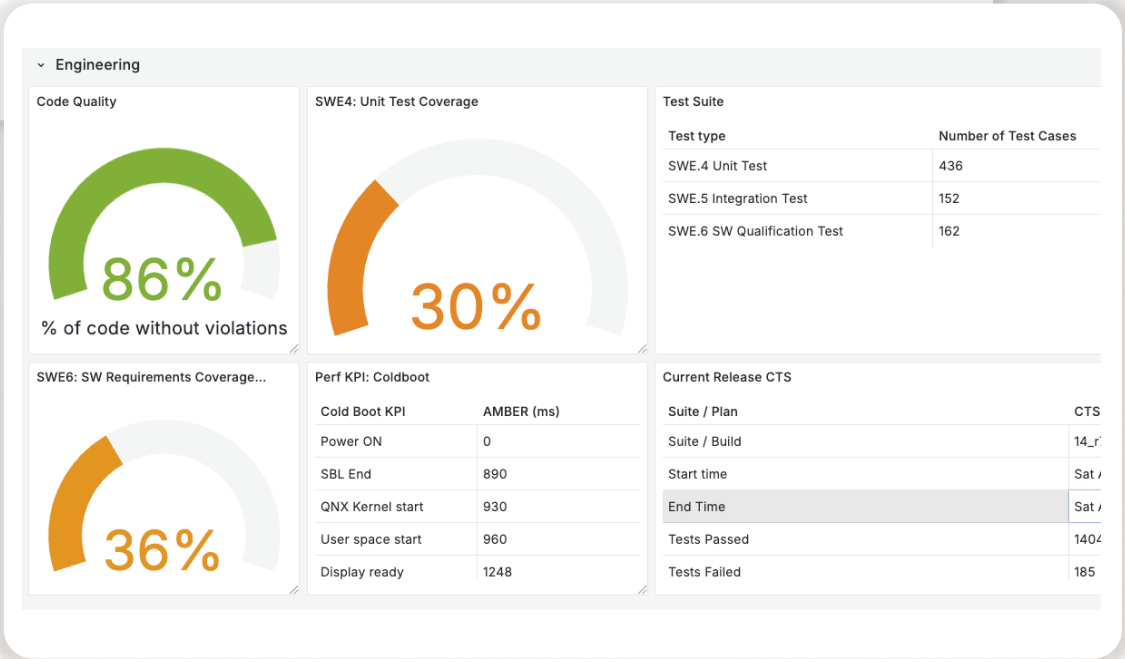
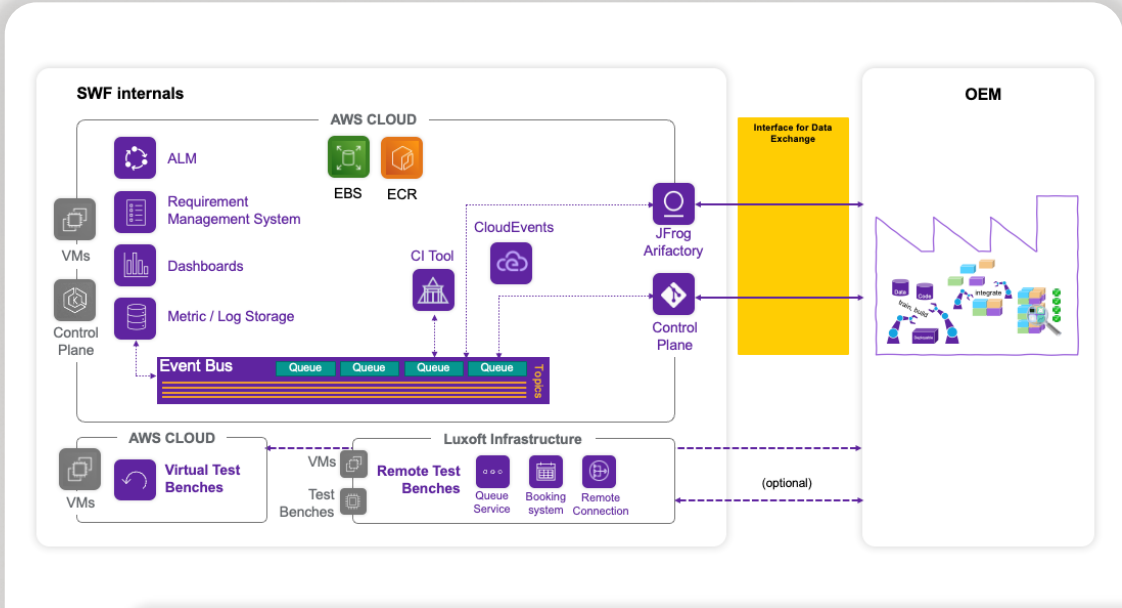
SOFTWARE FACTORY

DESCRIPTION: AMBER is developed on DXC Luxoft Software Factory with focus on compliance and transparency.

