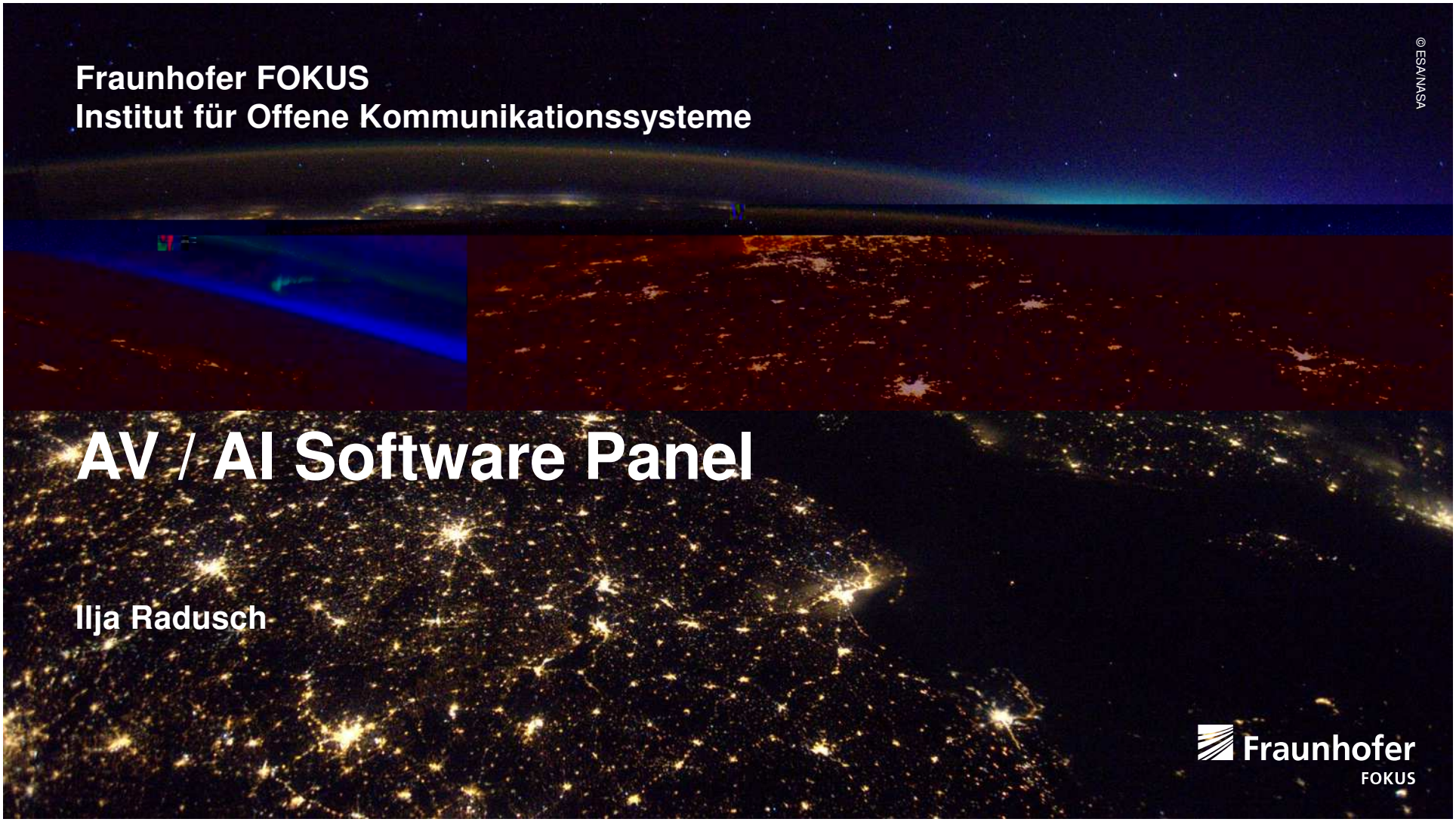
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Institut für Offene Kommunikationssysteme
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AV / AI Software Panel
Ilja Radusch
Fraunhofer
FOKUS

