

# AI, AUTONOMY AND COMPUTER VISION FOR SMART MAINTENANCE OF ROAD INFRASTRUCTURE

Statens Vei Vesen (SVV), Trondheim Kommune (TK), Trøndelag Fylkeskommune (TF) og Hell Smart Mobility (HSM)

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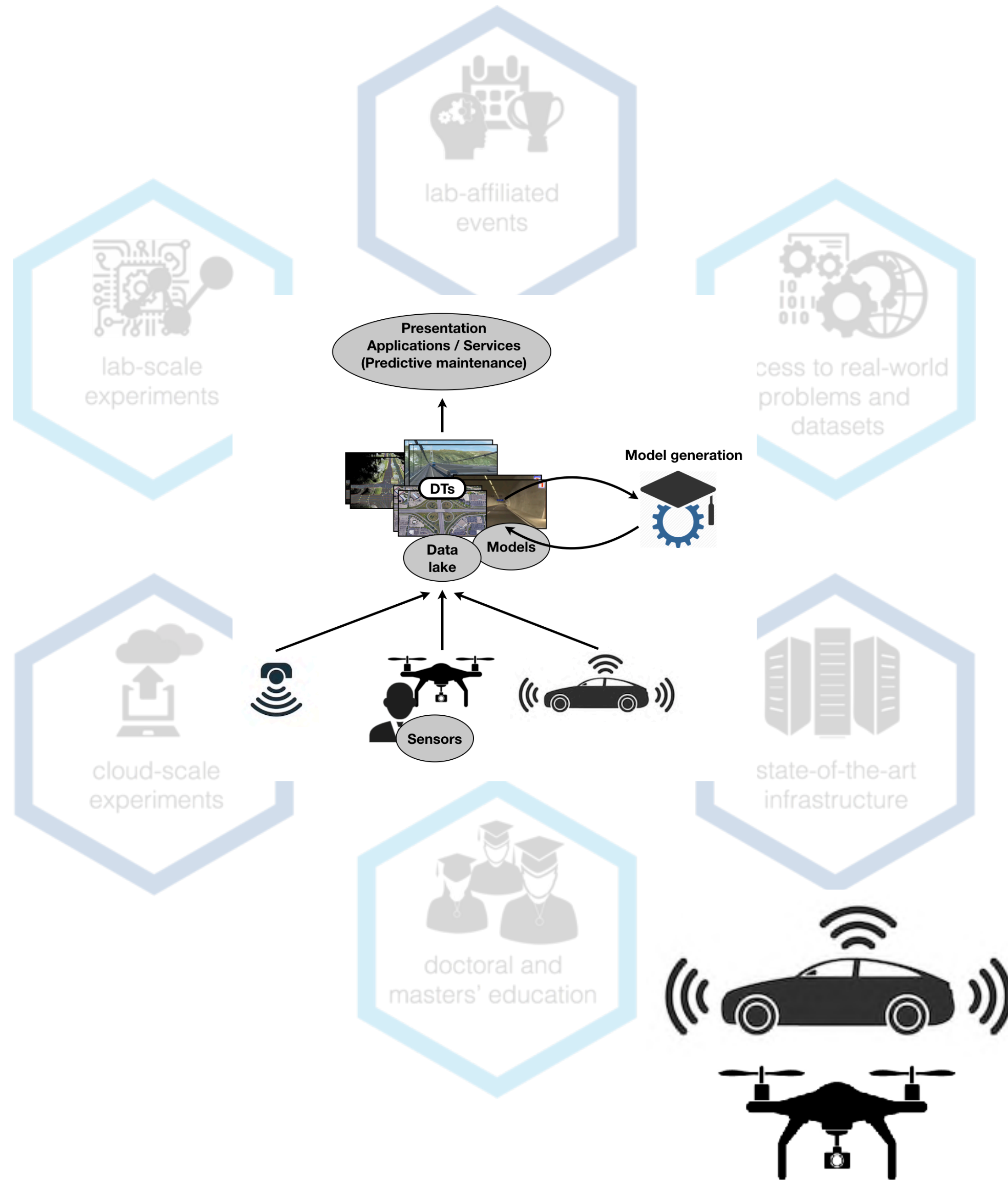
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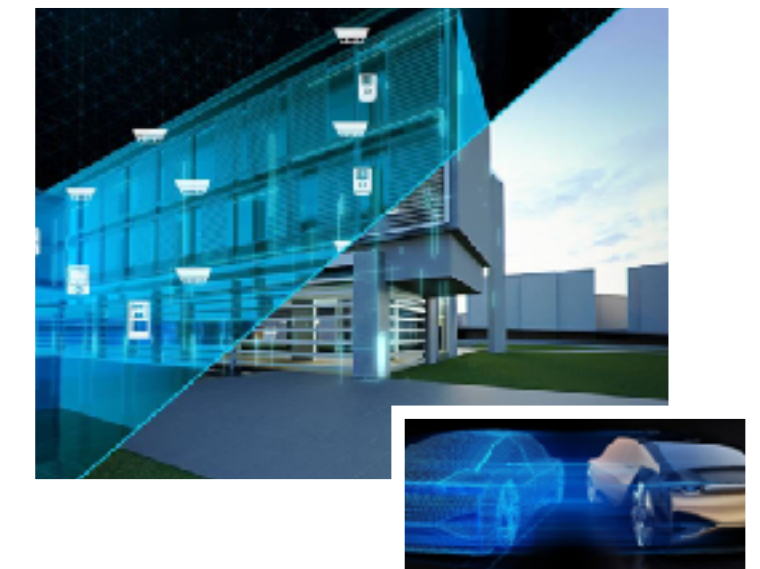


