

The image features a wireframe car model, likely a sedan, displayed on a laptop screen. The car is rendered in a light blue, semi-transparent style, showing its internal structure and components. The laptop is positioned in the foreground, and the background shows a workshop or laboratory environment with various tools and equipment. The overall color scheme is dominated by shades of blue and green, creating a futuristic and technological atmosphere.

digital.auto

**Driving Innovation:  
Digital-First Strategies  
for Software-Defined Vehicles**

Prof. Dirk Slama, Bosch

#digitalfirst



**Memory Lane**



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Friday, August 27, 1999

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✓prime

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★★★★☆ 4,312  
✓prime

**Bosch Professional GSR 18V-55 Cordless Screw...**  
★★★★☆ 500  
✓prime

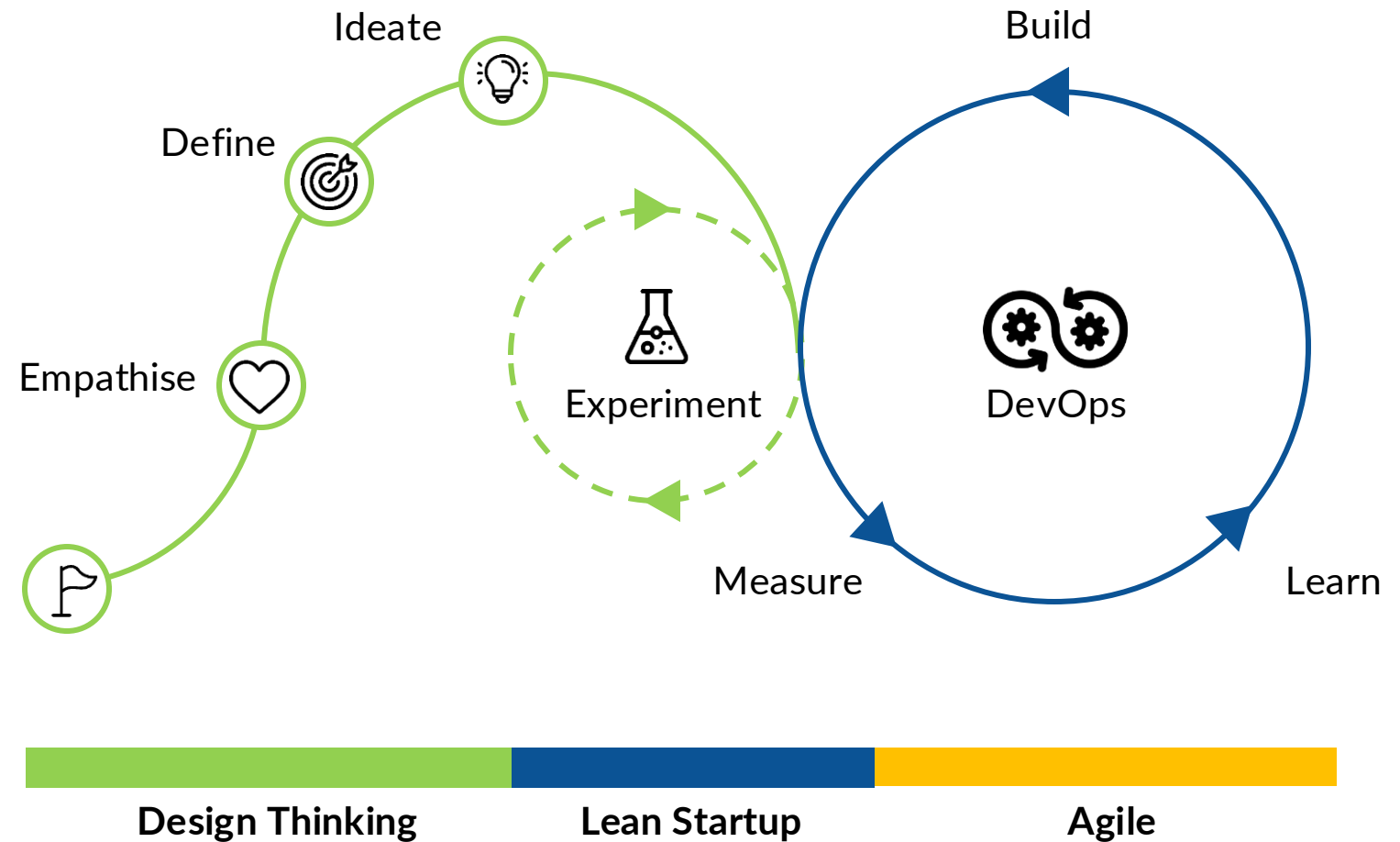
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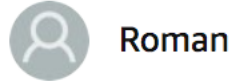
Which features do customers really want?  
And how do they like the UX?







## Top-Kundenrezensionen




★★★★★ **Sous-vide macht tierisch Spass mit dem Searzall Torch!**

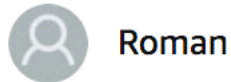
16. Juli 2018

**Verifizierter Kauf**

Sous-vide mit Searzall macht Spass und das Resultat ist sehr gut. Ich nutze es aber auch für andere Gerichte um ein Spiegel-Ei am Schluss etwas zu erhitzen on top. Nicht günstig mit den Brenner aber es hat sich gelohnt.

 Nützlich | [Kommentar](#) | [Missbrauch melden](#)

## Top-Kundenreze



★★★★★ **Sous-vi**

16. Juli 2018

**Verifizierter Kauf**

Sous-vide mit Searzall

um ein Spiegel-Ei am Schluss etwas zu erhitzen on top. Nicht günstig mit den Brenner aber es hat sich gelohnt.

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## Top-Kundenrezens



★★★★★ **Sous-vide**

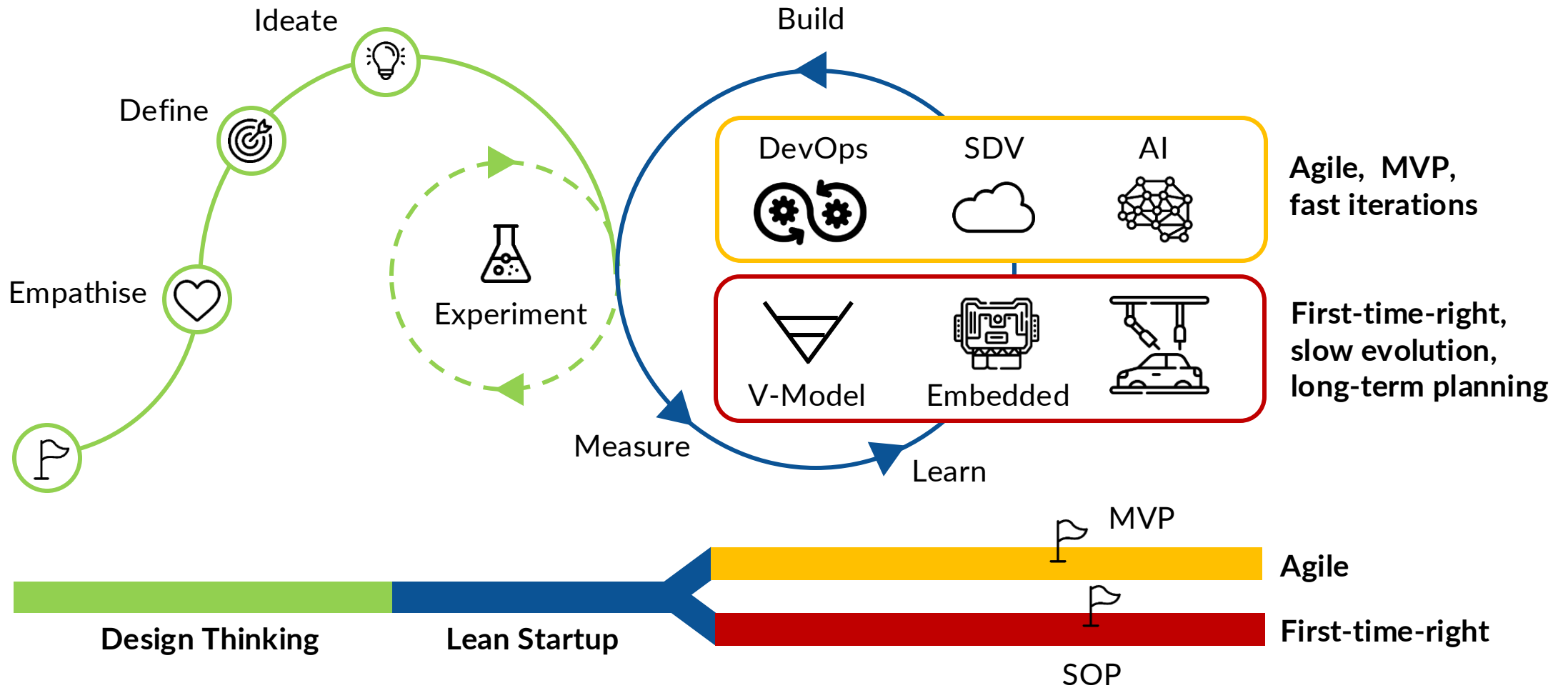
16. Juli 2018

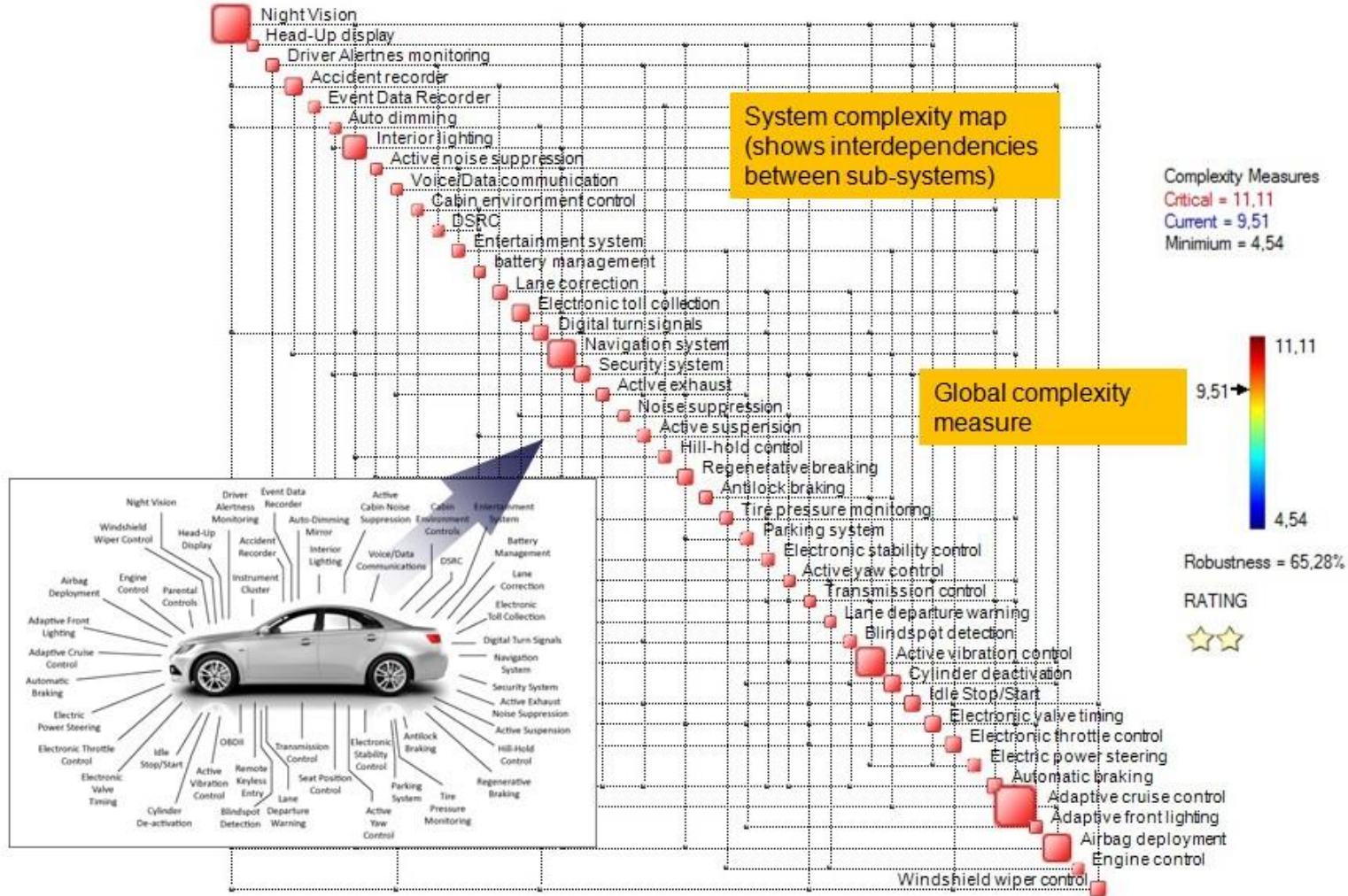
**Verifizierter Kauf**

Sous-vide mit Searzall macht Spass und das Resultat ist sehr gut. Ich nutze es aber auch für andere Gerichte mit Kase oder eintrach um ein Spiegel-Ei am Schluss etwas zu erhitzen on top. Nicht günstig mit den Brenner aber es hat sich gelohnt.

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# But: How to apply this to the automotive reality?