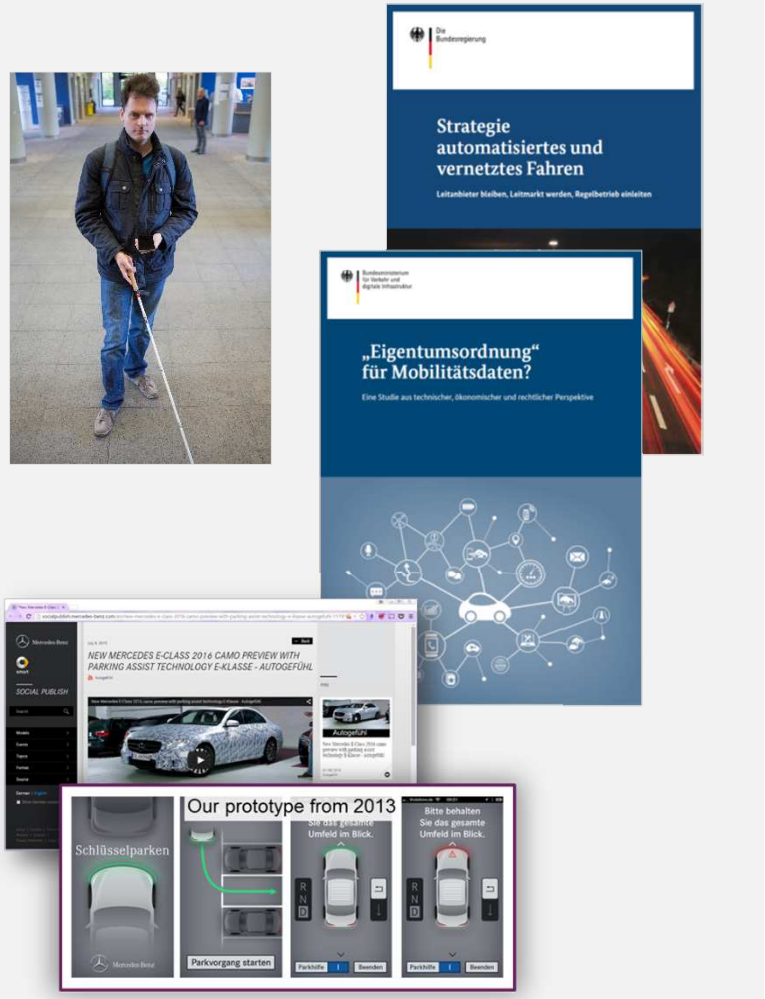
Who am I ?

Director **Smart Mobility** at Fraunhofer FOKUS

Director **Daimler Center for Automotive IT Innovations**

Technology development and consulting

- Prototyped the Remote Parking Assist and Map-based Speed Control for current Mercedes cars
- Extensive use of AI for localization, perception, and automated driving
- Analysis of big mobility data sets (smart data)
- Development of deep-tech MVTs for future mobility start-ups



Automated and Cooperative Driving

Goals

- Cooperative driving in mixed city traffic. Use cases include:
- Platooning, University shuttle service, and tele-operated driving
- Generate and maintain HD maps for self-localisation, detect and classify map changes, e.g. road works

Test Areas

- Equipped with communication infrastructure
- ITS G5/ DSRC, LTE-V2X, and Backend-V2X
- Collection of ambient traffic data for test scenario generation

DIGITALES TESTFELD STADTVERKEHR

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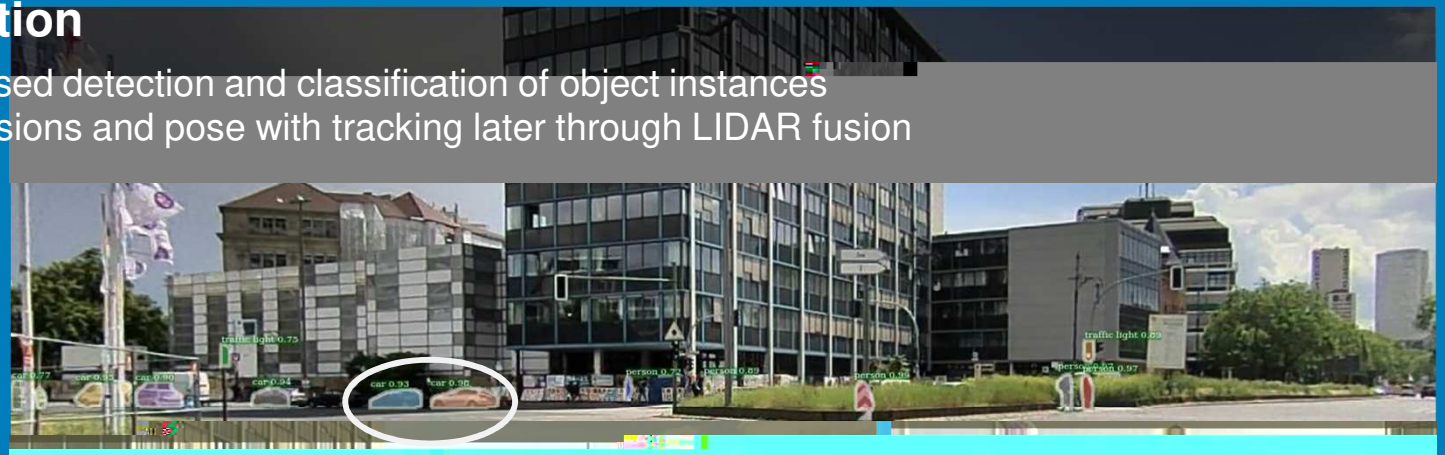
Perception

