



KI Data Tooling Final Event | 05/06 December 2023

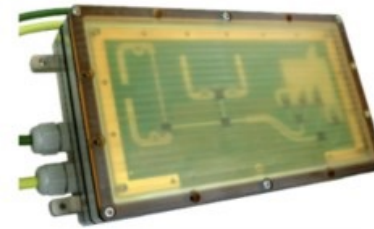
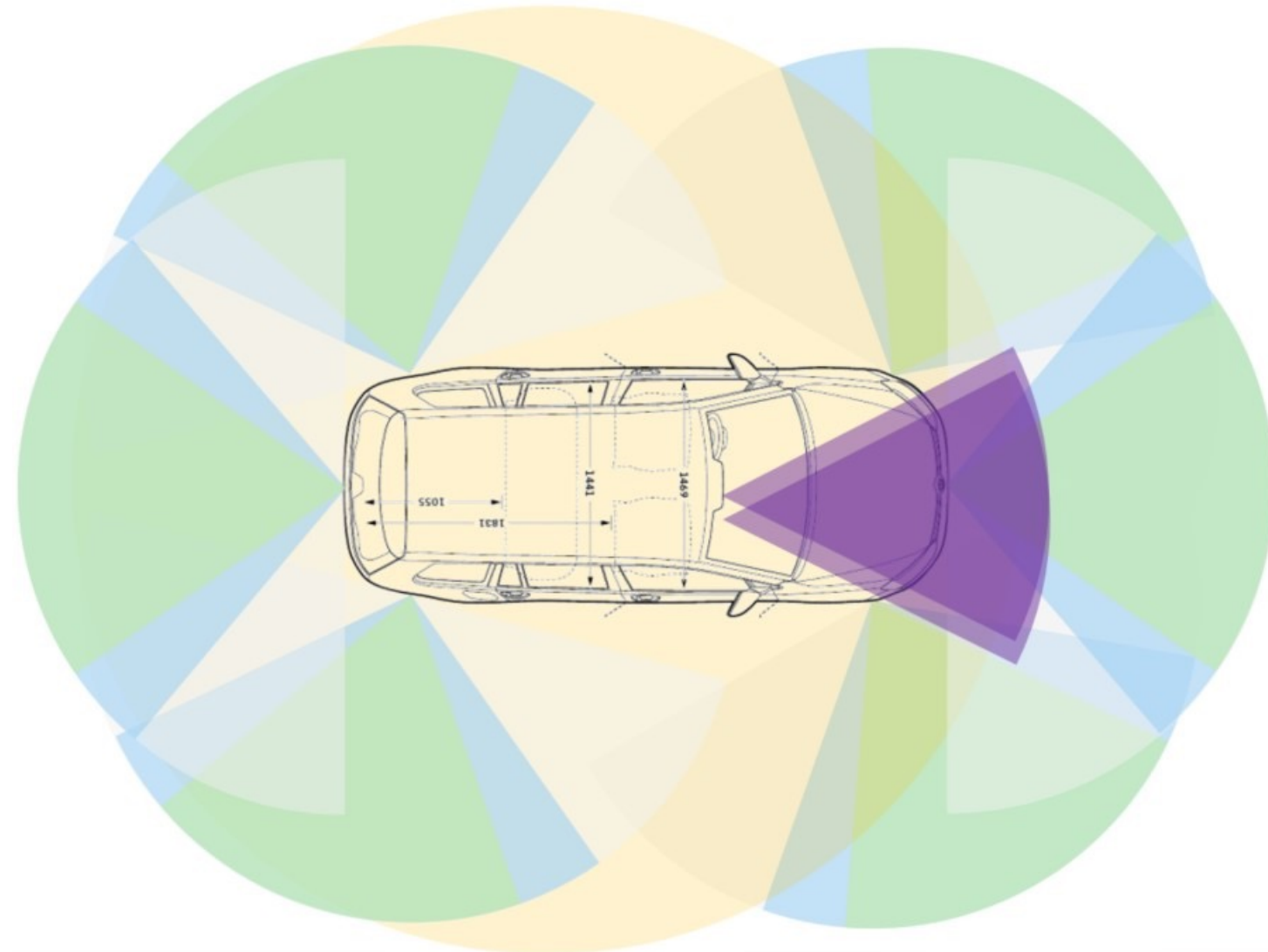
Deep Dive #2 Real Data

Andrea Kraus | Valeo

Recording Cars



Recording Cars - Bosch



- ▶ **6x Bosch Imaging Radar**
- ▶ **-10dB @ +/- 35°**
- ▶ **-20dB @ +/- 50°**
- ▶ **Az.-unambiguity +/-90°**



- ▶ **AtomOne Stereo Cams**
- ▶ **Raw data mode**
- ▶ **Realtime H264 encoder mode as docu cam**