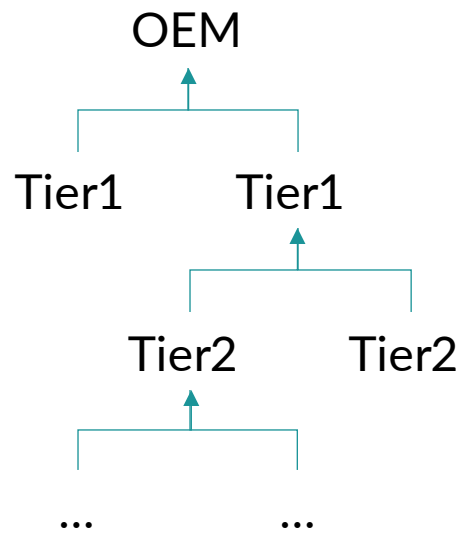
Source: [ontonixqcm.blog](http://ontonixqcm.blog)

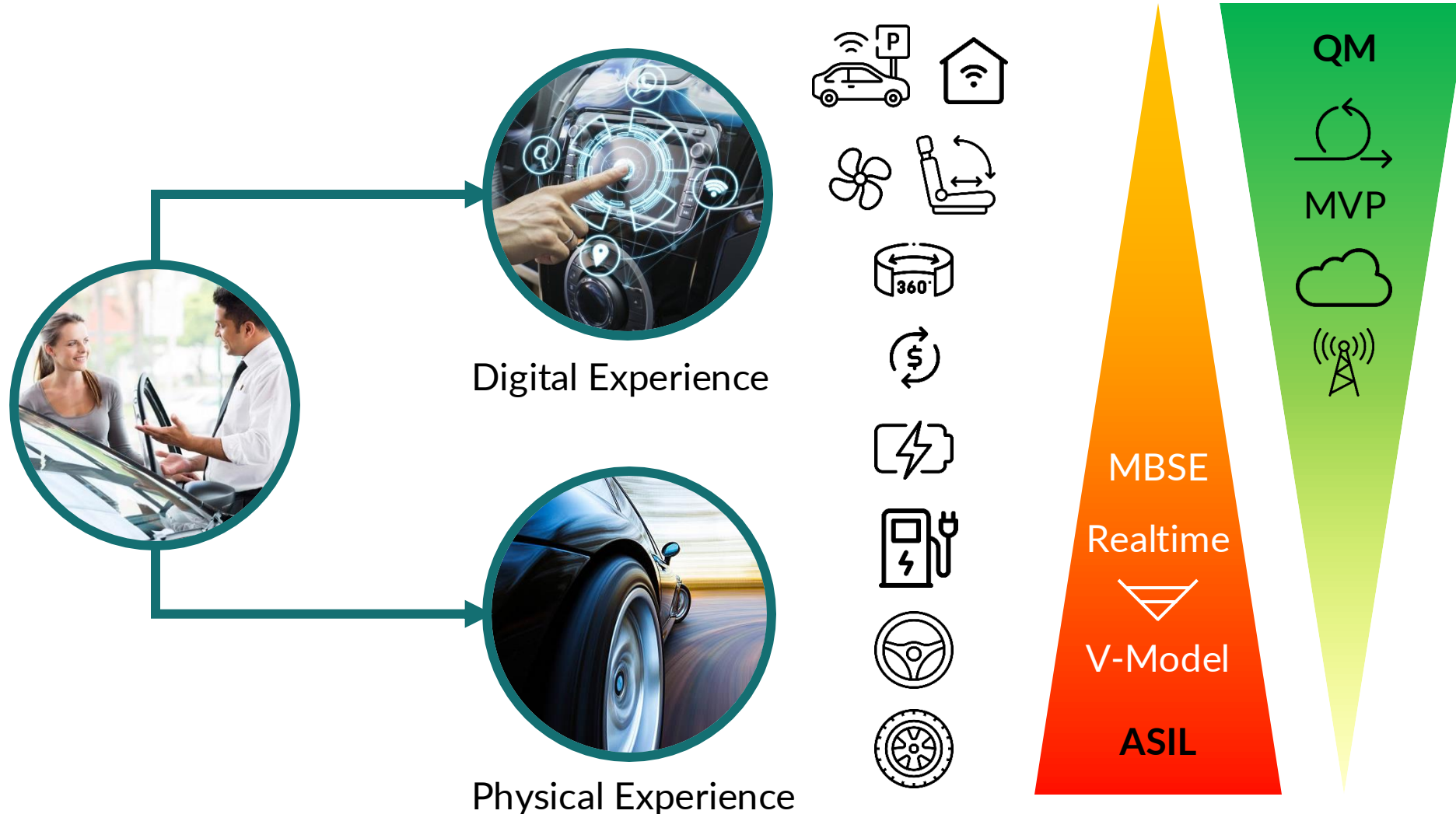
Complexity

Dependencies

Heterogeneity

Variants





# How to cut the gordian knot?



# De-coupling



# De-coupling





## DevOps

Cross-functional DevOps teams are collaborating throughout the product lifecycle



## Continuous Delivery

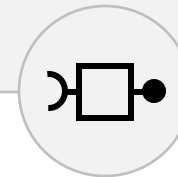
Incremental code changes are made frequently and reliably



## Loose Coupling

### Microservices & APIs

Applications are developed as suites of modular microservices with well defined programming interfaces



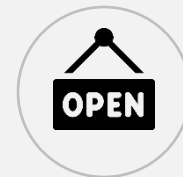
### Containerization

Containers provide a lightweight, portable and automated runtime for applications and microservices

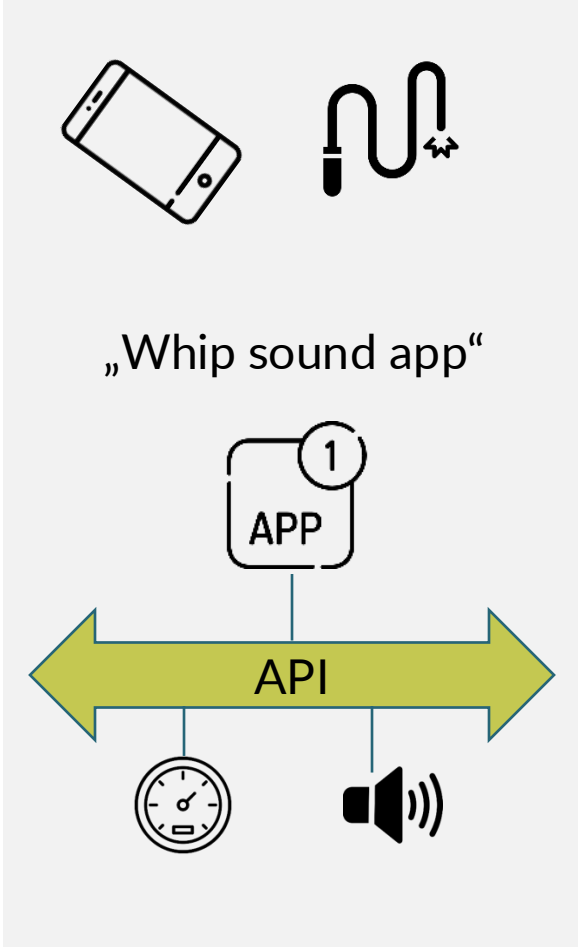
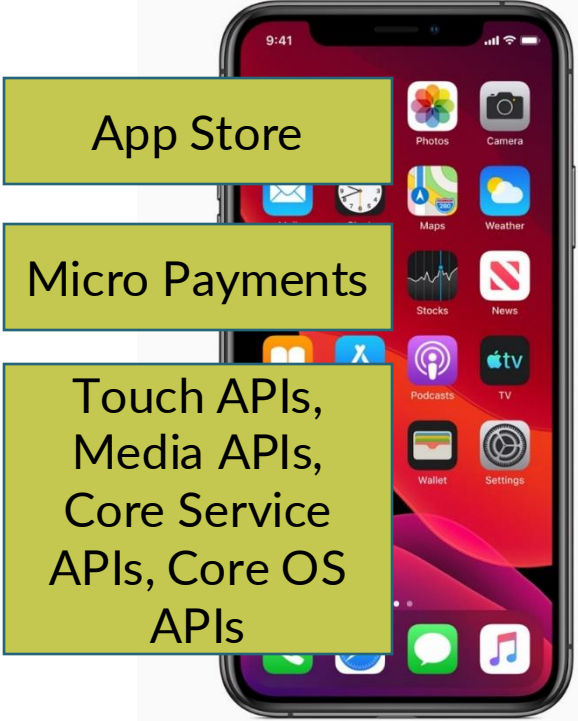


## Open-source

Foundational software is jointly developed and shared by a large open-source community. This includes operating systems, container runtimes, middleware for microservice orchestration, and the tool chain for continuous integration and delivery (CI/CD)







- Benchmark Apple (2023)
- \$89bn revenue
  - 2.3 mio apps
  - 36 mio registered developers



Search

Filter

+ New Wishlist API

Vehicle

- Vehicle.ADAS
- Vehicle.ADAS.ABS
- Vehicle.ADAS.ABS.IsEnabled
- Vehicle.ADAS.ABS.IsEngaged
- Vehicle.ADAS.ABS.IsError
- Vehicle.ADAS.ActiveAutonomyLevel
- Vehicle.ADAS.CruiseControl
- Vehicle.ADAS.CruiseControl.IsActive
- Vehicle.ADAS.CruiseControl.IsEnabled
- Vehicle.ADAS.CruiseControl.IsError
- Vehicle.ADAS.CruiseControl.SpeedSet
- Vehicle.ADAS.EBA
- Vehicle.ADAS.EBA.IsEnabled
- Vehicle.ADAS.EBA.IsEngaged
- Vehicle.ADAS.EBA.IsError
- Vehicle.ADAS.EBD
- Vehicle.ADAS.EBD.IsEnabled
- Vehicle.ADAS.EBD.IsEngaged
- Vehicle.ADAS.EBD.IsError
- Vehicle.ADAS.EESC

BRANCH

BRANCH

BRANCH

ACTUATOR

SENSOR

SENSOR

SENSOR

BRANCH

ACTUATOR

ACTUATOR

SENSOR

ACTUATOR

BRANCH

ACTUATOR

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Edit

Report

Search

Filter

+ New Wishlist API

Vehicle

- Vehicle.ADAS
- Vehicle.ADAS.ABS
- Vehicle.ADAS.ABS.IsEnabled
- Vehicle.ADAS.ABS.IsEngaged
- Vehicle.ADAS.ABS.IsError
- Vehicle.ADAS.ActiveAutonomyLevel
- Vehicle.ADAS.CruiseControl
- Vehicle.ADAS.CruiseControl.IsActive
- Vehicle.ADAS.CruiseControl.IsEnabled
- Vehicle.ADAS.CruiseControl.IsError
- Vehicle.ADAS.CruiseControl.SpeedSet
- Vehicle.ADAS.EBA
- Vehicle.ADAS.EBA.IsEnabled
- Vehicle.ADAS.EBA.IsEngaged
- Vehicle.ADAS.EBA.IsError
- Vehicle.ADAS.EBD
- Vehicle.ADAS.EBD.IsEnabled
- Vehicle.ADAS.EBD.IsEngaged
- Vehicle.ADAS.EBD.IsError
- Vehicle.ADAS.EESC

BRANCH

BRANCH

BRANCH

ACTUATOR

SENSOR

SENSOR

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SENSOR

BRANCH

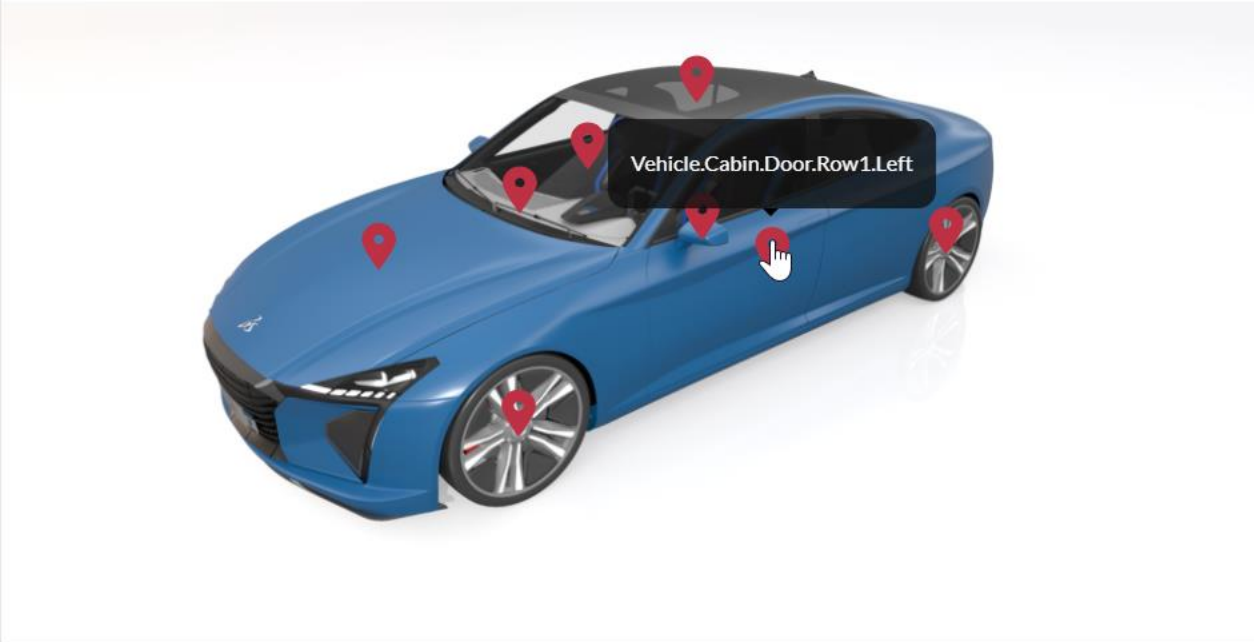
ACTUATOR

SENSOR

SENSOR

BRANCH

Edit



Report

Vehicle.Cabin.Door.Row1.Left

Filter

+ New Wishlist API

Recently viewed APIs

- Vehicle.Cabin.Door.Row1.Left** >
- Vehicle.Cabin.Door.Row1.Left.IsChildLockActive SENSOR
- Vehicle.Cabin.Door.Row1.Left.IsLocked ACTUATOR
- Vehicle.Cabin.Door.Row1.Left.IsOpen ACTUATOR
- Vehicle.Cabin.Door.Row1.Left.Shade BRANCH
- Vehicle.Cabin.Door.Row1.Left.Shade.Position ACTUATOR
- Vehicle.Cabin.Door.Row1.Left.Shade.Switch ACTUATOR
- Vehicle.Cabin.Door.Row1.Left.Window BRANCH
- Vehicle.Cabin.Door.Row1.Left.Window.IsChildLockEngaged SENSOR
- Vehicle.Cabin.Door.Row1.Left.Window.IsOpen SENSOR
- Vehicle.Cabin.Door.Row1.Left.Window.Position SENSOR
- Vehicle.Cabin.Door.Row1.Left.Window.Switch ACTUATOR

Edit



Vehicle.Cabin.Door.Row1.Left

Discussion (0)

BRANCH

Tags + Add tag

VSS Specification

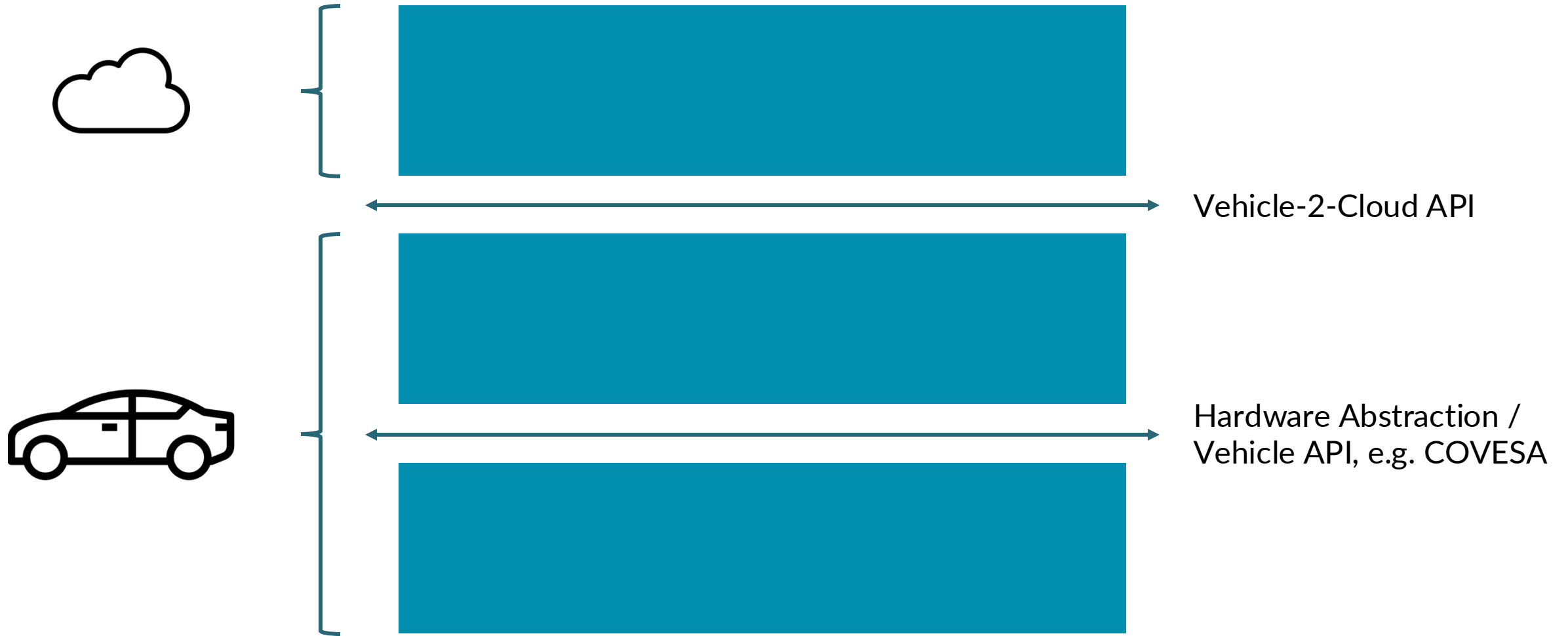
Description All doors, including windows and switches.

