DG Connect – EDGE IA Workshop (17.01.2020)

Hardware and automotive – a tier1 supplier approach

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KEY FIGURES

€

19.3 BN
TOTAL SALES

113,600
EMPLOYEES

33
COUNTRIES

186
PRODUCTION SITES

59
**RESEARCH &
DEVELOPMENT CENTERS**

15
**DISTRIBUTION
PLATFORMS**

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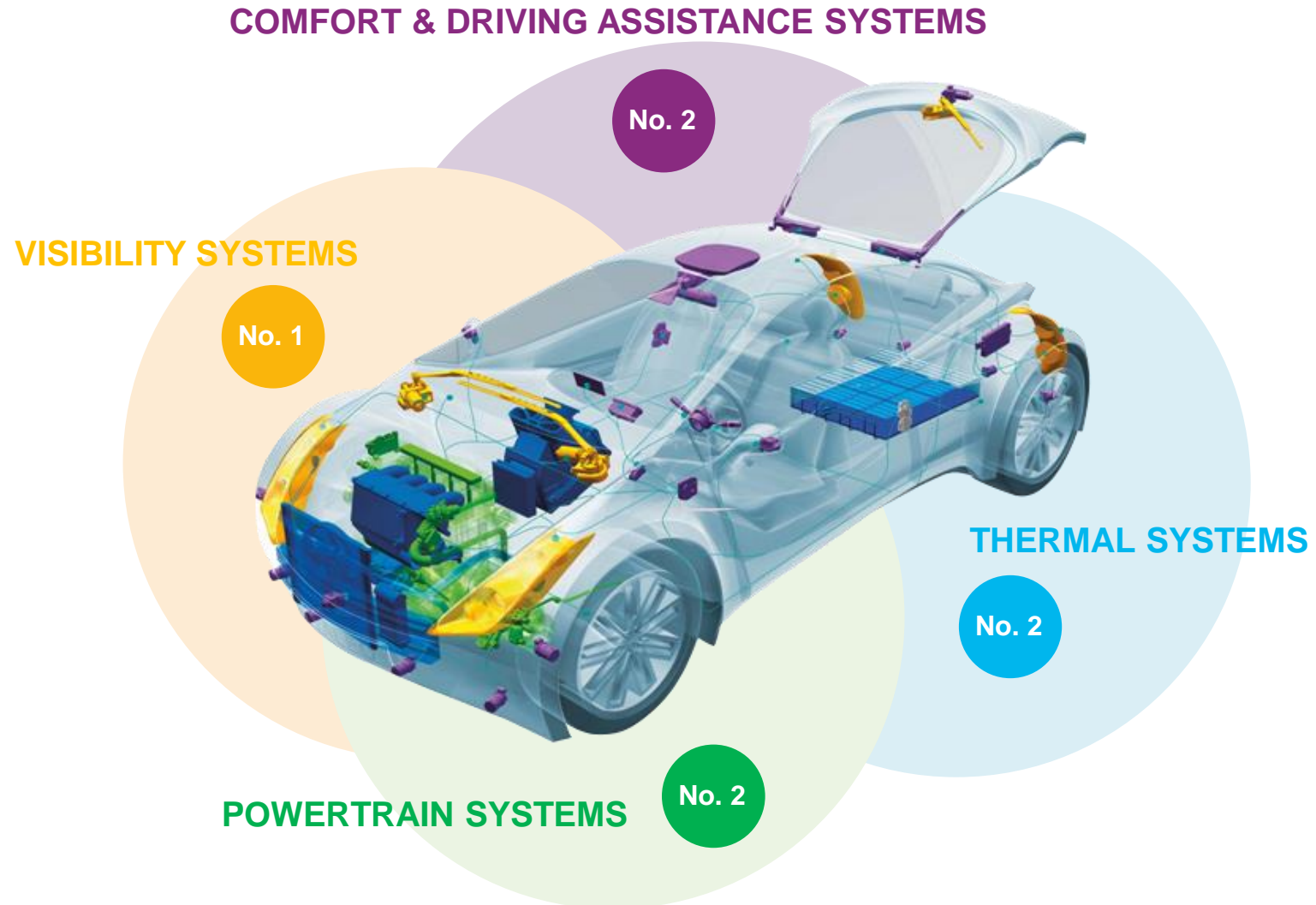# VALEO'S STRATEGY - BASED ON 2 PRIORITIES
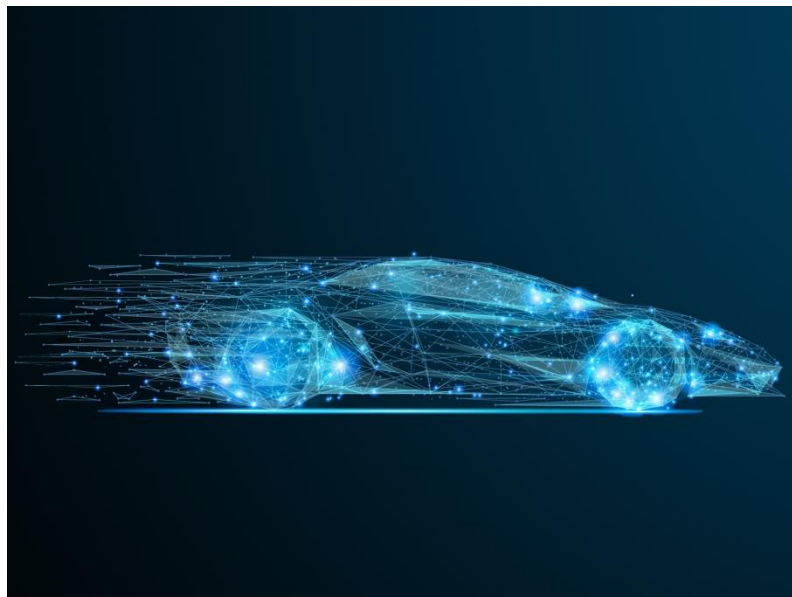
INNOVATION