# Problem Description

- The computer science department as well as the AI-lab are working together with several external stakeholders towards the future of transportation and smart mobility, e.g. Statens Vei Vesen (SVV) and Smart Maintenance of Road infrastructure, Trondheim Kommune (TK) and «Universitets-kommunen», Trøndelag Fylkeskommune (TF) and «kunnskapspakke for godstransport», and Hell Smart Mobility (HSM) and the establishment of a test siste for AVs and modern ITS solutions.
- A substantial part of the challenges we face within this domain can only be solved be digitalization, AI and computer vision.
- More specifically, for smart/predictive maintenance of road infrastructure we need to assess the state of road segments, intersections, tunnels and bridges using more and more sensors, we need to integrate all this information (in addition traffic and weather condition) in a useful way (e.g. using a hierarchy of digital twins) and on top of this we need to build a self-learning ecosystem for prediction, decision support and automation.



Autonomous Mobile **Sensors**



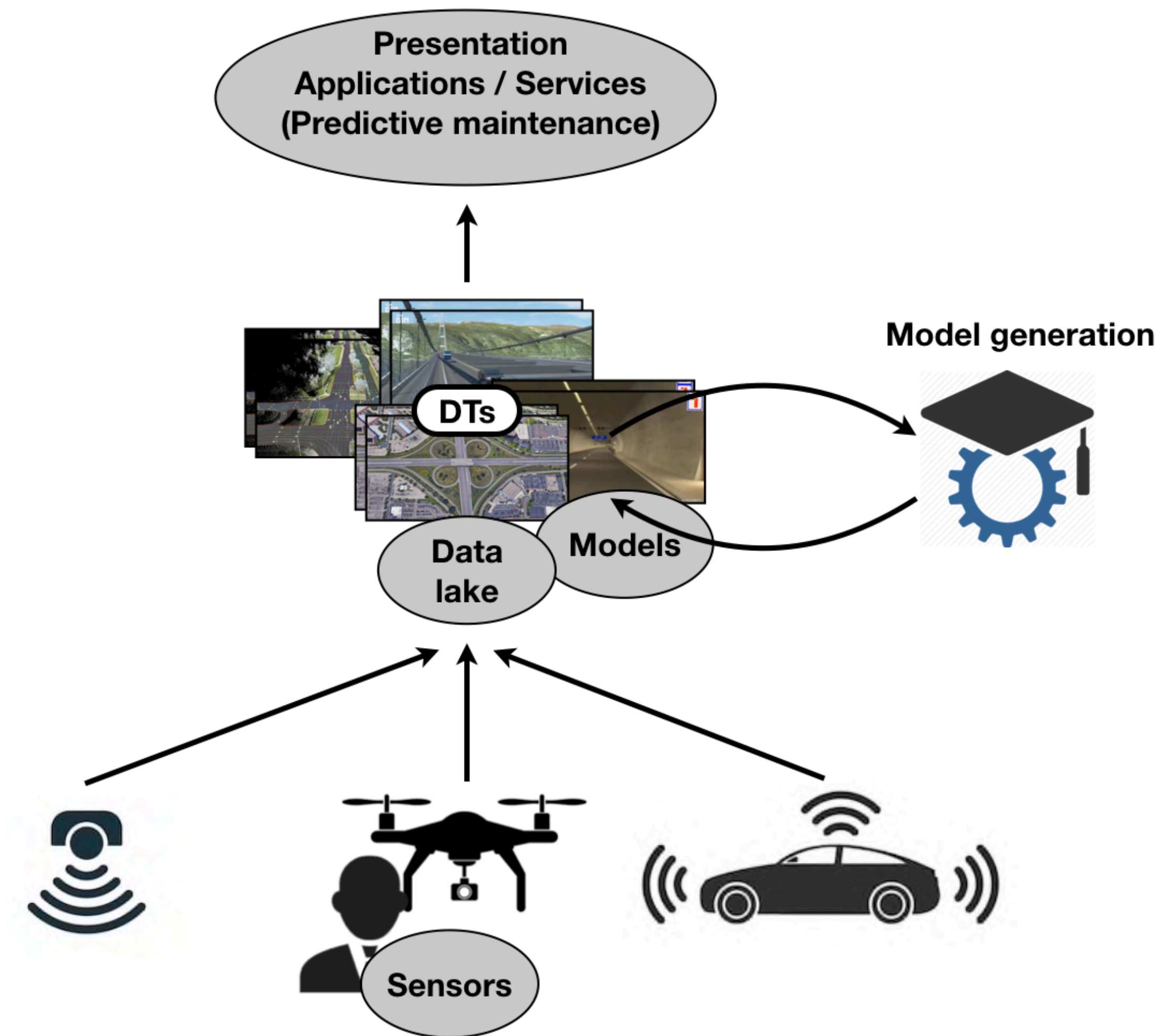
**Digital (Road) Twins**



**Monitoring, prediction,  
decision support and automation**

# Tasks / Challenges

- Mobile sensor platforms (including autonomous vehicles (AVs) and drones) for road condition registration and continuous monitoring of the **infrastructure** state.
  - AVs: assess the state of all visible road objects (e.g. potholes and (road facing) railings), amount of traffic and weather conditions + [AVs \(here\)](#)
  - Drones (AI lab has [two](#)): assess the state of all road objects that are not visible from the road (e.g. bridges, culverts and bolts only visible from the back of the railings) + [autonomous drones](#)
- Unifying and Smart Digital Road **Twins** (life-cycle and hierarchical, including [HD map](#) generation using LiDAR)
- Predictive maintenance, decision support and automation (descriptive, diagnostic, predictive and prescriptive analytics) - Model generation (data, mathematical and hybrid)



# Data

- Raw data: substantial and easy to generate new
- Labeled data: some (depending on the task at hand some semi-manual labeling will be required).

# Additional info

- A more concrete project will be worked out in dialog with students that find the domain interesting.
- The project is available for one or two students.
- A number of extension can be looked into.

