



Labeling specifications

key learnings and industry trends from 4 years with OEMs



UNDERSTAND.AI

A dSPACE
COMPANY

understand.ai

Why

We believe that AI is the most powerful tool our generation has at hand. We make it accessible to bring society to the next level.

How

We enable you to get the **right data** at the **right quality** and the **right quantity** to bring AI into real-world products like self-driving cars. For the benefit of everyone.

What

We provide a world class SaaS tool chain to **select** the right data, generate **high quality** 2D & 3D data sets and real world test scenarios **at scale**.

TL; DR:
We solve
the data
problem
of AI!

A young fast-growing start-up

understand.ai | a dSPACE company



Founded: March 10th, 2017

Research dates back to 2014

HQ: Karlsruhe (Germany)

Heart of a key European Automotive & AI cluster

Team:

53 associates, combination of AI & Automotive talent

Customers:

Automotive OEMs and Tier 1/2s

e.g. VDA V&V-Methoden (Pegasus successor)

Offerings:

SaaS Annotation tooling, Annotation Service and
Scenario Extraction



Portfolio - Focus on Automation and Quality

2D Bounding Box



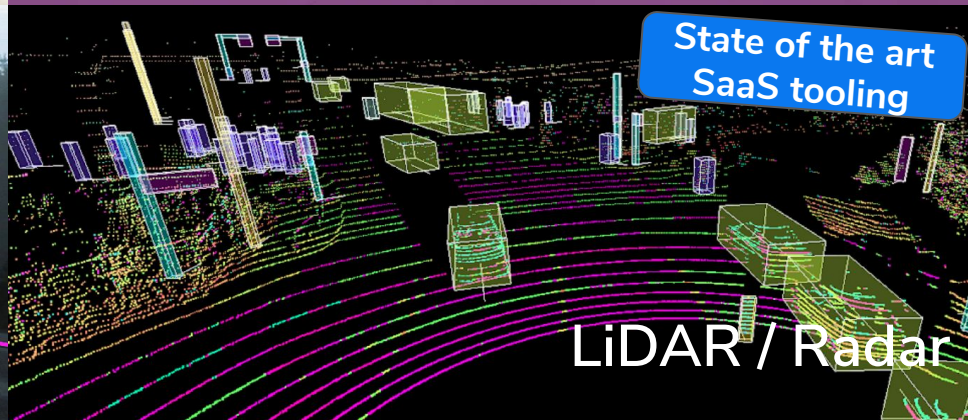
Semantic Segmentation



Polyline Annotation

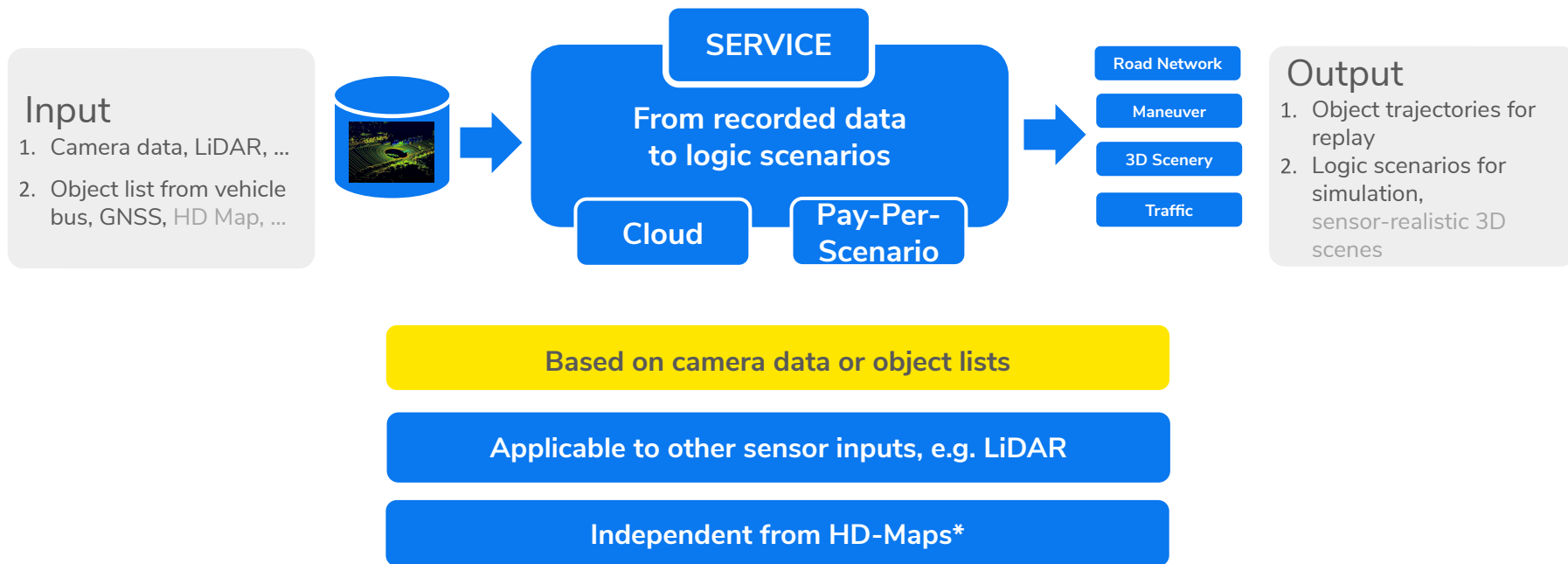


State of the art
SaaS tooling



LiDAR / Radar

Generation of simulation scenarios

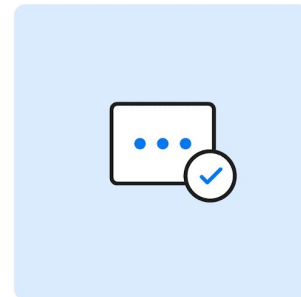
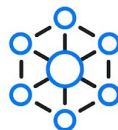