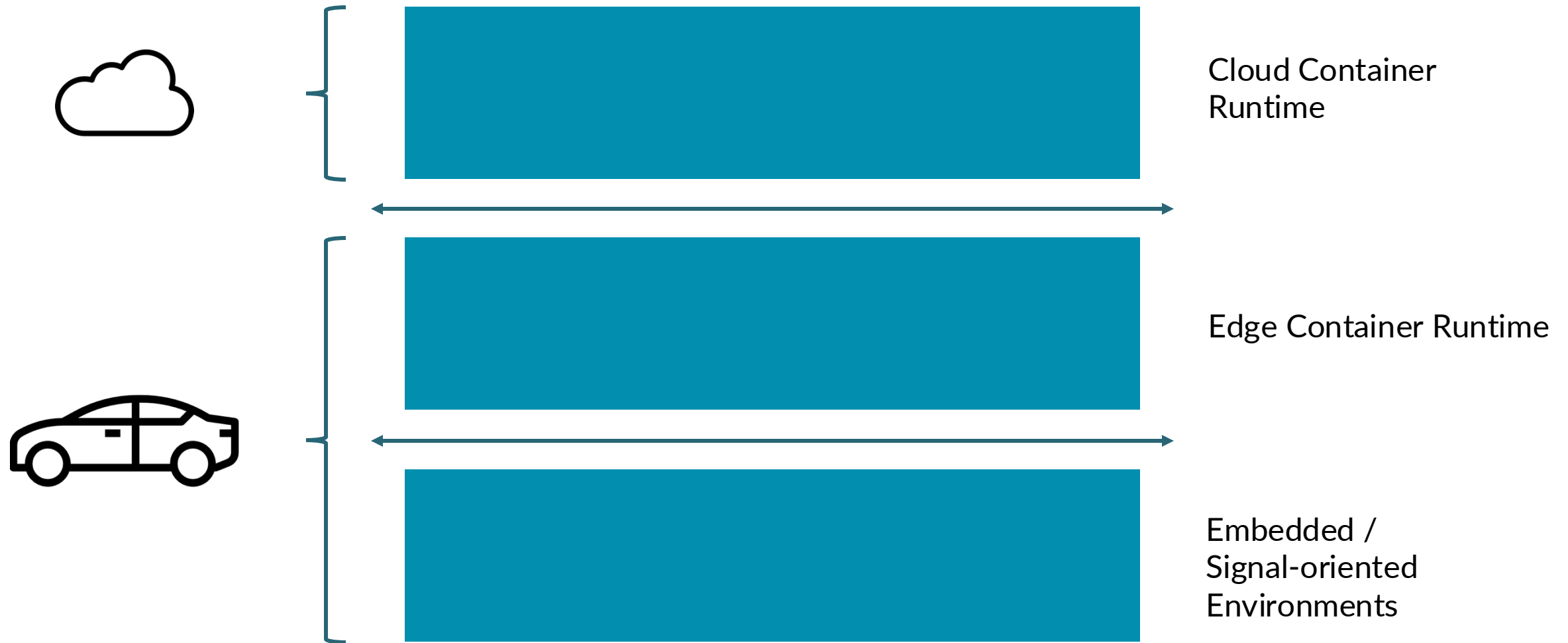
Type branch

UUID ee74ca8275485ea89f70931d3b3e4bed

Source https://github.com/COVESA/vehicle\_signal\_specification/tree/main

Report

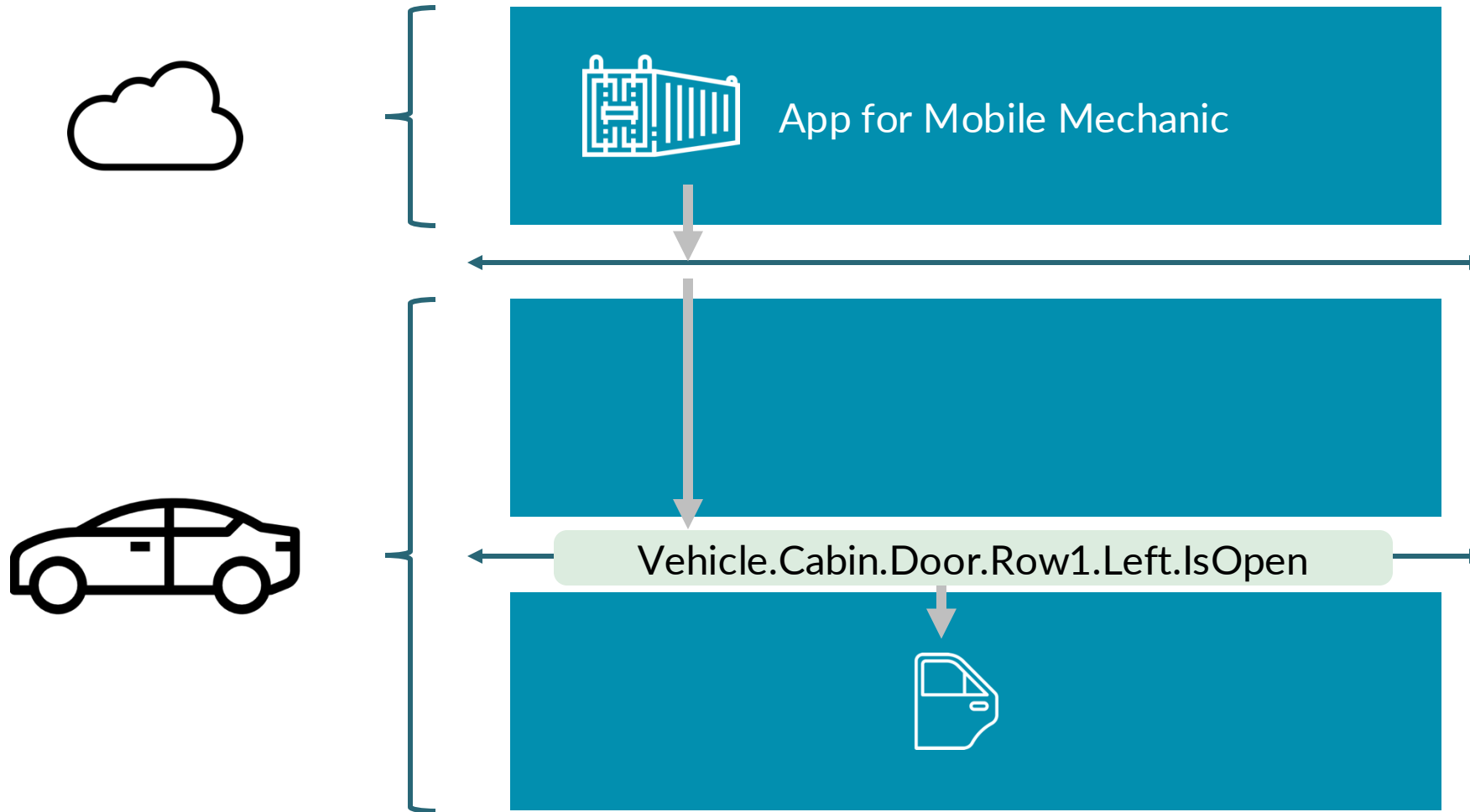








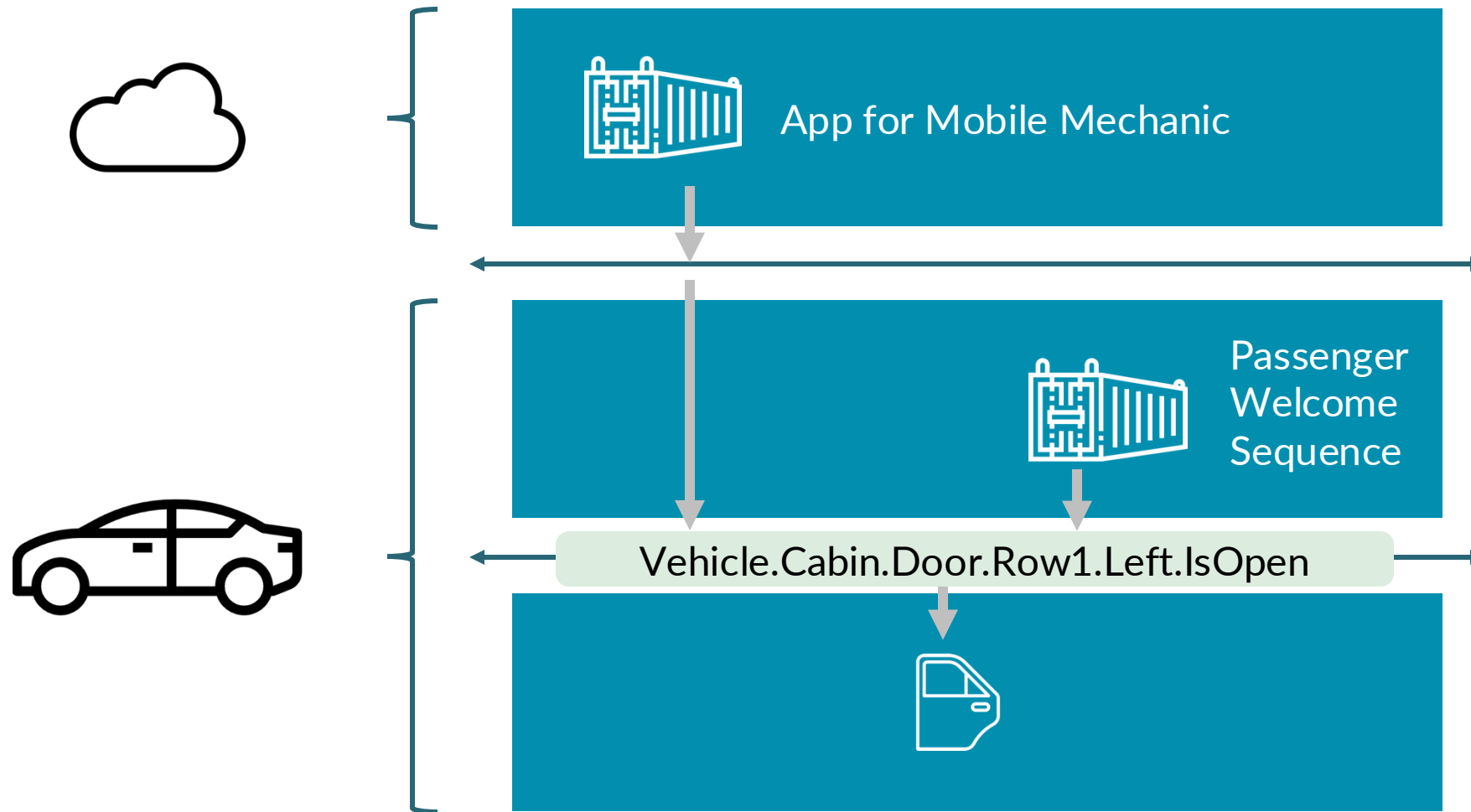
<https://www.youtube.com/watch?v=Z4a62H5f2EU>