- ▶ **Hesai 360° Lidar**
- ▶ **Reference & documentation sensor**

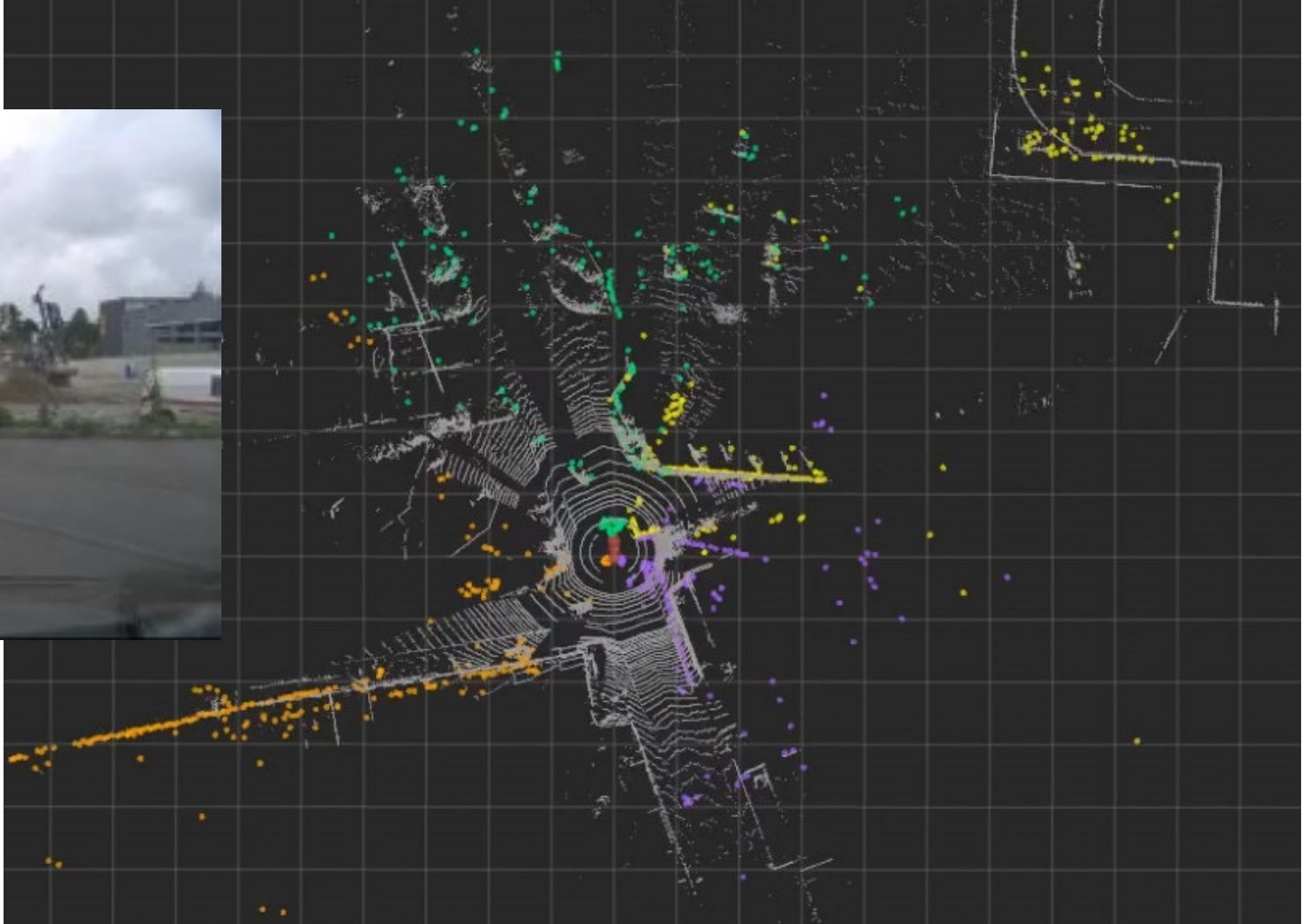


- ▶ **Displays visual demonstration to up to 3 passengers**

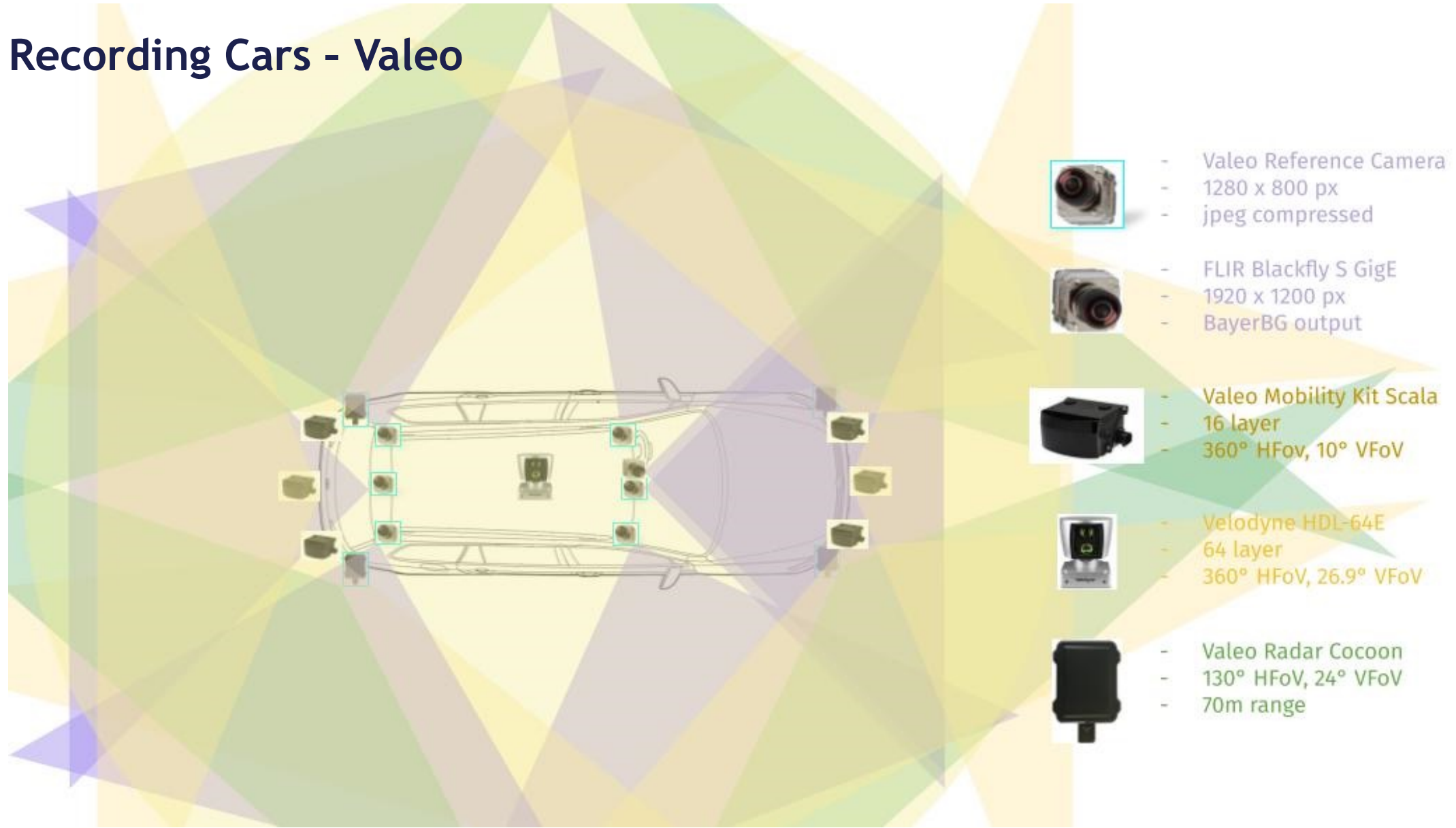


- ▶ **High computation power due to 2 PCs partly equipped with Nvidia GPUs**

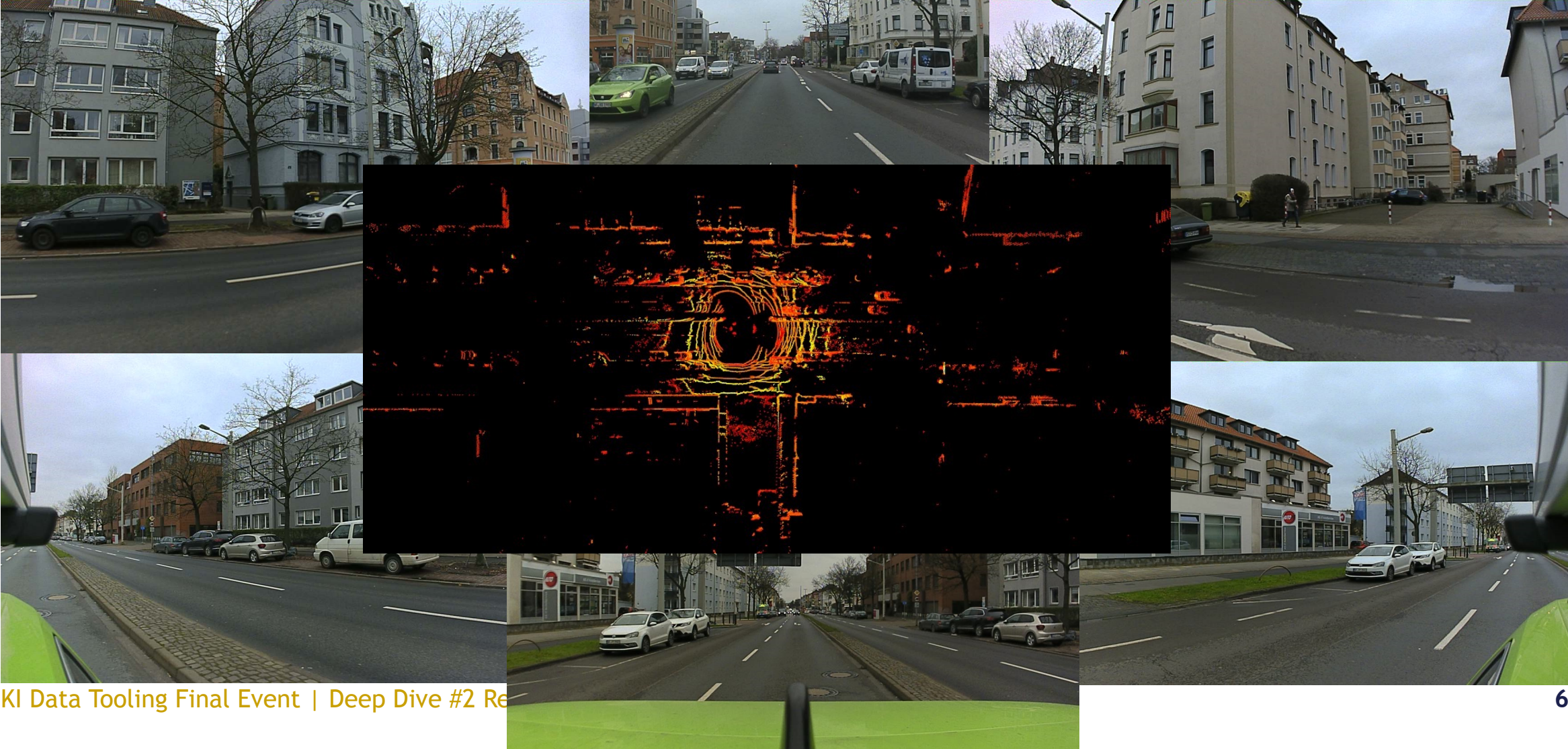
Recording Cars - Bosch



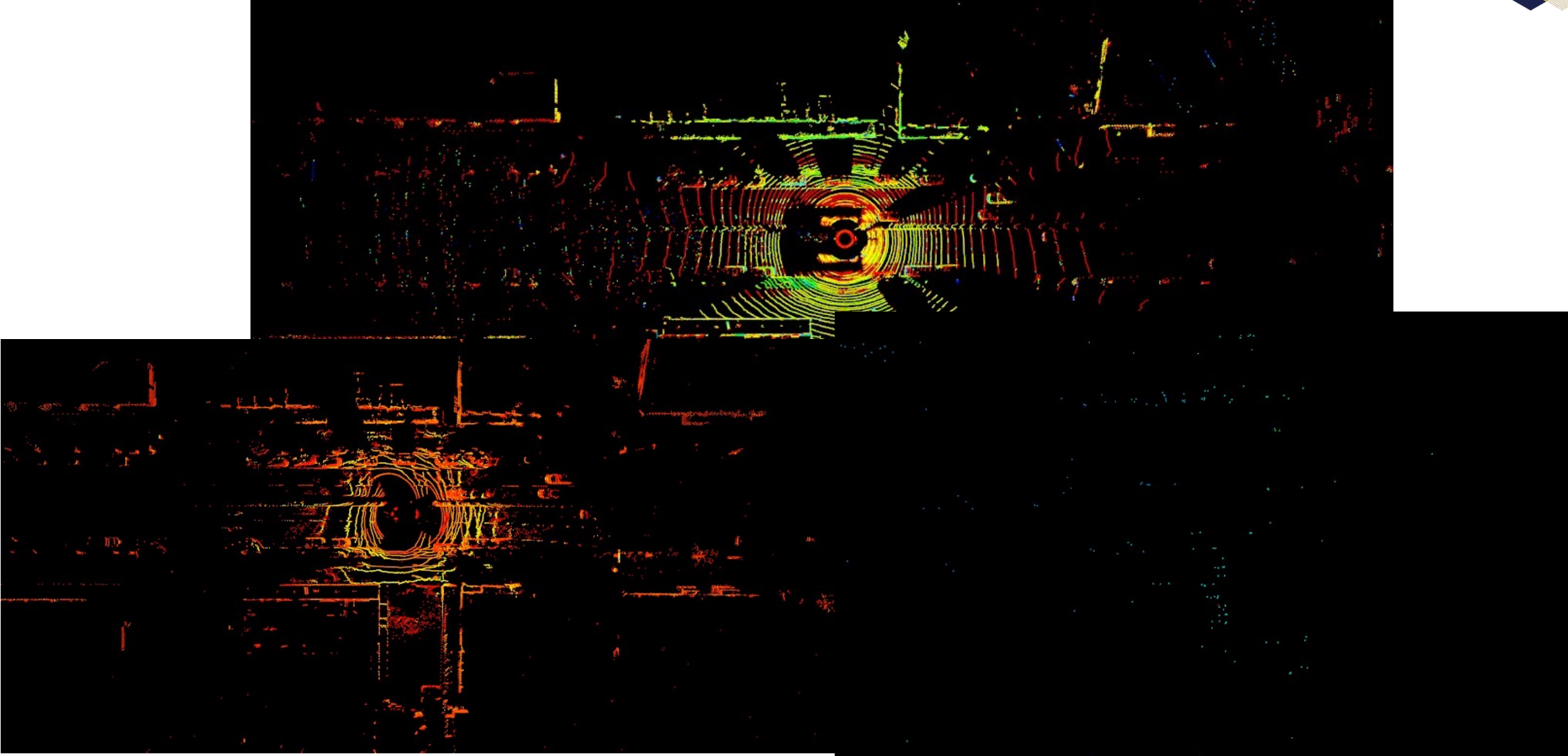
Recording Cars - Valeo



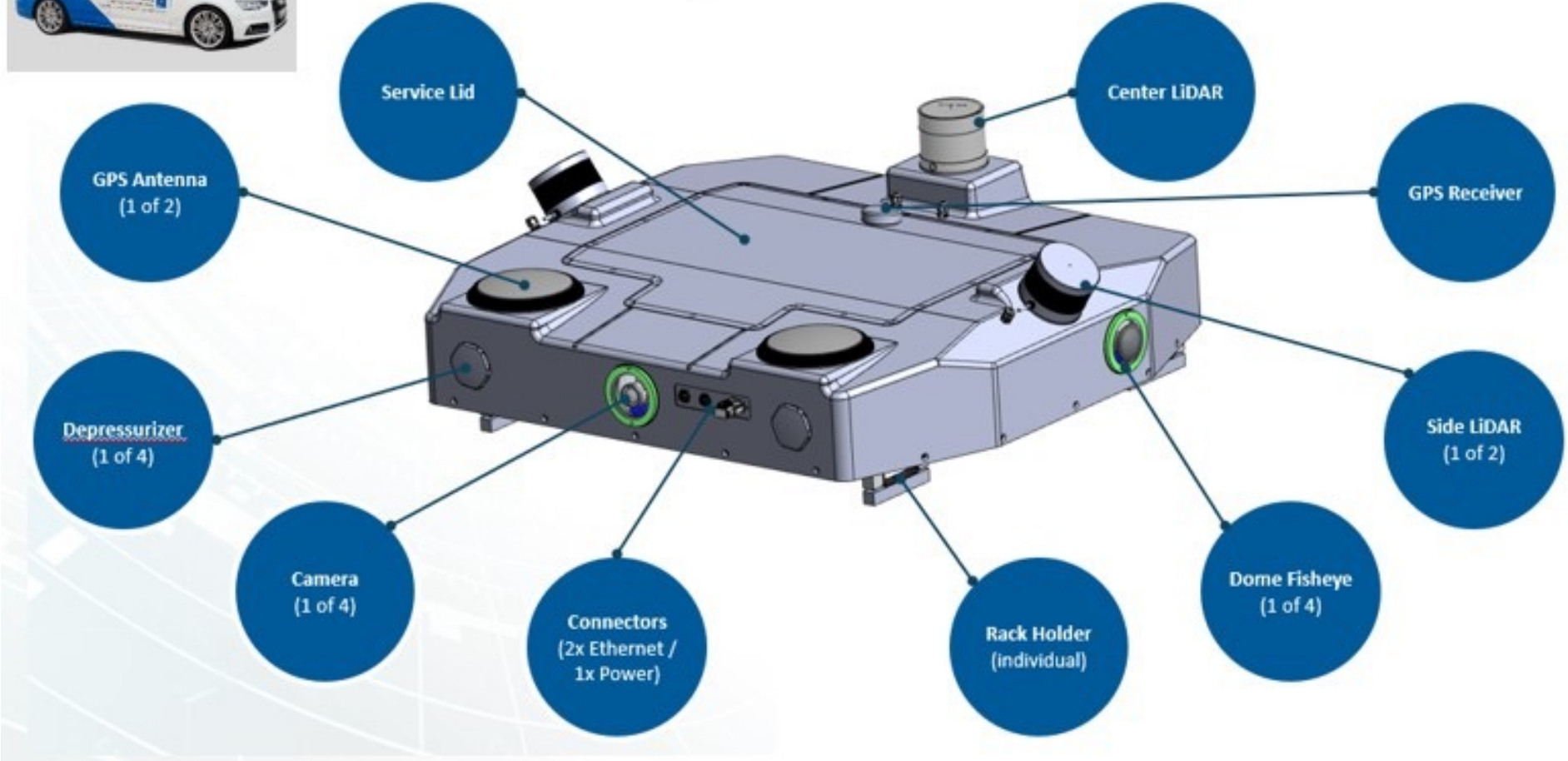