Daily challenges

Working with labeling specifications

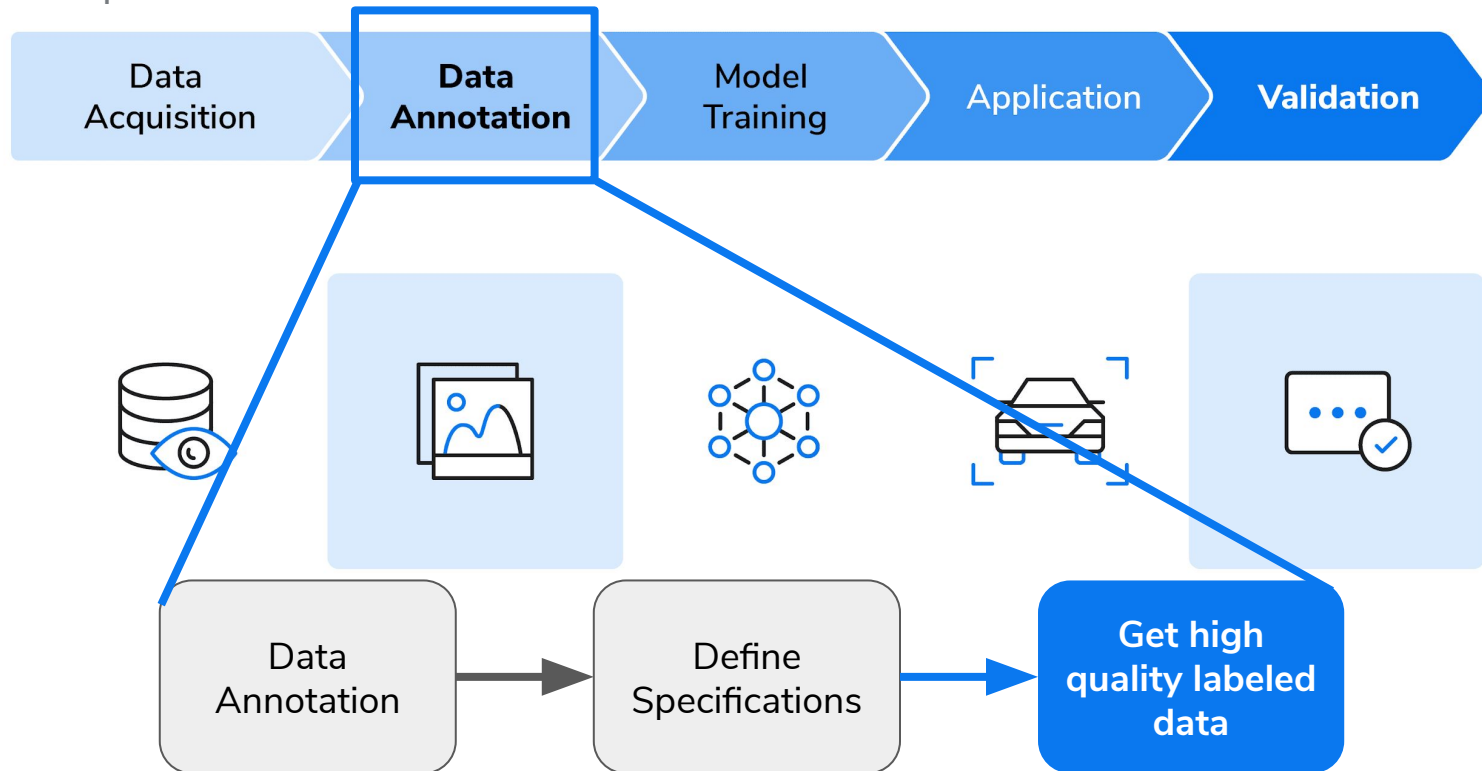
Process of an annotation projects

Expectation



Process of an annotation projects

Expectation in an ideal world



Truck or Car?

Every day challenges



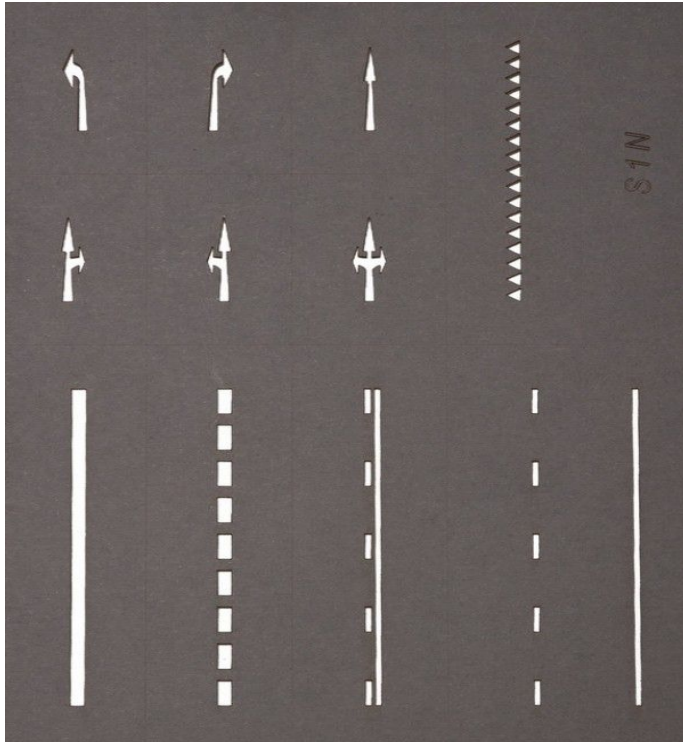
Separate cars or part of the truck?