# Second Example: Passenger Welcome

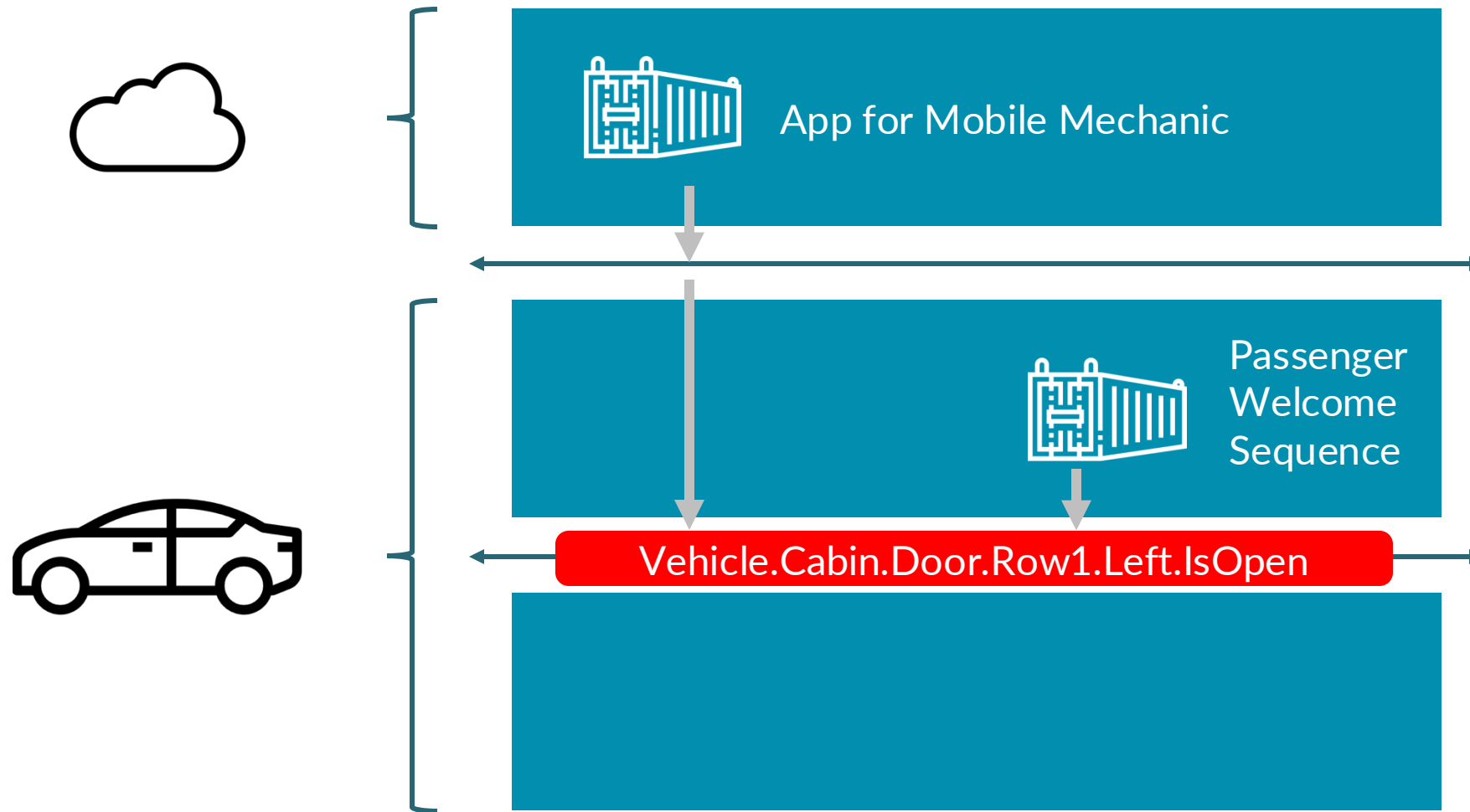


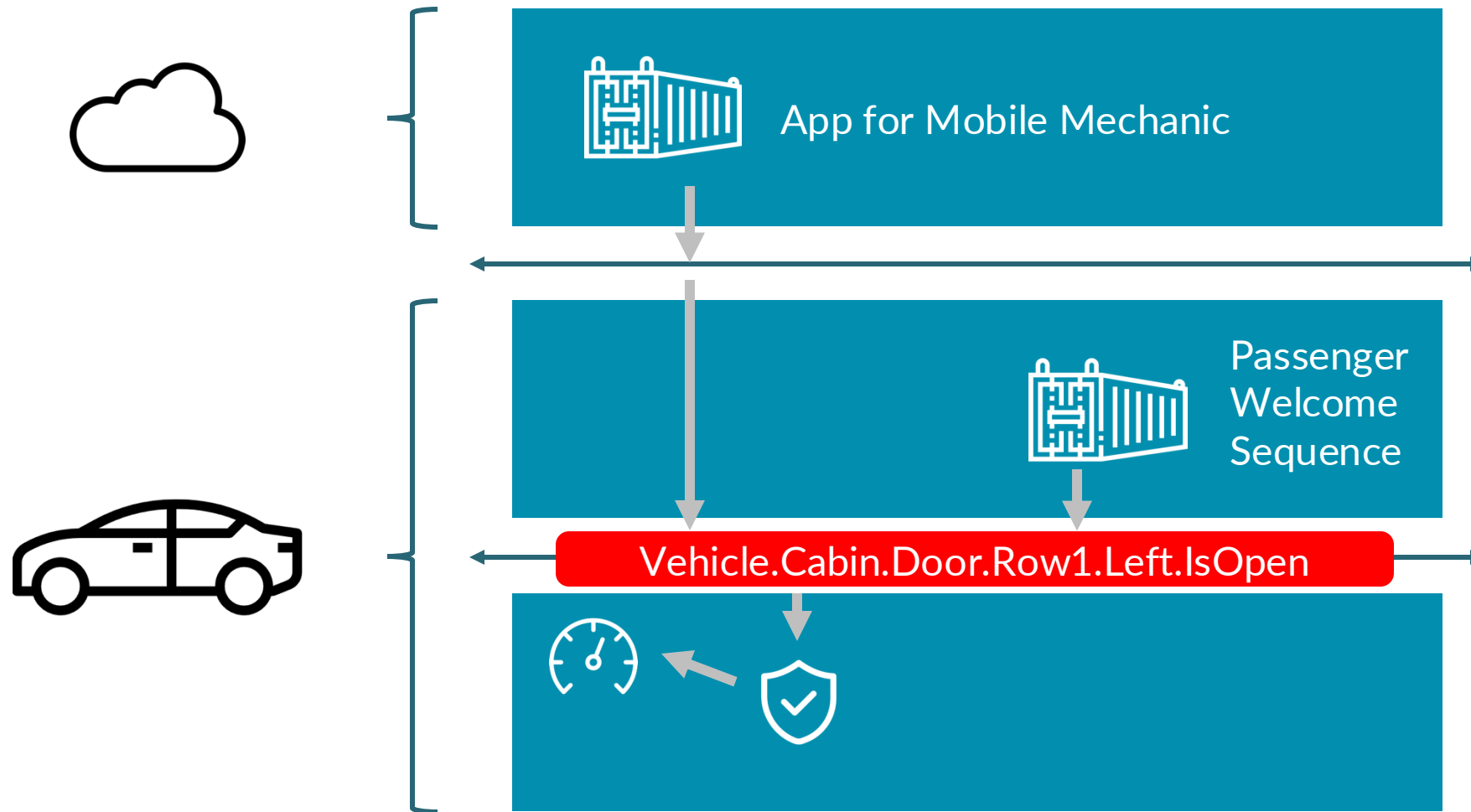
Source: 3ds.com



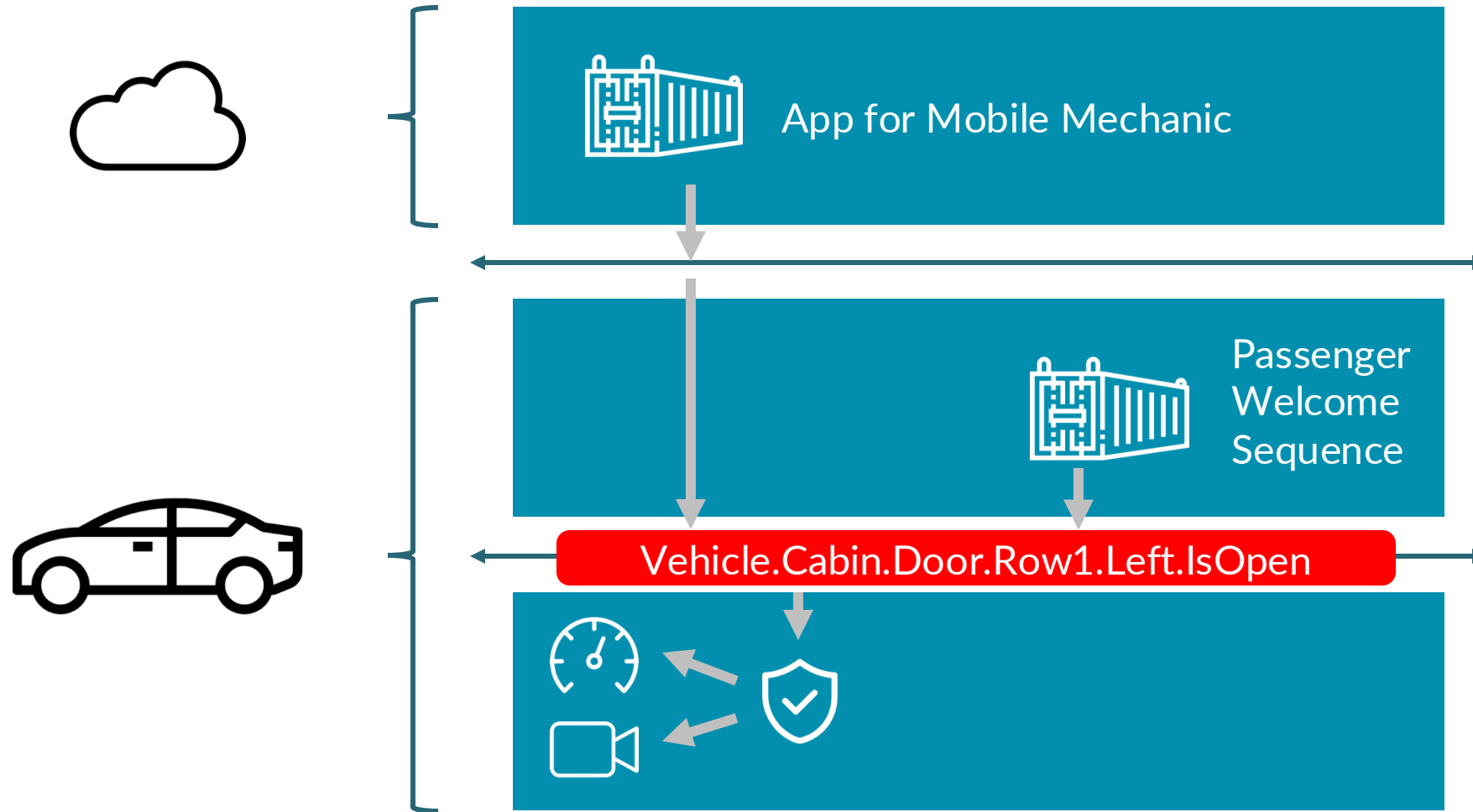
**Is it safe to open  
the vehicle door via an API?**

