

# From Virtual to Reality: accelerating engineering with simulation

Thomas NGUYEN THAT – Chief Product and Strategy Officer

[thomas.nguyen@avsimulation.com](mailto:thomas.nguyen@avsimulation.com)

# Driving simulation & Automotive trends

Objectives

Trends

Challenges

Simulation trends & solutions



Safety

L2/L2+/L3 Sotif  
NCAP 2026

Sensor & perception  
AI



User  
experience

Services & assistants  
DMS



Costs /Time  
to market  
optimization

Model based design  
Software defined car  
Shift-left



# Driving simulation & Automotive trends

## Objectives



Safety



User experience



Costs /Time to market optimization

## Trends

L2/L2+/L3 Sotif  
NCAP 2026

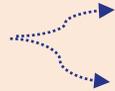
Sensor & perception  
AI

Services & assistants  
DMS

Model based design  
Software defined car  
Shift-left

## Challenges

Scenario and coverage  
Test complexity



## Simulation trends & solutions

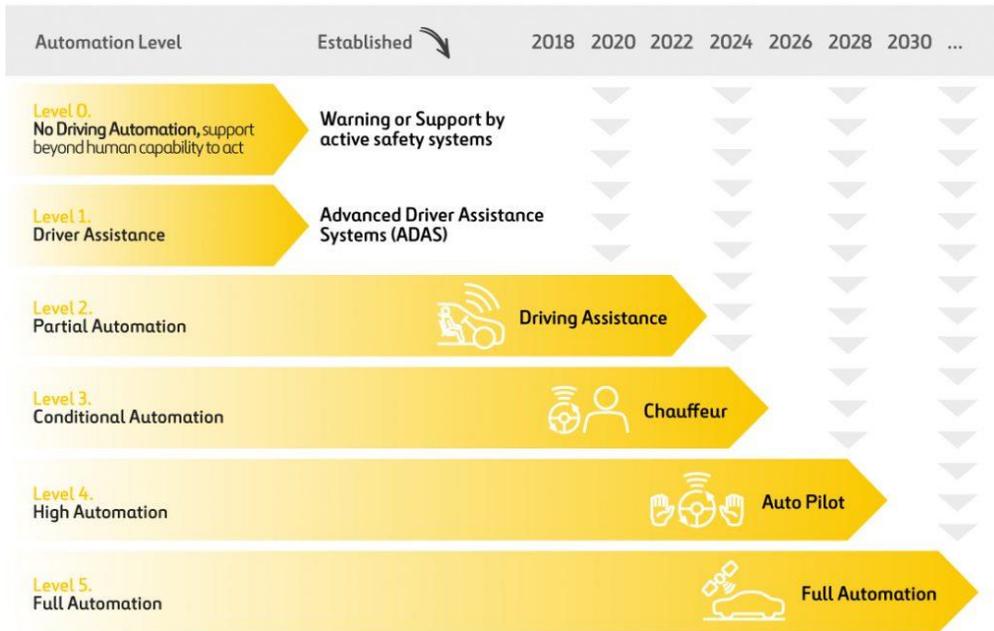
→ Massive simulation in the cloud  
→ Scenario Packs

# The context: an increase need for simulations

## > Autonomous vehicles



### THE VEHICLE AUTOMATION EXPECTED ADOPTION



Source: Automated Driving Roadmap

### ISO 21448

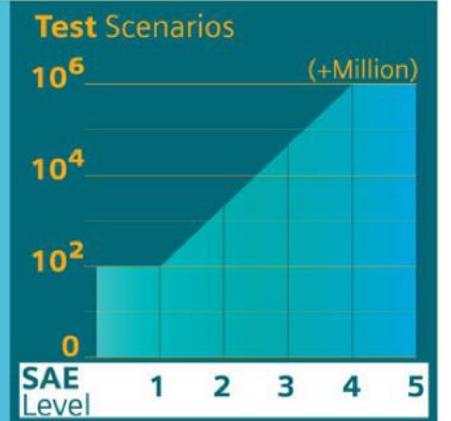
Safety Of The Itended Functionnality (SOTIF)

- Improper situations
- Bad system reaction/decisions

➔ **Perform better than a human driver**

■ The number of scenarios to validate controls will explode from SAE automation level 1 to level 5. Physical testing only is no longer feasible.

■ "14.2 billion miles of testing is needed"  
*Akio Toyoda, CEO of Toyota*  
*Paris Auto Show 2016*



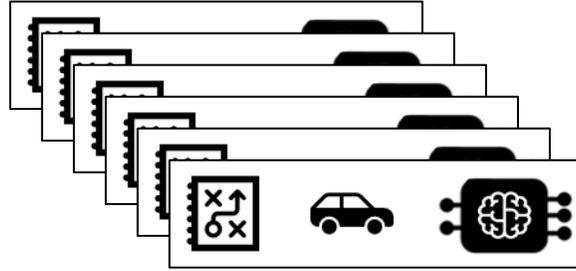
To compute 1M scenario on 1 computer ➔

**5 years !**

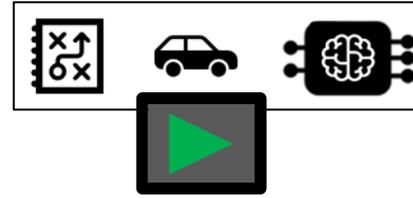
# Complete end-to-end massive simulation solution