Every day challenges



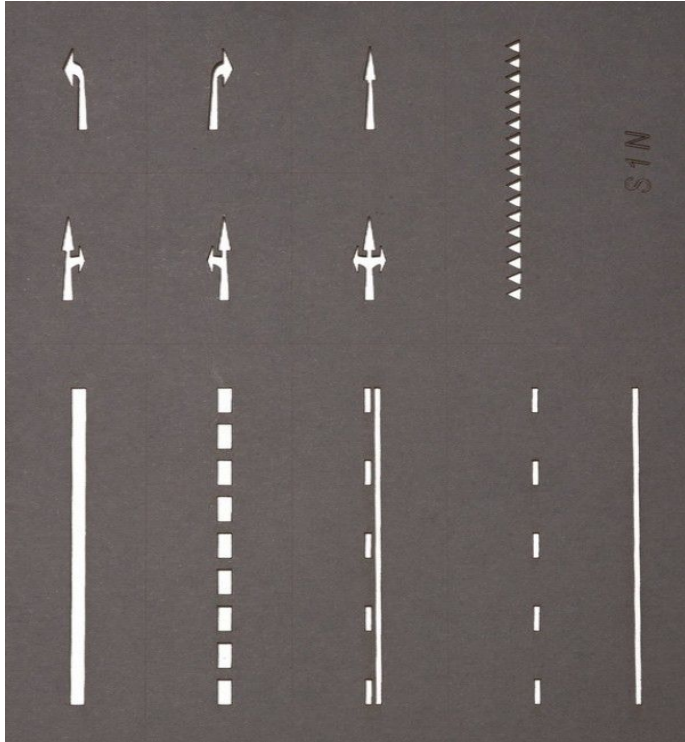
Lane markings - expectation

Every day challenges



Lane markings - reality

Every day challenges



Unique traffic participants

Every day challenges

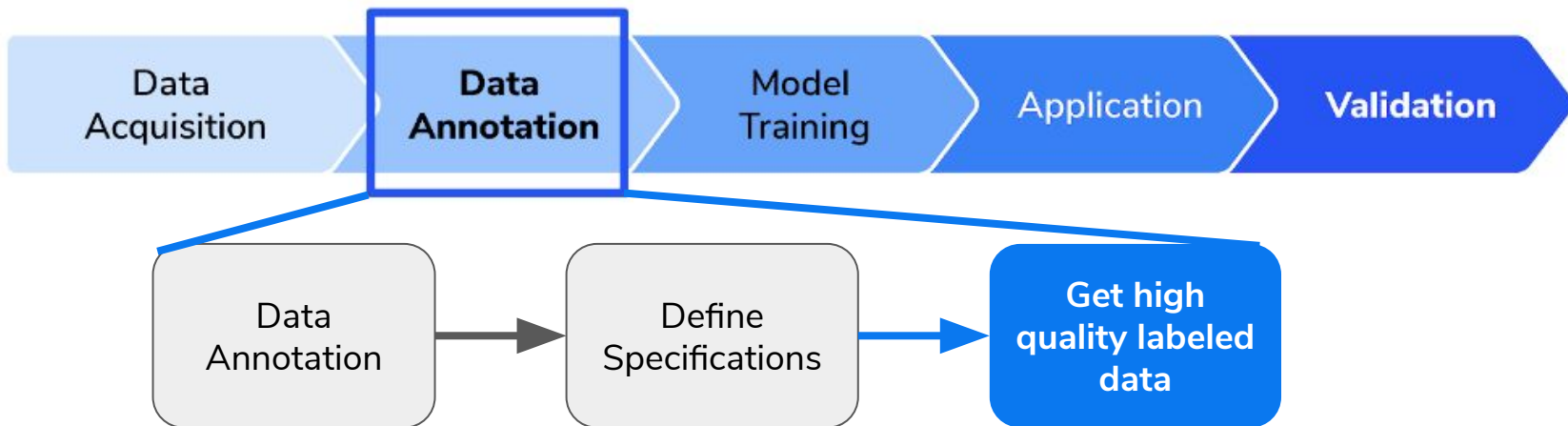


Key learnings

Goal: Consistent and high quality data sets