CO_2 emissions reduction and autonomous driving for cleaner, safer, more intuitive vehicles

GROWTH

Reinforcement in high growth potential regions

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VALEO, A GLOBAL KEY PLAYER

COMFORT & DRIVING ASSISTANCE SYSTEMS

No. 2

VISIBILITY SYSTEMS

No. 1

THERMAL SYSTEMS

No. 2

POWERTRAIN SYSTEMS

No. 2

LEADERSHIP POSITION IN AUTOMOTIVE REVOLUTIONS
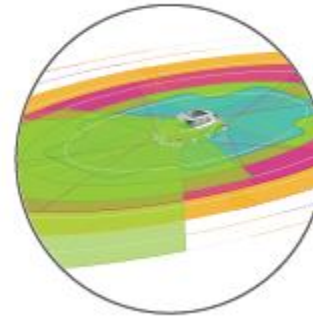

#1
IN ELECTRIFICATION

2 OUT OF 3
EUROPEAN OEMs HV LAUNCHES IN 2019-2022
EQUIPPED WITH OUR HV SOLUTIONS

#1
IN ADAS

1 OUT OF 4
PRODUCED VEHICLES IN 2019
EQUIPPED WITH OUR ADAS SOLUTIONS

LEADERSHIP IN ADAS

SYSTEM

SOFTWARE

COMPONENT

1 OUT OF 4
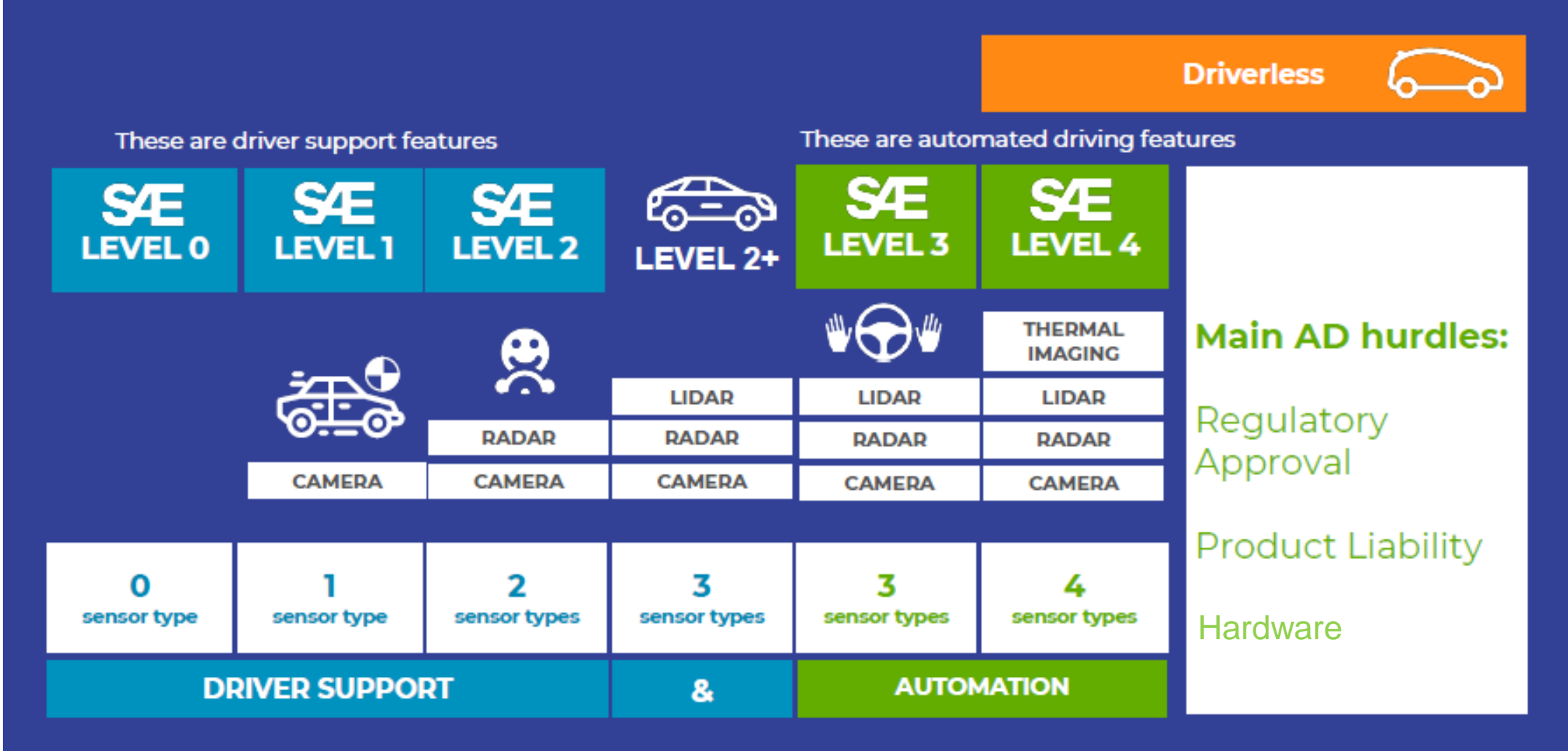### PRODUCED VEHICLES IN 2019 EQUIPPED WITH OUR ADAS SOLUTIONS

FROM ADAS TO AD...

...MORE IS EXPECTED

= MORE SAFETY
= MORE FUNCTIONS
= MORE RELIABILITY & SAFETY EXPECTED
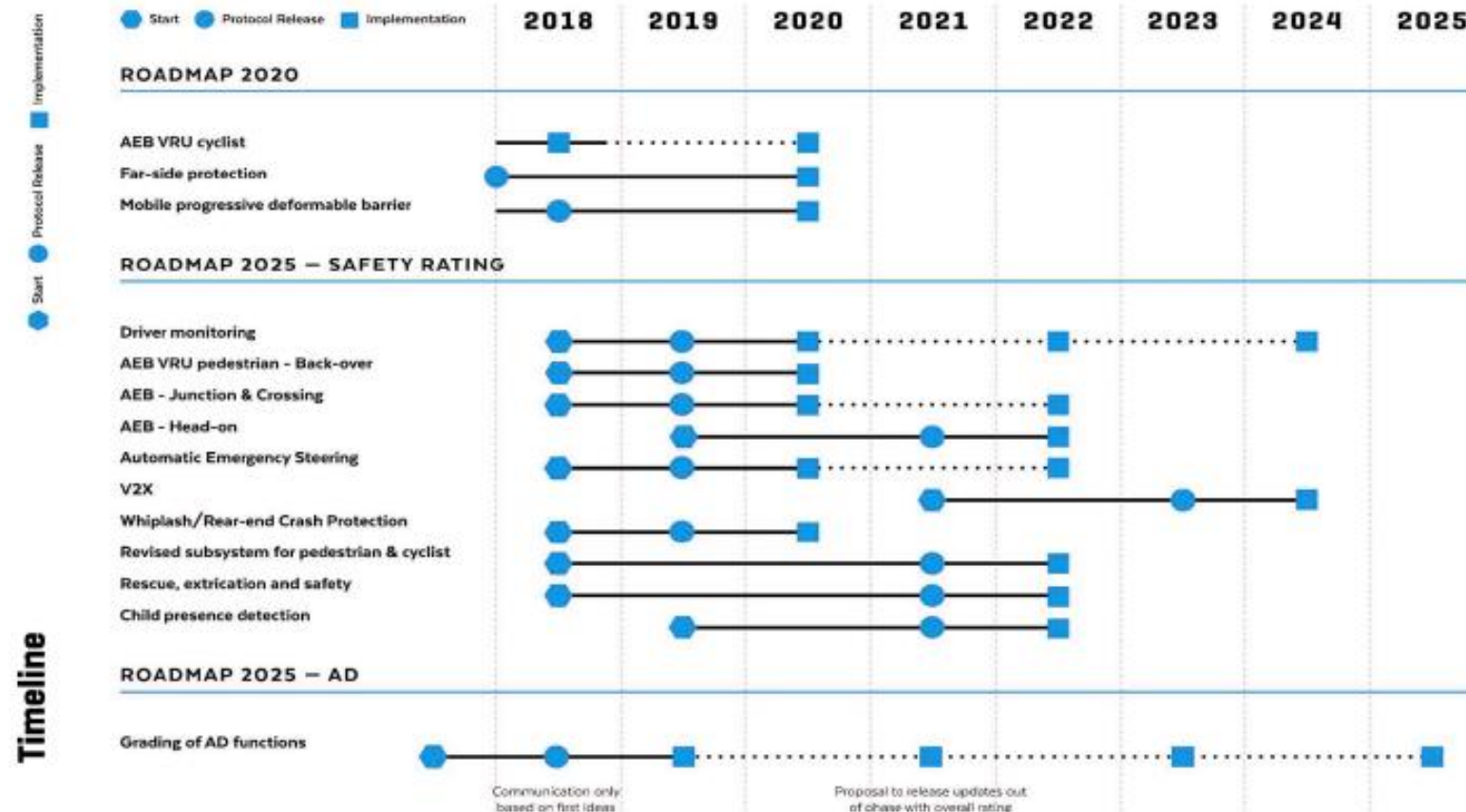
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SAFER MOBILITY WILL BE DRIVING ADAS & AD GROWTH