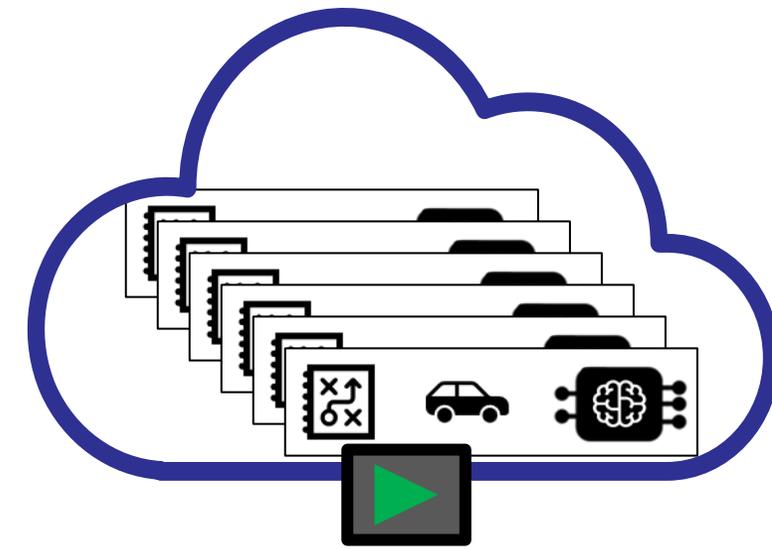
Scenario & model preparation  
Interactive simulation



Scenario generation  
Test plan



Batch Execution

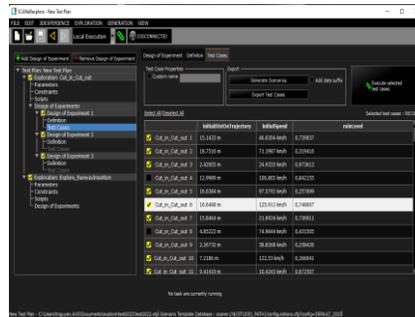


Massive parallel execution in the cloud

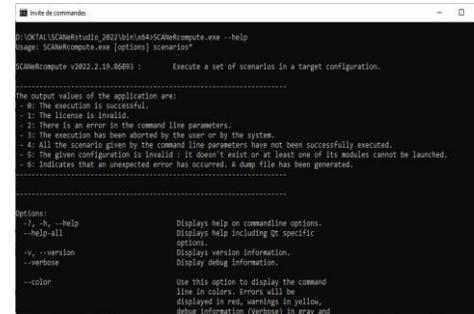
**New!**



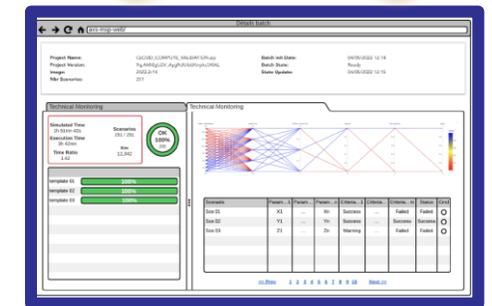
**SCANer studio**



**SCANer explore**



**SCANer compute**

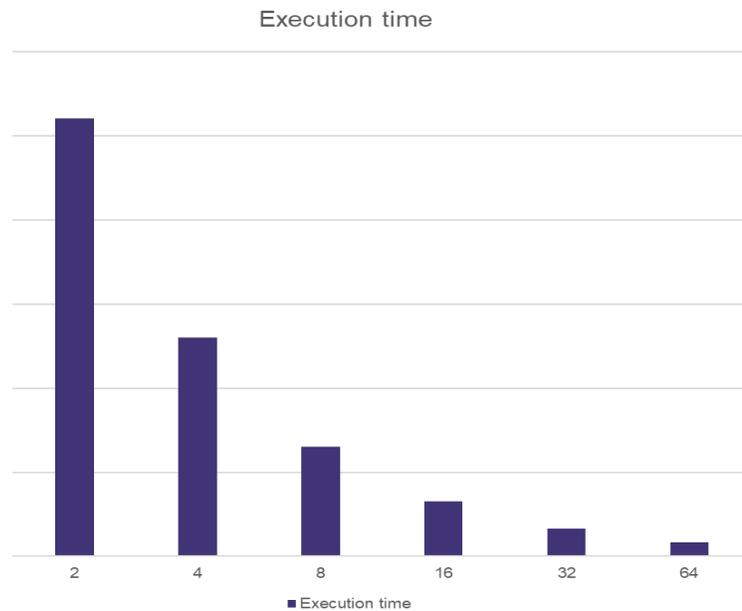


**SCANer Cloud**

# SCANer Cloud

A complete web-based massive simulation solution designed for SCANer:

- Simulation preparation, execution, monitoring & analysis
- Massive parallel execution with high scalability



AVSIMULATION SCANer Cloud Durand Guillaume

Project Name: AEB Validation  
Project Version: v3  
Image: 2022 2r13  
Simulated Scenario(s): 2028/2028

Batch Init Date: 24/10/2022 17:34  
Batch State: Succeeded  
State Update: 24/10/2022 18:53  
Elapsed time: 01h 19mn 06s

TECHNICAL MONITORING FUNCTIONAL MONITORING ASSETS INFORMATION

14h 2m 41s Simulated Time  
16h 19m 19s Execution Time  
0,847 Time Ratio  
REMAIN 0%  
9