Image-based detection and classification of object instances
3D dimensions and pose with tracking later through LIDAR fusion



Instance segmentation (without tracking)

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Reference data generation
Data and label toolchain

Allows for full LIDAR-frame labeling
of class, instance, and box
in 5 min or less

Data collection

Probe data segmentation

Probe data elevation

ML pre-labeling

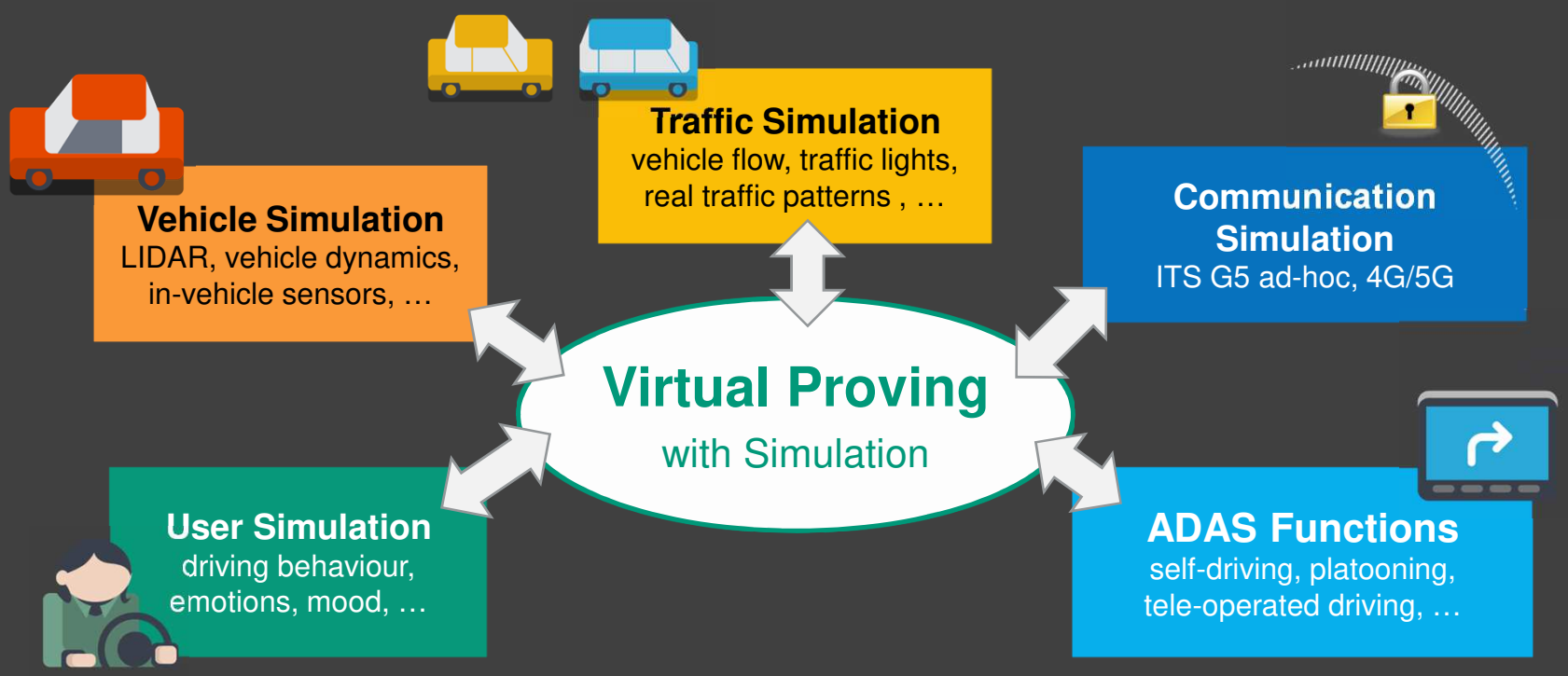
Key frame identification

Processing and tracking

Review and manual correction

Class labeling in 1min 17sec (real-time video)