ACTIVE SAFETY PUSHED BY REGULATORS
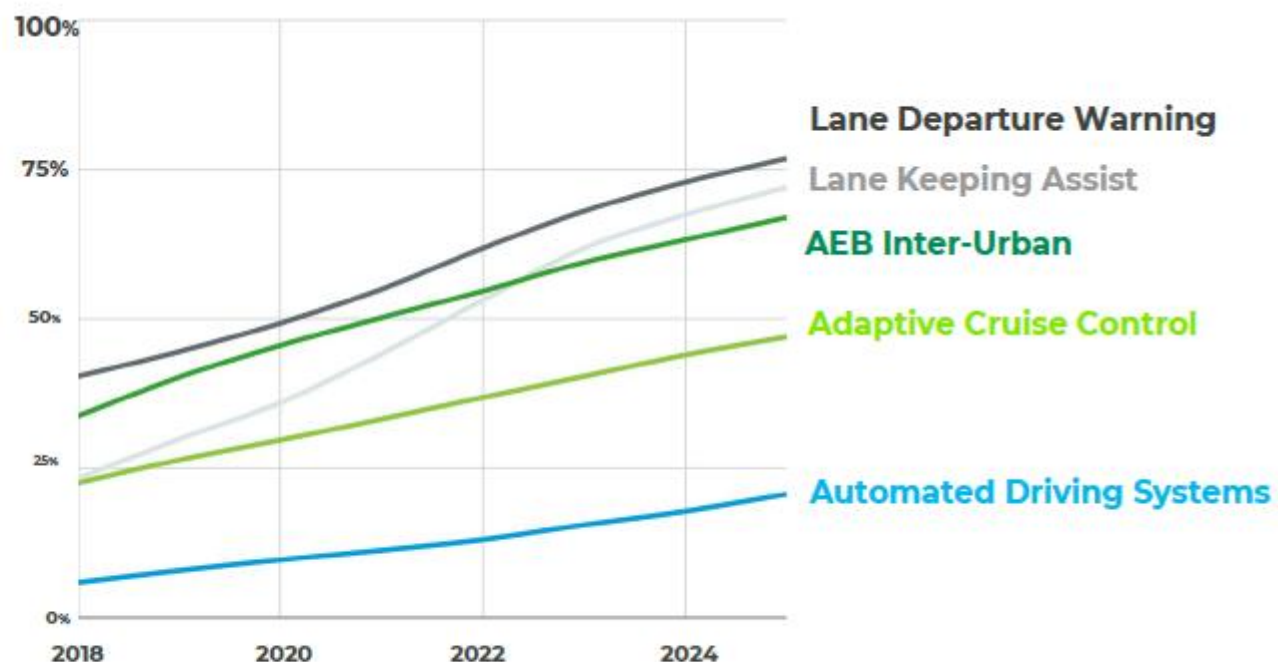
EU GENERAL SAFETY REGULATION (2019)