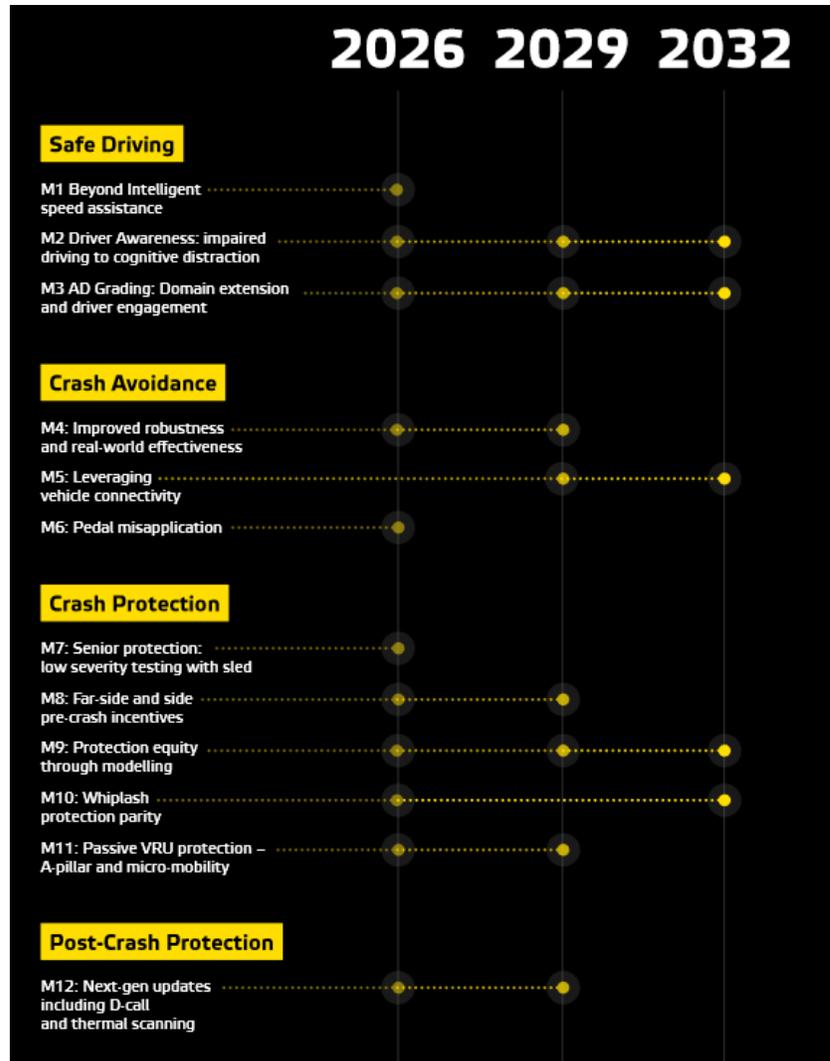
/CutOut/CutOut\_V2\_fullBreaking 93.5% 37.5%  
/CutOut\_lightCutOut\_V2\_lightBreak 68.8% 15.6%

Initial speed (km/h) Param\_CutOutTime safety time (s) Collision avoidance Stop distance Status

Selected scenarios: 1014

| Scenario         | Initial speed (km/h) | Param_CutOutTime | Safety time (s) | Collision avoidance | Stop distance | Status  | Actions |
|------------------|----------------------|------------------|-----------------|---------------------|---------------|---------|---------|
| CutOut_light 48  | 120                  | 1                | 1.9             | Success             | Success       | Success | 🔍 🔄     |
| CutOut_light 483 | 80                   | 2                | 1.7             | Success             | Success       | Success | 🔍 🔄     |
| CutOut_light 484 | 110                  | 3                | 1.4             | Success             | Success       | Success | 🔍 🔄     |
| CutOut_light 485 | 170                  | 1                | 2.9             | Success             | Success       | Success | 🔍 🔄     |
| CutOut_light 486 | 120                  | 2                | 0.9             | Success             | Failed        | Failed  | 🔍 🔄     |

# Euro NCAP 2026



- Increased focus on Assisted and Automated driver support systems
- New assessment of technology that monitors driver impairment and cognitive distraction
- Higher representativeness of situations and road environments
- Assessment of safety functions enabled by V2V, V2I and V2X communication
- Improving testing for vulnerable road user and 2 wheelers

# SCANeR NCAP scenario packages – early access to 2026 protocols

Packs content:  
**995**  
scenarios

17 protocols in  
**6**  
packs

Packs are  
**100%**  
plug & play



ALKS scenario



Car to bicycle scenario



Blind spot scenario



Scooter scenario



Heavy vehicle scenario



Car to pedestrian scenario



Night scenario

Euro NCAP  
Preview 2026

Driver-In-the-Loop  
Pack

K NCAP  
Preview 2025

Euro NCAP V2X  
2026

China NCAP  
Preview 2025



Connected motorcycles

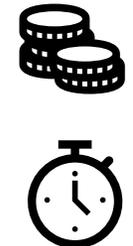


LTAP V2X



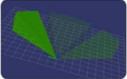
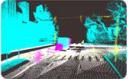
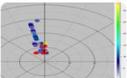
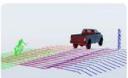
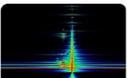
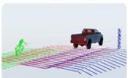
Traffic light violation V2X