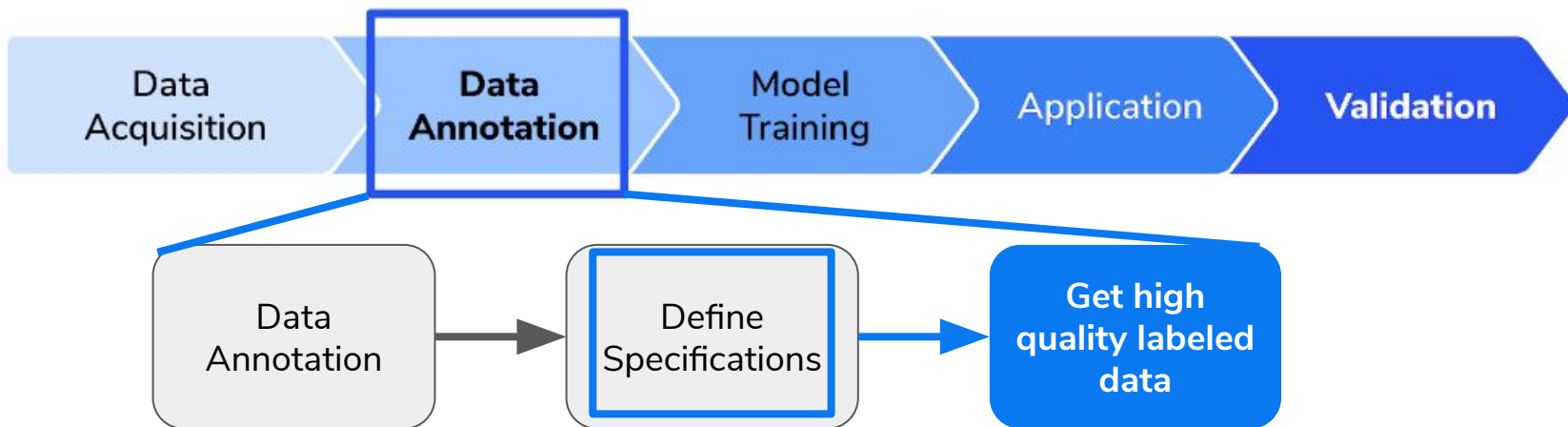
Best practices for defining specifications

Goal: Consistent and high quality data sets



Best practices for defining specifications

Goal: Consistent and high quality data sets



Be precise with wording

Guidelines

Class: Truck

This includes all trucks.

