

OFFER OVERVIEW

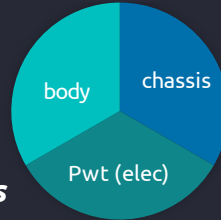
SOFTWARE DRIVEN TRANSFORMATION FOR AUTOMOTIVE

2021

AUTOMOTIVE MOVE

FROM MECHANICAL NATIVE TO SOFTWARE NATIVE

Customer Value foundations



From artisanal to industrial

- Infotainment
- Remote commands
- OTA updates

1st SW transform at "components" level

- Infotainment
- Pwt, body

2nd SW transform at vehicle level

- ADAS
- Cockpit (IVI/cluster)
- Elec pwt
- connected

3rd SW transform at company level

- People
- Org, process, tools
- Business model
- Mobility solutions

Beginning automotive industry

<1900



1st Consolidation
Body+chassis+pwt

2000



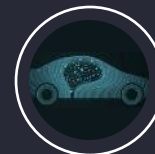
SW supporting user experience

2010



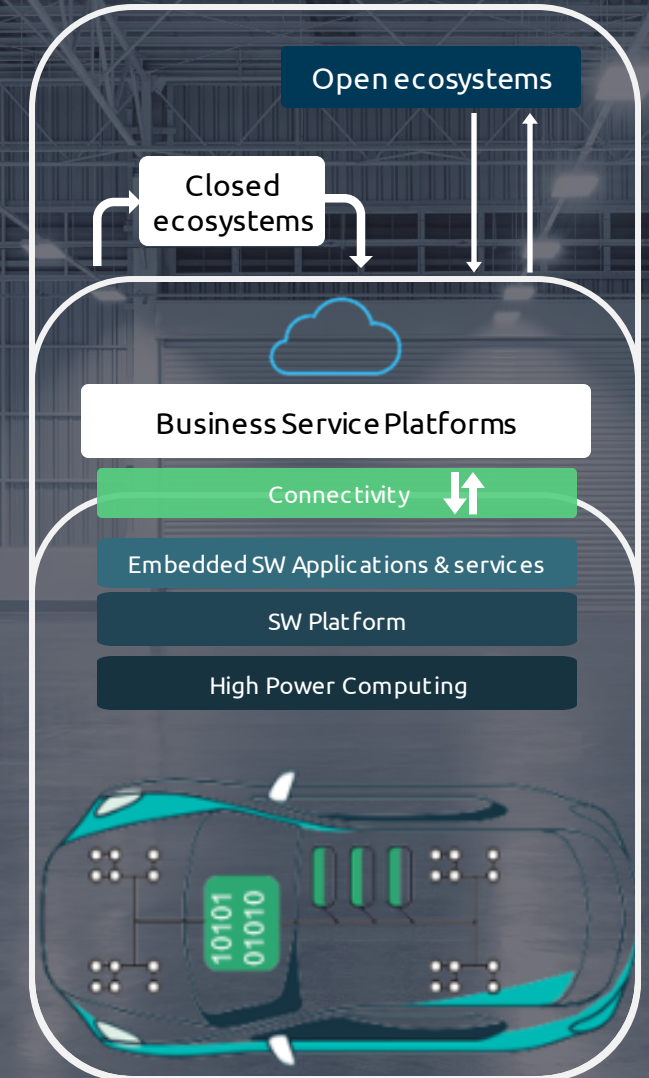
2nd consolidation
Sw driven move

2020

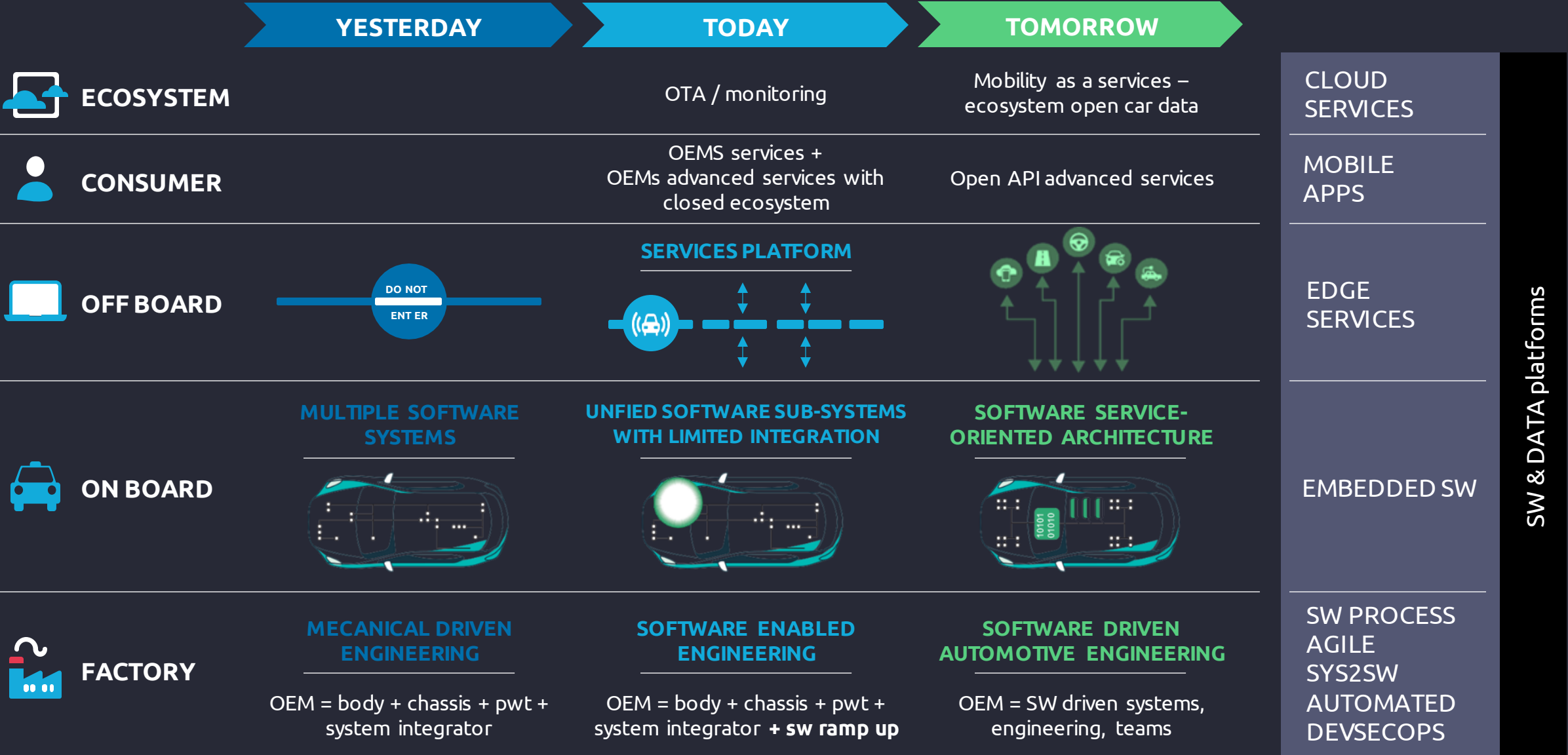


steps

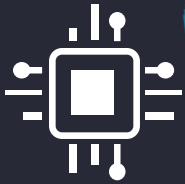
Software landscape in Auto engineering



OEM NEW PARADIGM - FROM MECHANICAL TO SW DRIVEN



KEY CHALLENGES



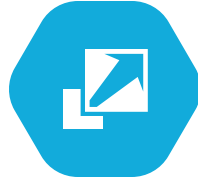
The **Software Defined Vehicle** has completely shifted the paradigm for the Automotive industry.

This requires Organisations to transform the current way of doing business.

KEY CHALLENGES TO MAKE THE CHANGE



PRODUCT



HOW TO RATIONALIZE EE ARCHITECTURE ?

New architectures enabling scalability, upgradability, safe & secure systems



HOW TO BUILD SOFTWARE ASSETS ?

Develop assets to maximise re-use of software & services cross programs & brands

BUSINESS MODELS



HOW TO IMPROVE GO TO MARKET ?

New way to consume services & mobility (mobility as a service)

ENGINEERING PROCESS



HOW TO MANAGE RESSOURCES SCARCITY ?

Upskilling resources to digital native & growth SW capacity



HOW TO MANAGE SW LIFECYCLE ?

Handle products evolutions through entire SW lifecycle for legacy & new products



HOW TO MONETIZE SW ?

