EUROPEAN BIG DATA VALUE FORUM

Integrating Data driven DevOps Cycle in the Automotive Sector

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ABOUT US

Non-for-Profit Private Research Institution in Artificial Intelligence, Visual Computing & Interaction

www. vicomtech.org

+220 RESEARCHERS

+60 Ph.D

24% H2020 & INTERNATIONAL

46% INDUSTRIAL R&D

Positioning in the EU Automotive sector

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ASAM
Association for Standardization of Automation and Measuring Systems

ASAM is a standardization organization where experts from OEMs, Tier-1s, tool vendors, engineering service providers, and research institutes meet to commonly standardize development and test systems for the automotive industry.

Vicomtech is OpenLabel standard definition co-leader

- Annotation Data format definition
- VCD format standarisation
- Link to other formats

BDV
BIG DATA VALUE ASSOCIATION

The **Big Data Value Association** (BDVA) is an industry-driven international not–for-profit organisation with more than 200 members all over Europe and a well-balanced composition of large, small, and medium-sized industries as well as research and user organizations. BDVA is the private counterpart to the EU Commission to implement the **Big Data Value PPP program**.

Automotive Group co-leader (Oihana Otaegui) with AVL (Bernhard Peischl)

ERTICO
ITS EUROPE

ITS Europe is a public-private partnership of 120 companies and organisations representing service providers, suppliers, traffic and transport industry, research, public authorities, user organisations, mobile network operators, and vehicle manufacturers.

(Oihana Otaegui) member of the Strategy Committee representing Big Data and AI technologies

CCAM
CONNECTED, COOPERATIVE & AUTOMATED MOBILITY

On June 23, the European Commission and the CCAM Association formally kicked-off the Co-Programmed CCAM Partnership by signing the Memorandum of Understanding. The CCAM Association is to promote and facilitate pre-competitive research on Connected, Cooperative and Automated Mobility (CCAM) within the European Research Area, by bringing together the different actors of the CCAM value chain.

(Oihana Otaegui) is elected executive group member – Cluster co-leader for KET (Data, IA, 5G) (Cluster 5)

ASAM SIM:Guide Magazine 2021
Article "Sematic Labelling with ASAM OpenLabel for SAE L3+ AD Development" by Marcos Nieto

Background

Digitalisation as a flagship action in Europe is an ongoing integration of digital technologies and digitalized data across the economy and society

CHALLENGES FOR EUROPE

- In numbers **Europe's GDP** is mainly based **on traditional industries** such as **manufacturing** (14% approx.) and **automotive** (7,5% approx.),
- **Adopting Artificial Intelligence (AI), Big Data (BD), Cloud Computing, and High Performance Computing (HPC) technologies for data processing in traditional industrial** sectors
- The work of mechanical, electric, and electronic engineers **is constrained to consolidated workflow models** not adapted to modern software technologies
- The challenge of **transforming European B2B** model towards a digital business is inherently more complex than in US B2C market