Recording Cars - Valeo



Recording Cars - Valeo



Recording Cars - AVL



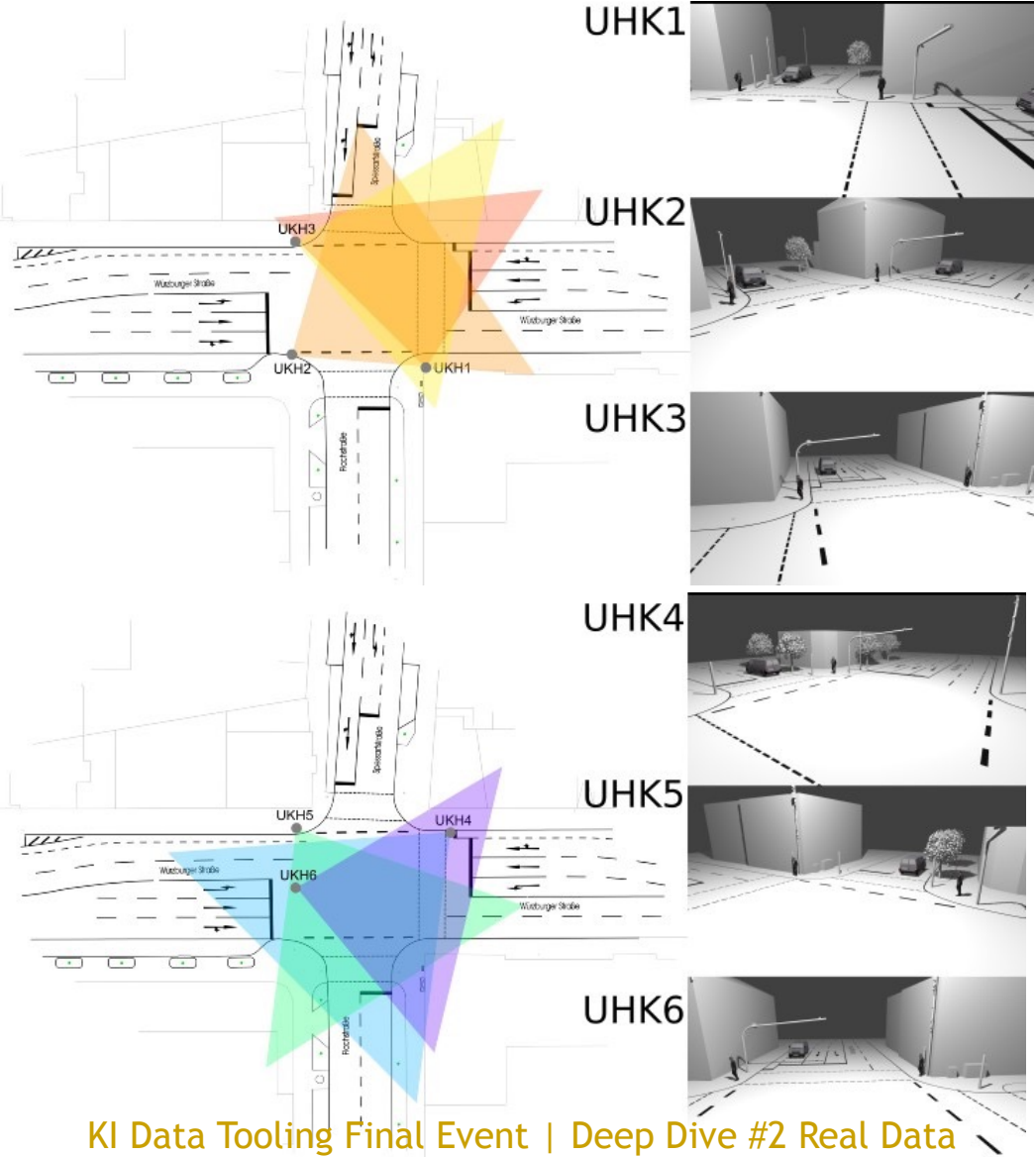
Recording Cars - AVL



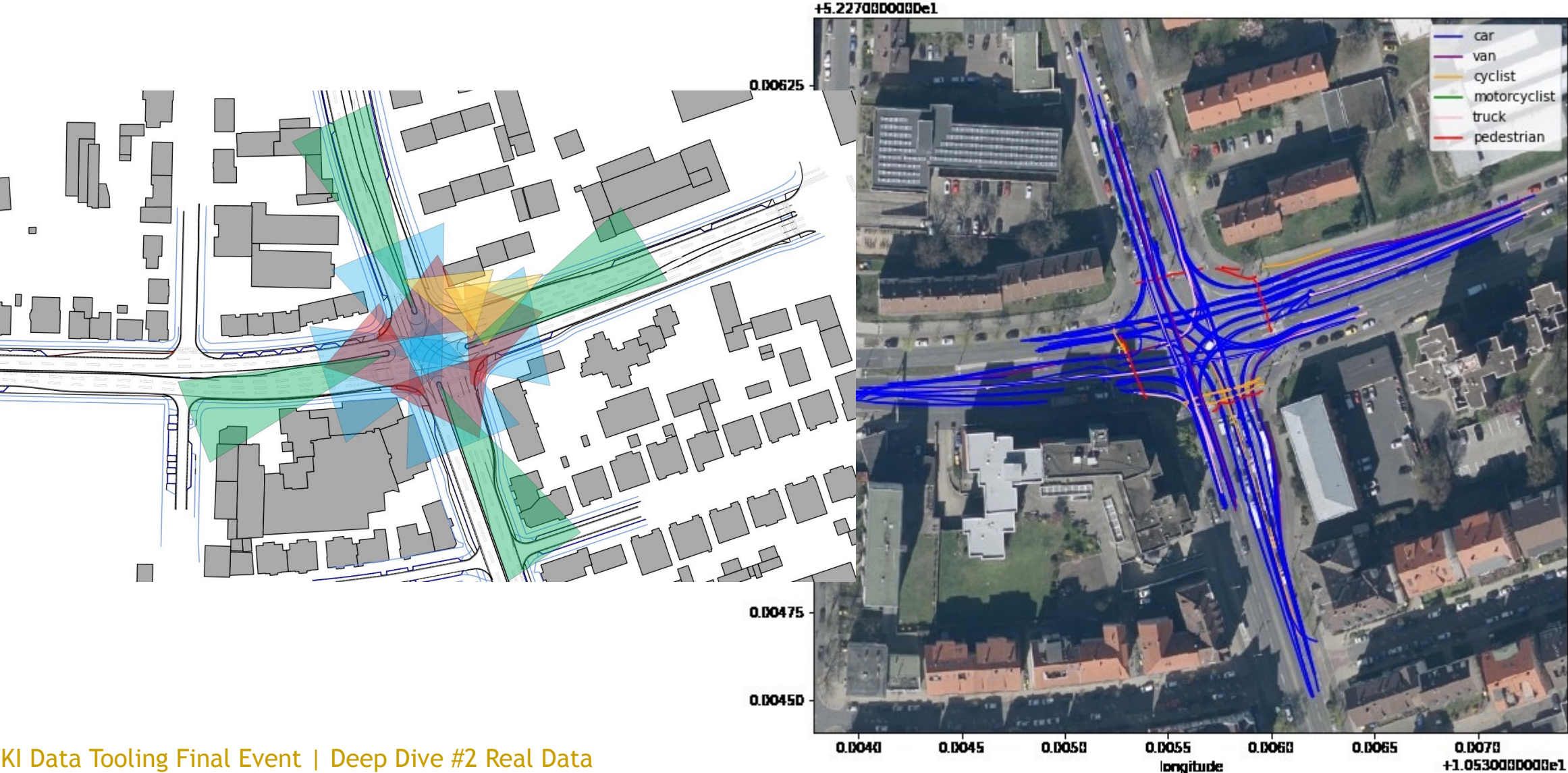
The screenshot displays a ROS visualization interface with the following components:

- Displays Panel (Top Left):** Shows 'PointCloud2' settings with 'Min Intensity' at 0 and 'Max Intensity' at 255. Below this is a 'Queue Size' section with a text description: 'Advanced: set the size of the incoming PointCloud2 message queue. Increasing this is useful if your incoming TF data is delayed.' It includes buttons for 'Add', 'Duplicate', 'Remove', and 'Rename'.
- Image Views (Left):** Three camera views are stacked vertically, showing different perspectives of a street scene.
- 3D Point Cloud (Center):** A large 3D visualization of a street scene rendered as a point cloud with a grid overlay. The points are color-coded, with red and orange points forming a central structure, and green points at the bottom.
- Image View (Right):** A large image view showing a street scene from a car's perspective, including buildings, a crosswalk, and a speed limit sign.
- Time Panel (Bottom):** Displays system performance metrics: 'ROS Time: 1580918713.10', 'ROS Elapsed: 1170.80', 'Wall Time: 1580918713.13', and 'Wall Elapsed: 1170.79'. There is also an 'Experimental' checkbox.