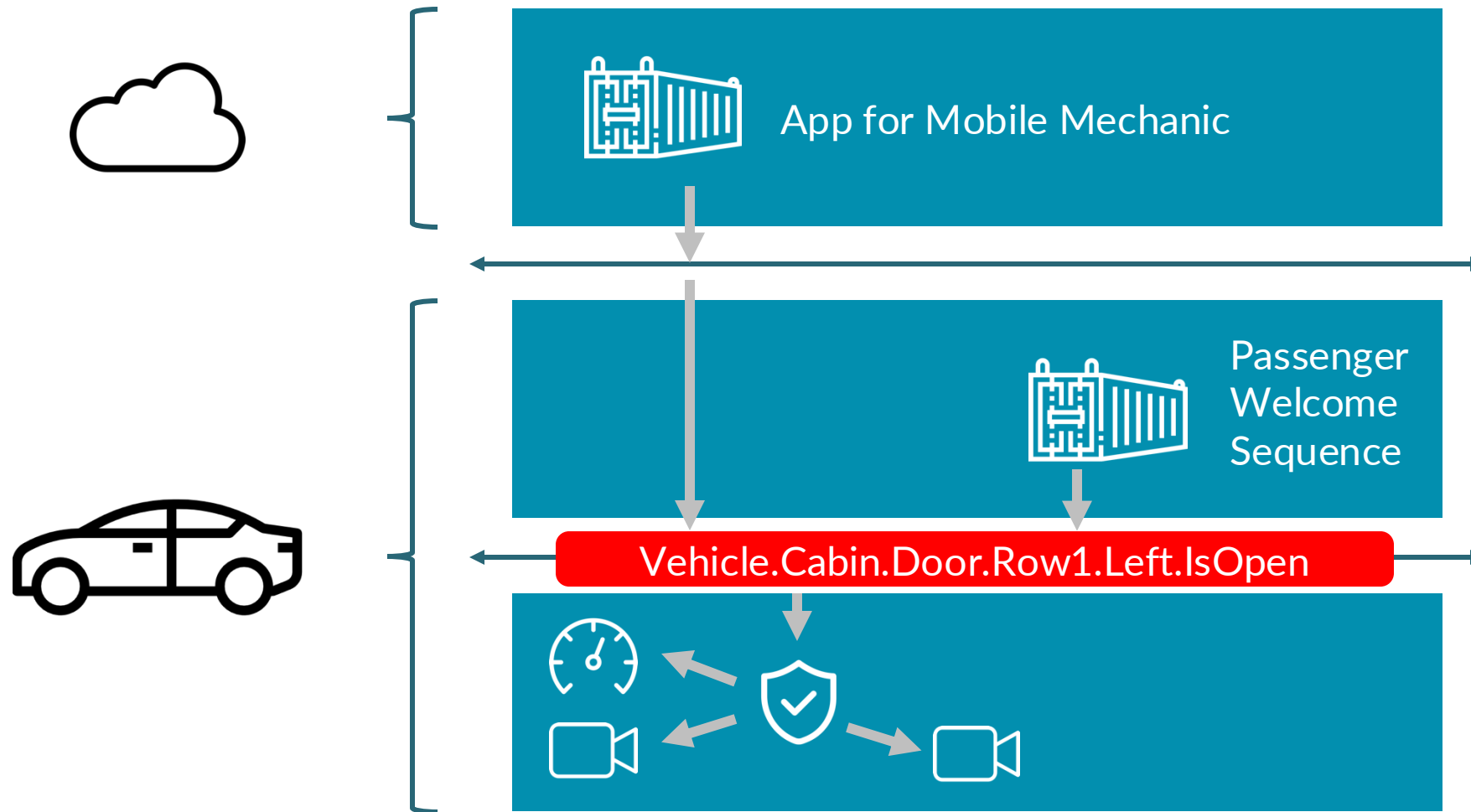
**No! Unless...**

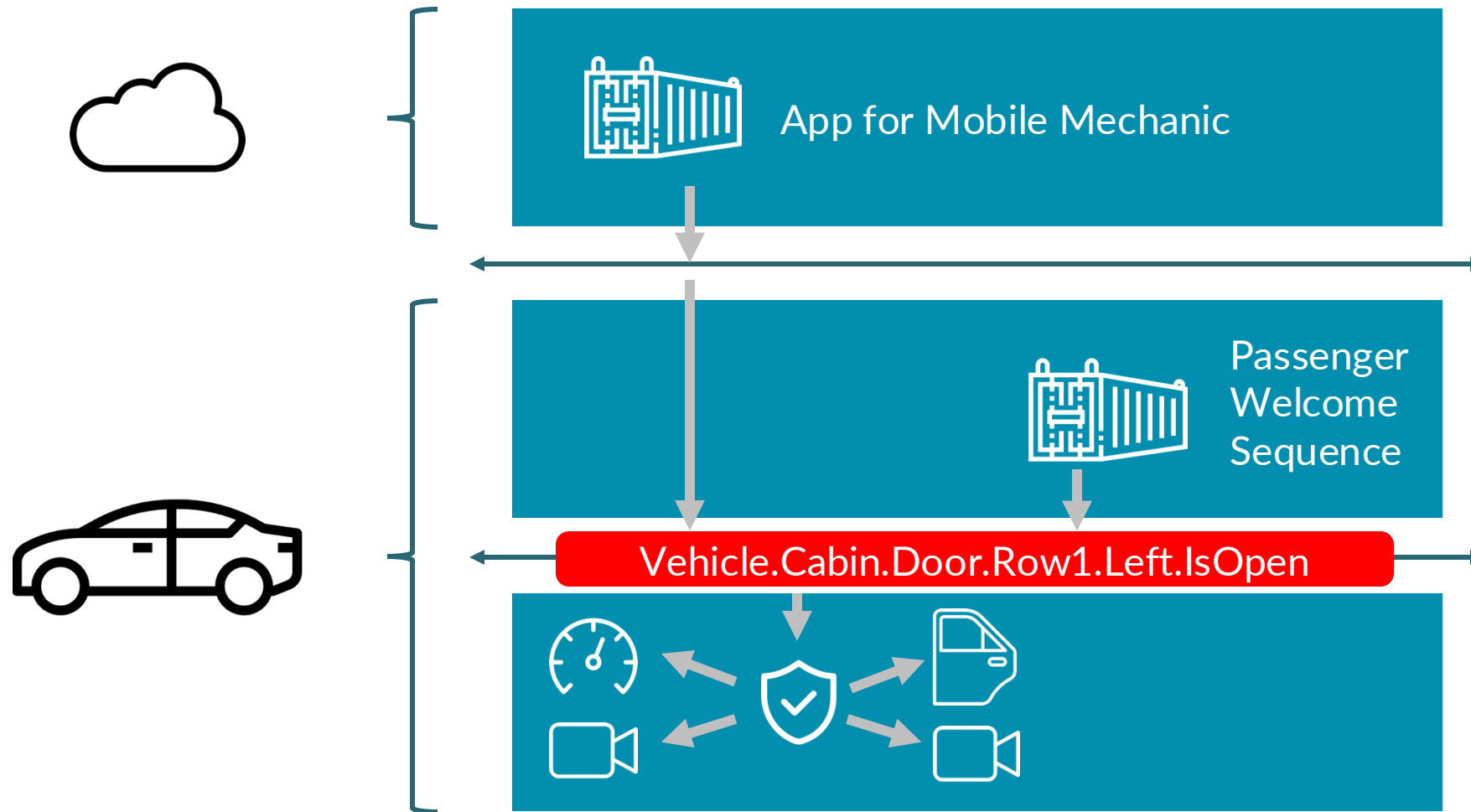


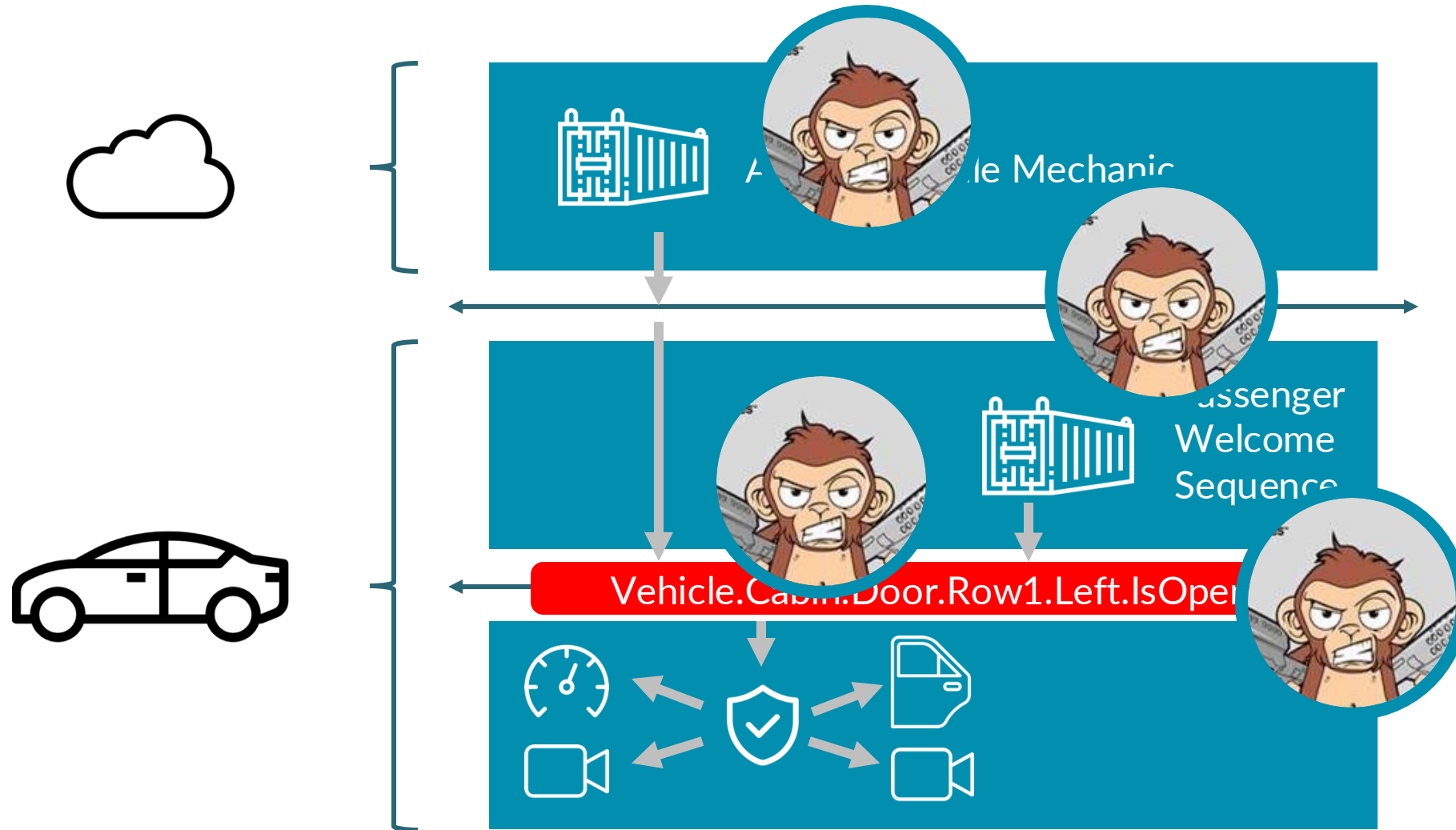












From Building-  
Blocks...



# ...to Value Streams





## Agile: Fast, continuous improvements

- Minimal Viable Product
- Frequent updates
- Lower safety requirements
- No real-time requirements

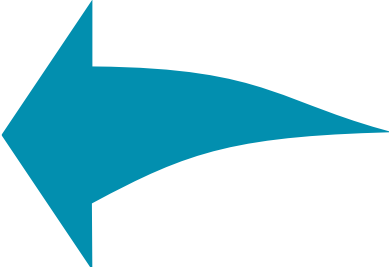


## Safe: First time right, safe evolution

- Long-term planning and stability
- Fully hardened environment
- High safety requirements
- Hard real-time + prioritization



