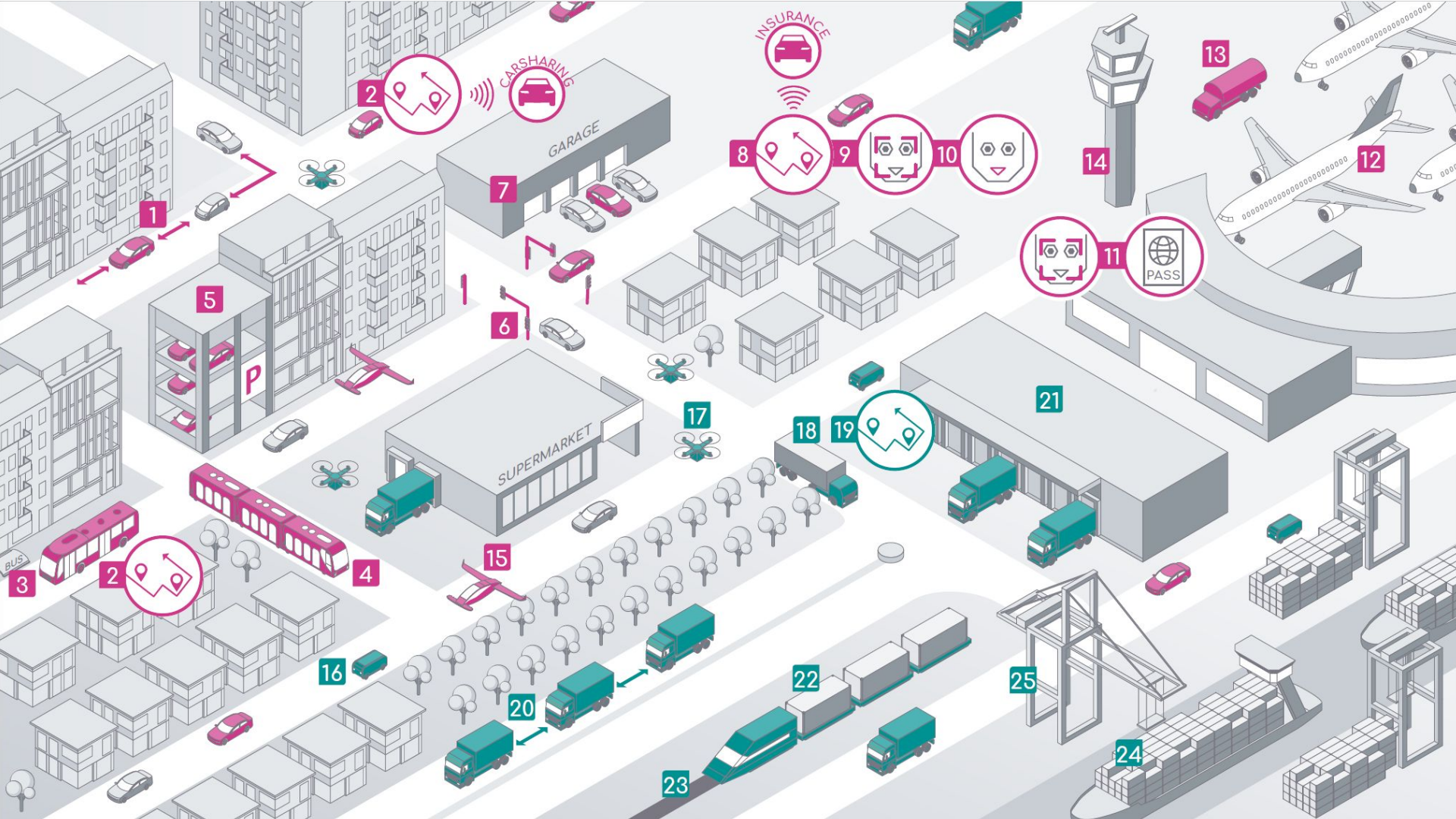
Initiative for
applied artificial
intelligence