MORE ADAS FUNCTIONS TO COME
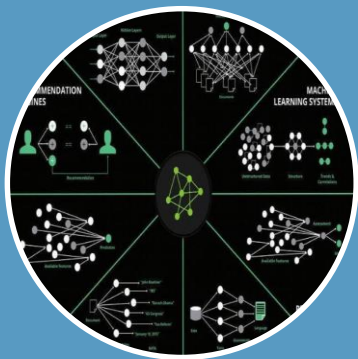
TAKE RATE FOR ADAS WILL CONTINUE TO GROWTH

Consumers want it

Regulators are pushing

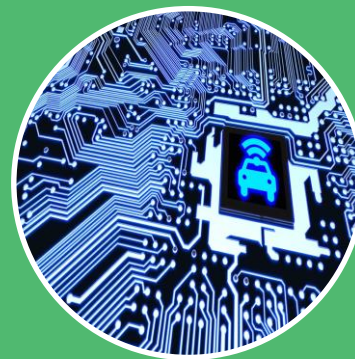# A NEED TO MASTER ALL DIMENSION FOR A SYSTEM & FUNCTION SUPPLIER

Algorithms

- Design adapted network
- State of the art expertise
➜ Valeo.ai creation

Data

- Performances driven by data
- Data mining needed & Annotation cost
➜ Data factory

Computing power

- Embedded constraints
- Optimization needed
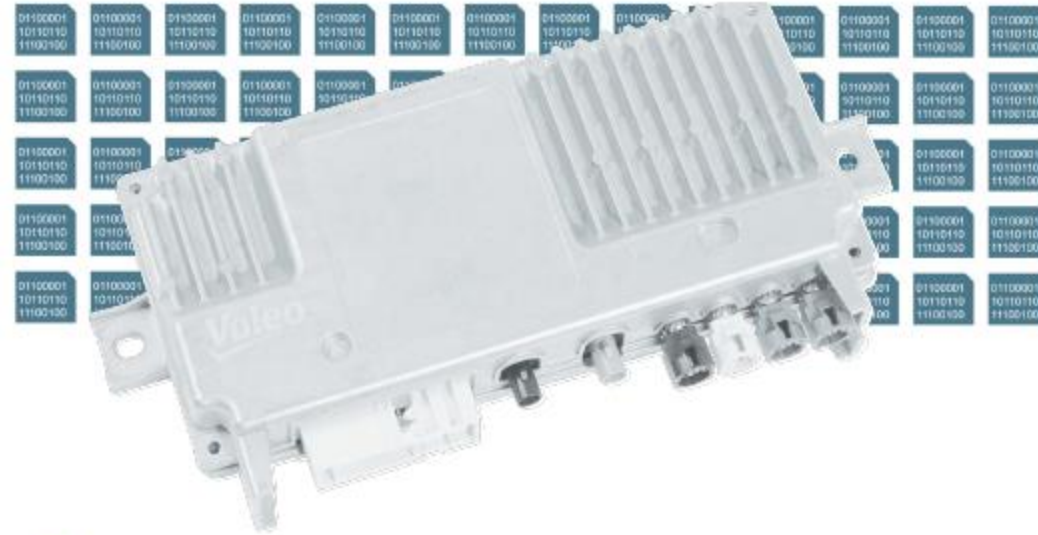➜ Identify hardware platform & design to fit hardware capabilities