Shift Left



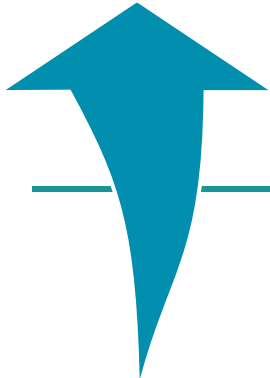
Agile: Fast, continuous improvements



Safe: First time right, safe evolution



Shift North

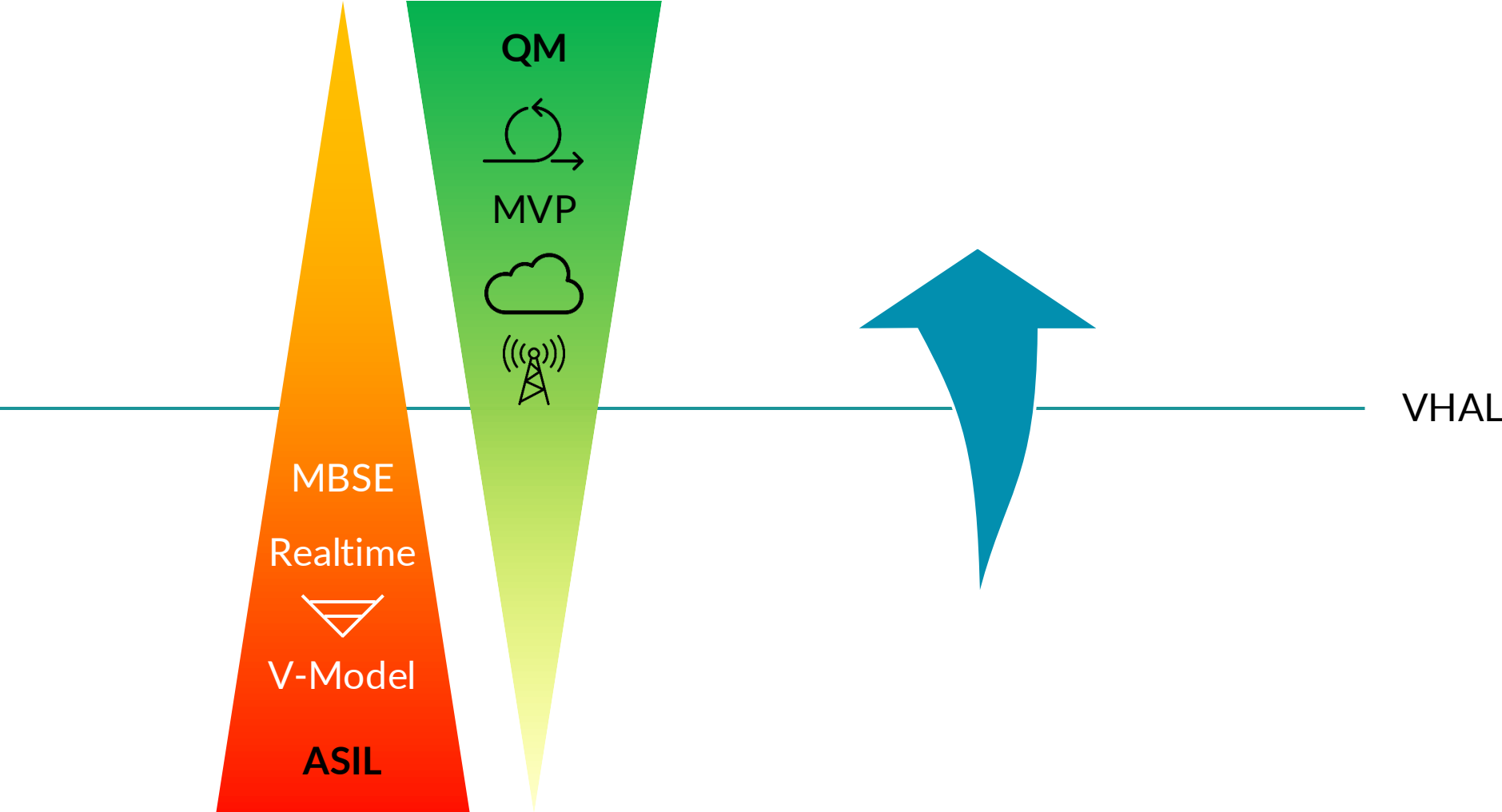


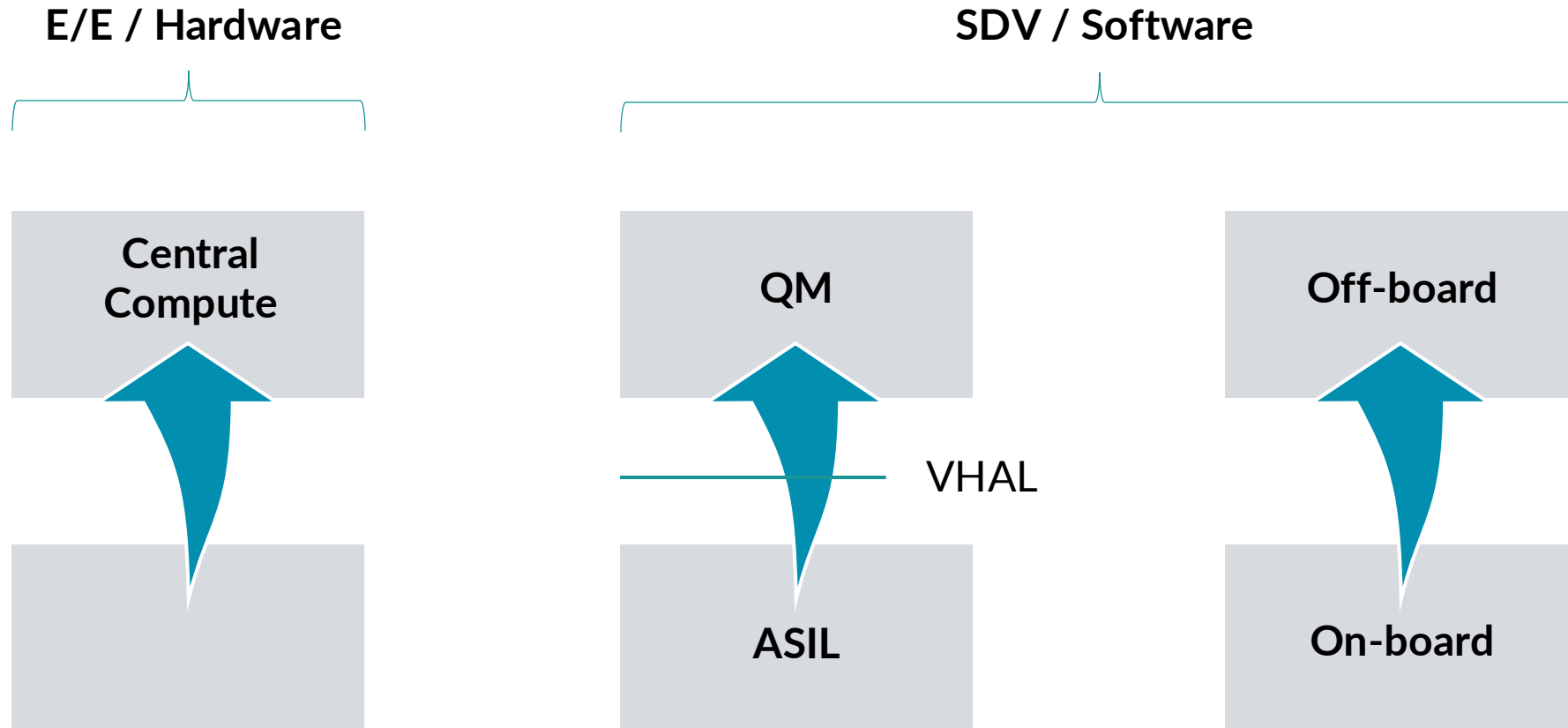
VHAL



# Shift North

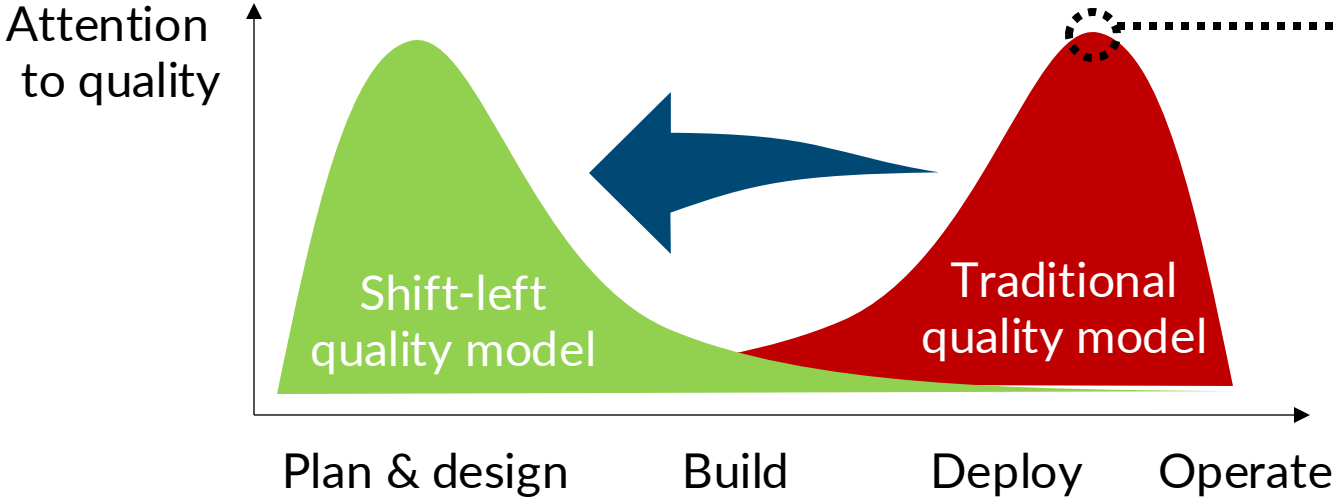






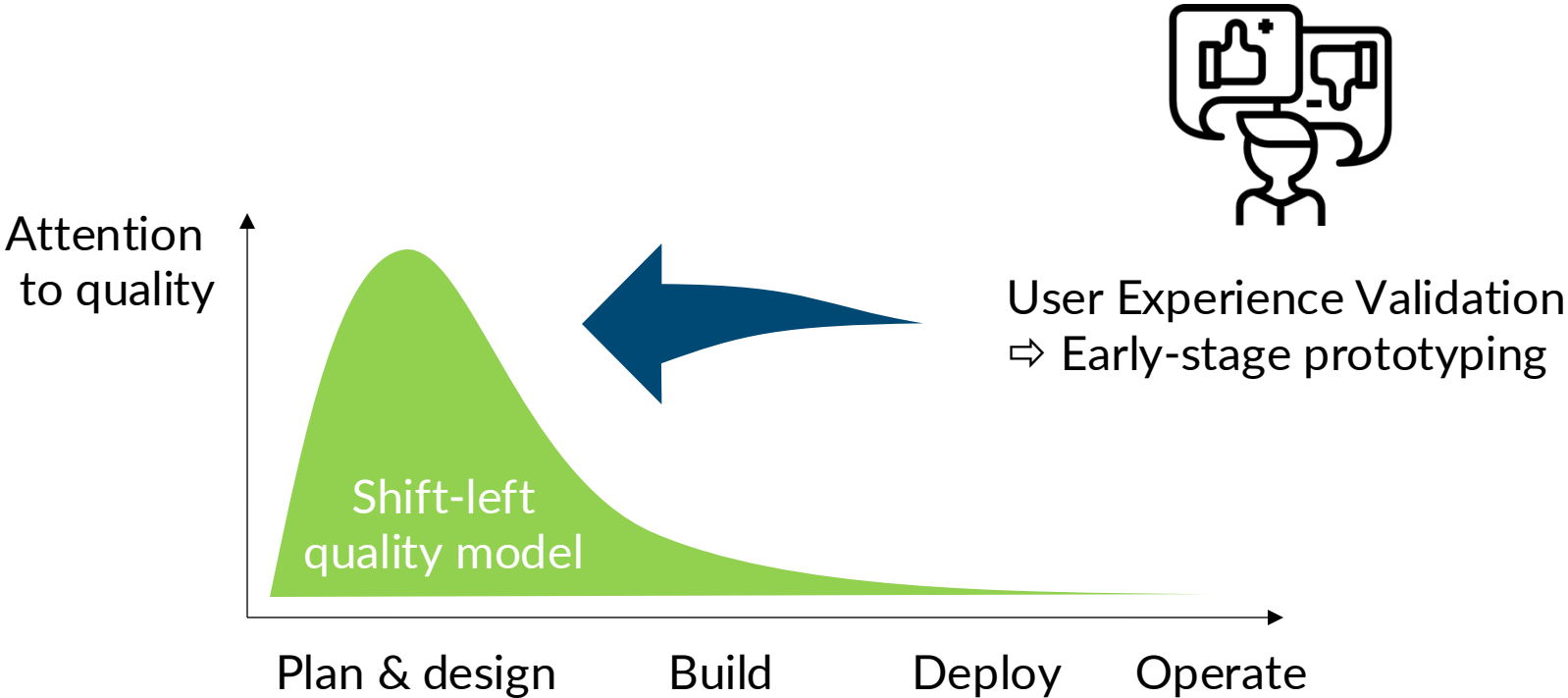
# Shift Left

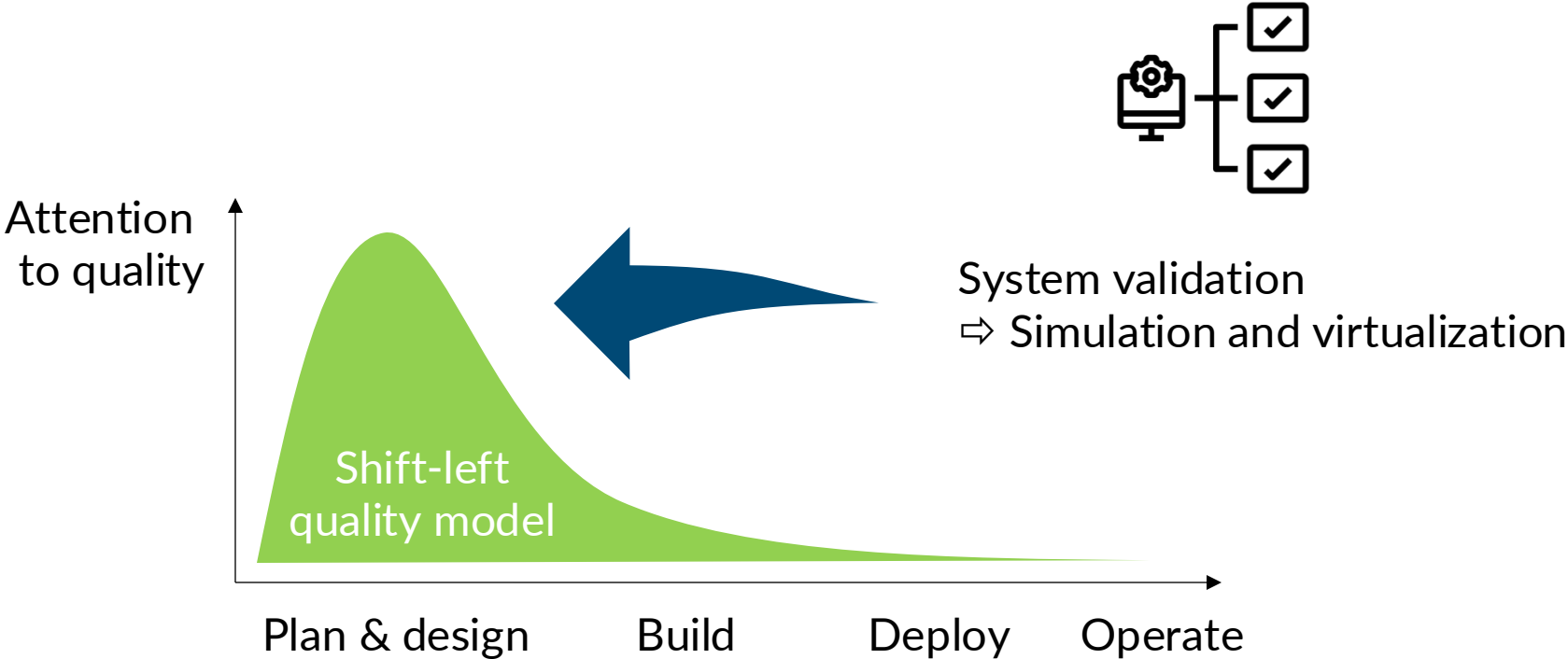


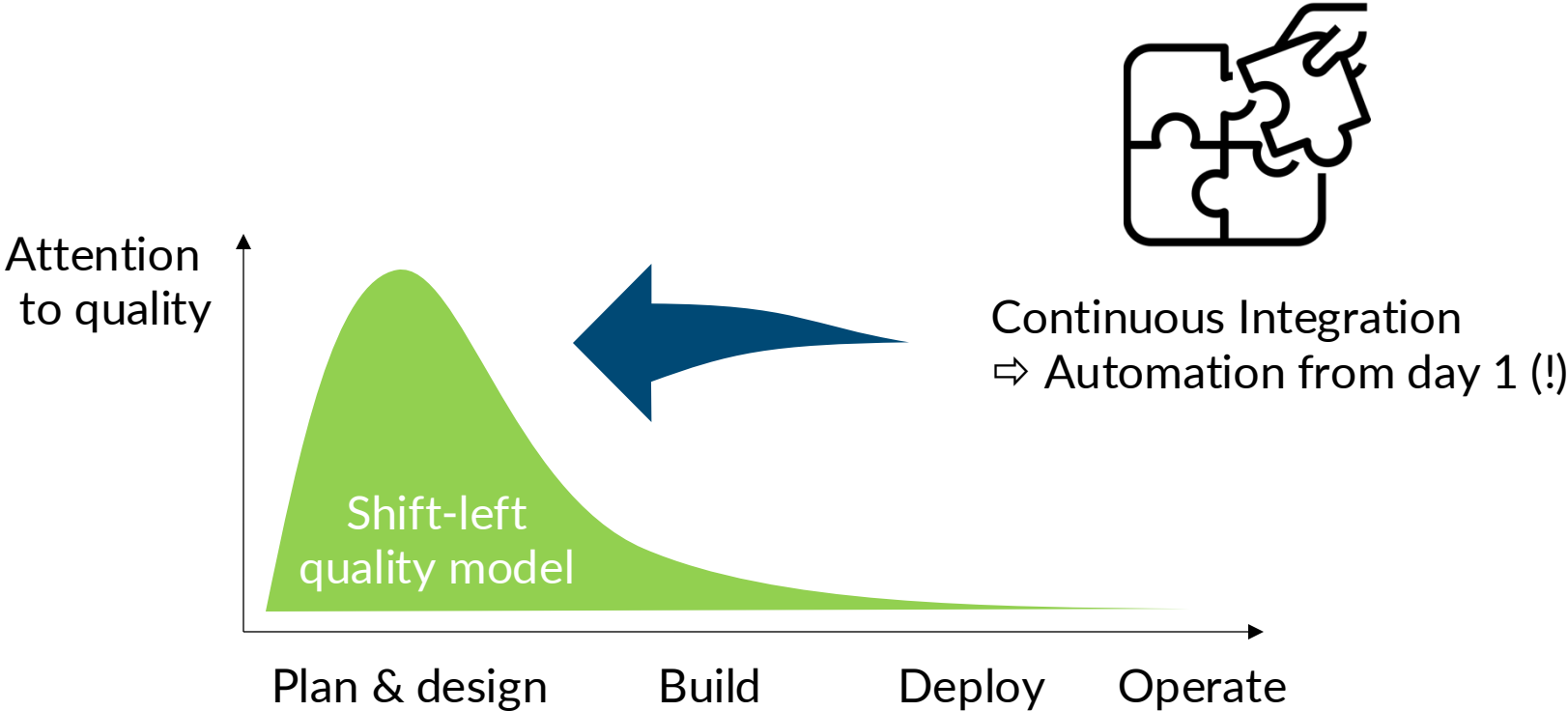


**640x**

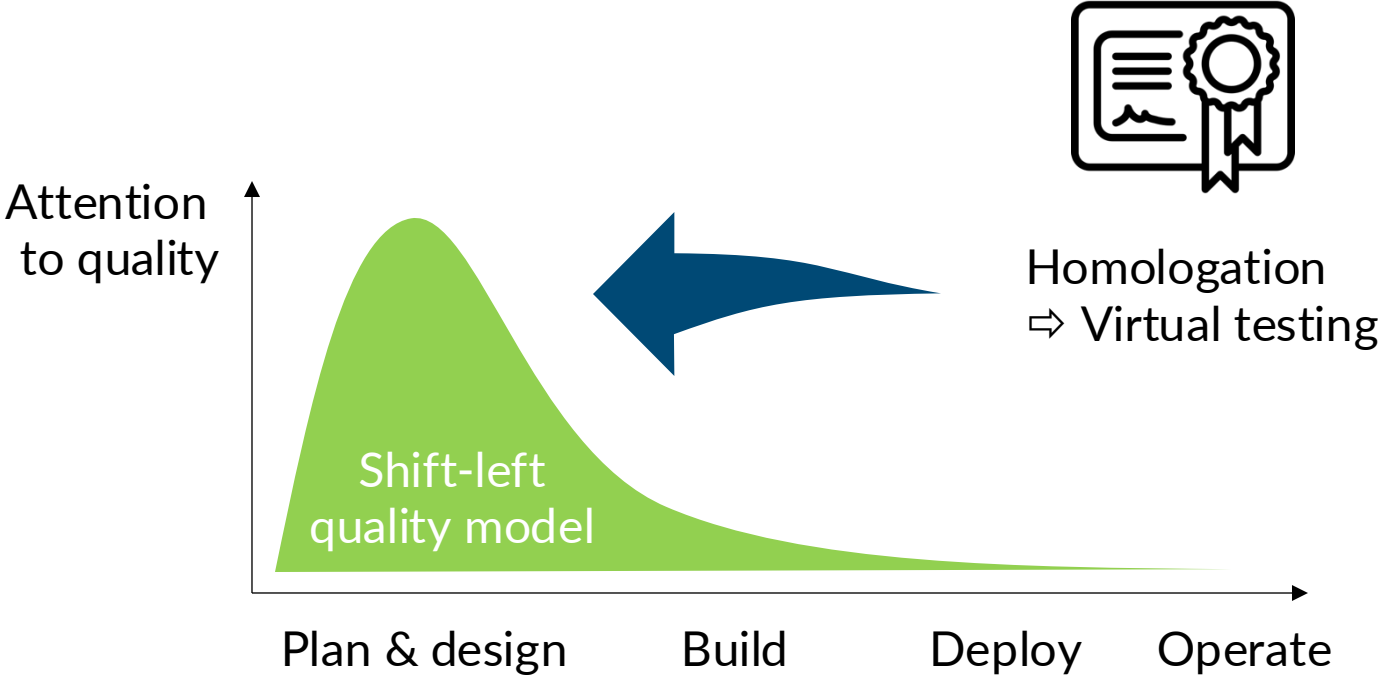
NIST (USA): Cost factor of error corrections based on work hours