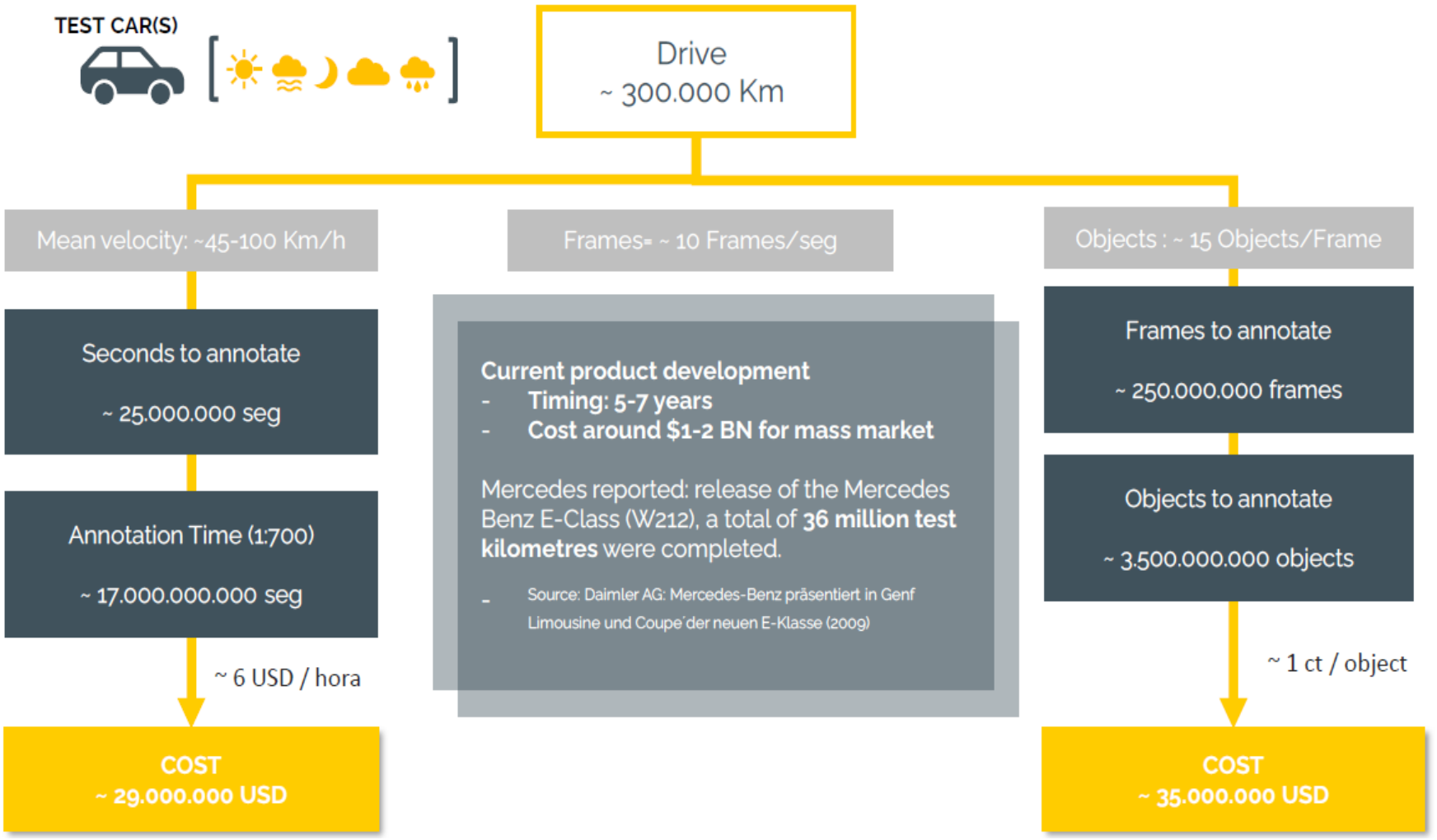
Approach

DataLoop – Integrating Data driven DevOps Cycle in the Automotive Sector to

- Reduce market time
- Increase efficiency
- Develop future electric and automated vehicles

- **Data generation, processing and usage in the Automotive sector is extreme**
  - Automotive sector evolving towards the generation of electric, connected, cooperative and automated vehicles
  - The data requirements for design, validation, verification and integration of each of the function and technologies requires the analysis of large scale data
  - Data ingestion, preparation and processing is very difficult and there are limited capabilities in existing tooling
- The development and testing process in the automotive sector is mechanical/electric/electronic process driven
  - Difficult to cope with new SW demands for enabling CCAM
  - Hard to deal with heterogenous data from diverse sensors
  - Different users (engineers) need to work with data (at different data process stages) for development, integration and testing

