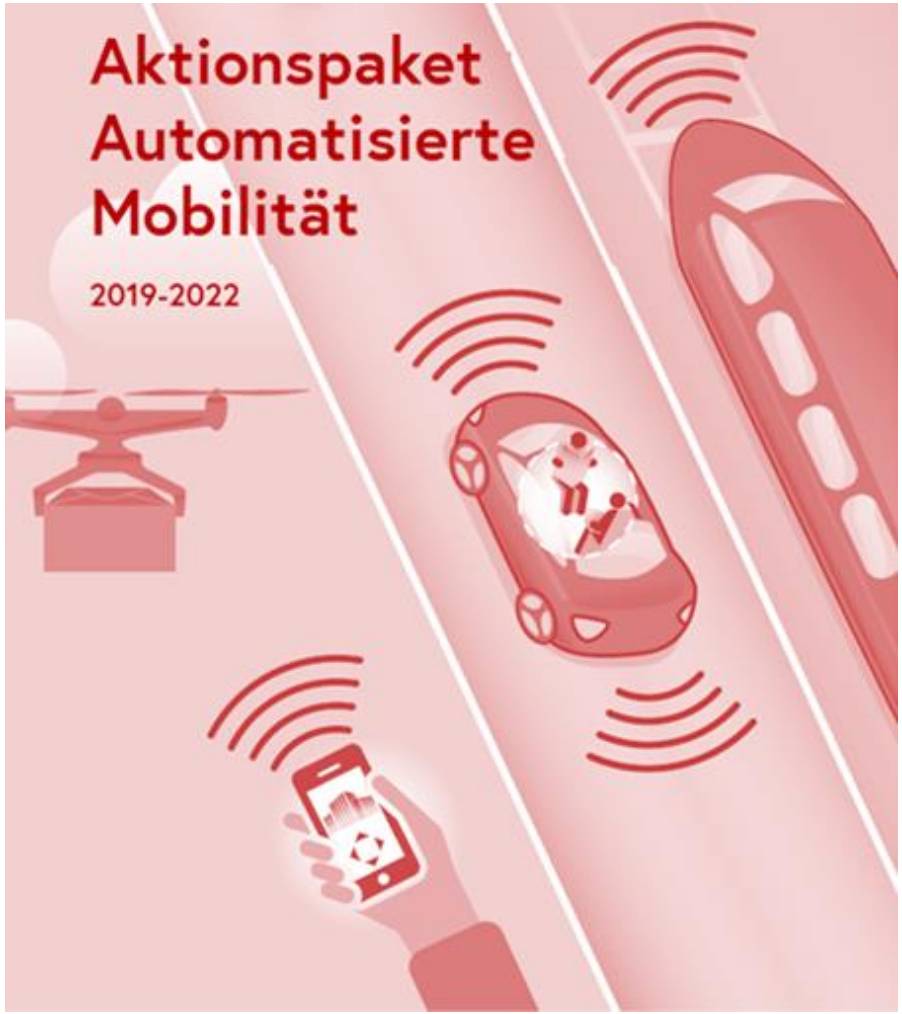
CCAM in Austria

Strategies – Actions – Priorities

#SIP-ADUS 2019, Tokio

Martin Russ, AustriaTech



1_National Actionplan

2nd edition

2019-2022
65 Mio.€
34 Measures
All modes

Developed with 300 Stakeholders

Field of action I:
Transparent information, active participation of the public sector and strengthening of societal dialogue on automated mobility

Measures

1. Transparent information
2. Amendment of the legal framework
3. Assessing and controlling the impact of automated mobility in the interests of sustainability
4. Strengthening the co-creation influence of the public sector
5. Promotion of research and development and strengthening of domestic competencies
6. Smart and sustainable use of infrastructure
7. Establishing competencies in the area of human-machine interaction as a key to value added in the context of transport safety

Federal Ministry
Transport, Innovation
and Technology

„Audi.JKU deep learning centers“
JKU Linz

Endowed chair „Digitisation & Automation in the transport and mobility system“ *
Interlocking of science and industry exploit potentials and avoid negative side effects, BOKU Vienna

Research project „auto.BUS Seestadt“ *
Sustainable Increase in the efficiency of automated vehicles

Pilot project „Connecting Austria“ *
Evaluation of the effects of energy-efficient automated truck convoys

Test region „DigiTrans“ *
Automated and connected driving with focus on logistic hubs

Linz

Vienna

Pilot project „IOT4CPS“ *
New safety concepts for the Internet of Things with focus on connected vehicles and intelligent production

Pilot project „Digibus®Austria“
Automated minibuses for the local public transport

Salzburg

Endowed chair "Sustainable transport logisitcs 4.0" *
Revolutionization of the logistics system through the concept "Physical Internet", focus on freight mobility