Class: Truck

This includes all trucks.
Please include any cargo on the truck.
Pick-up trucks are considered trucks
as well.

Everyone understands pictures

Guidelines

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Use exceptions (edge cases) wisely

Meta attributes can split complex tasks

Class: Truck

This includes all trucks.

Mark the trailer of the truck separately, if you see the whole trailer. If there is a second trailer only mark the last trailer.

Class: Truck

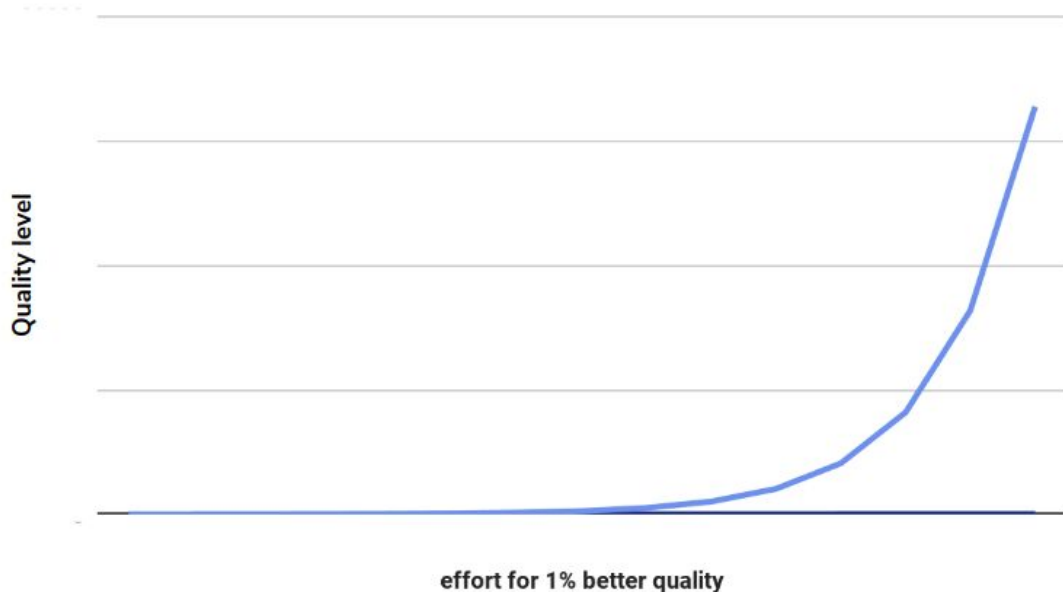
This includes all trucks.
Set a meta attribute “occluded trailer” if the trailer is occluded by **other** traffic participants or objects.



Feedback pipeline

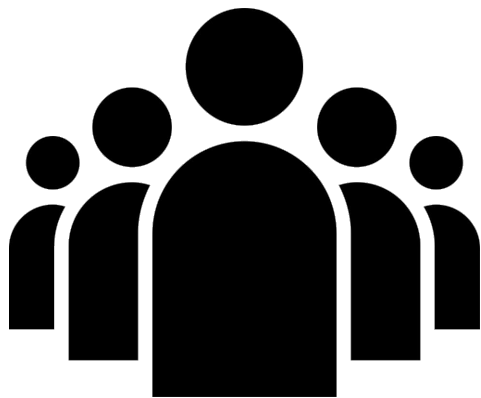
Creating a feedback pipeline is crucial for solving specification issues early on