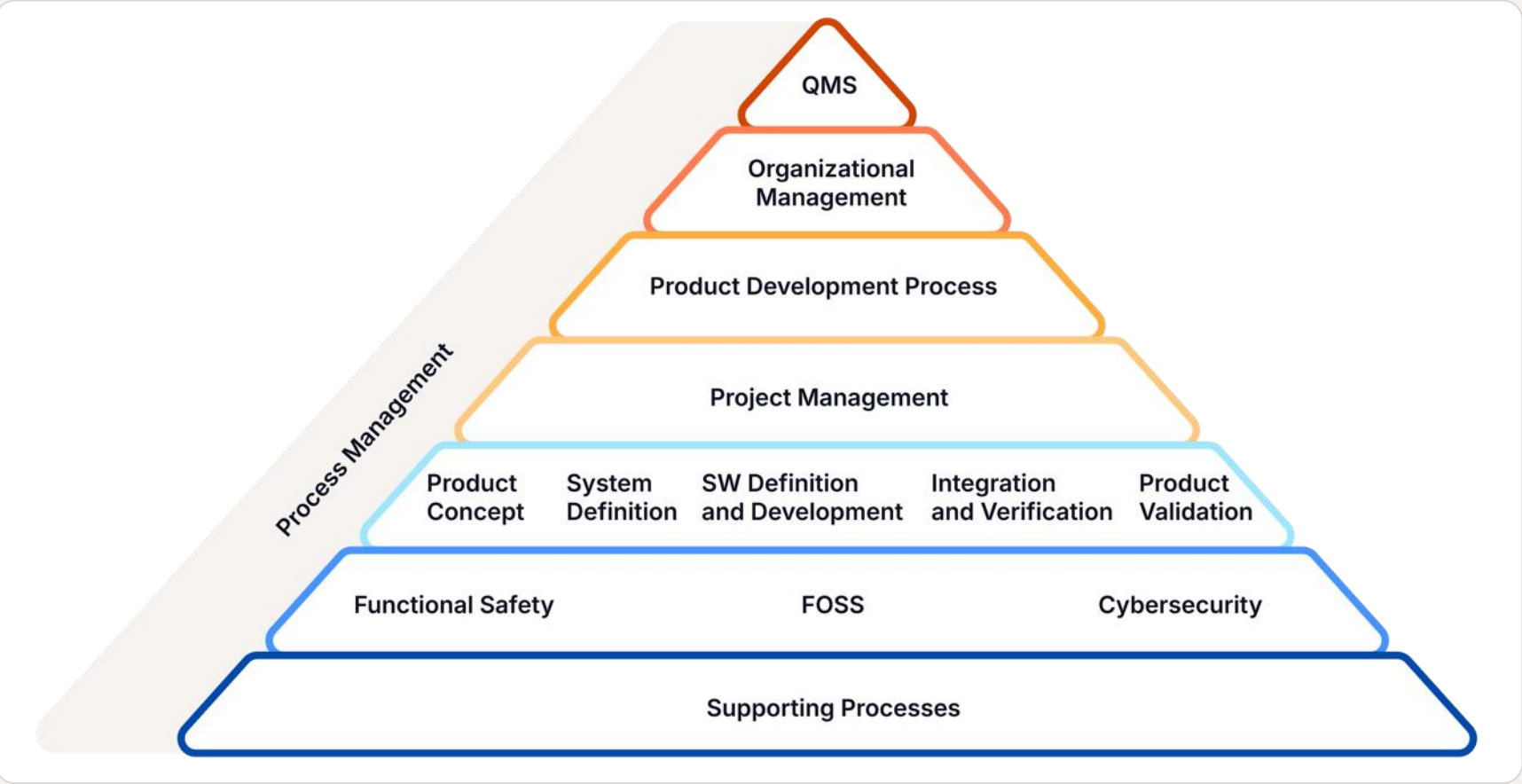
FEATURES:

- Regular BOM and license scanning
- Regular vulnerability scanning
- Rigorous testing and quality gates according SWE4-6 execution
- automated Google xTS for AMBER products
- Full traceability and white-box delivery
- Dashboard giving observability on product status, maturity, bug inflow and maintenance
- ASPICE L2 and Cybersecurity compliance

#	ASSUMPTION
1	Software Factory is internal DXC Luxoft environment used for AMBER development and maintenance
2	Software Factory can be used by client as part of Innovation Stream or other agreement
3	Software Factory can be provided without AMBER, in SaaS or on-prem deployment models
4	Software Factory can be fully customized in engineering service agreement