Intersections - Aschaffenburg



Intersections - Braunschweig



Sensor Synchronization

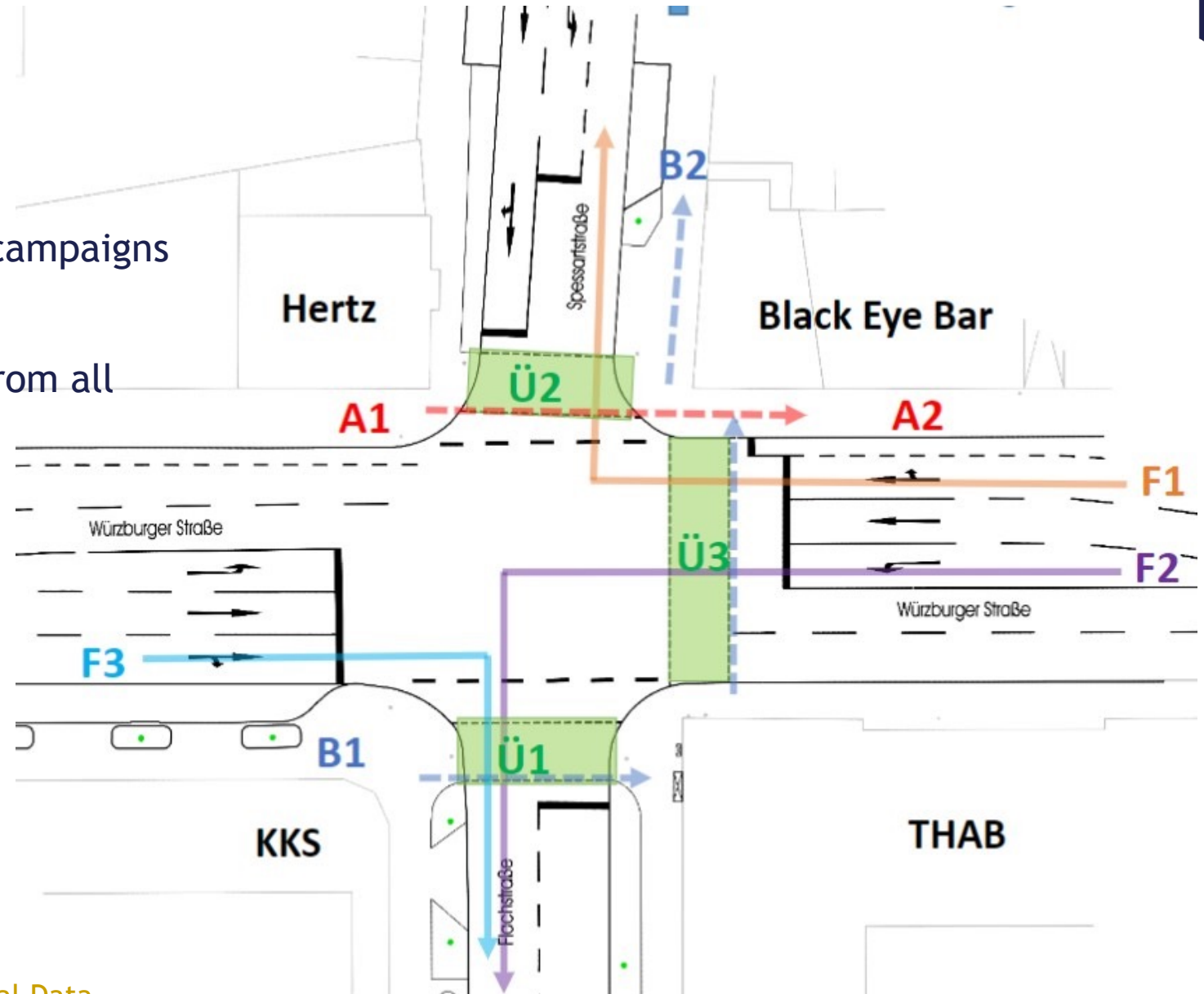
- All sensors have the same timebase, which makes a synchronization over intersection and car possible
- All sensors are internal and external calibrated
- As we have automotive sensors, no triggering possible, but software synchronization processed



Measurement Campaigns



- Respectively two measurement campaigns on each intersection
- Recording of scenarios defined from all project members



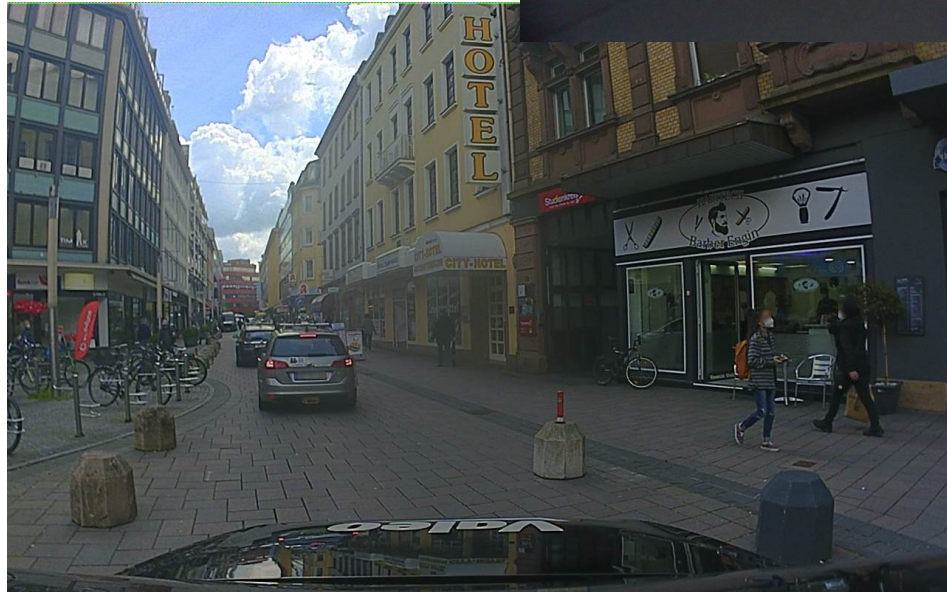
Measurement Campaigns



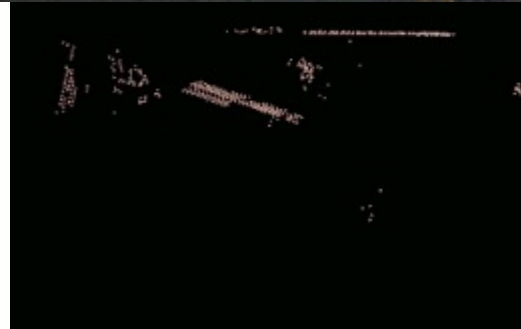
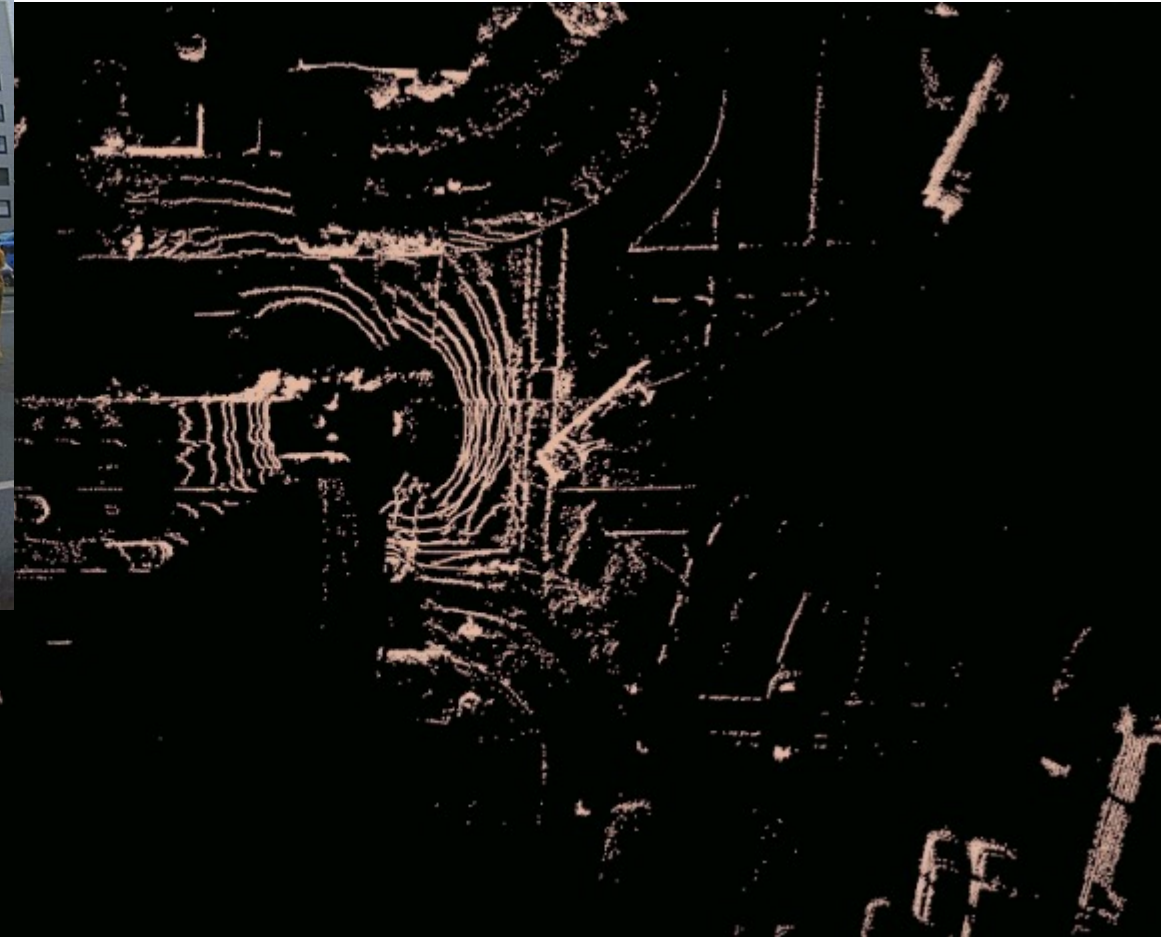
- Huge variants in timing and weather conditions
- Special corner cases with carried obstacles
- Dressed up pedestrians