time needed to spot inconsistencies in labeling specifications



5 by 5 rule

Hands on solution for spotting labeling spec inconsistencies



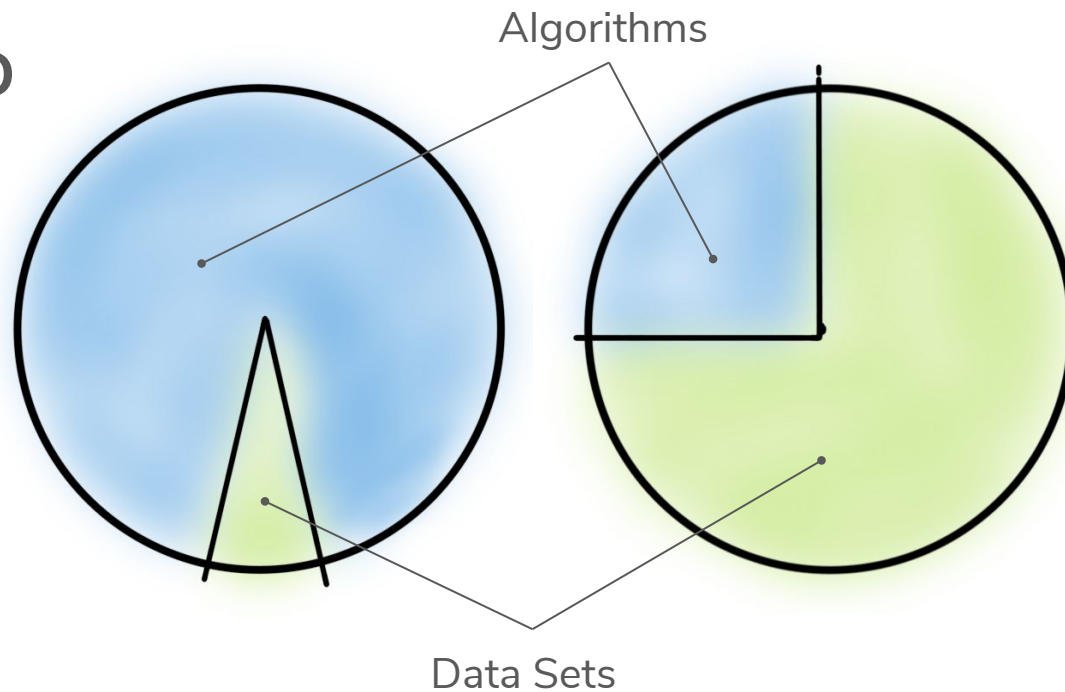
Industry trends

From academia to industry

Shift in work focus

PhD

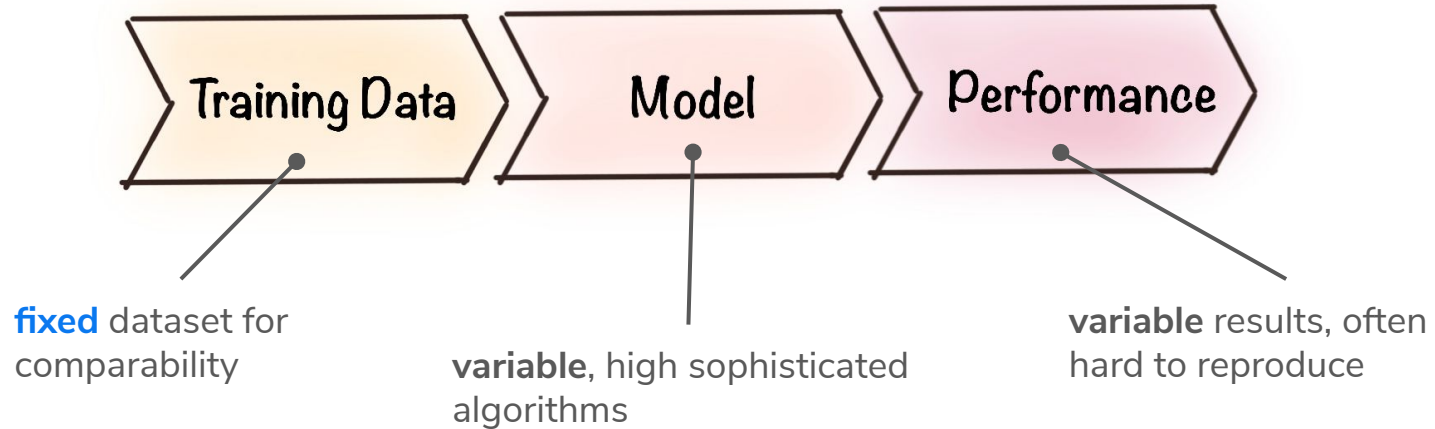
Tesla



Source: Andrej Karpathy

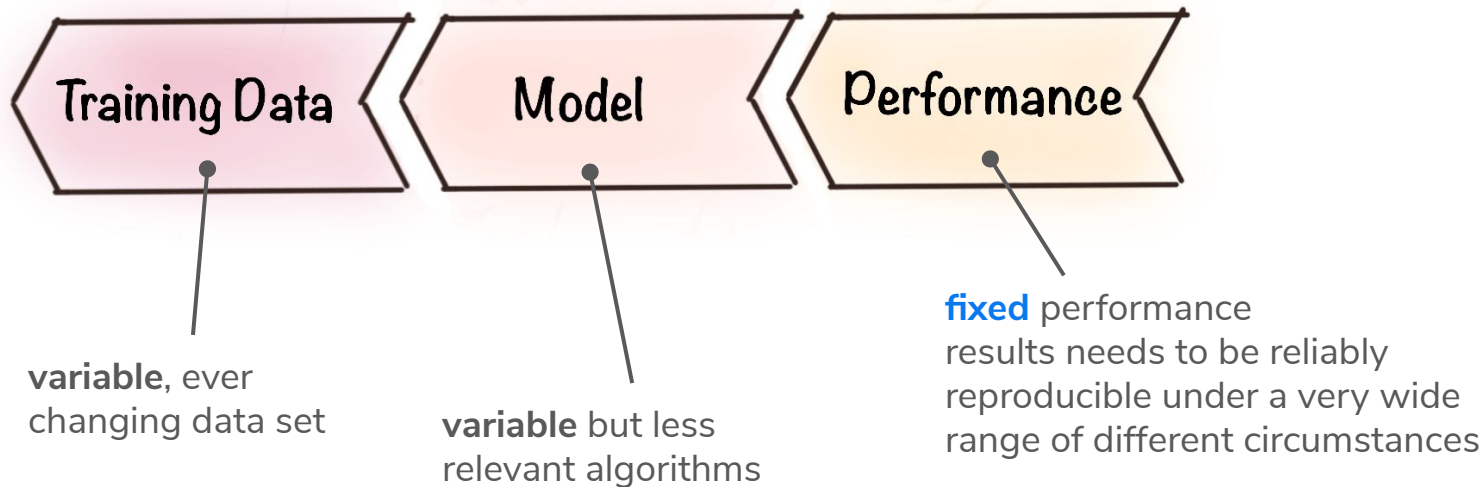
Academia

Academia versus Industry



Industry