Extreme Data



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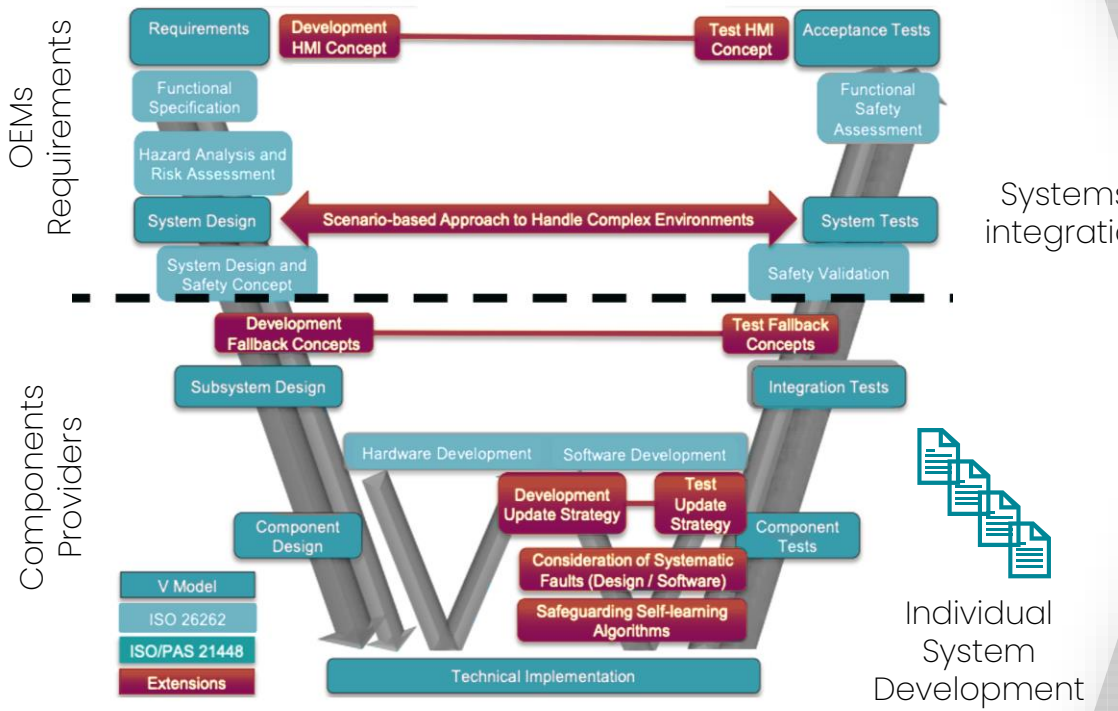
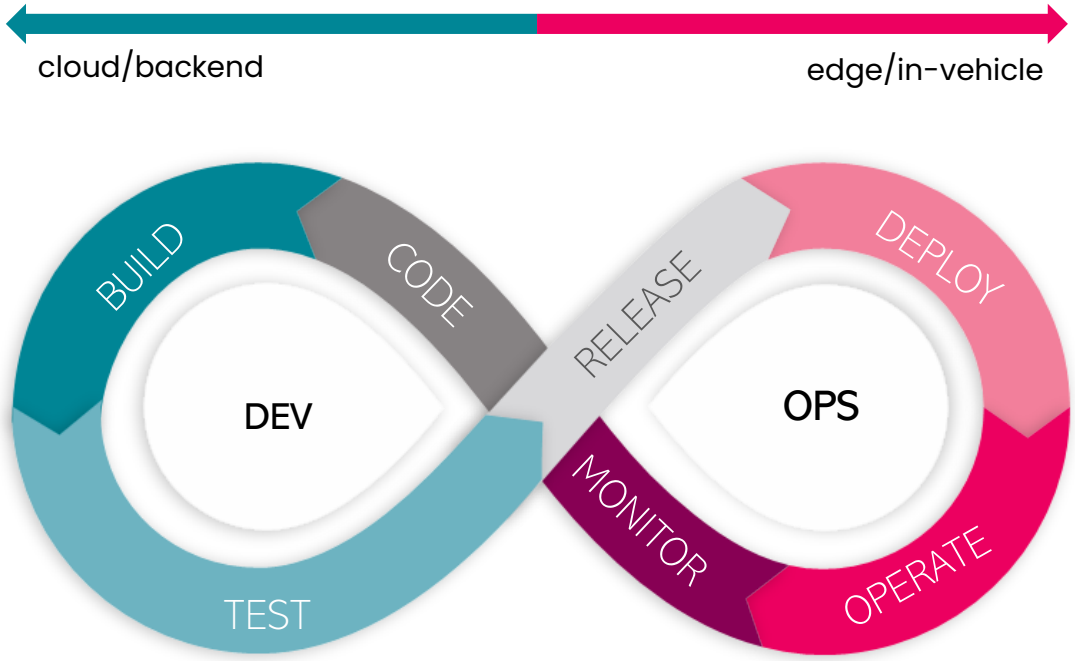
V-Model Industrial Developments