Validation & Safety

- Explicability
- Validation domain
➜ Design redundancy & validation process

Connectivity

October 2019

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IN ORDER TO PROPOSE SCALABLE ADAS & AUTOMATED DRIVING SOFTWARE SYSTEM – FUNCTION FOR A TIER1 SUPPLIER …
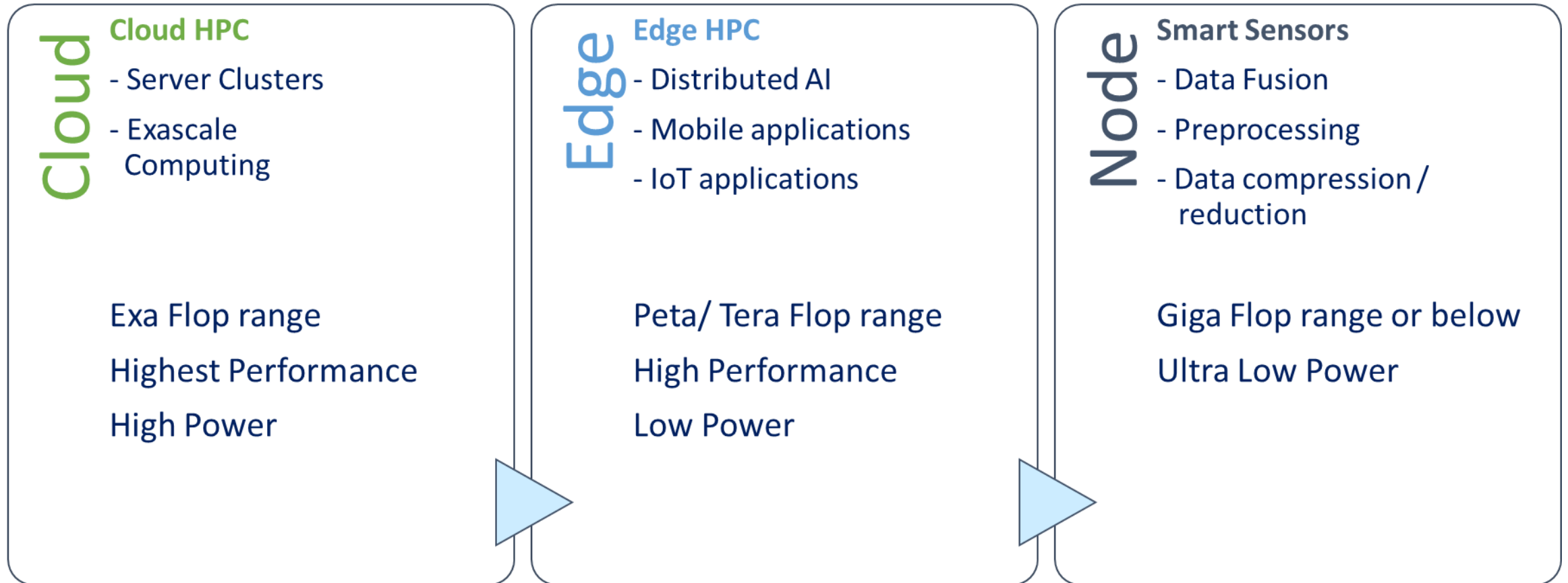

AUTOMATED PARKING SYSTEM

Park 4U ®

AUTOMATED DRIVING SYSTEM

Cruise4U

100mio
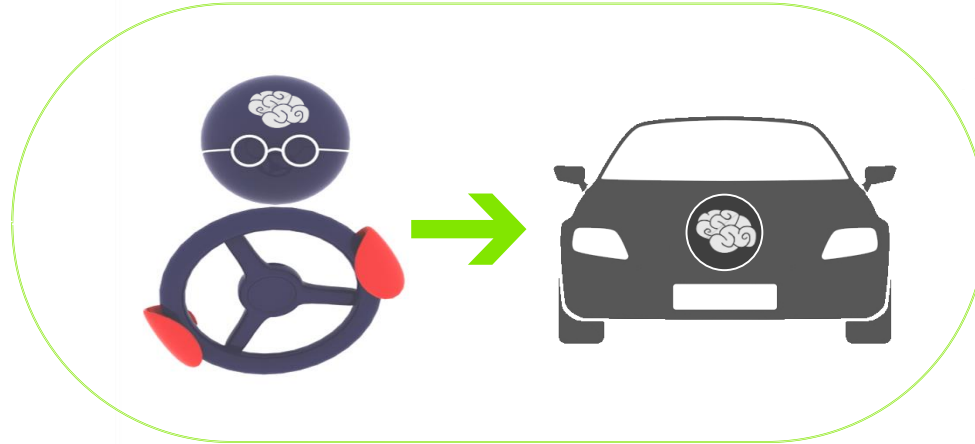lines of code in System and Software library

70
validated re-configurable software modules

3 500+
SW developers worldwide

1 - MASTER HARDWARE DIVERSITY IS A REQUISITE TO MOVE FROM ADAS TO AUTOMATED DRIVING

Cloud

Cloud HPC

- Server Clusters
- Exascale Computing

Exa Flop range

Highest Performance

High Power

Edge

Edge HPC

- Distributed AI
- Mobile applications
- IoT applications

Peta/ Tera Flop range

High Performance

Low Power

Node

Smart Sensors

- Data Fusion
- Preprocessing
- Data compression / reduction

Giga Flop range or below

Ultra Low Power

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2 - AI IS SAFETY CRITICAL

Driving Assistance

▶ Driver is responsible

▶ Avoid False Positives – Non necessary emergency braking

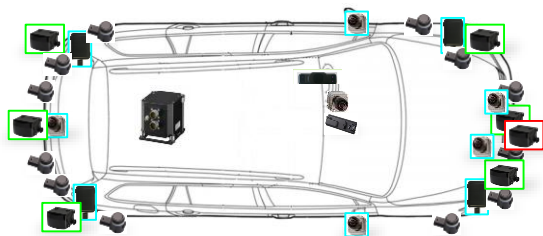▶ The driver handles False Negatives – Non detected obstacles