# Driving simulation & Automotive trends

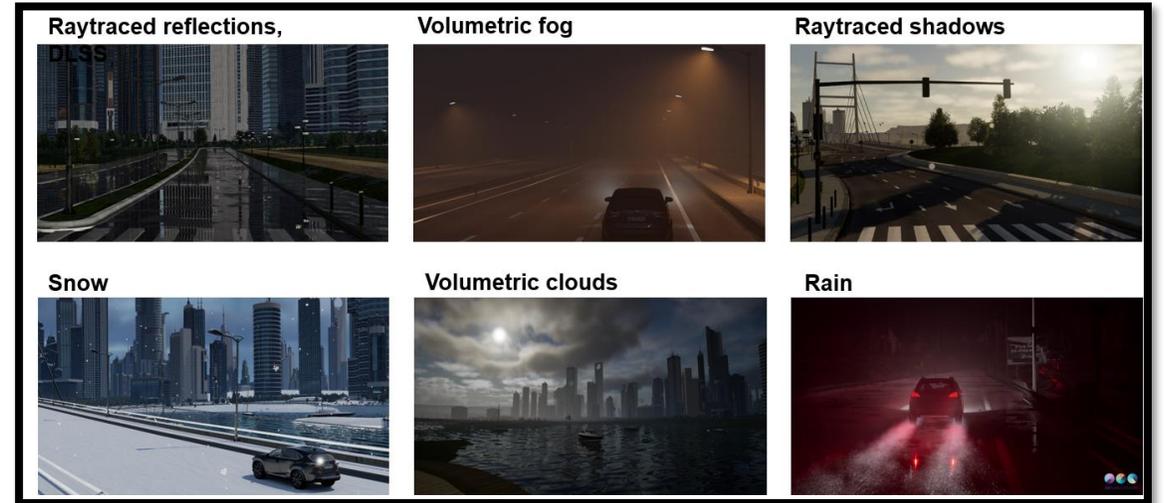
| Objectives  | Trends                       | Challenges  | Simulation trends & solutions                         |
|---|------------------------------|---|---|
|  Safety                               | L2/L2+/L3 Sotif<br>NCAP 2026 | Scenario and coverage<br>Test complexity                | → Massive simulation in the cloud<br>→ Scenario Packs |
|   | Sensor & perception<br>AI    | Choice/Positioning<br>Validation/Performance<br>Weather | → Physics based sensor modelling<br>→ Validation      |
|  User experience                      |                              |   |   |
|  Costs /Time to market optimization |                              |   |   |

# Physics based Sensor modeling

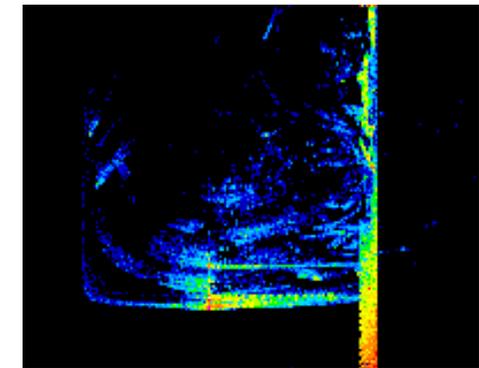
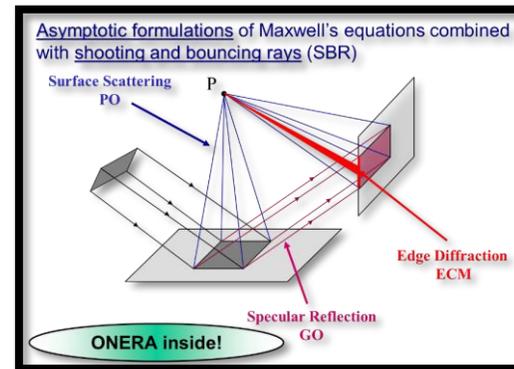
**Complete sensor offer**

|                         |   |   |   |  |  |
|-------------------------|---|---|---|--|--|
| L1<br>Ideal model       |  Radar |  Lidar     |  Camera (logics) |  GNSS |  Ultrasonic |
|                         |  Light |  E-Horizon |   |  |  |
| L2<br>Real-time Physics |  Radar |  Lidar     |  Camera (image)  |  |  |
|                         |   |   |   |  |  |
| L3<br>Full Physics      |  Radar |  Lidar     |  Camera (image)  |  |  |
|                         |   |   |   |  |  |

AVSIMULATION



SCANeR UXD Engine 



 OKTAL-SE  
Synthetic Environment

# Physics based Sensor validation

<https://www.irt-systemx.fr/en/projets/3sa/>



Real world

Simulation

Sensor

Acquisitions

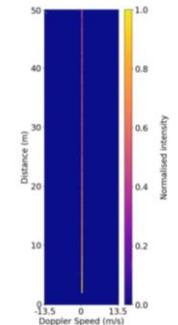
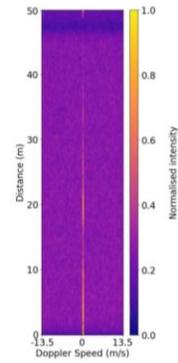
Results

Models

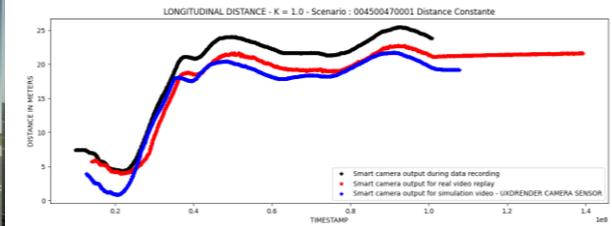
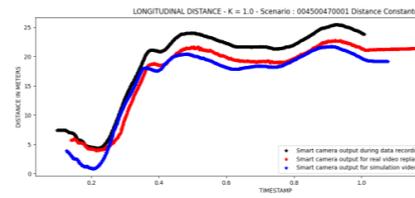
Results



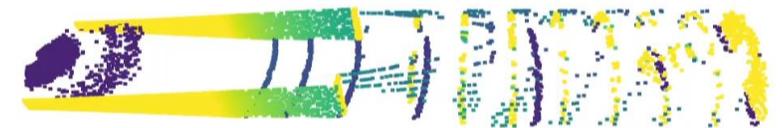
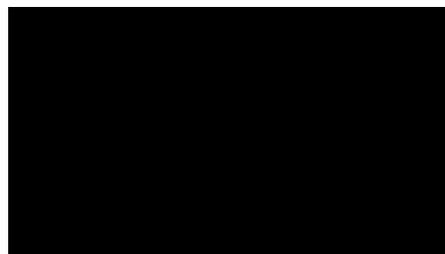
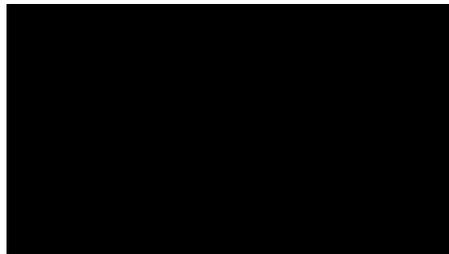
Radar