Generate new Business Models for Monetisation (services, ecosystem)

OUR OFFER



TRANSFORM

Software Driven Transformation (SDT)

To help our clients realise the transformation, we have created SDT Framework, a set of transformational services to achieve rapid software transformation, from the initial vision to the deployment at scale

SOFTWARE TRANSFORMATION FRAMEWORK

	TO THINK & DESIGN	TO BUILD & IMPLEMENT	TO SCALE
AUTO INDUSTRY CONTEXTUALISATION	Envision strategy & roadmaps advisory services	End-to-End development & integration services	Full scale industrialization
PRODUCT	EE Architecture, new SW paradigm & technology	SW centric Sys Architecture SW Platform Development System Solution instantiation	System Solution cross program management & deployment
ENGINEERING	Software Factory Design (PMT & Academy)	Build, instantiate PMT Set-up a SW Academy	PMT at scale deployment services Change Management services (incl. Mentoring, training ...)
BUSINESS MODELS	Business model Advisory services (New business models)	Business model Implementation	Efficiency/Capability Transformation services Core/Context advisory Execute the Make-or-Buy strategy

Scaling with ecosystems

RUN

Engineering-as-a-Service

(Capgemini factory with ecosystem)
Leveraging our SDT framework, assets and automotive engineering capabilities to establish and operate a software engineering factory for our customers



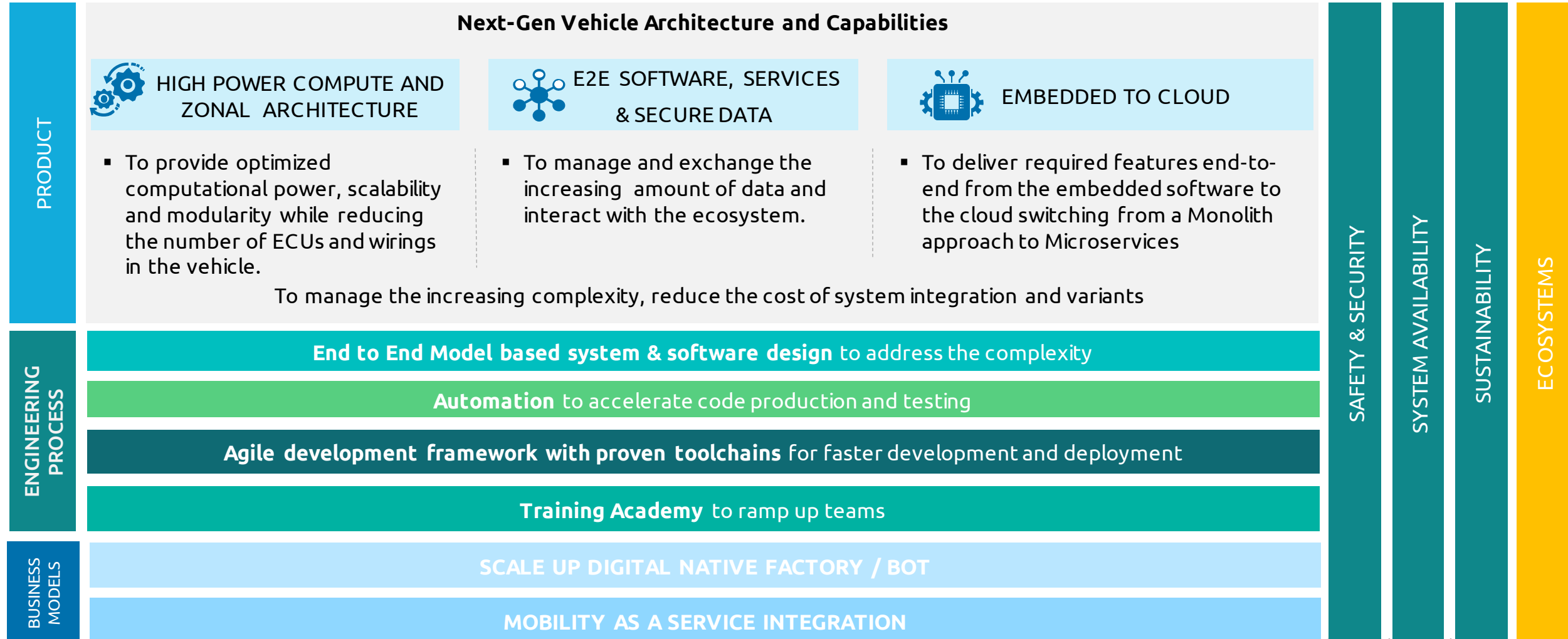
Industrialised Software Development
(for new and legacy)

AUTOMOTIVE VALUE PROPOSITION

OFFER: Software Transformation and Platform Engineering for Products & Systems



Capgemini Engineering enables our clients in developing the **core software platform** of future vehicles by bringing together our deep auto industry expertise, leading skills in embedded and digital native development, engineering tools and best practice and transformative operation models to scale software driven transformation for automotive



NEXT GEN VEHICLE ARCHITECTURE AND CAPABILITIES

We help you

- To define and develop a scalable system architecture based on SOA software architecture principles, served by HPC and scaled peripheral management multicore processor/controllers, secure by design and updatable, ready for next gen networks, enabling AI based vehicle control. To inform make or buy & techno choices, to design high level requirements, facilitate innovation in a sustainable (long life cycles) perspective.

We offer

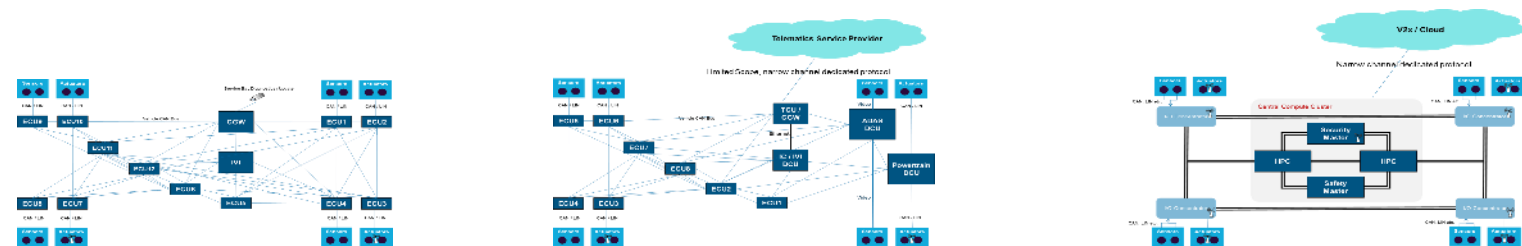
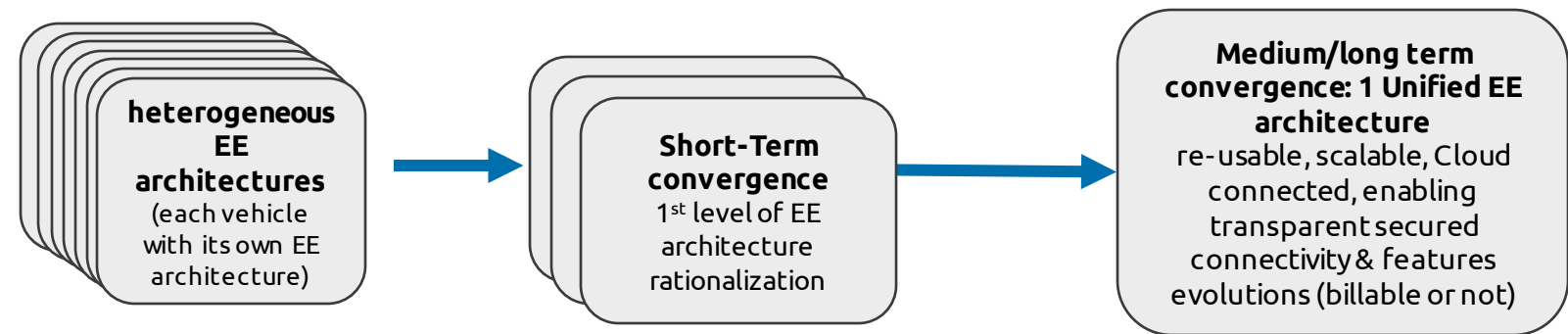
- Audit and Diagnostic of the existing
- Consulting services to define the technical roadmap and a project management plan
- Expertise & Project support on IT/OT architecture, IT/OT continuum, Communication (i.e 5G & Edge) Safety-designed SW, Cybersecurity, AI application SDKs
- HW & SW Architecture development services

Leveraging our accelerators:

- Reference Architecture, 3 Horizon Roadmap & key Enabling Technologies

We believe in the medium/long term, vehicle architectures will converge to a scalable EE architecture which will decrease hardware and networking structure complexity whilst supporting a more configurable approach to software development and integration:

- HPC and Zonal architecture
- Connectivity and data
- Embedded to cloud (Evolution to hybrid embedded / cloud microservices)



Next-Gen Vehicle Architecture and Capabilities		
EE HPC and Zonal Architecture	Connectivity and Data	Embedded to Cloud
<ul style="list-style-type: none">• To provide a scalable, secure, and updatable architecture, ready for next gen networks, enabling AI based vehicle control.	<ul style="list-style-type: none">• To manage and exchange the increasing amount of data and interact with the ecosystem.	<ul style="list-style-type: none">• To deliver real-time features, enable the cloud-connected vehicle to the cloud computing, and a flexible approach to Microservices.
To manage the increasing complexity, reduce the cost of system integration and security.		
Reference Architecture, 3 Horizon Roadmap & key Enabling Technologies		



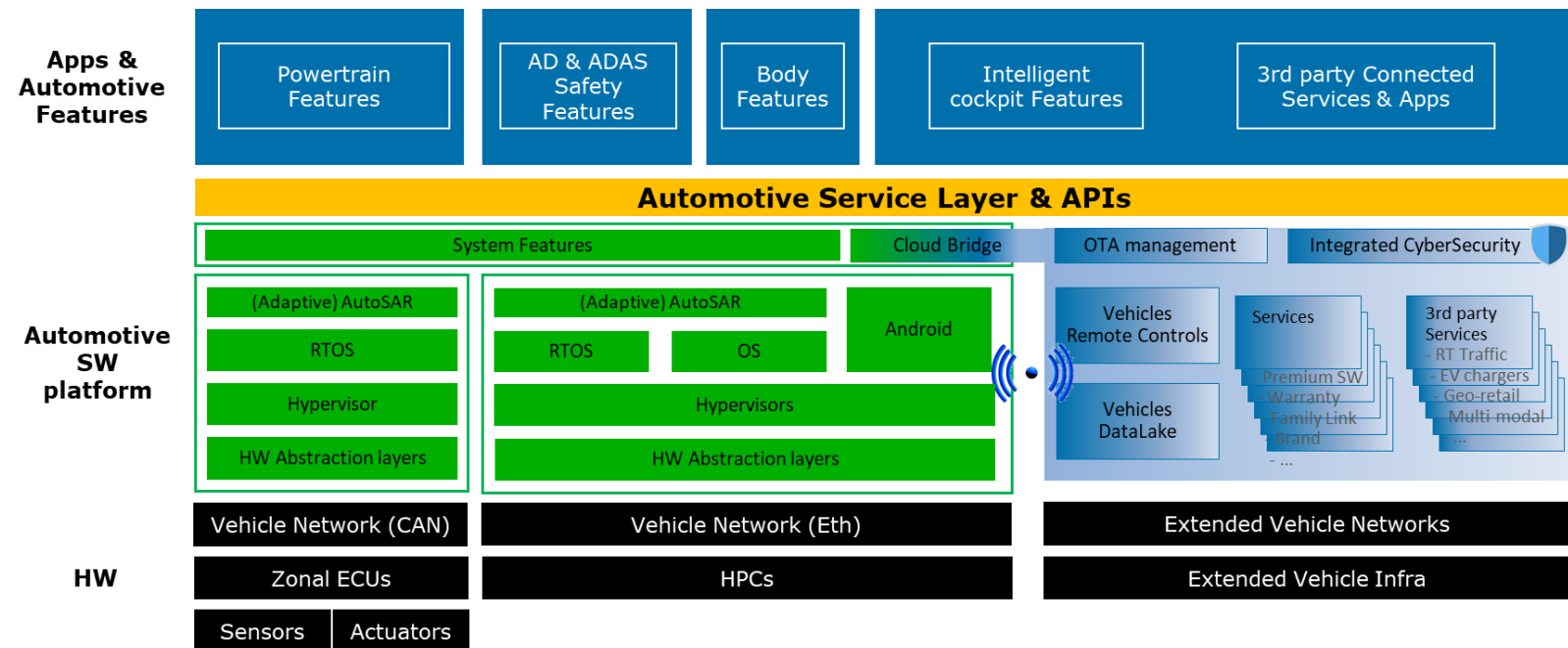
HIGH POWER COMPUTE AND ZONAL ARCHITECTURE

We help you

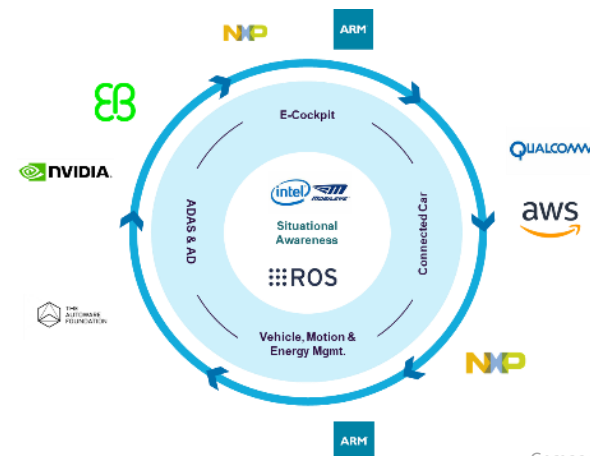
- Optimize and integrate against the HW for effective usage against domain needs
- Abstract from HW layer and build a platform that can decouple from its limitations
- Identify and implement HW solutions to optimize safety and security

We offer

- Expertise in design, optimisation and integration the software platform to the HW, also leveraging our automotive ecosystem of partners.
- Accelerated access to foundation software of new microcontroller and application processors



With our Automotive ecosystem partners, we work to optimize the HW for its unique application for seamless Chip to Cloud experience



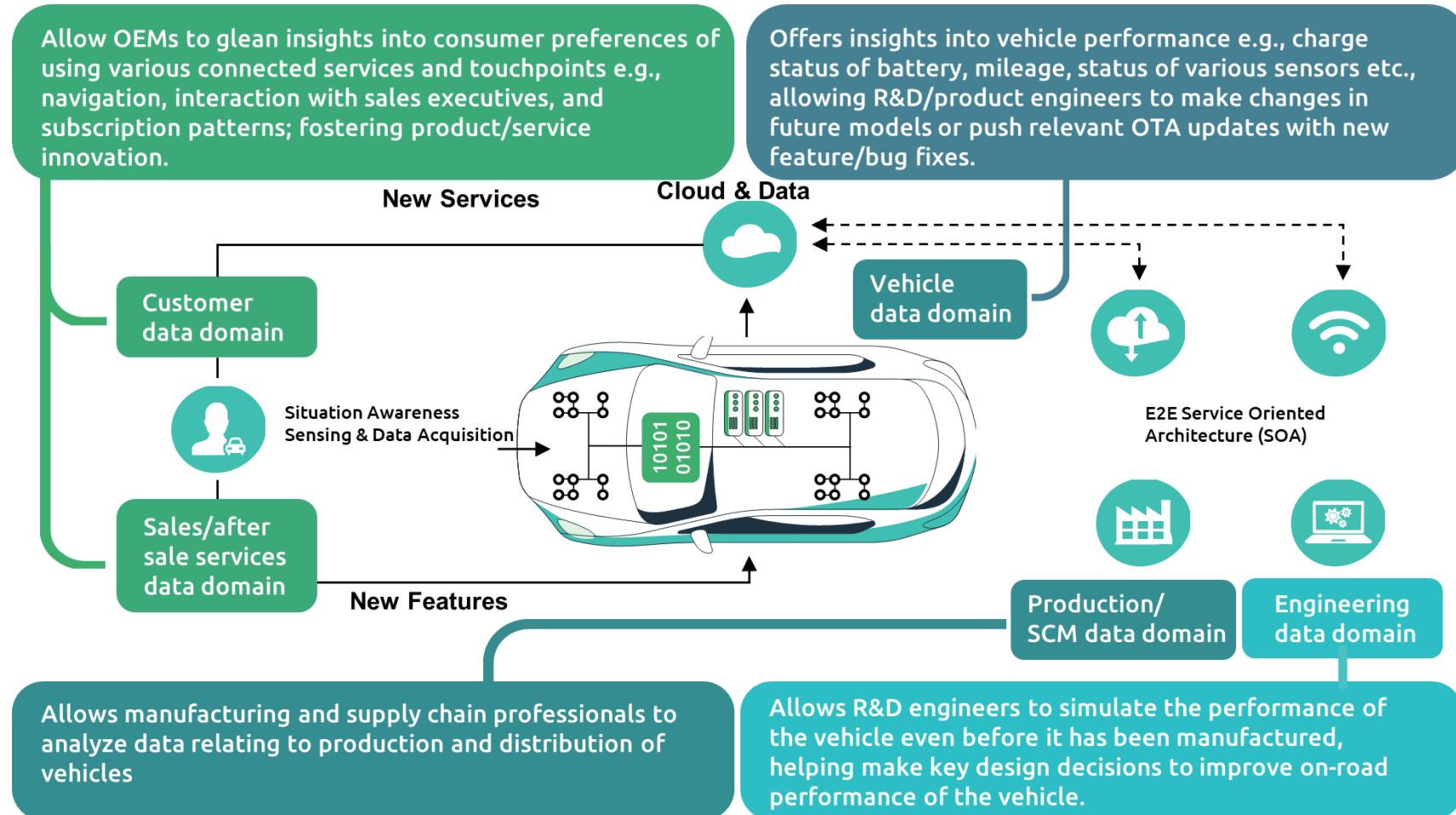
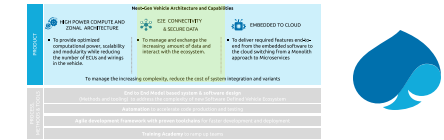
E2E CONNECTIVITY & SECURE DATA