Systems integration

Individual System Development

SW Development Life Cycle



Centralized component development

Remote products
Connectivity
Predictive maintenance

USER
DATA CONSUMERS

Design Engineers

Development Engineers

Testing Engineers

cloud/backend

edge/in-vehicle

data:
- Semantics/Ontologies
- Labelling
- Fusion
- Digital Twin

analytics:
- Fit for purpose
- Scalable, federated analytics on distributed / decentralized data
- Analytics-as-a-Service
- Reinforcement learning

UX:
- Adatative Interfaces
- User Centric

- increase level of automation
- increase observability
- selectively trigger data collection
- (non-customer facing functions)

extreme data:
- 5V's on data
- multi-physics
- discrete & continuous

analytics:
- Embedded Processing
- Federated data
- Semantics for edge case detection

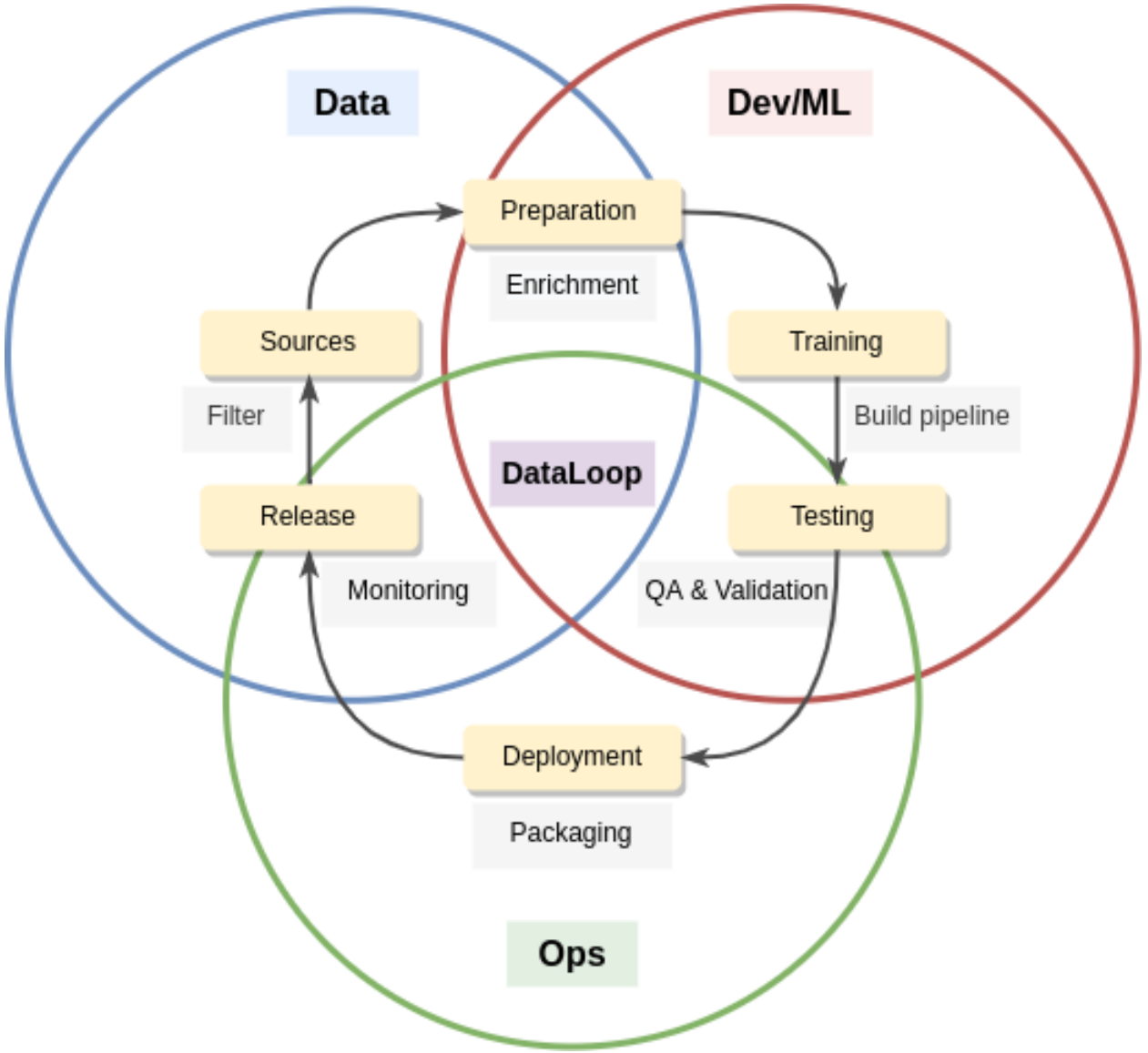
APPLICATION DOMAIN

Batteries & powertrain integration and lifecycle management

Assisted & Automated driving

SmartCity: Mobility & Traffic management

DevOps Cycle from the perspective of ML and Data



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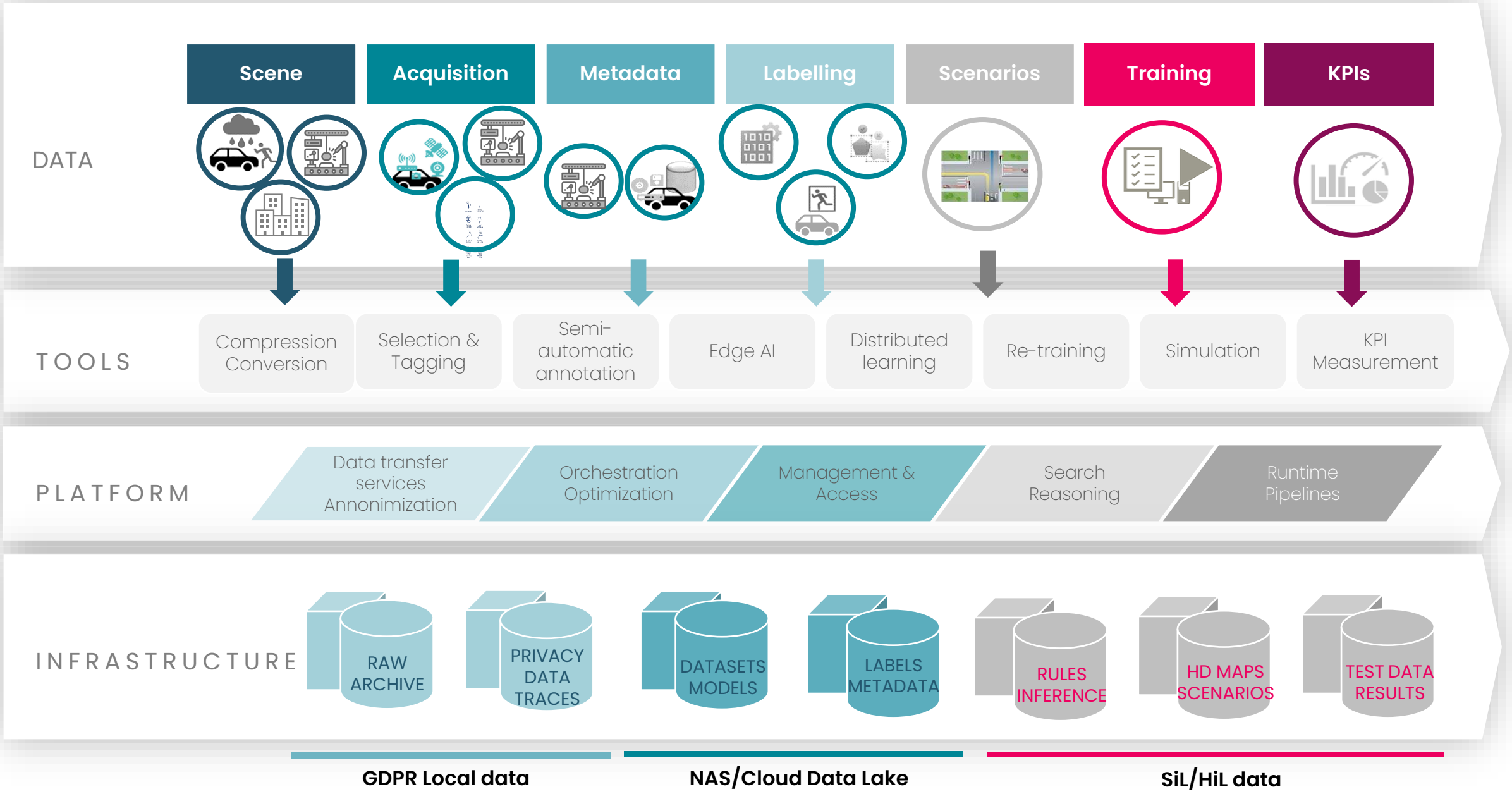