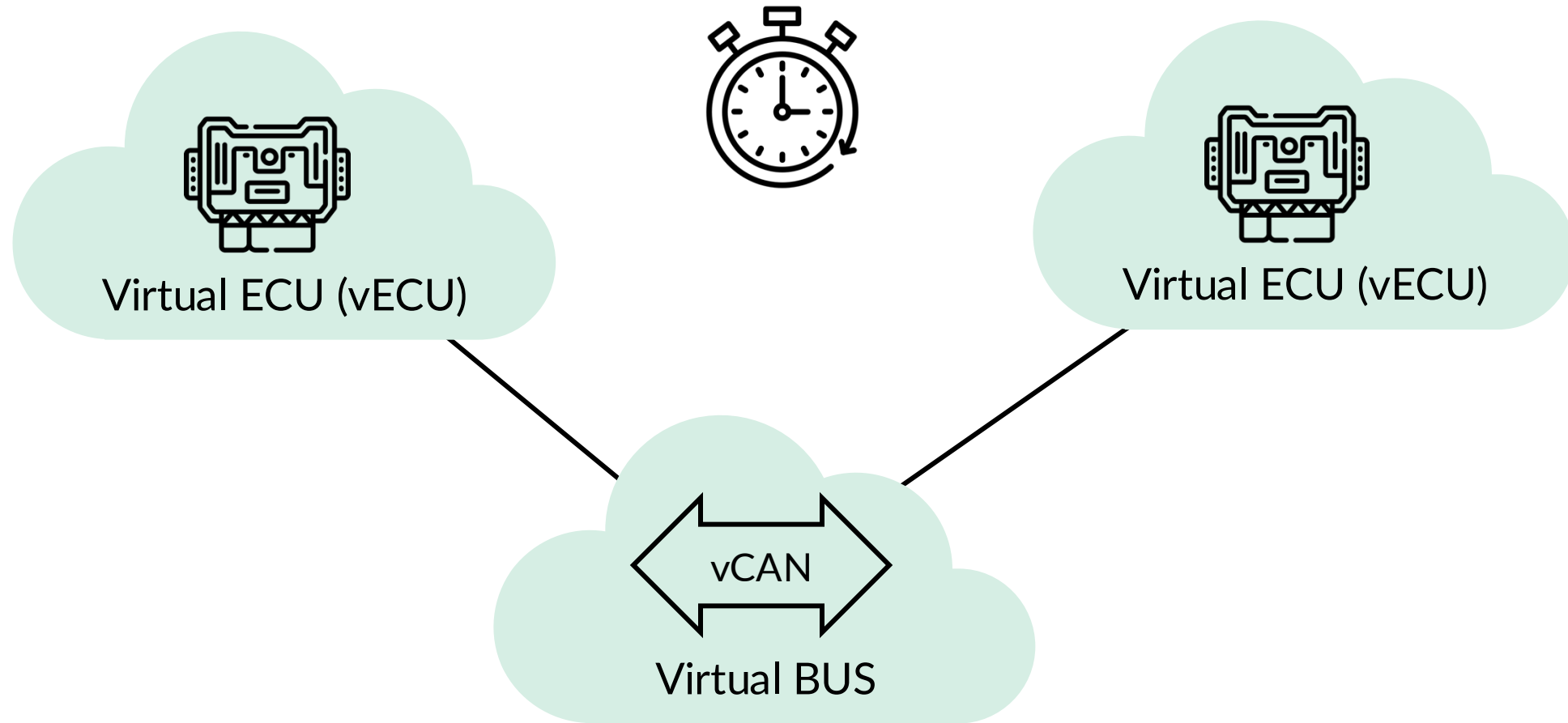


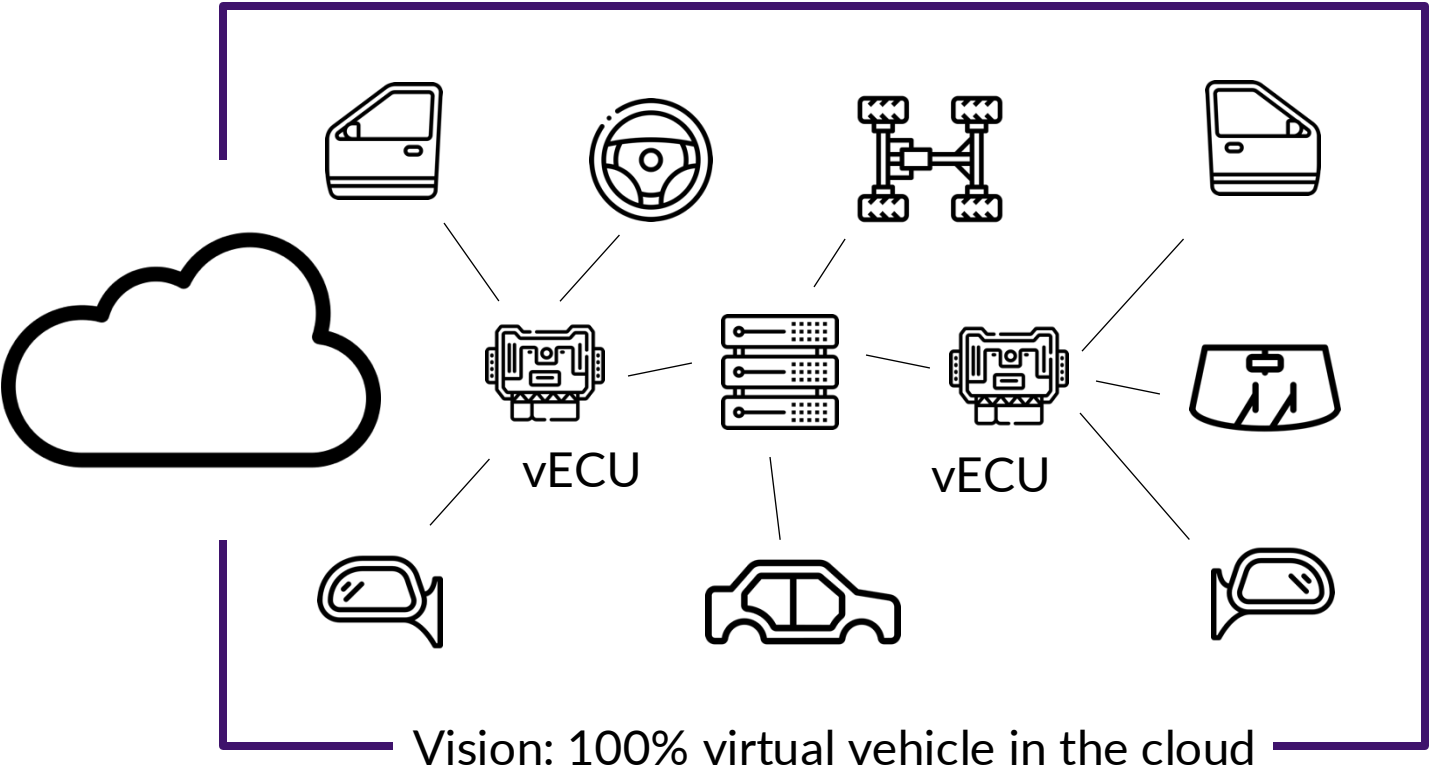






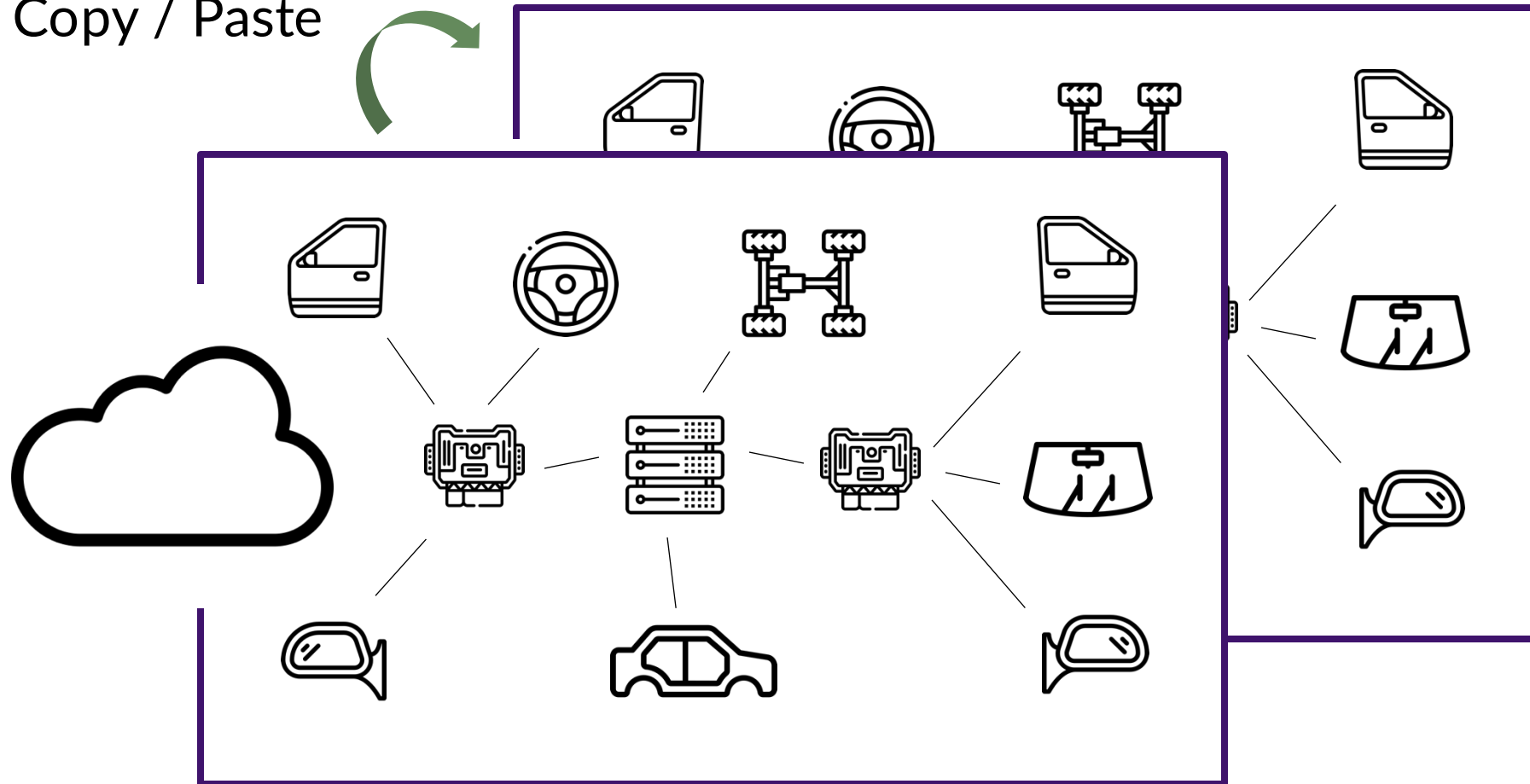
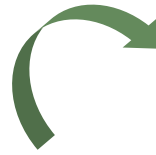