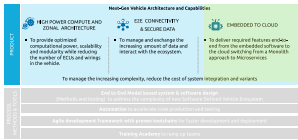
We help you

- Tap into the power of vehicle data to more quickly enable customer-oriented and value-creating operations and services
- Identify and implement the appropriate communication between the vehicle and its ecosystem for efficient connectivity
- Structure and analyze in-vehicle and out-vehicle data across domains and functions to feed attractive features and services

We offer

- Secure and efficient vehicle communication architecture and services as well as edge processing
- Data architecture schemes with data privacy leveraging the computation power of AI capabilities to glean insights from customer behaviours





We help you

- Build intelligent vehicle solutions that bring together connectivity, HW and SW and integrated with larger ecosystem
- Bring together all aspects of software development and integration from embedded to digital native to cloud
- Convert legacy applications into faster and more nimble microservice based solutions

We offer

- Full domain expertise in areas around e-cockpit, connected car that works with embedded and digital native software
- Expertise and best practice in converting monolith legacy applications into microservices with API access
- Deep knowledge of safety, security requirements and features in software development
- Custom developed software that satisfy unique needs and requirements



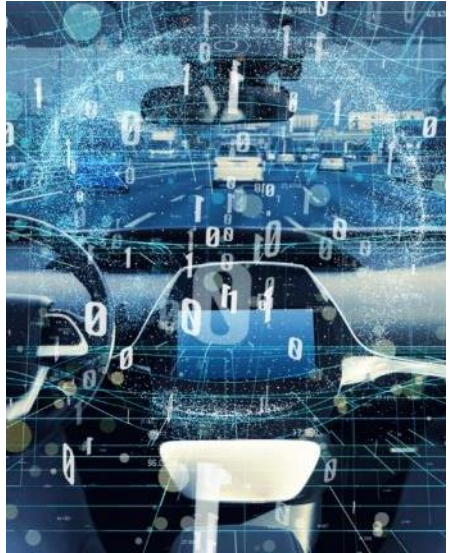
Embedded SW for
Next-Gen Digital Cockpits

Deliver of end-to-end embedded software for all feature domains of the cluster: Booting, Diagnostics, Graphics, Communications, IC Applications, Safety and Security features



Enabling Service & Edge

Development of all customer-facing connected web & mobile applications: parking assistance, fun & entertainment, location & tracking, fleet management, other ride assistance, etc



Digital Native and
Monolith to Microservice

Migration from legacy applications to microservices which included code clean-up, refactoring, API enablement, analysis and addressing security violations including improving code quality and ecosystem access

END TO END MODEL BASED SOFTWARE CENTRIC SYSTEM DESIGN

We help you

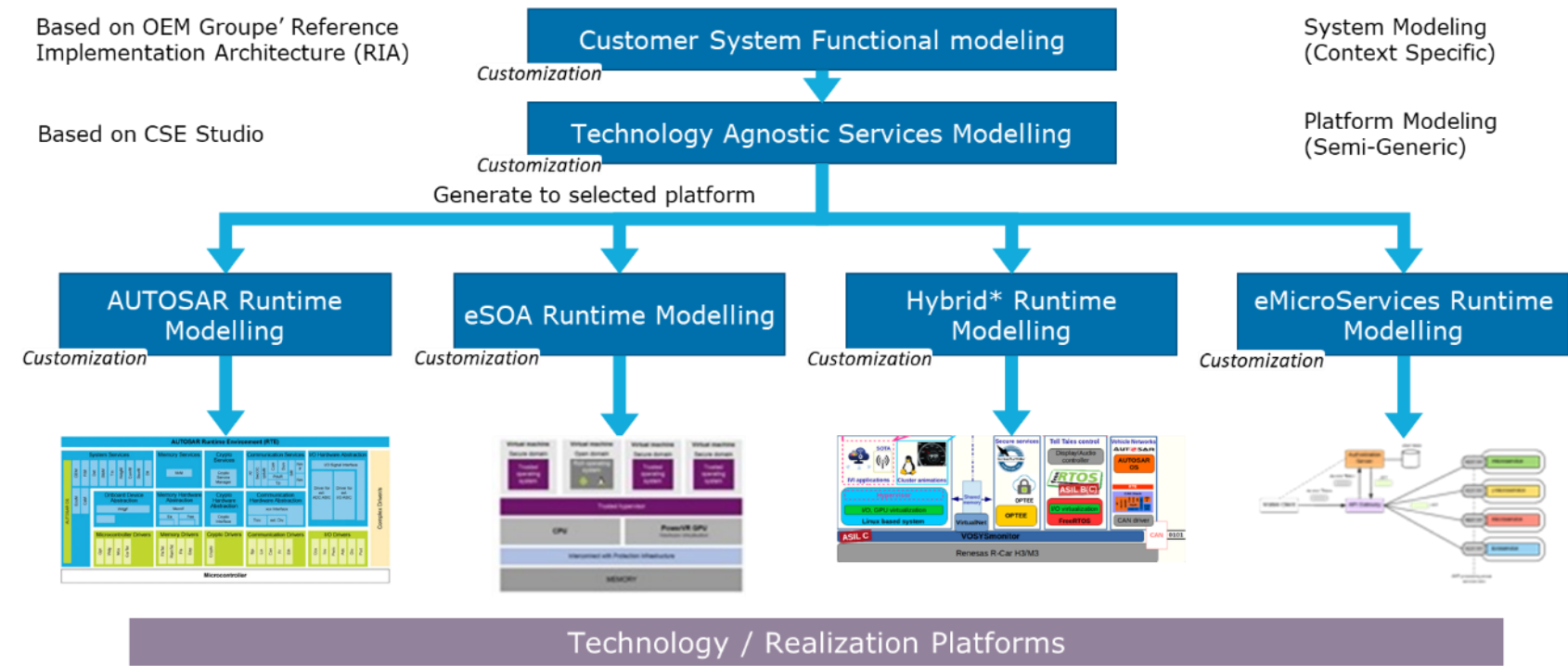
- Visualise, communicate and control the technical vision of the end to end target system
- Provide support for full flow design rule specification and validation
- Establish extensive support for code generation, platform configuration, build script generation and full requirements traceability
- Support full flow asset reuse and variant management

We offer

- Full flow (end to end) system architecture definition, design, implementation and validation based on a formalised, documented, repeatable and extensible process
- Model based software/systems engineering best practices
- Extensive experience in Automotive Technology & Product Development

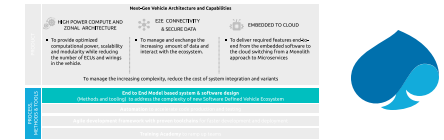
Leveraging our accelerators:

- CSE Studio MVP
- DevSecOps and TestAutomation integration



*Hybrid relates to a combination of eSOA & eMicroservices

Note CSE Studio : Capgemini Engineering asset providing an End to End system engineering modeling based on Service Oriented Architecture paradigm