AMBER PROCESS & COMPLIANCE



Toolchain

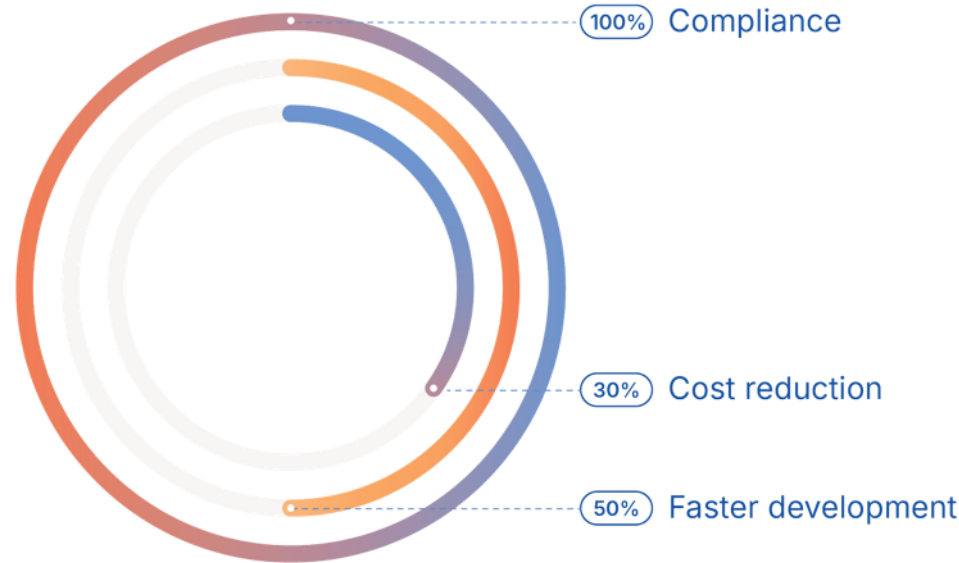
Automation

Observability

DXC Luxoft Software Factory

Process compliance

ASPICE L2
Cybersecurity UN155/156, ISO 21434
FOSS usage compliance ISO 5230



Product development culture

Agile
Shift left
Test-driven development

AMBER INTEGRATION AND TEST STRATEGY

Digital Twin (Cuttlefish, emulator)

Hardware Test Bench

ASPICE	SYSTEM UNDER TEST	CHECK (PUSH TO BRANCH)	GATE	...	NIGHTLY	...	RELEASE
		Blocking	Blocking	Non- blocking → Post-main merge			
Cybersec and compliance	FOSS compliance, SW cybersec vulnerabilities	Check license statement			Fuzzy Testing		Full FOSS scan
							Cybersec Tests
SYS.5	System Qualification Tests (HW + SW)				Smoke System Qualification Tests		System Qualification Tests
SYS.4	System Integration (HW + SW) + Integration Tests				Smoke System Integration Tests		System Integration Tests
SWE.6: SW Qualification	SW System Qualification Tests				Smoke SW System Tests (incl. CTS subset)		Vendor Test Suite (VTS)
							Compatibility Test Suite (CTS)
SWE.5: Integration Test	SW Integration + SW Integration Tests		SW Integration Build and Smoke Test (incl. CTS subset)				Full SW Integration Tests
SWE.4: Unit Test	Class SW Component	Peer Review					
					Static Code Analysis		Static Code Analysis
		Lint / Code format checks					Lint / Code format checks
		Component Test					Component Test
		Unit Tests					Unit Tests



ARTIFACTS & DASHBOARD



AMBER ARTIFACT

- Manifest snapshot / manifest tag
- Qualcomm drop ID
- Build images/packages
- Build logs
- CTS/VTS .7z archive
- xts_metadata.json
- Grafana entry
- Jira defect
- Gerrit CR/Patchset
- Release note / change log

PURPOSE

- Reproduce exact source baseline.
- Link build to Qualcomm baseline and known issue list.
- Flash or deploy to SA8295P/Trout/cuttlefish.
- Prove reproducibility and support debugging.
- Preserve test_result.xml, test_result.html, logs, and retry output.
- Provide dashboard and audit metadata.
- Track execution, trend, delta, and release status.
- Track RCA, owner, fix, and retest.
- Track source change and merge status.
- Summarize baseline, fixes, known issues, and readiness.

GOOGLE COMPLIANCE

DESCRIPTION: Complete coverage of Android xTS compliance readiness for AMBER including GAS integration and Pre-Certification.

SCOPE OF WORK:

- xTS testing environment setup with AMBER development stream.
- Setting up HW test benches with AMBER SWF workbench.
- Test execution done both with Virtual and Hardware environment.
- ~100% compliance on CTS with AMBER software stack.
- GAS pre-certification readiness with AMBER GAS package build.
- End-to-end testing & automation of xTS testing, reporting & compliance.

#	ASSUMPTION
1	GAS Certification is required on top of AMBER pre-certification software.
2	OEM should provision GAS licensing, access and 3PL enablement.
3	Failures due to OEM specific modules should be handled by OEM.
4	DXC Luxoft is not responsible to solve failures already with SoC vendor.



✓

AMBER xTS Coverage

1

CTS (Certification Test Suite)

2

VTS (Vendor Test Suite)

3

ATS (Automotive Test Suite)

4

STS (Security Test Suite)

5

ART (Assistance Readiness Test)

6

BTS (Build Test Suite)

7

DTS (Drivable Test Suite)