KI im Mobilitätskontext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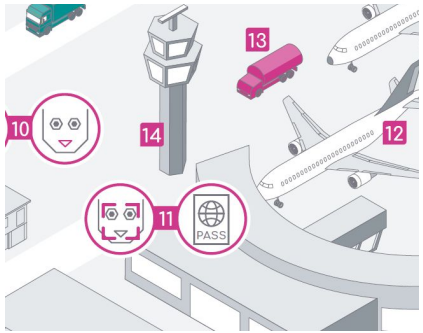
Passenger Transport - Transportation & Connected Services

- 01. Driver assistance systems
- 02. Demand planning - Car sharing
- 03. On-demand public transport
- 06. Intelligent traffic management
- 07. + 12. Predictive Maintenance
- 08. Usage based insurance



- 04. Autonomous trams
- 05. Automated Valet Parking
- 15. eVTOL vehicle (Lilium)
- 09. + 10. In-vehicle experience
- 11. Face recognition for security checks
- 13 + 14. Intelligent flight planning

Logistics - Ground, Sea & Air

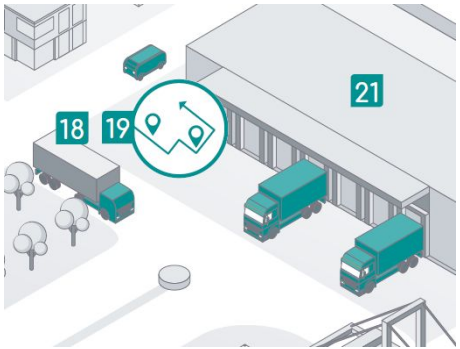
16. Unmanned last mile delivery vehicles

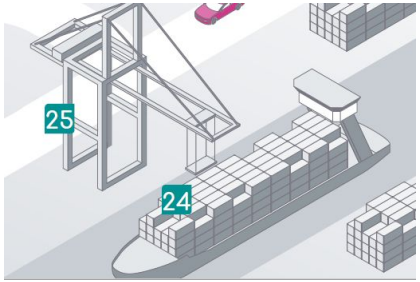
18. Autonomous trucks

19. Route optimization for trucks

24. Remote controlled ships

25. Stowage plan optimization





20. Platooning of trucks

21. Predictive planning of demands

22 + 23. Autonomous trains

17. Drone delivery

Passenger Transport I/III - Transportation

01. Driver assistance systems	02. Demand management - Car sharing	03. On-demand public transport
Autopilots run with artificial intelligence models can support the driver by taking over tasks such as adjusting the car's speed to that of surrounding cars, detecting obstacles, steering or braking (Level 2 Autonomy).	With the help of Floating Car Data (FCD) procedures, car sharing providers can use and analyze this data with ML algorithms to detect movement patterns and predict demands. Deployment of the cars can thereby be optimized and utilization of cars can be increased.	On-demand public transportation is operated by artificial intelligence: real-time data collected on traffic conditions and customer requests is used to calculate the vehicles route optimally.

04. Autonomous trams	05. Automated Valet parking	15. eVTOL vehicle (Lilium)
Autonomous trams navigate throughout the city without a driver. Multiple sensors capture data from surrounding traffic and the environment, which is analyzed and used to safely operate the tram in unknown urban situations.	Through communication of the parking garage with the vehicle. Cameras and sensors in the garage help depict free parking spots, while the car autonomously navigates and parks itself in the designated parking spot.	Lillium's all-electric, vertical take-off air taxi transports 5 passengers and flys autonomously using AI. Thereby, it aims to offer autonomous on-demand air travel in urban areas in the future.