TOOLS & AUTOMATION

We help you

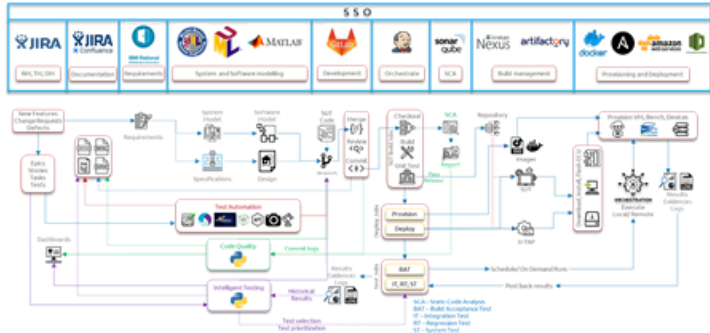
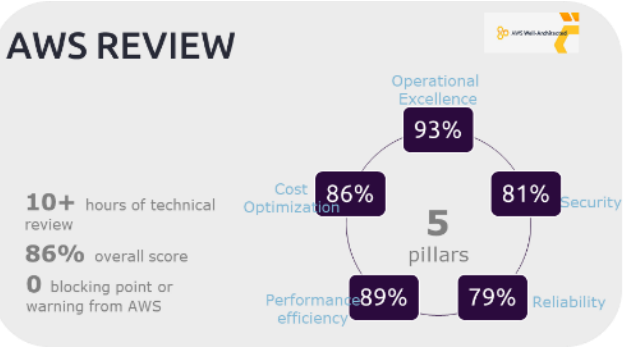
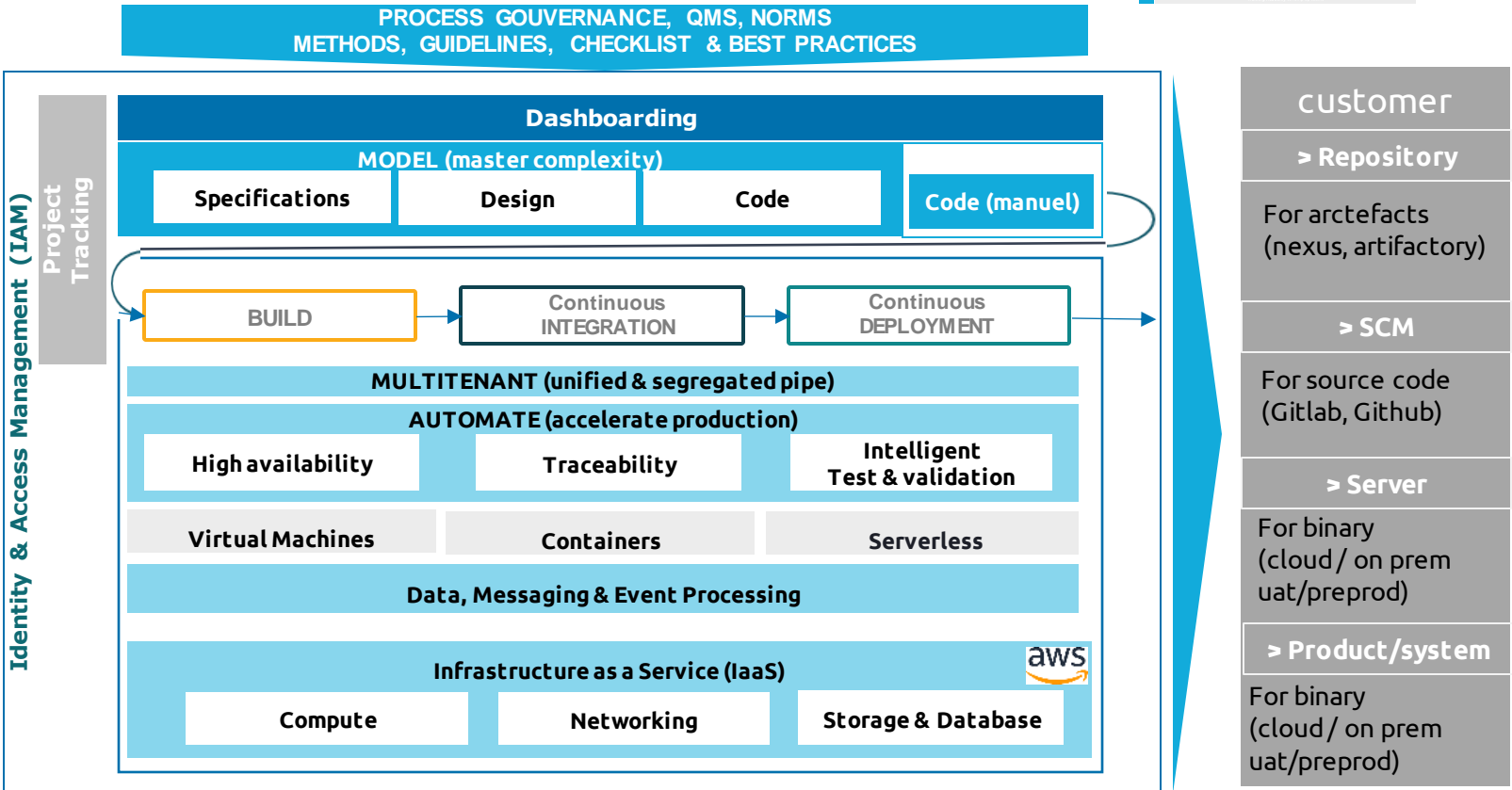
- Accelerate software development and verification through test automation and intelligent testing
- Improve quality of outcomes through more robust but efficient test prioritizing and scheduling
- Improve defect detection and drive automation in Product Engineering Lifecycle

We offer

- Complete automation solution with orchestration, test environment management, deployment and provisioning, scheduling and executing automated tests locally and remotely
- A unified code quality platform that automates and analyzes, audits and assess code quality of code base
- An intelligent testing platform that leverages data from test management, defect management, requirements and project repositories to perform test selection and prioritization

Leveraging our accelerators:

- Model based test automation, vision based test automation, Re-useable rules, reference implementations



AGILE FRAMEWORKS

We help you

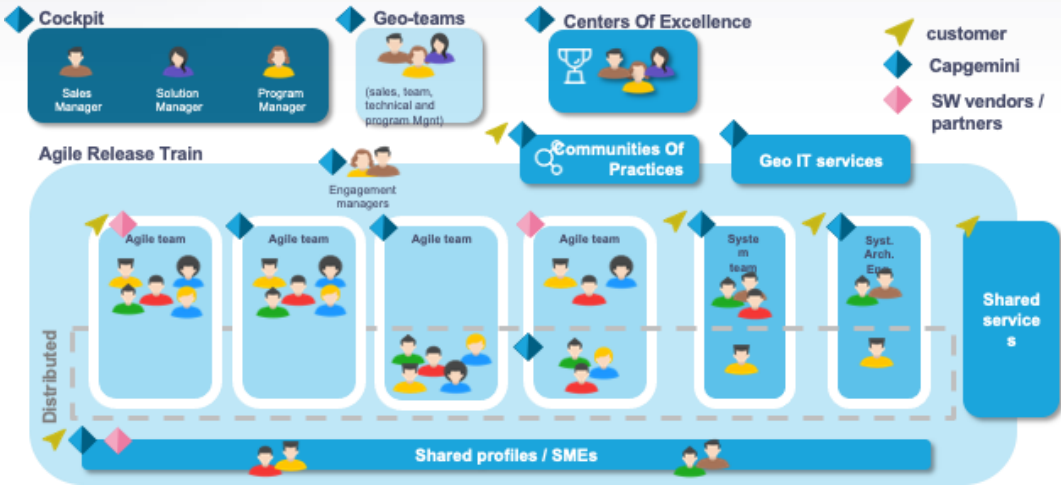
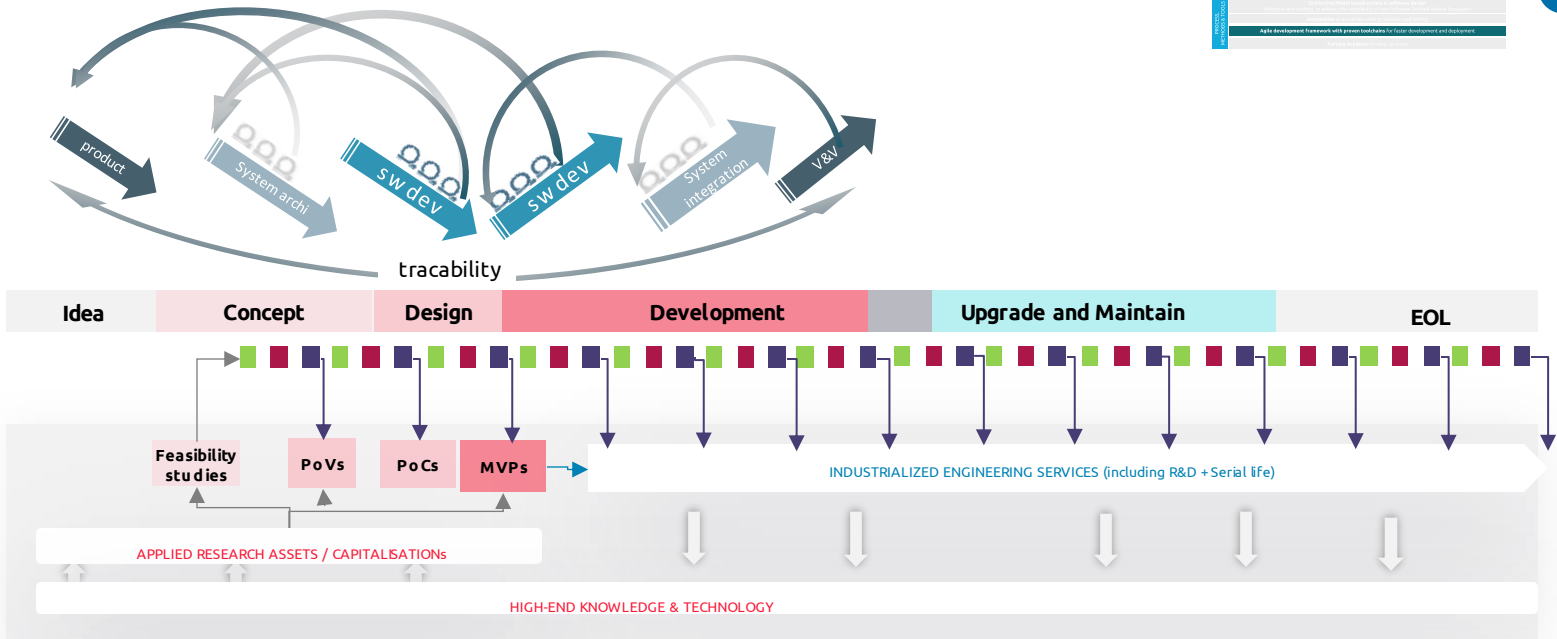
- Drive team efficiency with
 - Accelerated project onboarding
 - High Performance with built in automation
 - Continuous monitoring and optimization
 - Continuous Security testing
- Improve team flexibility and vitality while delivering accountability and performance