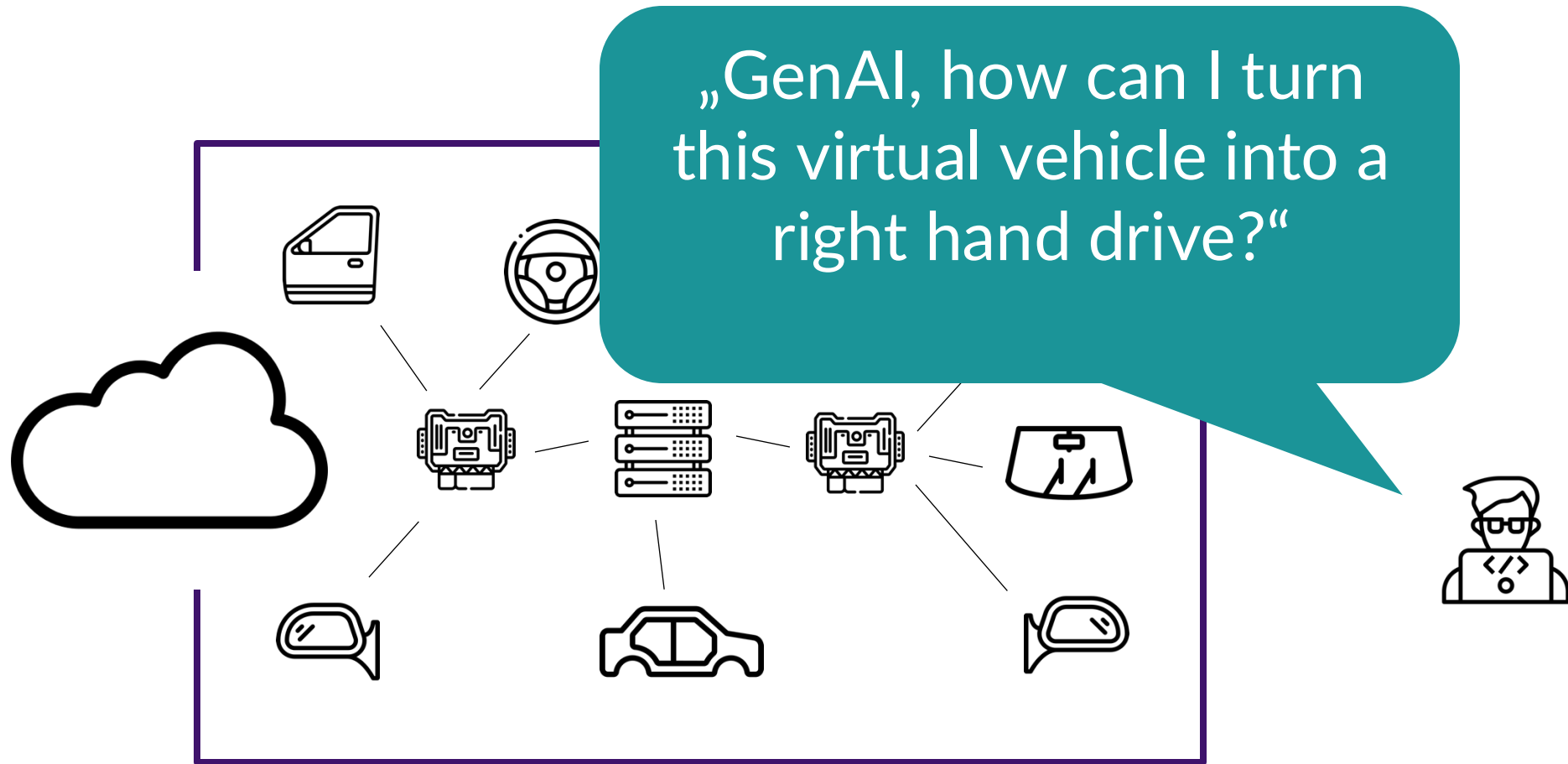


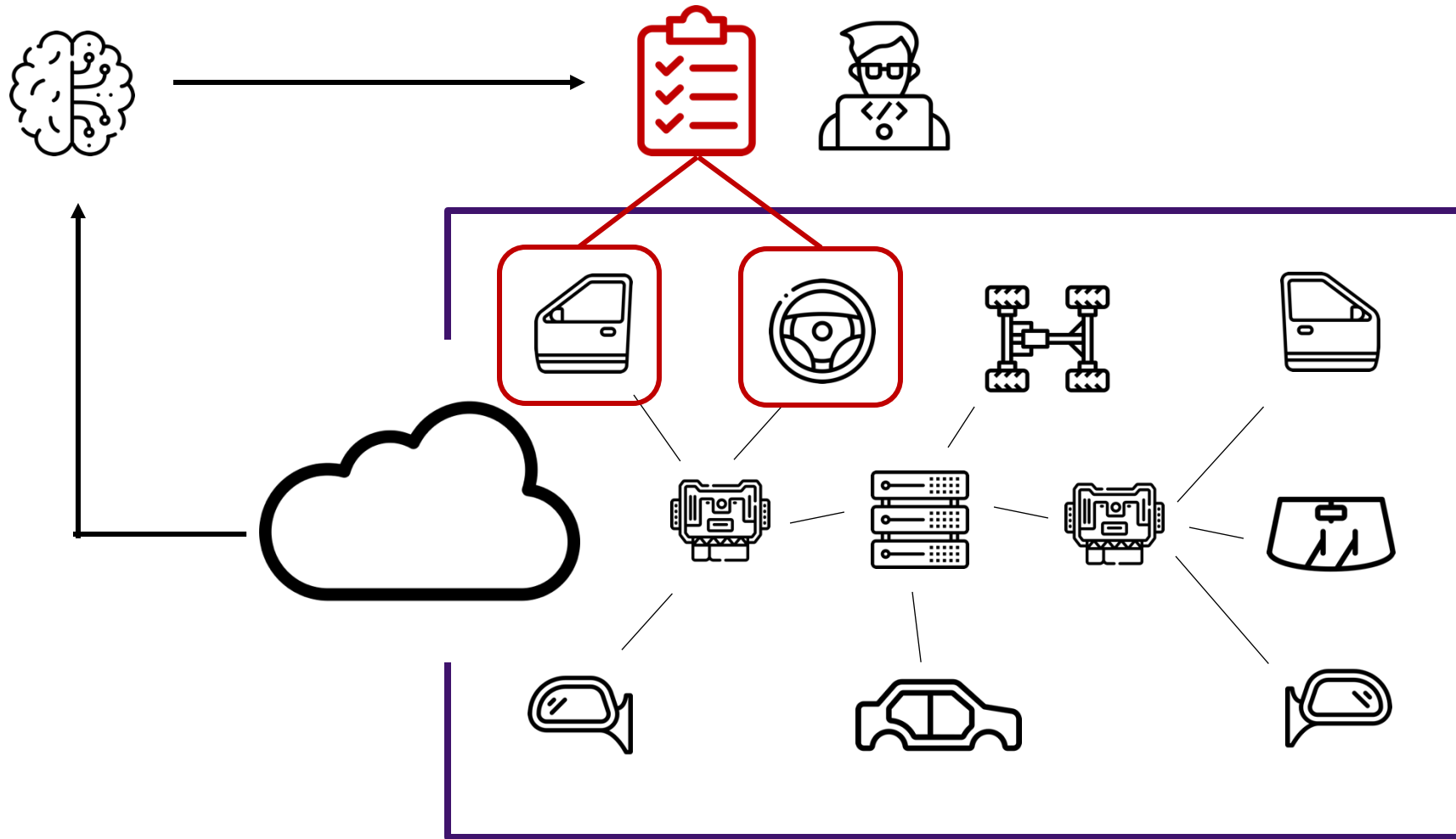


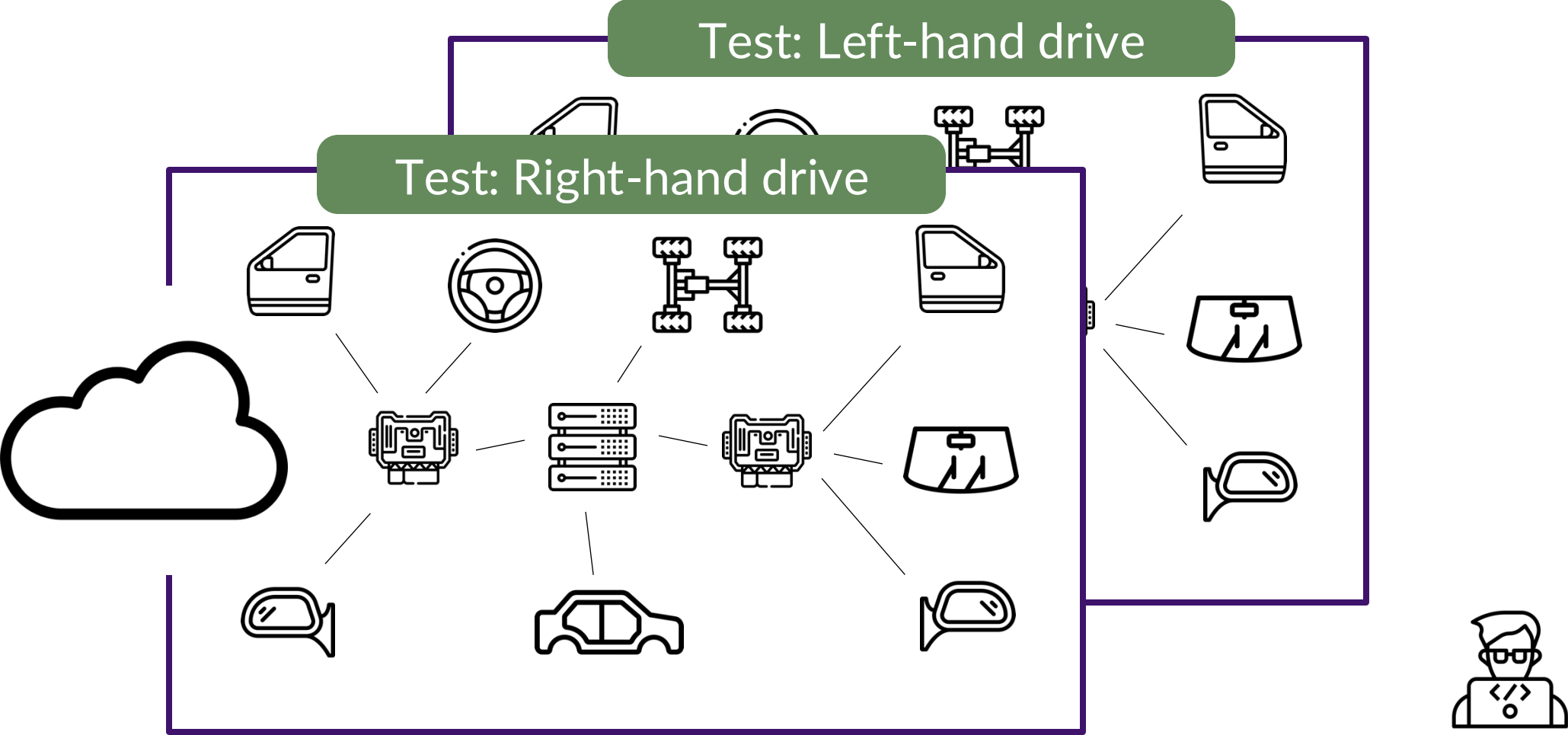


Copy / Paste





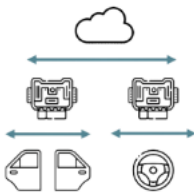








### Passenger Welcome

Prototype Action ▾

#### Staging

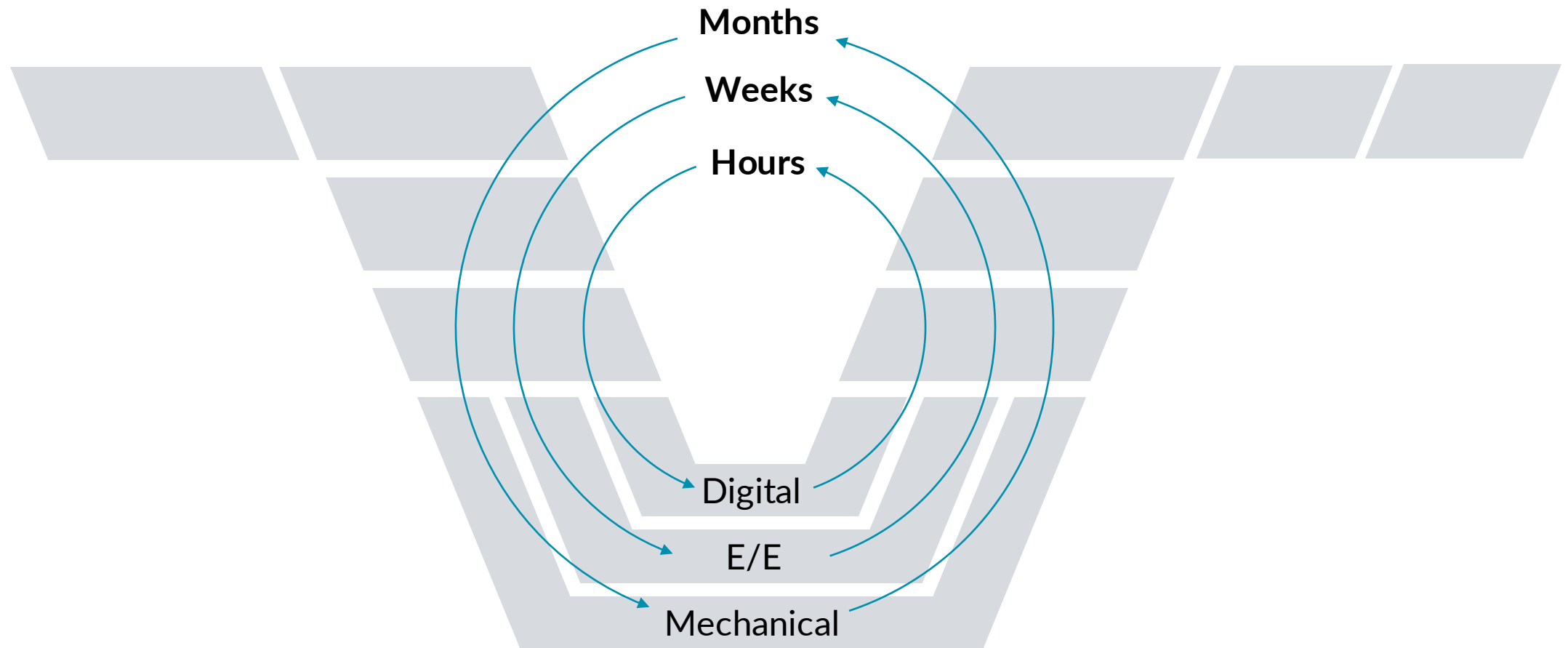
System	Stages			
 <p>Concept Car 2024 v1.0</p> <p>Edit</p>	 <p>Virtual WS v1.0</p> <p>Update</p>	 <p>Education Kit: MakerKit v1.0</p> <p>Update</p>	 <p>dreamKIT v1.0</p> <p>Update</p>	 <p>Test Fleet v1.0</p> <p>Update</p>

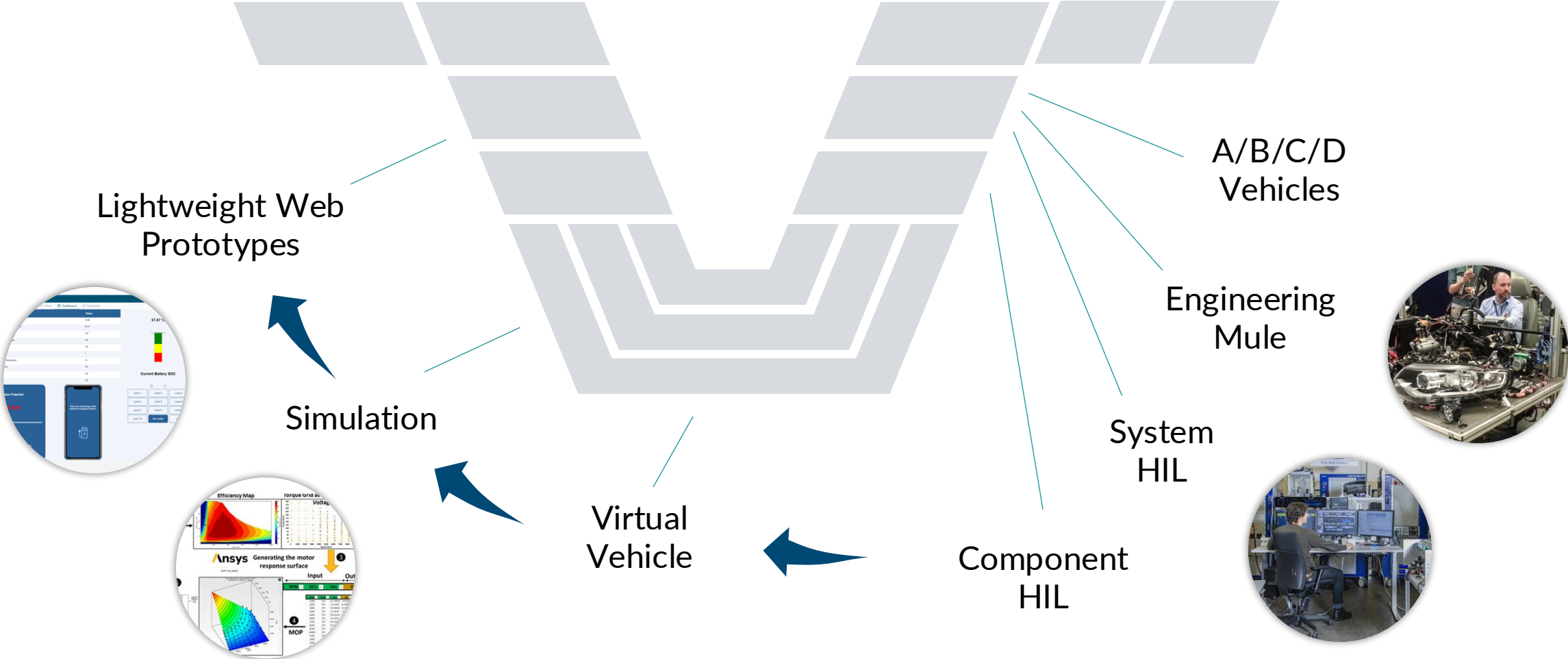
### Customer Journey

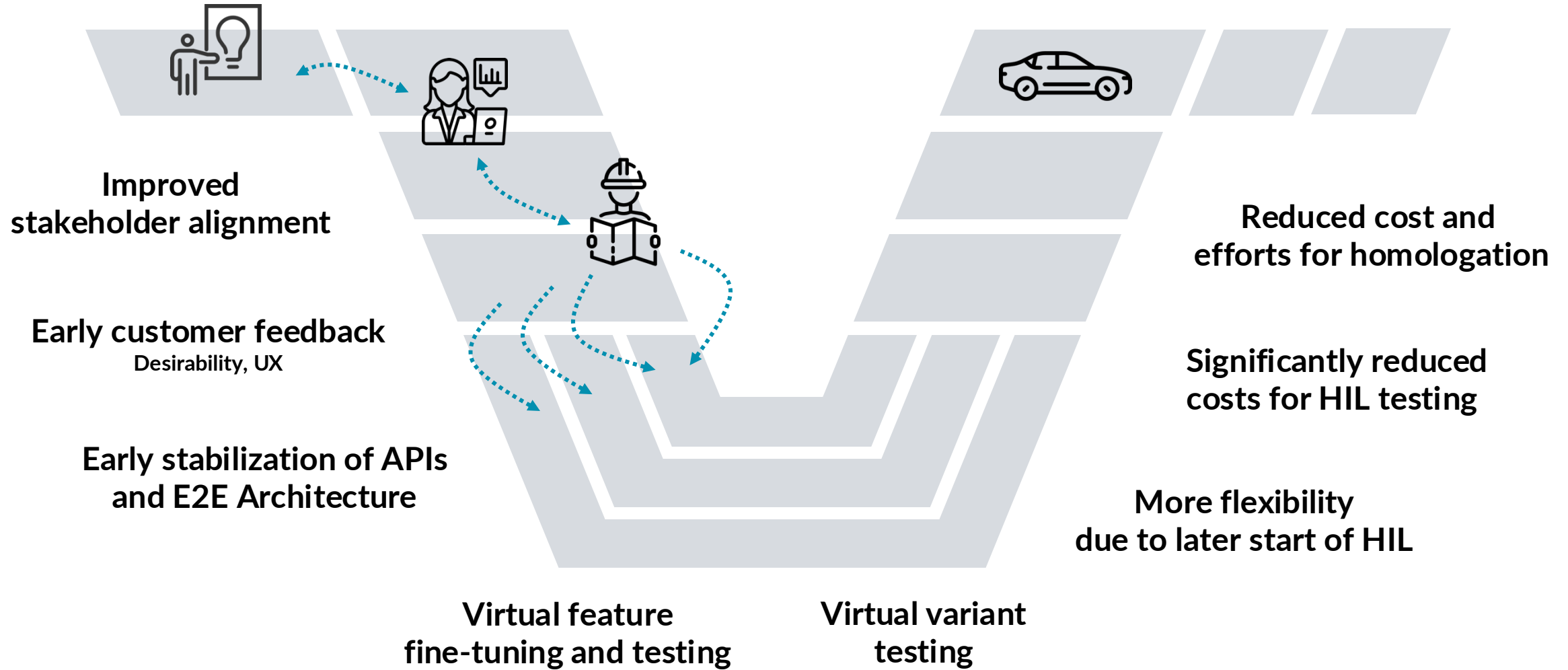
	Step 1	Step 2	Step 3
Who	Driver	User	System











## Use Cases



HYUNDAI  
MOBIS



C A R I A D



Die  
Autobahn

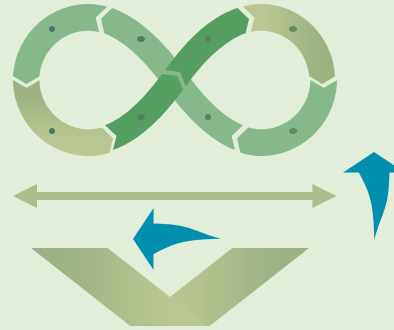
## Prototyping + UX Validation

eTAS

Testbirds

DASSAULT  
SYSTEMES

## #digitalfirst



## 360° Testing & Integration



BOSCH

bertrandt

## Virtualization + Simulation

Ansys

IPG

bertrandt

eTAS

## Continuous Homologation

T Systems

eTAS

\* certivity



## GenAI

aws



Amazon Bedrock

ANTHROPIC



LANDING AI



ALEPH ALPHA

## Architecture & Platforms

<epam>

eTAS

Thank You!



**What's next?**

**SDV Con**  
Nov 26<sup>th</sup>, 2024, Heilbronn

**SDV Unplugged**  
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