Academia versus Industry



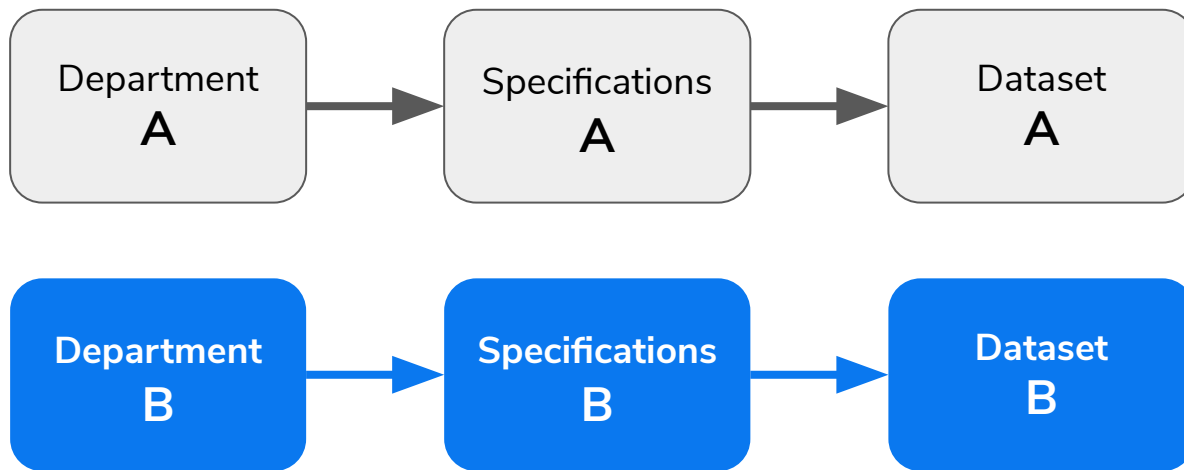
Fixed Model Performance

Industry



Annotation projects

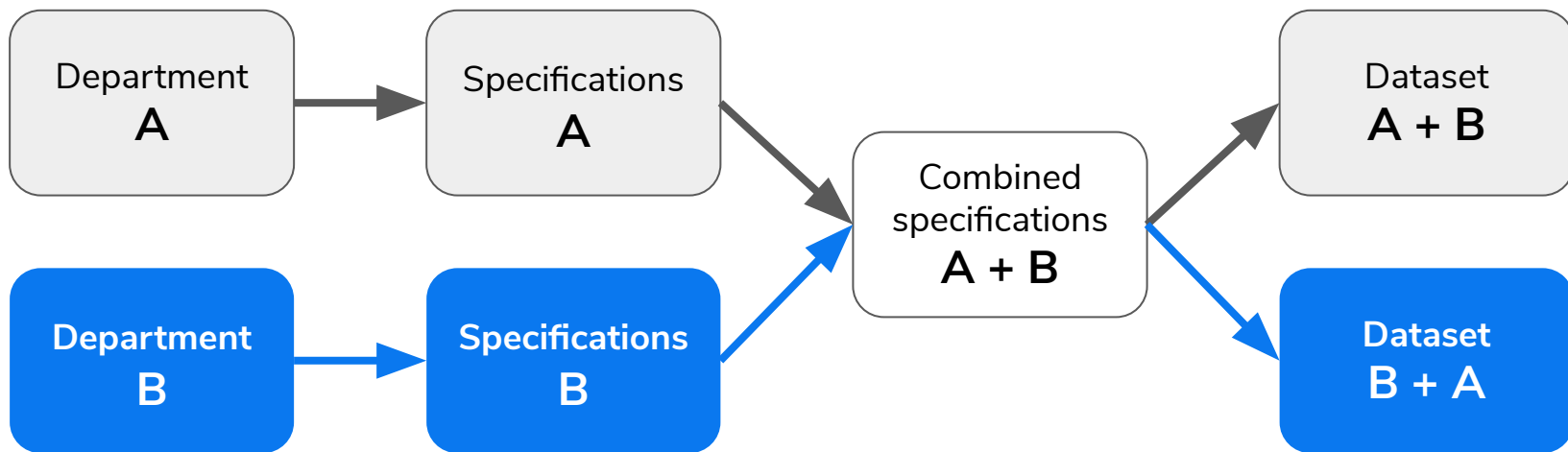
Industry: Past



Outcome: Non-compatible datasets in the same company

Annotation projects

Industry: Present



Outcome: compatible datasets inside a company ?

Annotation projects

Industry: Future

(Some) standardised Datasets:

- + Lower entry barrier