Passenger Transport II/III - Connected Services

06. Intelligent traffic management	07. Predictive Maintenance (cars)	08. Usage based insurance
Information from cameras at intersections and GPS location data of vehicles are combined and used in ML algorithms. Whole traffic light networks are switched based on these outputs to minimize traffic congestions and gridlocks.	Potential future failures of vehicles are predicted and detected based on data from the same vehicle model with similar driving patterns and road conditions. Consequently, appointments at workshops are scheduled automatically.	In-car sensors can be used to track mileage and monitor driver behavior. Applying ML models to this data can help insurances to predict the likelihood of a driver to cause an accident and thus determine optimal insurance rates.

09. Floating Car Data procedures	10. AI based voice assistants	11. Passenger identification
Facial recognition by cameras inside the car can detect, identify and monitor the driver. Furthermore, it allows motion-based infotainment control. The in-car experience can thereby be enhanced through personalization and simplification of operations.	Voice assistants that are run by AI systems can be used in cars to enable drivers to carry out different tasks, such as making phone calls or using infotainment systems without distractions.	AI powered facial recognition is used for passenger identification by matching customer faces with passport photos. Thereby, lines at security checkpoints, boarding gates and immigration at airports are reduced and speed is increased.

Passenger Transport III/III - Connected Services

12. Predictive maintenance (airplanes)	13. Fuel planning and optimization	14. Prediction of flight movements
Airlines can decrease delays and flight cancellations significantly by using predictive maintenance for their airplane fleets.	AI helps airlines to save money and decrease CO2 emissions due to optimized fuelling of airplanes. Based on route distance, weather conditions, aircraft types, altitudes and further data, ML models predict the optimal amount of fuel needed for a flight.	Air traffic controllers can be supported by artificial intelligence in the future, which will reduce their workload while enabling them to handle more air traffic. The AI is then used to predict flight movements in a four-dimensional space.

Logistics I/III - Ground

16. Unmanned last mile delivery vehicles	18. Autonomous trucks
Unmanned ground vehicles can use artificial intelligence to autonomously deliver packages from distribution centers to the end customer. The last mile delivery robot can help take over the last step in the delivery process.	Costs and time can be saved and road security increased by autonomous trucks. Using machine learning techniques, trucks are learned to navigate autonomously on highways and thus safely deliver goods across countries.

19. Route optimization for trucks	20. Platooning of trucks
Neural networks help logistics companies in planning trips optimally, so that the amount of empty runs is minimized. This helps to save time, money and CO2 emissions and increases productivity of the trucks.	A number of trucks create a convoy on the highway using vehicle to vehicle communication, sensors to detect the surroundings and autonomous driving functions. Thereby, costs can be saved due to lower gas consumption and road safety can be increased.

Logistics II/III - Ground

21. Predictive Maintenance	22. Autonomous trains	23. Predictive planning of demands
Machine Learning can be used to predict demands of goods. Thereby, supply chains and truck allocation can be optimized and costs can be saved by avoiding an over or under supply of goods and adjusting inventories to the demand.	Autonomous trains are used in freight train networks to increase safety, productivity and flexibility as well as to reduce bottlenecks.	Railway systems can be optimized by using sensors that are placed on the switches of the rails and collect real-time data. The data is analyzed by an AI, which helps to predict possible failures of the rails and thus decrease costs and system downtimes.

Logistics III/III - Sea & Air

17. Drone delivery	24. Remote controlled ships	25. Stowage plan optimization
Unmanned flying vehicles use AI to navigate within an unknown surrounding in the third space. Thereby, they can be used to deliver goods in urban areas through the air without boundaries on the ground, such as delays through traffic or human errors.	Space on freight ships can significantly be increased by remotely controlling them. The ship navigates autonomously, while being monitored from a shore control center, which makes crews on board unnecessary. On-board drones can be used for inspection flights.	Simulation of optimal loading plan for freight ships bearing in mind ship related constraints (capacity, layout) and limiting factors at the harbor (crane intensity, cargo handling) for optimizing loading efficiency and overall turnover.