Camera



Lidar



# Test AD Pilot in various conditions

openpilot



SCANeR™ studio



# Validation & Performance evaluation

openpilot



SCANeR™ studio

The screenshot displays a simulation environment with the following components:

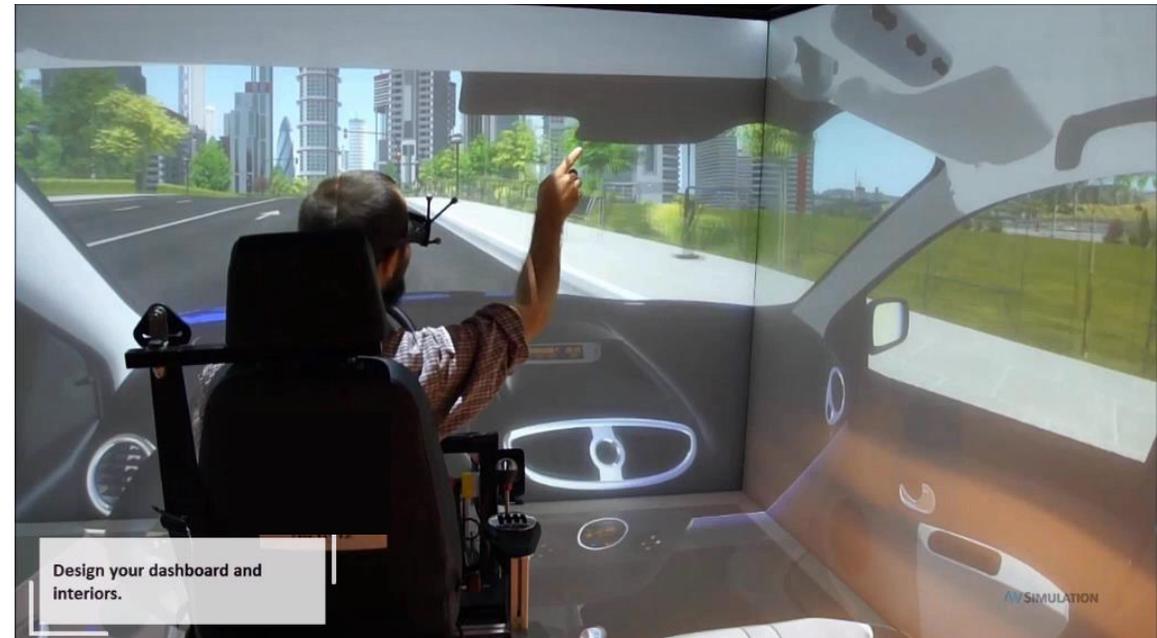
- Top Left:** A browser window titled "comma\_3\_road\_main\_camera\_modified" showing a forward-facing camera view of a road with a white car in the distance.
- Top Right:** A browser window titled "comma\_3\_road\_wide\_angle\_camera\_modified" showing a wide-angle side view of the same road.
- Center:** A central dashboard overlay with a speedometer showing "67 km/h" and a "MAX 70" limit. It also features a logo and a small inset camera view.
- Bottom Left:** A graph titled "Brake" showing a series of vertical spikes representing braking events over time, with an x-axis ranging from 0 to 400.
- Bottom Right:** A graph titled "Steering" showing a fluctuating green line representing steering input over time, with an x-axis ranging from 0 to 3500.