Bregenz

Innsbruck

Endowed chair „Automated Driving“
Increased reliability and robustness as well as connection of high and fully automated systems

Graz

Test infrastructure for automated trains„Open.Rail.Lab“ *
Europes first test infrastructure for automated trains on open tracks

5G test region "5G Playground Carinthia"
Test region for the next mobile radio standard

5G

Klagenfurt

„K2 Digital Mobility – Context-Embedded Vehicle Technologies“ *
Close cooperation between the automotive and digital industry in different research areas

DRIVE.LAB
Development and research platform, for the optimization of the interplay of human and automated driving

Test region „ALP.Lab“ *
Focus on security of passenger motor vehicles, from simulations up to the test on public roads

* The projects listed here are a selection of those supported by BMVIT in the are of automated mobility in Austria.
In addition, BMVIT supports a large number of interdisciplinary projects in the fields of information and communications technologien, mobility and security research.

Key initiatives in Austria - Overview

3 Test Environments

- Alp.Lab
- DigiTrans
- AIRLab Austria

4 R&D & Pilot Projects

Shuttles:

- Digibus® Austria
- Auto.Bus – Seestadt
- SURAAA – Carinthia

Platooning

- Connecting Austria

3 Centers of Competence

- K2 Digital Mobility – Context-Embedded Vehicle Technologies
- Audi.JKU deep learning center
- DRIVE.LAB

3 Endowed Chairs

- Automated Driving Technologies
- Digitisation & Automation in the transport and mobility system
- Sustainable transport logistics 4.0