We offer

- Refined process, methods, and tools that drive high quality, speed and performance for development teams
- A DevSecOps platform that utilizes best of breed tools that has been honed by thousands of projects and developers
- Strong experience in agile projects that bring industry best practice in agile projects

Leveraging our accelerators:

- Global DevSecOps platform that operates locally or in the cloud



Modern Vehicle Architecture and Capabilities		
<ul style="list-style-type: none"> • To provide enhanced control and safety, scalability and flexibility while reducing the number of ECUs and wiring in the vehicle. 	<ul style="list-style-type: none"> • To manage and optimize the increasing amount of data and interact with the ecosystem. 	<ul style="list-style-type: none"> • To deliver real-time features and services to the end customer via a cloud-based approach to Microservices.
To manage the increasing complexity, reduce the cost of system integration and security.		
Agile development framework with proven capabilities for faster development and deployment.		



TRAINING ACADEMY

We help you

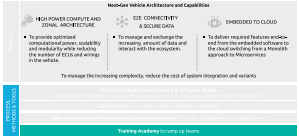
- Train your operational teams to oncoming technology and new engineering approaches
- Upskill engineering coming with different declining Automotive domain backgrounds (e.g. thermal Powertrain)
- Provide Software background to non specialists
- Coach your teams after the training to follow the skill acquisition on operational projects

We offer

- An international team of trainers with average 15+ years of professional background
- A training path built around examples and real time demonstration
- An e-learning platform for trainees
- Personalized Coaching with 3 option Levels depending on the reskilling plan and the project full autonomy target

Leveraging our accelerators:

- Global Training Centers



GLOBAL TRAINING CENTER

- 1 THEORETICAL TRAINING**
Provide by an international expert team
- 2 CONTINUOUS LEARNING**
Access to resources through our e-learning platform
- 3 CONTINUOUS LEARNING**
Access to resources through our e-learning platform

Training Modules		
Autosar	ADAS	E-cockpit
SoA Architecture	Auto DevSecOps	Agile

BOT

A WIN/WIN APPROACH FOR EFFICIENT RESOURCE MANAGEMENT



Today, some automotive eng. **resources**, esp. SW eng., **are scarce and expensive** in highly urbanised areas. Markets are increasingly competitive.

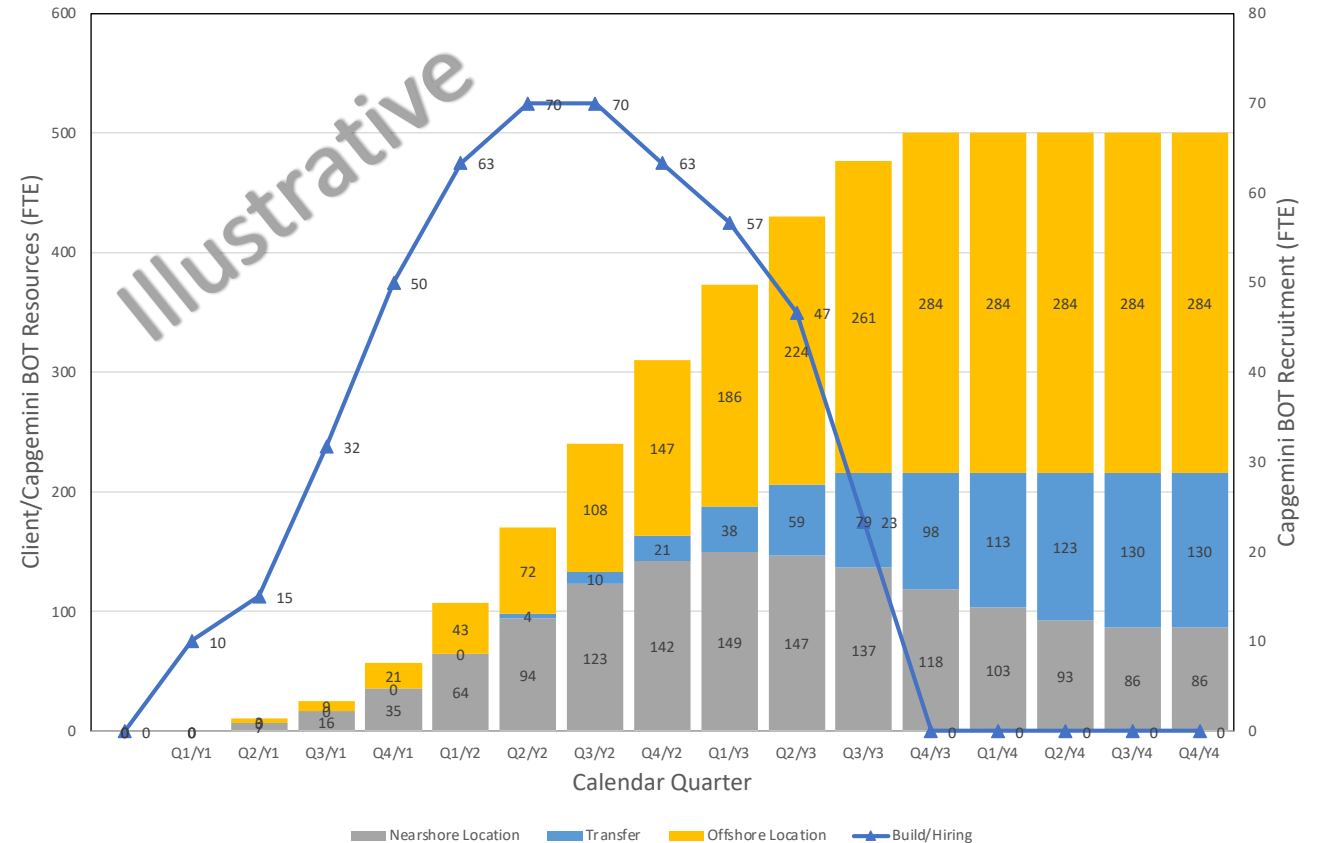
Standard hiring and resource management approaches cannot succeed because:

- All stakeholders are looking for the same profiles leading to a salary inflation
- Academic institutions do not graduate enough engineers, especially SW engineers
- Standard engineering processes require the resources to be in a single location

One alternative is a Built-Operate-Transfer / BOT based on:

- Defining, based on function description and engineering processes, the activities that must be mastered and those that can be delegated – i.e. Core/Context
- Focusing on delivery teams rather on individuals – i.e. Delivery Centres
- Accessing the right talent at the right place and right cost – i.e. Offshoring
- Partnering with service engineering companies used to reallocate resources based on value creation – i.e. Value creation

Example of BOT with nearshore, offshore and transfer



Benefits of BOT

- Shared roadmap with assessment of functions
- Focus on quality of deliverables through teams
- Explicit governance and transparent economic model
- Industrial process with anticipation of activities
- Optimisation between expertise, quality & competitiveness

MOBILITY SERVICES

BRINGING THE RIGHT SERVICES ALWAYS

Mobility is shifting from a people owning cars, to people 'consuming' mobility as a service.