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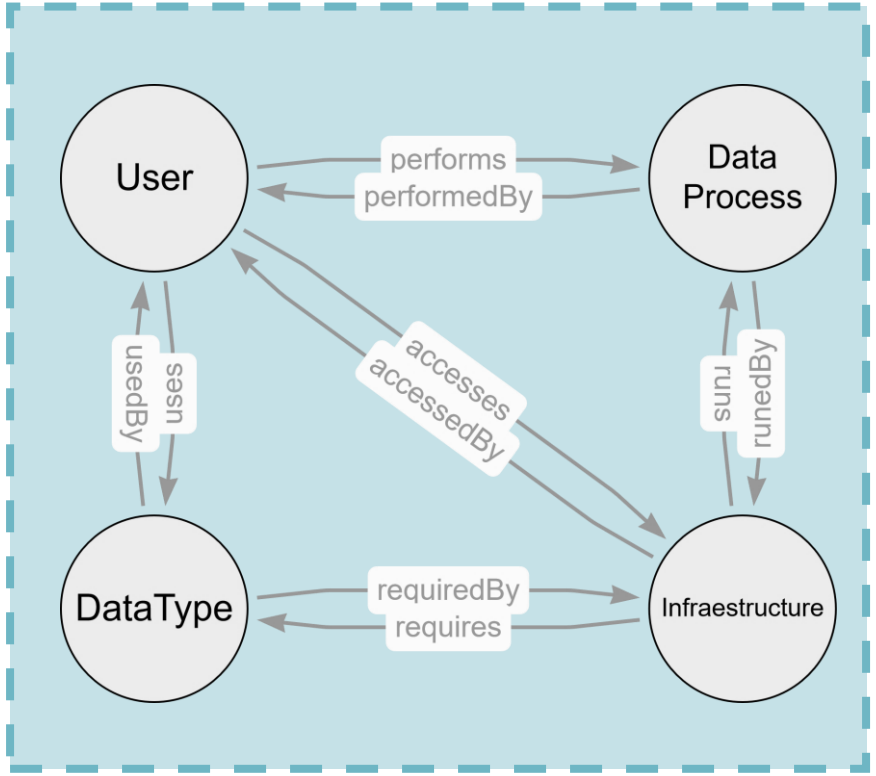
Back-end engine

Semantic Data Processing

Integration
Expansion
Inference
Reasoning

Semantic backbone



Data Provenance

Traceability, Registry

API

Knowledge-as-a-Service (KaaS)

Querying
Summarisation
Formatting

Applications

- Semantic search
- Visual analytics
- MLOps

DataLoop Graphical Databases

External Knowledge Resources

Example Use Cases: Challenges

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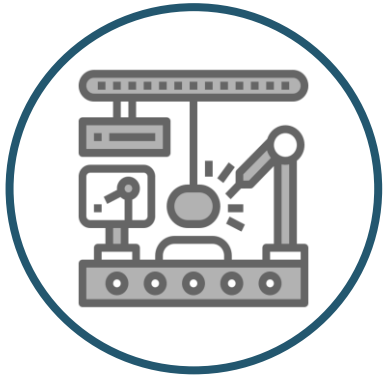
Electrification



Next Gen Vehicles (ADAS/AD)

Future Mobility

Use Case – ADAS Semiautomatic Labelling

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WEB UI – Data Preparation Engineer

3. Data Preparation

DATA ANNOTATION

Big Data / Machine Learning Analysis

Frame level automatic analysis
- Automatic 2D/3D Object detection
- Trajectory computation
- Characteristic Extraction