Synthetic data generation
VSimRTI: dynamic coupling of best-in-class simulators



10+ years experience in simulation

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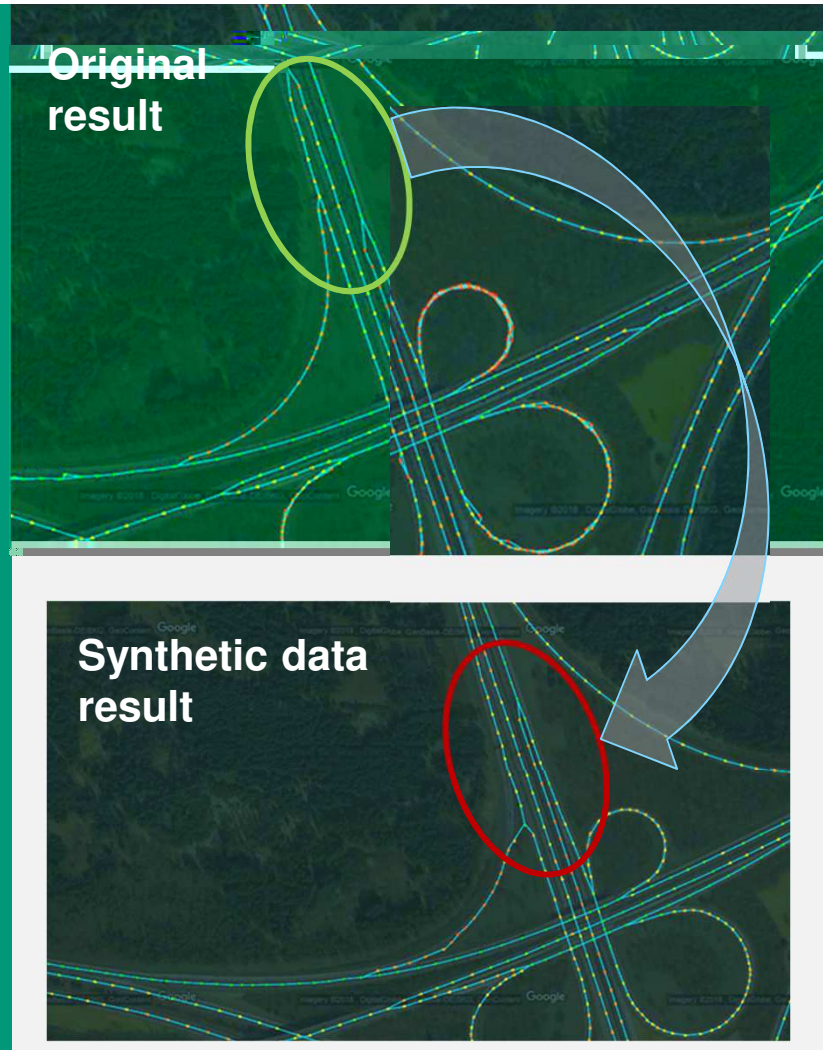
Inconvenient truth: Simulation is not all!

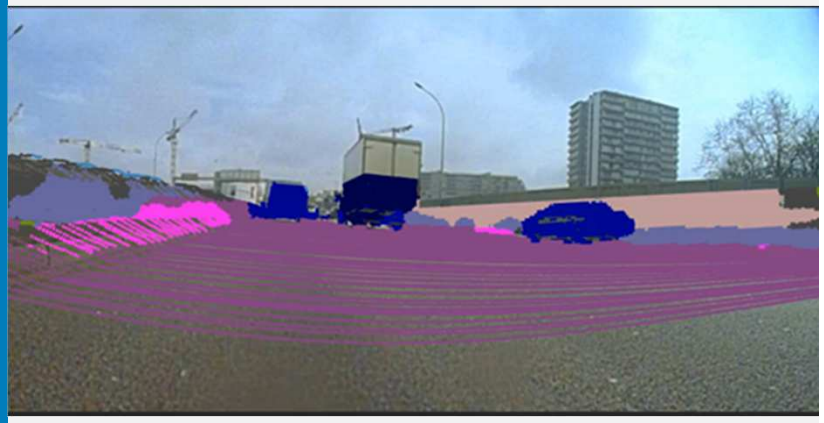
- Example: our HD map generation algorithms based on **163bn** dense real world data points generate lane-level accuracy of **< 0.5m** with **3 traces**
- However, when using synthetic**, simulated data** algorithm results are worse
- Early stages worked fine, but noise and error patterns in real vehicle trace data requires specific **data grooming** that leads inferior quality and results in synthetic data



Simulation and perception

- **Corner cases** of perception hard to foresee and simulate
- Simulation lacks proper sensor models with validated noise and error patterns, as well as range of scenarios that can prepare for the real world
- Collection of real data and annotation of real world **ground truth** are essential for development of automated driving

Courtesy Uber via Tempe Police



Real world ground truth data and scenarios crucial for automated driving