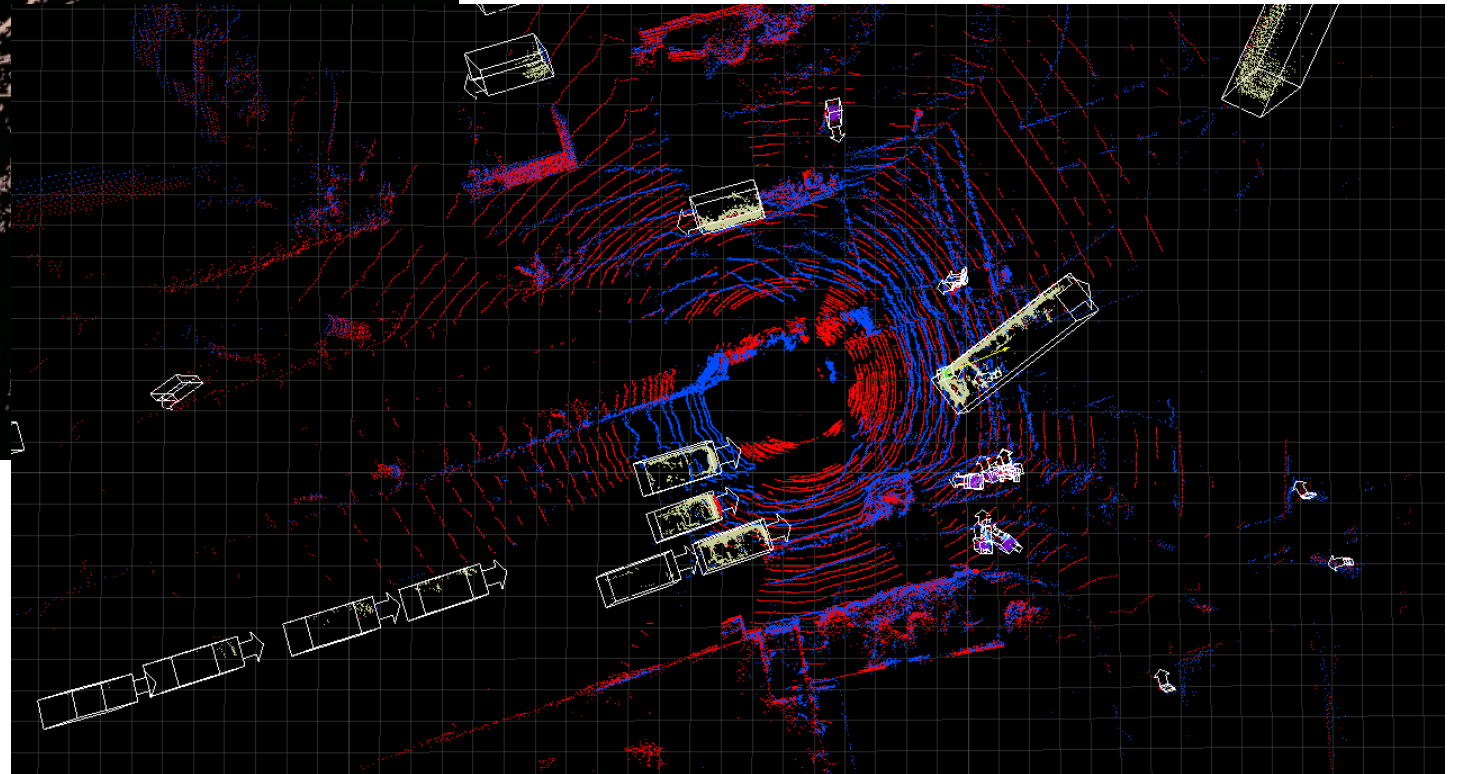
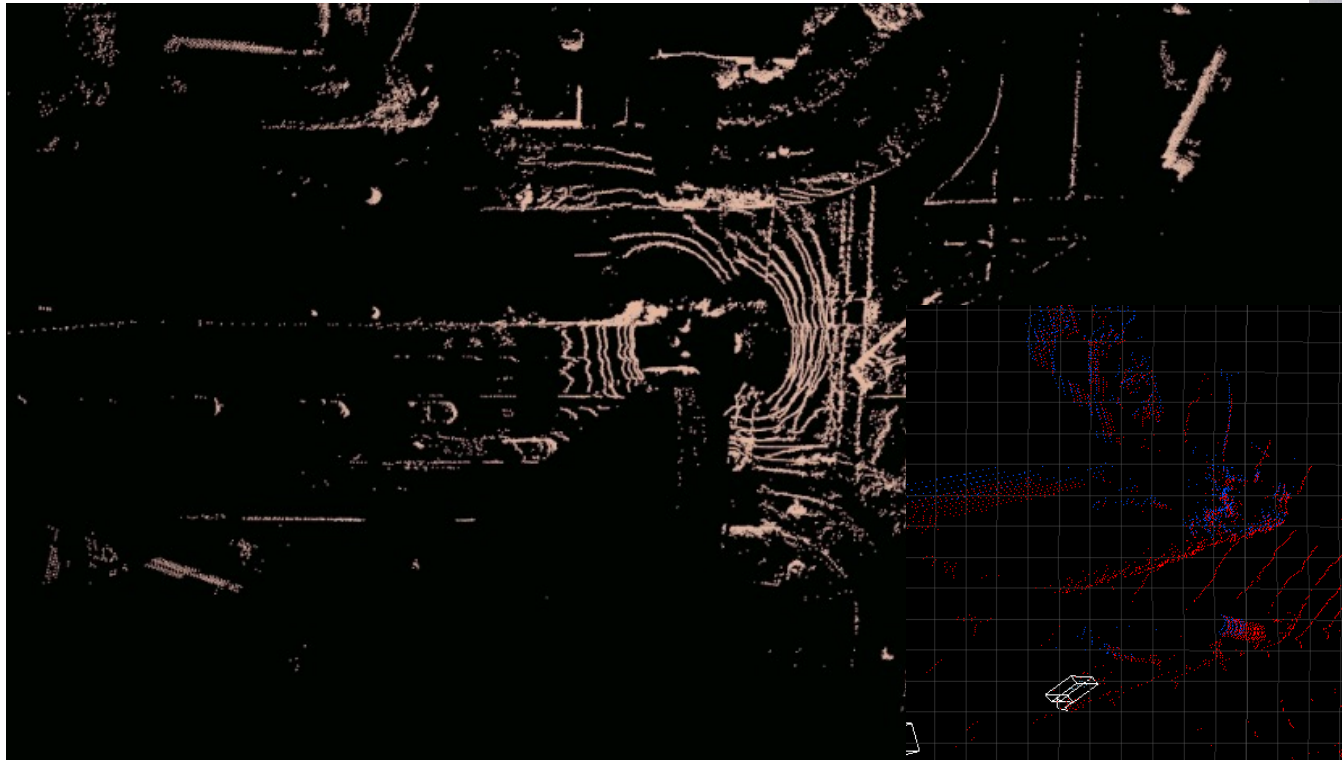
Free Drives