➡ AI is comfort (up to now)

Autonomous Car

▶ OEM is responsible

▶ False Positives are forbidden

▶ False Negative even more forbidden

➡ AI is critical

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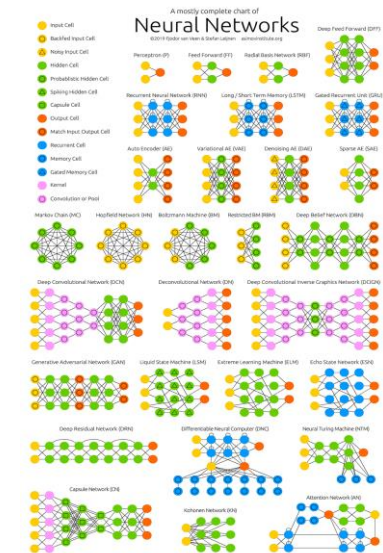# A NEED TO MASTER ALL ASPECTS:

DATA

Acquisition (real or synthetic)
Data management
Data Mining
Smart annotation

NETWORK DESIGN

Task specific network design
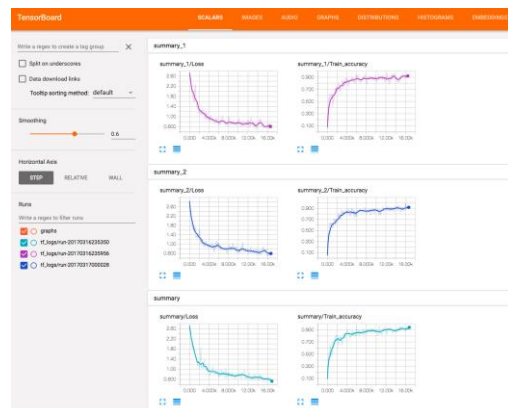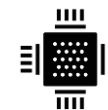Choice of adapted network structure

PERFORMANCE EVALUATION

Offline, SIL, HIL performance
Hard cases mining

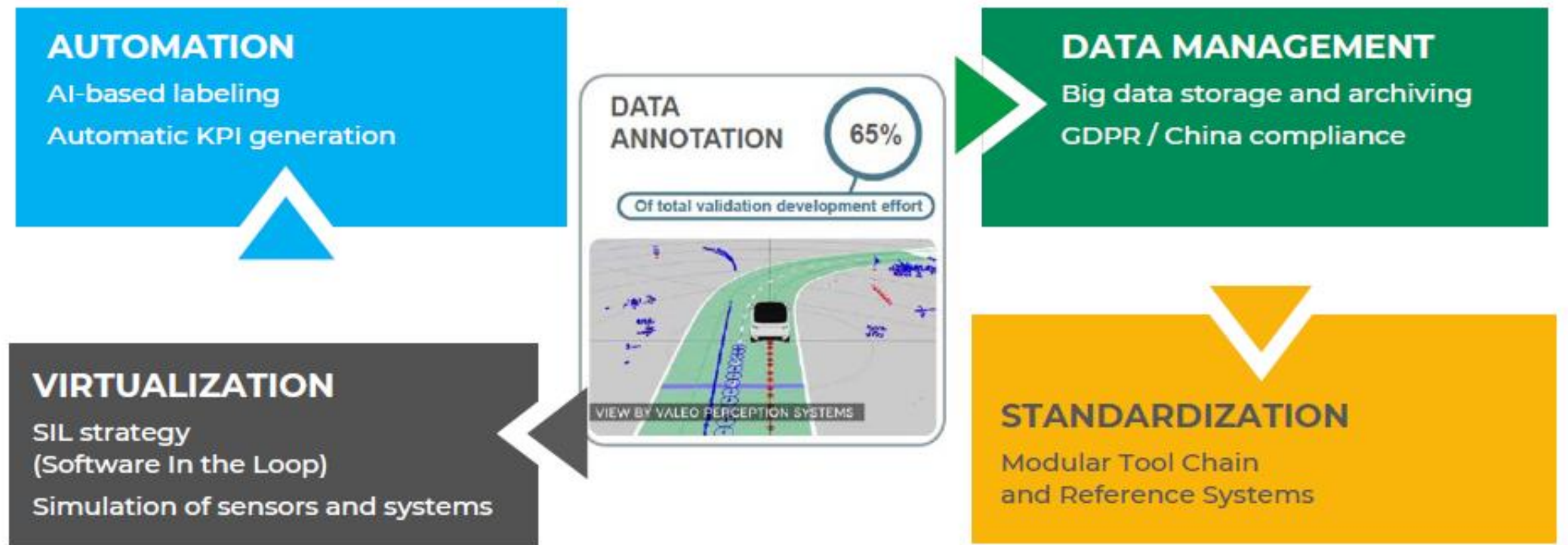**Typical AI Development Lifecycle**

TRAINING

Data post-processing
Parameters Tuning
Offline performance optimization

EMBEDDED MODEL

Model compression, Pruning, Optimization & porting for target hardware

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3 - SYSTEM VALIDATION IS A KEY REQUISITE