This new paradigm is mainly pushed by :

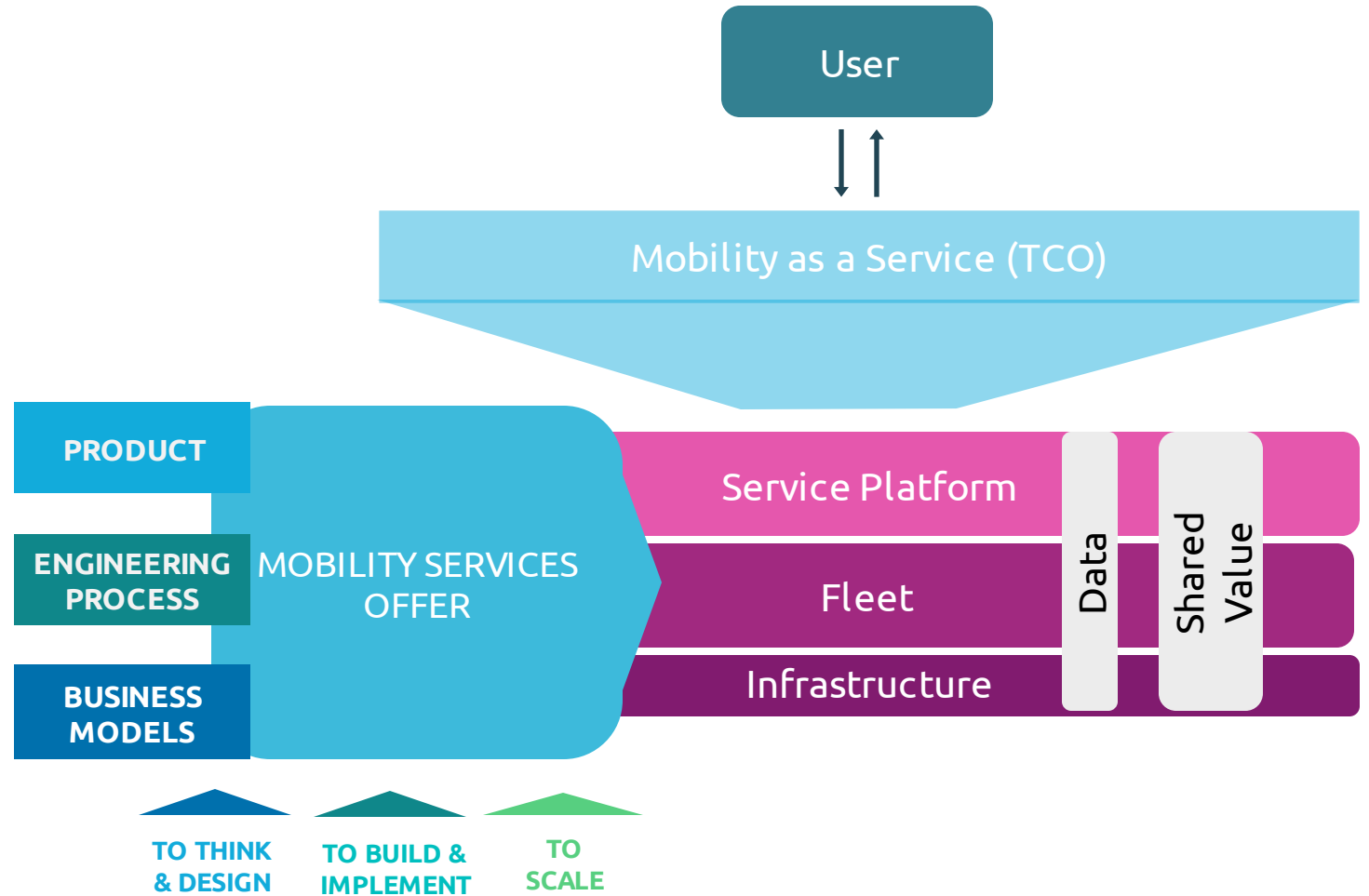
- The need to reduce pollution and congestion in metropolitan areas
- The increase cost of car ownership and parking costs

And enabled by:

- digital revolution (e.g. IoT, 4G/5G networks, artificial intelligence etc.).
- Availability of new mobility modes (i.e. such bike/scooter/car-sharing, ride-hailing...)

Capgemini Engineering position as the integrator to support :

- Mobility operators to accelerate the set up and provide a seamless experience during the whole mobility service life cycle
- Automotive industry to build the right platform enabling new mobility services and new business models
- Entire ecosystem to integrate & maximise the value each stakeholder bring in this new complex environment
- Asset management

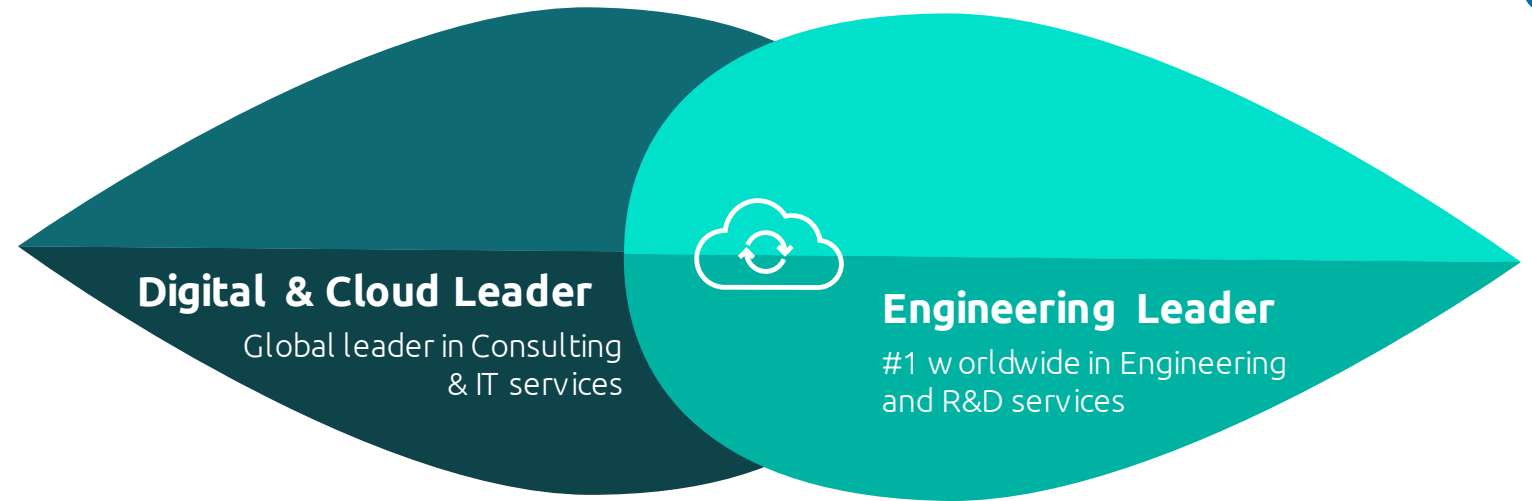


WHAT MAKES US UNIQUE



**WE BRING YOU
THE BEST OF CAPABILITIES
FROM SYSTEM TO CLOUD
TO ACCELERATE YOUR
JOURNEY TOWARD THE
INTELLIGENT INDUSTRY**

**WE BRIDGE STRONG
INDUSTRY KNOWLEDGE
WITH DIGITAL
CAPABILITIES AND ASSETS**



- UX, Mobility vision, Services Innovation, E2E Services Roadmap & Implementation
- Interop, Performance and pre-certification testing
- Safety / Regulations / Cybersecurity
- ALM – automation – DevSecOps – CI/CT/CD
- Digital & IT
- Organisation transformation – governance, interfaces, processes