# Driving simulation & Automotive trends

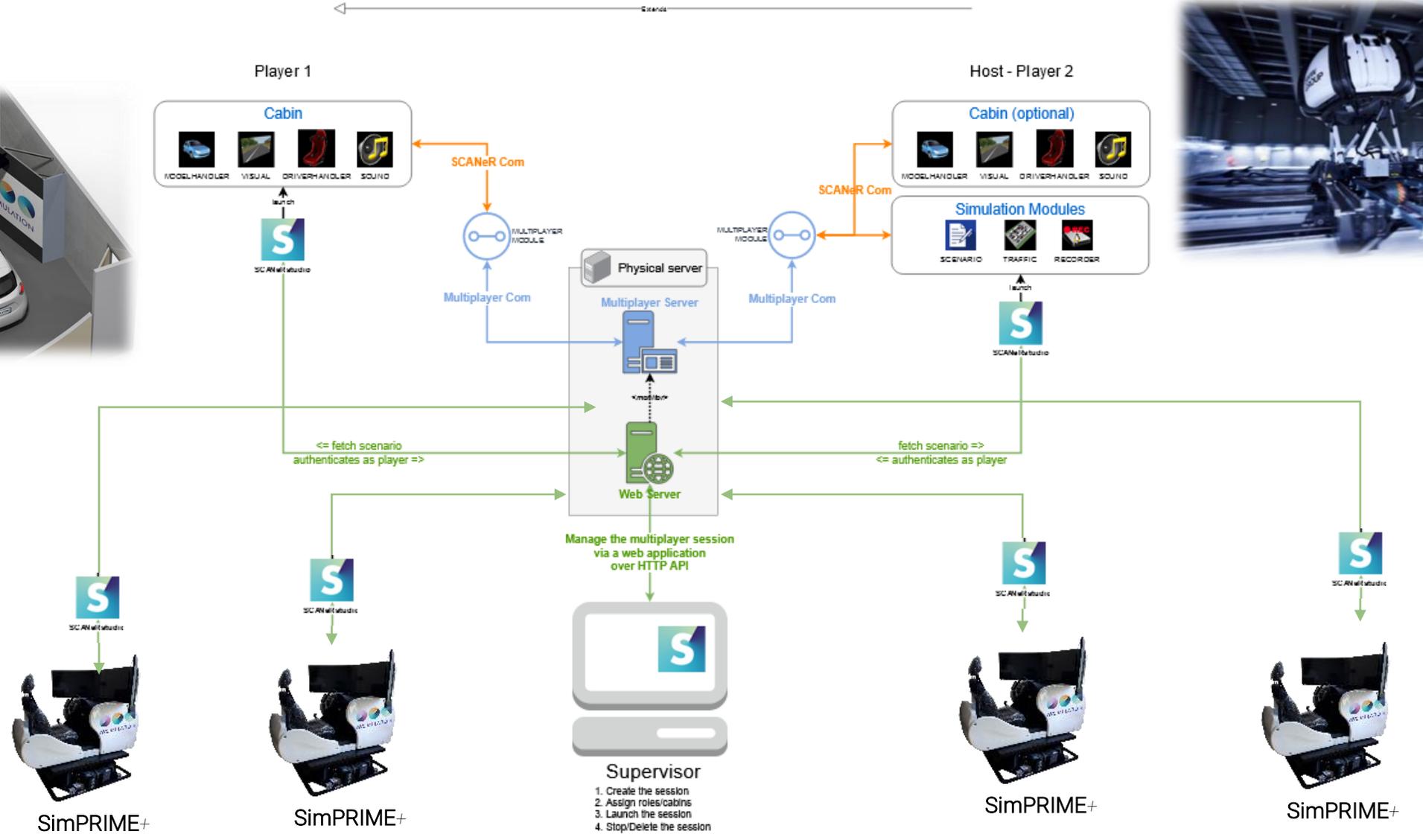
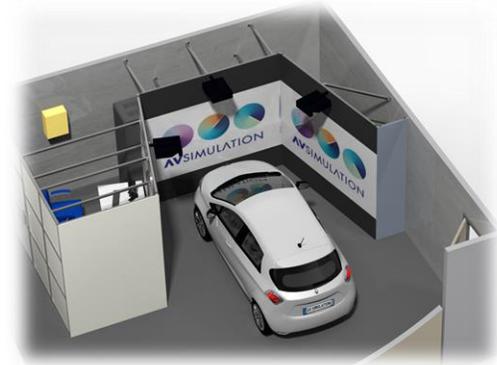
| Objectives  | Trends                       | Challenges   | Simulation trends & solutions                         |
|---|------------------------------|--|---|
|  Safety   | L2/L2+/L3 Sotif<br>NCAP 2026 | Scenario and coverage<br>Test complexity                   | → Massive simulation in the cloud<br>→ Scenario Packs |
|   | Sensor & perception<br>AI    | Choice/Positioning<br>Validation/Performance<br>Weather    | → Physics based sensor modelling<br>→ Validation      |
|  User experience  | Services & assistants<br>DMS | Driver distraction<br>Acceptability<br>Social interactions | → XR/VR<br>→ Multiplayer                              |
| <br> Costs /Time to market optimization |                              |  |   |

# Engineers-in-the-loop & Human factors

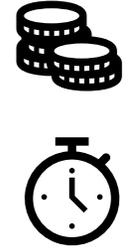
- Driver immersion
  - Mixed Reality
  - HMD with camera
  - Chroma key
  - Trackers
  - Haptic feedback
- Driver evaluation
  - Eye-tracking systems
  - Biometrics measurements
  - Camera