Raw data

Annotated Ground Truth

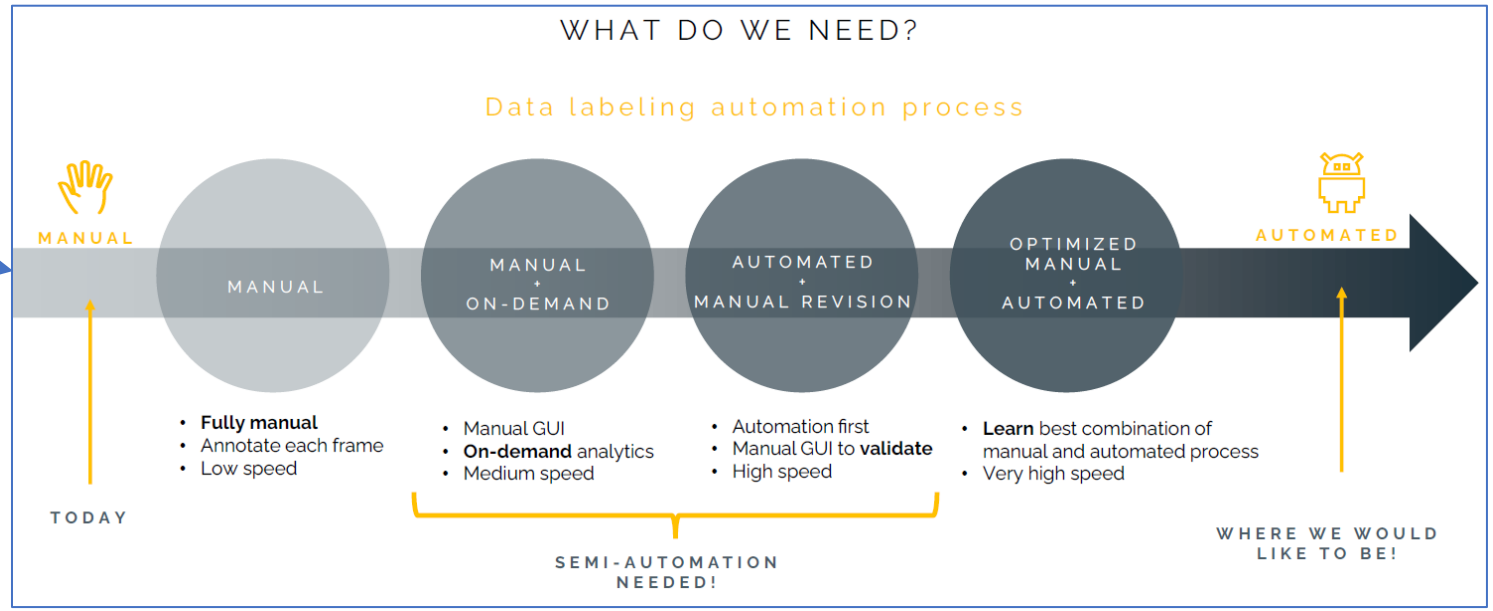
Containerized (ADTF or proprietary) or Raw
- Point clouds
- Video/Images
- CAN data
- Localization

Data+ Metadata description of the content
- Objects
- Spatio Temporal relations
- Metadata Format - Standarization

Massive Data Upload

REAL TRAFFIC SITUATION RECORDINGS

2. Real Massive Data Recording



PROVEN

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SPECIFICATIONS TO VALIDATE
- ODD
- Minimum Risk manoeuvre
- Behaviour
- etc

Assistance System/ Driving function

OEM / TIER1

1. Requirements

Conclusions

- **Digitalisation** is transforming traditional sectors facing **major challenges** in
  - Artificial Intelligence, Big Data, Edge/Cloud computing and High Performance Computing
  - **Data** is the new asset, **fuelling AI** and **new industrial processes**

- **Cyclical development** processes to **reduce time-to-market**
  - Adopt agile processes from SW development industry
  - Semantic traceability and transparency
  - Edge/Cloud infrastructures to operate lifecycle

- **Automotive** sector **challenges** & **opportunities**
  - **Complex development** chain with **heterogeneous user types** and needs
  - Transition from V-Model into modern MLOps
  - Data-driven use cases
    - E.g., powertrain manufacturing analytics/monitoring
    - E.g., AI-based autonomous driving
    - E.g., advanced traffic management and cooperative driving

Thank you!

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