WHY WE ARE THE BEST PARTNER

30+

years expertise in
product engineering

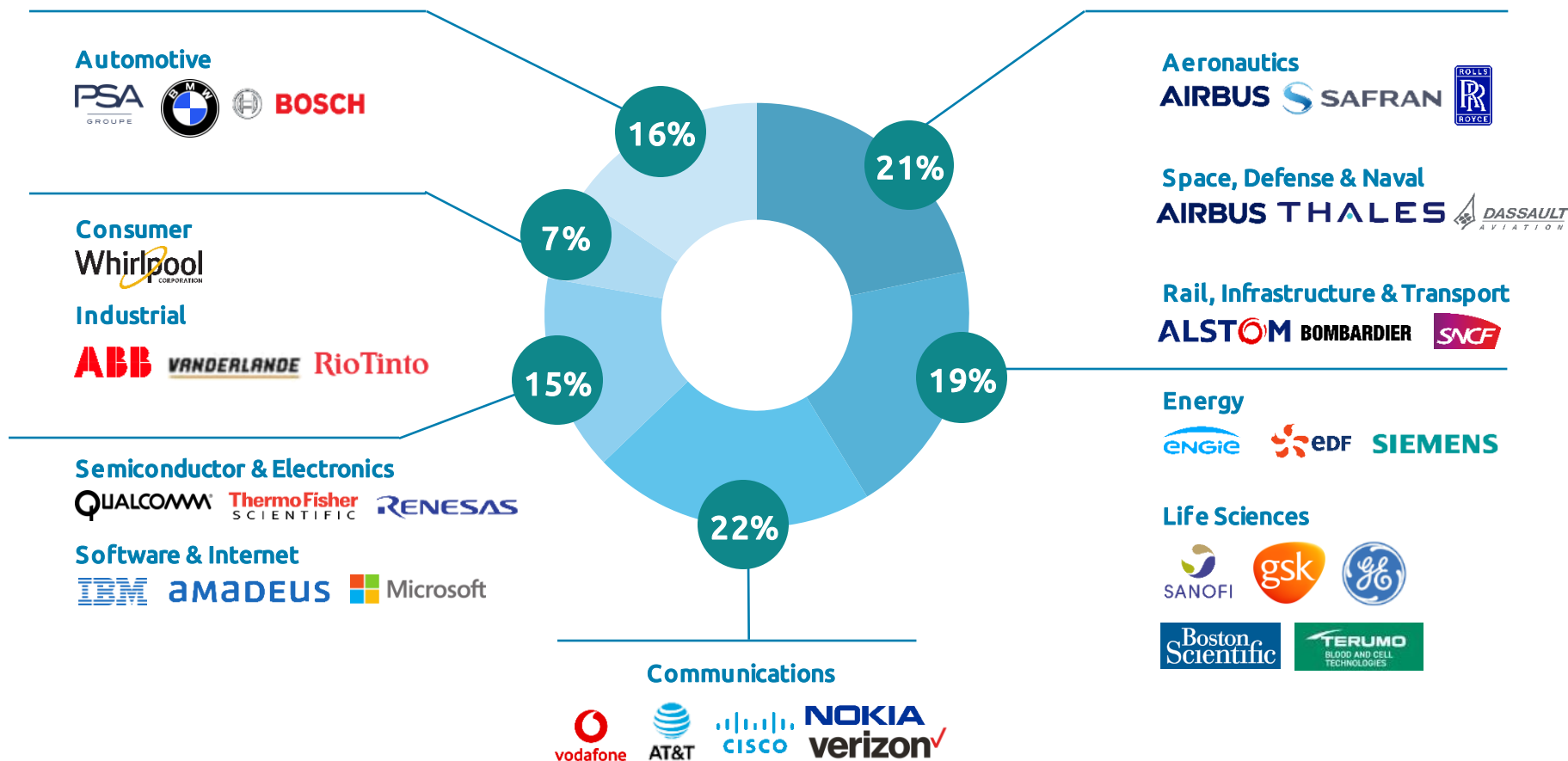
Ranked as strategic
partner by

50+ clients

2/3rd

Of the top 500 global
R&D spenders are
clients

WE ARE A LONG STANDING PARTNER TO INNOVATION LEADERS ACROSS INDUSTRIES



* Figures have been rounded

OUR SW ENGINEERING FOOTPRINT

12,000+

Globalshore
Software Engineers

Building innovative
software products for

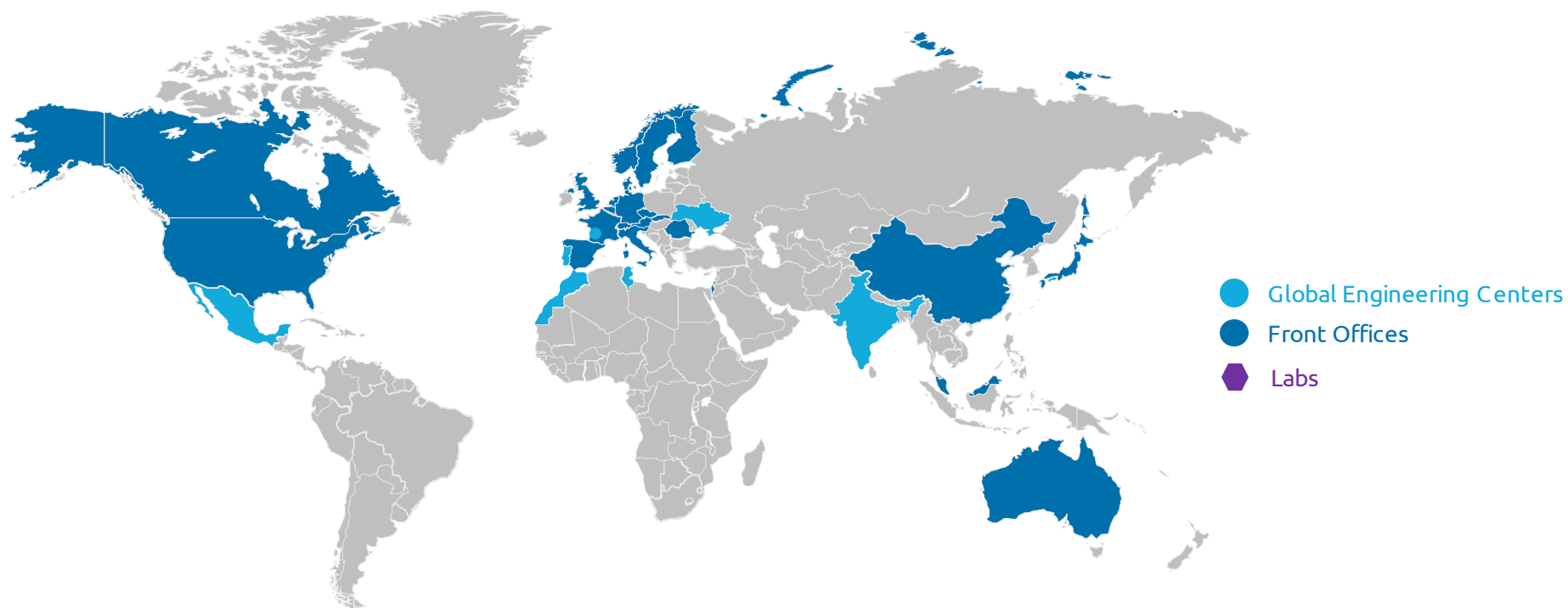
20+ years

#1

Engineering, Research
and Development
(ER&D)
Services in the world

Our premier Engineering and R&D global delivery platform offers:

- Domain specific expertise (Autosar, ADAS, e-cockpit, mobility, etc)
- Technology expertise (Embedded software, Agile Safe, Microservices)
- Automotive certifications (TISAX, Automotive Spice, etc)





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About Capgemini Engineering

Capgemini Engineering combines, under one brand, a unique set of strengths from across the Capgemini Group: the world leading engineering and R&D services of Altran – acquired by Capgemini in 2020 - and Capgemini's digital manufacturing expertise. With broad industry knowledge and cutting-edge technologies in digital and software, Capgemini Engineering supports the convergence of the physical and digital worlds. Combined with the capabilities of the rest of the Group, it helps clients to accelerate their journey towards Intelligent Industry. Capgemini Engineering has more than 52,000 engineer and scientist team members in over 30 countries across sectors including aeronautics, automotive, railways, communications, energy, life sciences, semiconductors, software & internet, space & defence, and consumer products.

Capgemini Engineering is an integral part of the Capgemini Group, a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided every day by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of 270,000 team members in nearly 50 countries. With its strong 50-year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering and platforms. The Group reported in 2020 global revenues of €16 billion.

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