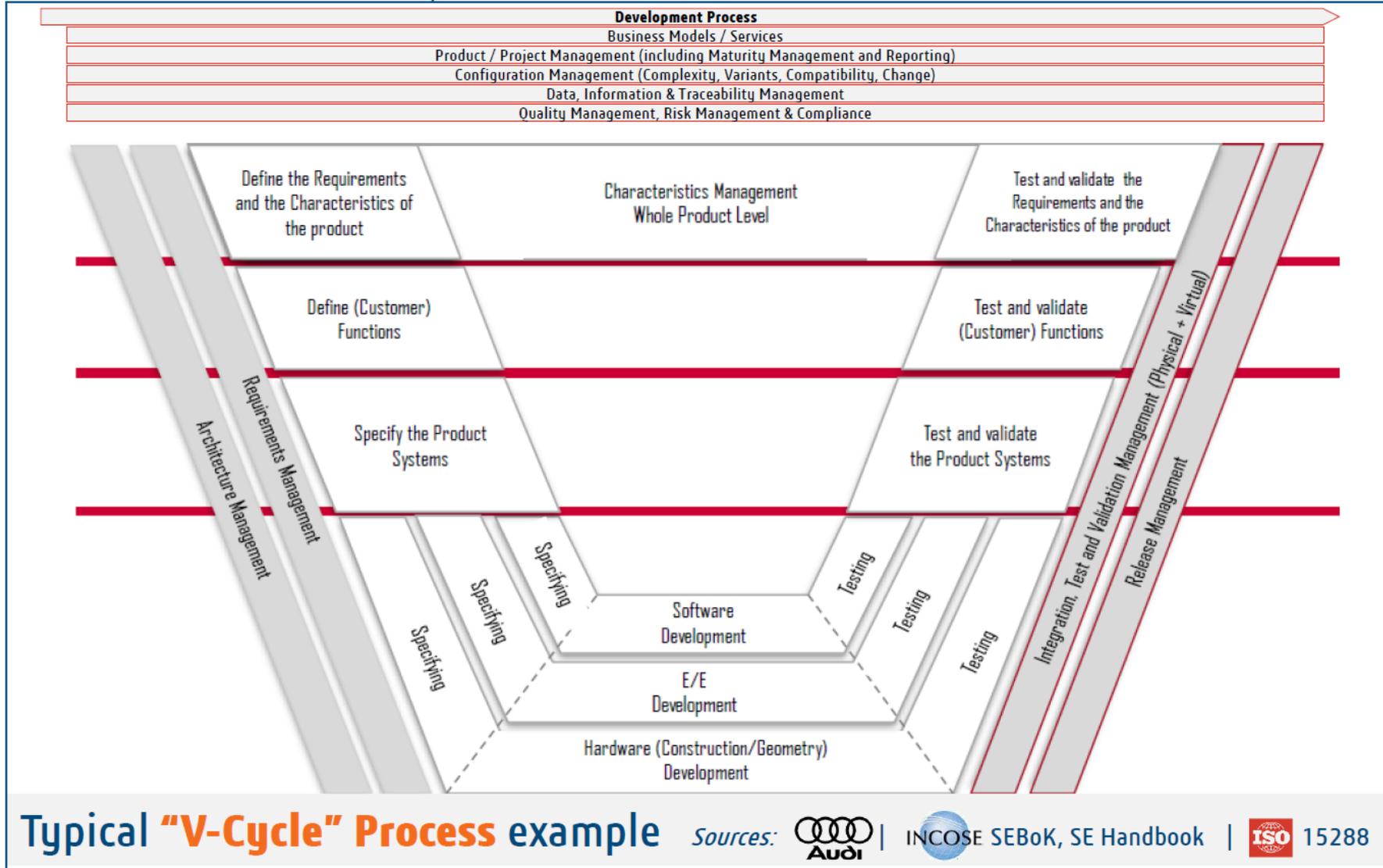
# SCANeR Multi-player experience



# Driving simulation & Automotive trends

| Objectives  | Trends   | Challenges  | Simulation trends & solutions                         |
|---|--|---|---|
|  Safety                               | L2/L2+/L3 Sotif<br>NCAP 2026                             | Scenario and coverage<br>Test complexity                          | → Massive simulation in the cloud<br>→ Scenario Packs |
|   | Sensor & perception<br>AI                                | Choice/Positioning<br>Validation/Performance<br>Weather           | → Physics based sensor modelling<br>→ Validation      |
|  User experience                      | Services & assistants<br>DMS                             | Driver distraction<br>Acceptability<br>Social interactions        | → XR/VR<br>→ Multiplayer                              |
|  Costs /Time to market optimization | Model based design<br>Software defined car<br>Shift-left | Master complexity<br>Multi disciplinary models &<br>Inter systems | → MBD toolchain integration<br>→ Architecture         |

# SYSTEMS ENGINEERING | Current State



# SYSTEMS ENGINEERING | Current State and on-going Transformation



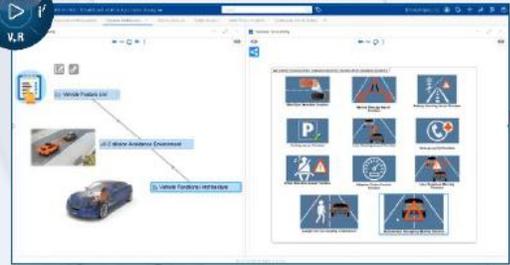
**Governance and Openness**



4

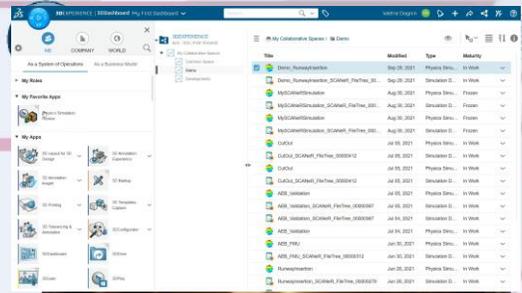
**From Mission Engineering**  
Define the Requirements  
and the product

**...to System Architecture**  
Modeling and Simulation





**...to massive simulation & V+R**  
testing of **Autonomous Systems**



1

∞

3

**2**

**...to continuous multi-disciplines**  
**automation & integration**











Attend Olivier SAPPIN presentation today at 5:30 pm

# SCANeR™ ne><t objectives

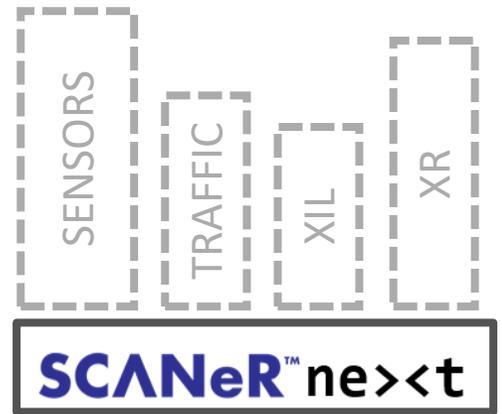
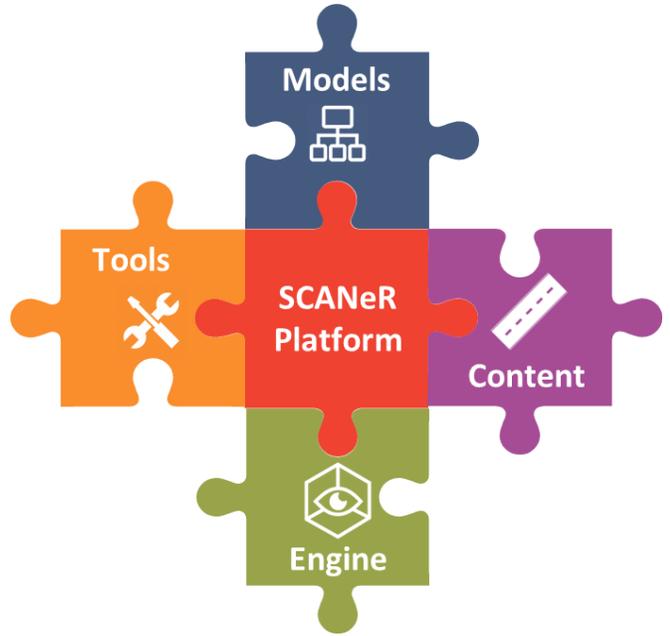
**Adress**  
Simulation challenges