AUTOMATION
AI-based labeling
Automatic KPI generation

DATA MANAGEMENT
Big data storage and archiving
GDPR / China compliance

DATA ANNOTATION 65%
Of total validation development effort

VIEW BY VALEO PERCEPTION SYSTEMS

VIRTUALIZATION
SIL strategy
(Software In the Loop)
Simulation of sensors and systems

STANDARDIZATION
Modular Tool Chain
and Reference Systems

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REINFORCED COLLABORATION IS KEY

DEFINE, TEST & VALIDATE NEW HARDWARE IN A COLLABORATIVE APPROACH

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NEW HARDWARE FOR AD: TESTING AT EARLY STAGE

"TEMPO" : Neuromorphic HARDWARE

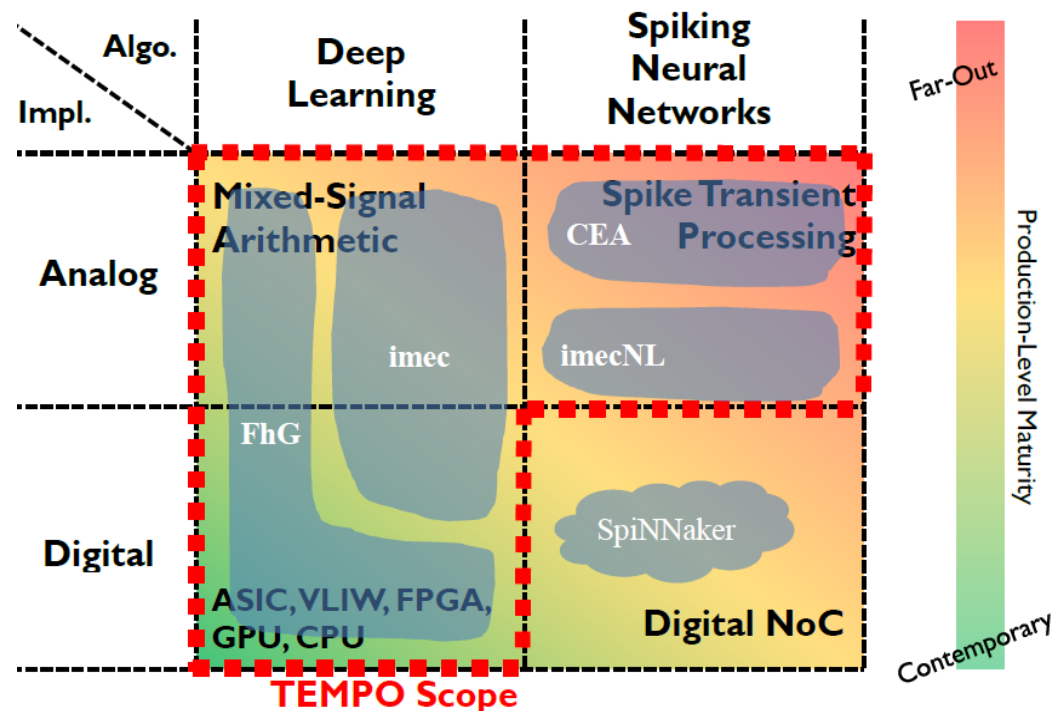**ECSEL 2018** (*)
(19 partners, 33 ME budget)

Innovative Design : CNN and SNN

Different Memories

MRAM
FeRAM
PCRAM
OxRAM

Silicon Technology

300mm Silicon wafers
22 and 28nm FDSOI technology

Next EU proposal: "ANDANTE" (ECSEL 2019)

TESTING & VALIDATION OF FUTURE HW & SW TO BE REINFORCED

FOR SAFETY CRITICAL SYSTEM

FOR RESILIENCE

FOR CUSTOMER ACCEPTANCE

EU COMMISSION NEEDS TO SUPPORT TESTING & VALIDATION FOR DEPLOYMENT AND SCALABILITY OF TECHNOLOGY