- + Best practices integrated
- + High quality
- + High quantity
- + Reasonable cost

Outcome: compatible datasets between companies

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Q&A



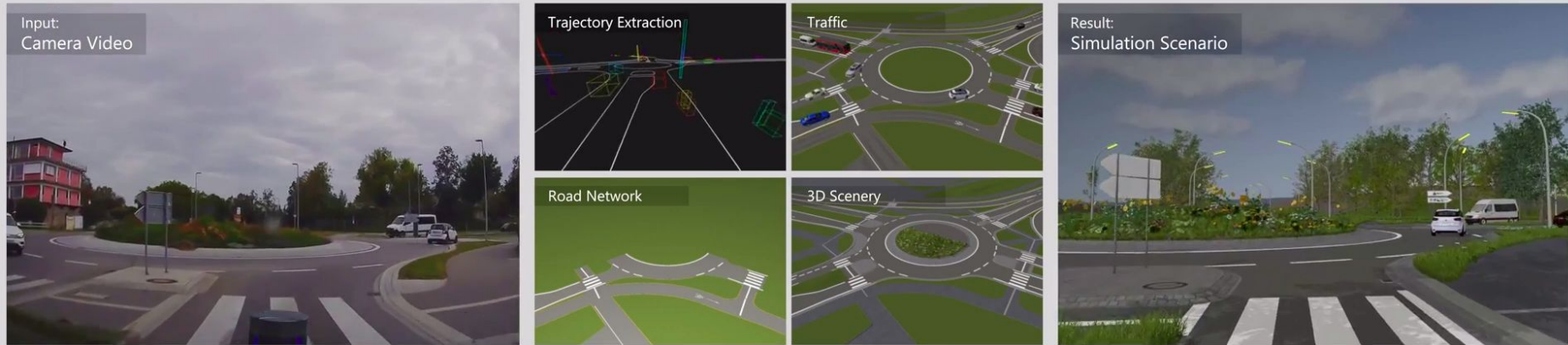
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Quality annotation meets scenario

UAI | dSPACE Scenario Generation Service



Measurement Data

Scenario Generation

Simulation