**With a modern & modular**  
architecture

**To build**  
The future

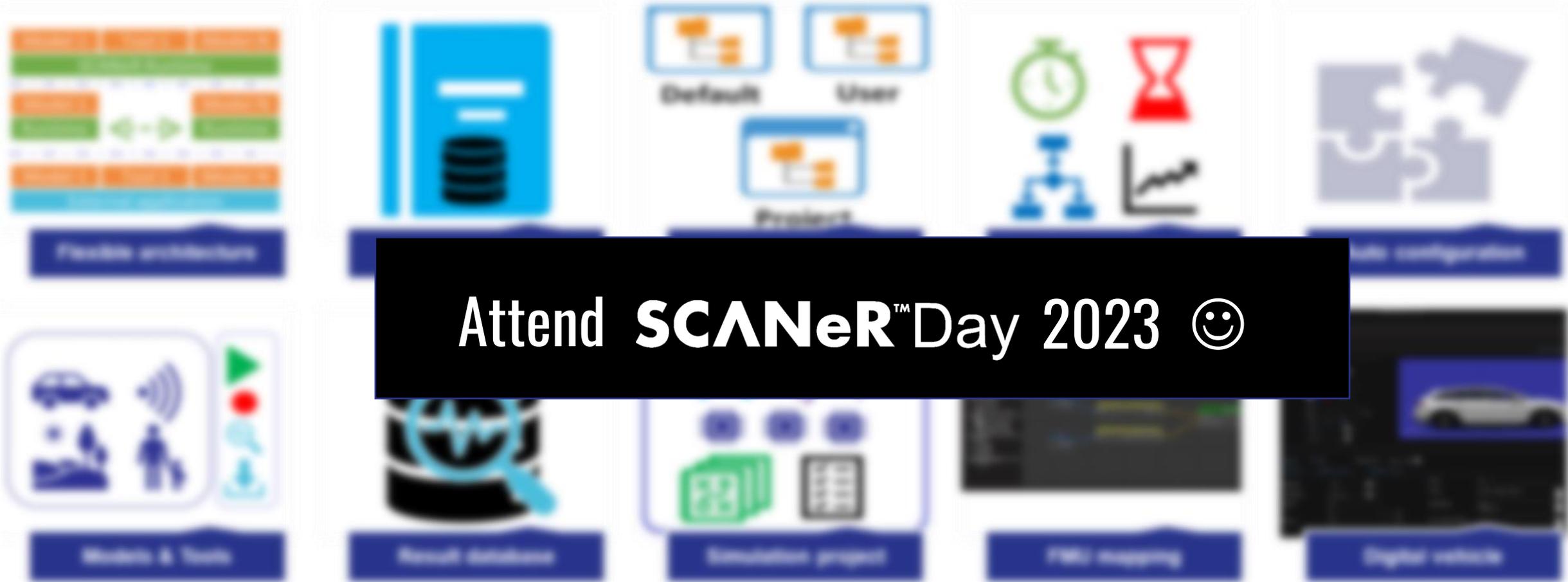
**and Tackle**  
Automotive challenges

-  Performances
-  Usability
-  Sharing
-  Flexibility



-   
L3/4/5 CCAM
-   
Virtual Twins
-   
Digital continuity

# SCANeR™ next Content



Attend **SCANeR™** Day 2023 😊

# Driving simulation & Automotive trends

| Objectives   | Trends   | Challenges  | Simulation trends & solutions                         |
|--|--|---|---|
|  <b>Safety</b>                               | L2/L2+/L3 Sotif<br>NCAP 2026                             | Scenario and coverage<br>Test complexity                          | → Massive simulation in the cloud<br>→ Scenario Packs |
|  | Sensor & perception<br>AI                                | Choice/Positioning<br>Validation/Performance<br>Weather           | → Physics based sensor modelling<br>→ Validation      |
|  <b>User experience</b>                      | Services & assistants<br>DMS                             | Driver distraction<br>Acceptability<br>Social interactions        | → XR/VR<br>→ Multiplayer                              |
|  <b>Costs /Time to market optimization</b> | Model based design<br>Software defined car<br>Shift-left | Master complexity<br>Multi disciplinary models &<br>Inter systems | → MBD toolchain integration<br>→ Architecture         |

# Strategic partnership to build unique value proposition

**Renault  
Group**



**Innovations and Mobility**  
**Digital engineering** for  
performance

**DASSAULT  
SYSTEMES**



**Collaborative Platform**  
for **Systems Engineering**  
and **Vehicle 3D**  
**Modelling & Simulation**

**AVSIMULATION**



**Virtual & Real**  
**Driving Simulator**  
for **ADAS &**  
**Automated Driving**

**UTAC**



**Digital certification**  
**scenarios** whose realism  
and accuracy are  
**correlated with real**  
**on-track** results