Labeling



Labeling - 3D Cuboids



Labeling - 2D Bounding Boxes



1. Projection of 3D Cuboids into image
2. Keeping same ID for 3D and 2D
3. Adaption and fitting of 2D Bounding Boxes

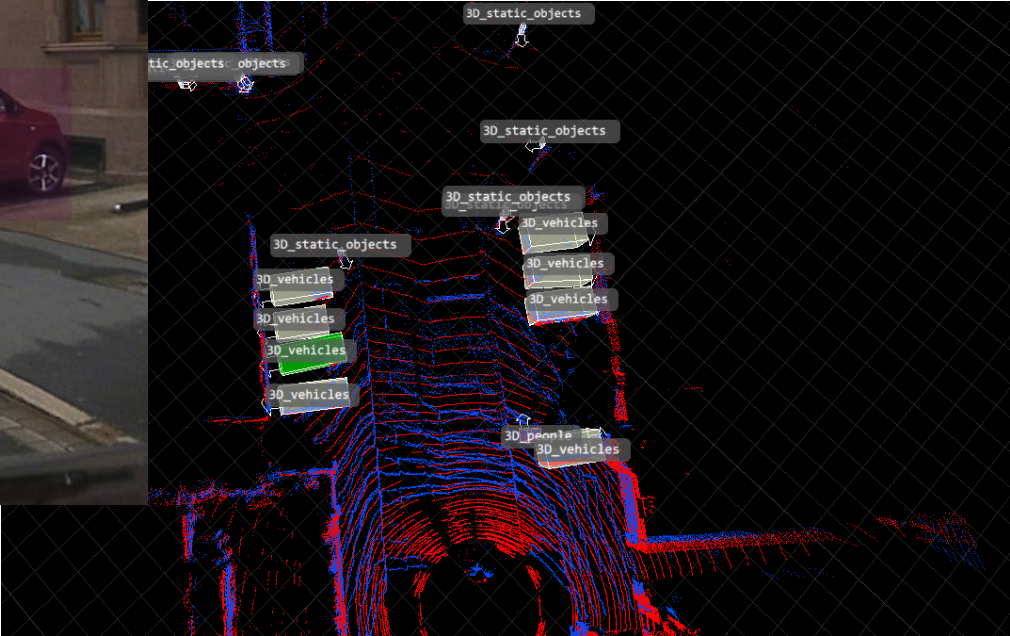
Labeling - Semantic (Instance) Segmentation



Labeling Policy - True Size



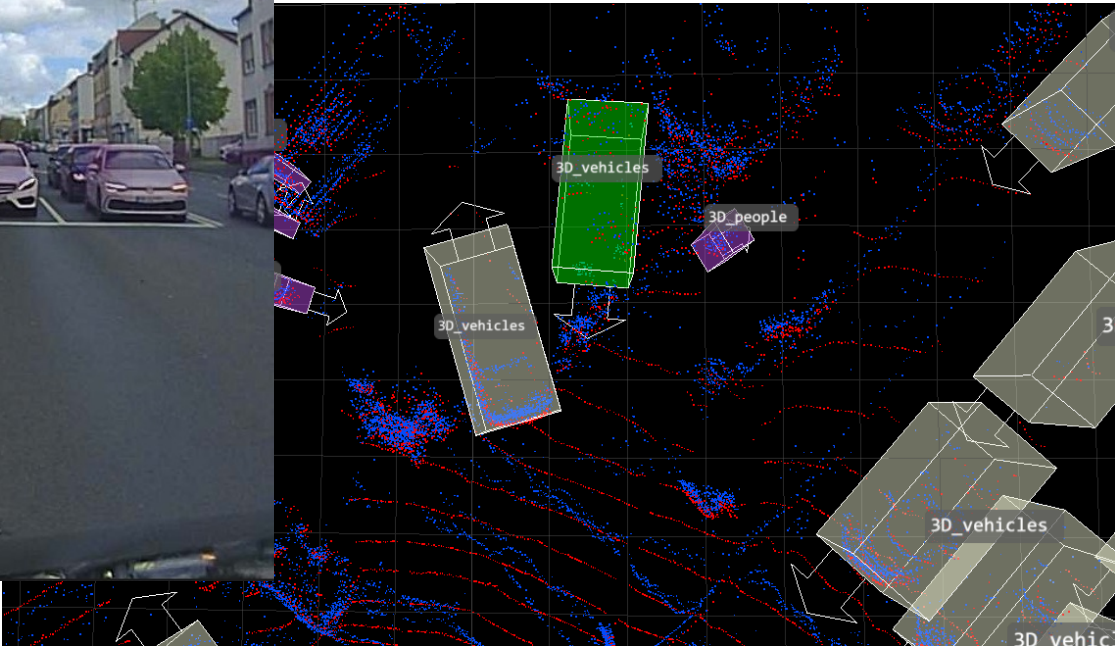
2D and 3D BB are labeled according to the real size of the object even it is partly occluded



Labeling - Heavily Occluded



Multimodal sensor data helps to label even heavily occluded objects



Labeling - Attributes



non_real attribute for objects on posters or for reflections

Labeling - Attributes



attached_to and has_rider attribute for better scene understanding



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KI Data Tooling is a project of the KI Familie. It was initiated and developed by the VDA Leitinitiative autonomous and connected driving and is funded by the Federal Ministry for Economic Affairs and Climate Action.



Supported by:



on the basis of a decision by the German Bundestag

www.ki-datatooling.de  @KI_Familie  KI Familie