2_A Matter of Trust

Engage with Citizens

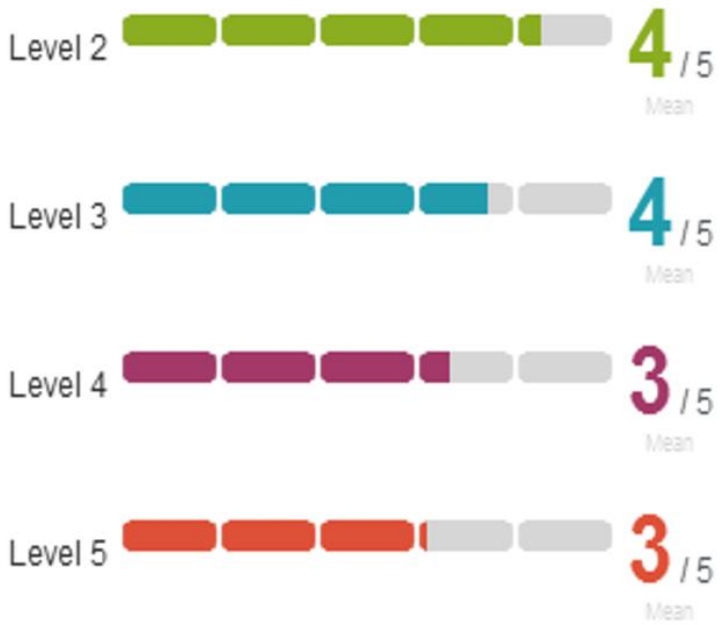
Explain what to expect

Give guidance on policy targets

Build collaboration

Get in touch with with Citizens/Users

Acceptance/Trust Level



GRAZ
PÖRTSCHACH
LINZ
SALZBURG
WIEN
6. April 2019

>> www.austriatech.at/Citizensdebate

3_Building Blocks for integrated & automated Mobility

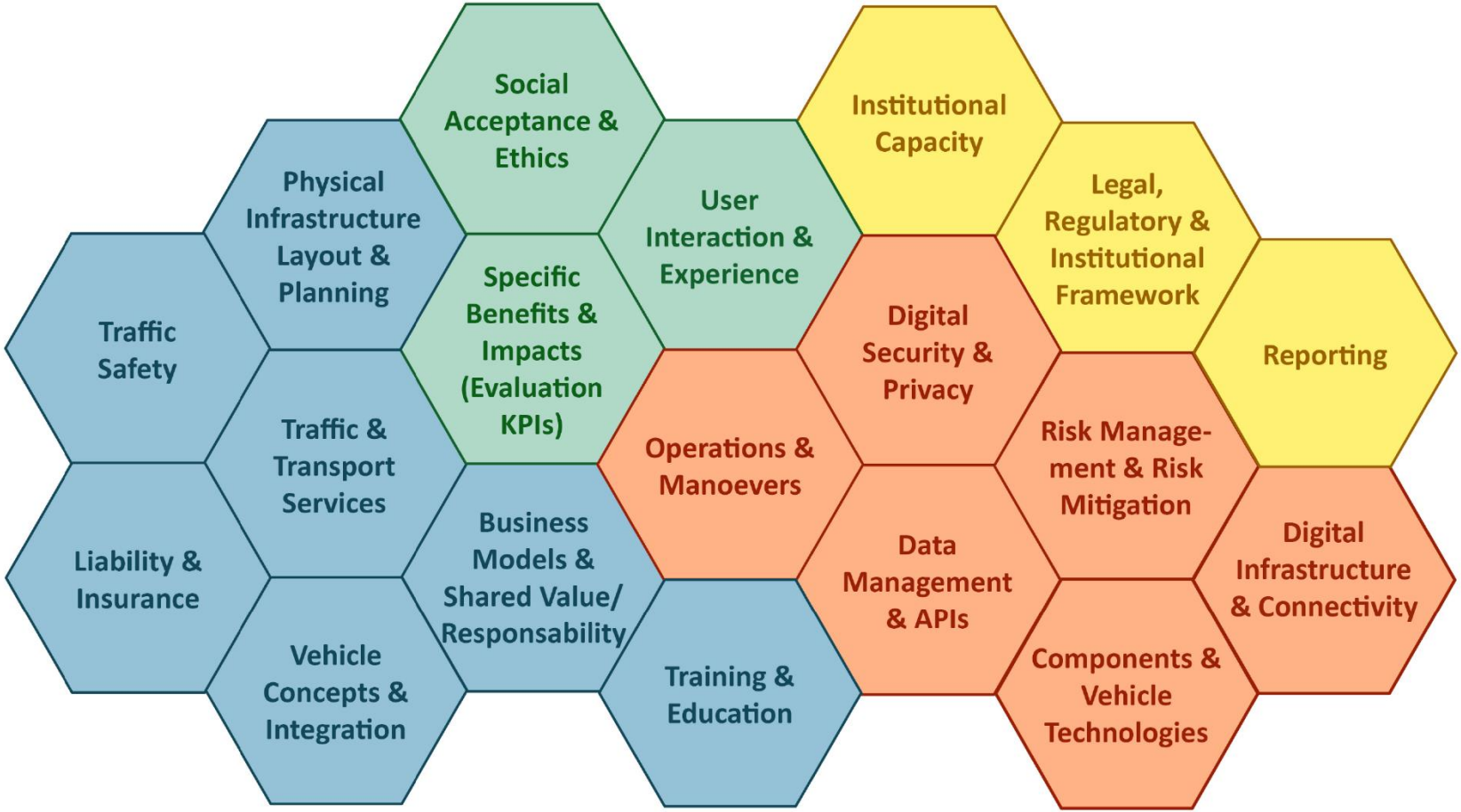
Integration needs Differentiation

Understanding needs Perplexity

Testing needs Comparability

Scenarions need Application

Scenario „Building Blocks“



CORE ASPECTS…FROM EU MEMBER STATES

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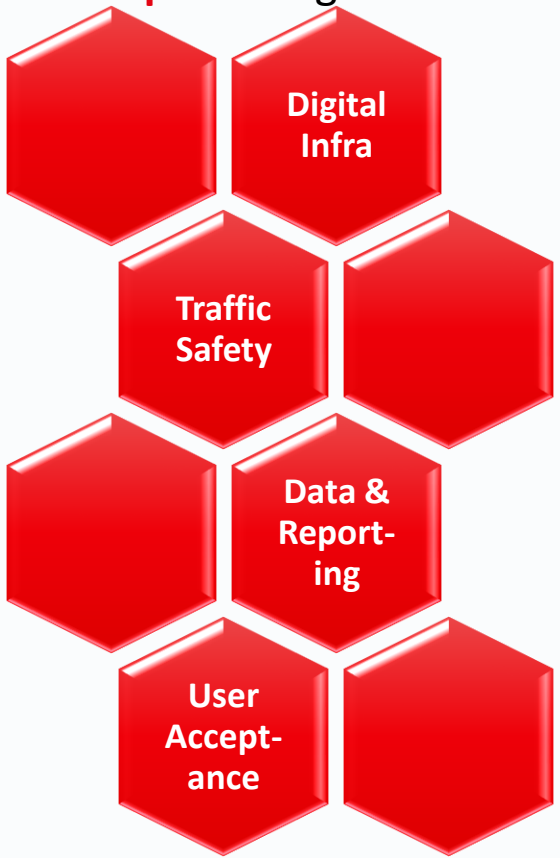
- Common pathway for **policy makers**
- Be specific on **goals** and how to **measure impacts**
- Effective frameworks for **sustainable business**
- A common **knowledge base** on building blocks
- Effective frameworks for **experiments**
- Aim for **consistency** and **interoperability**

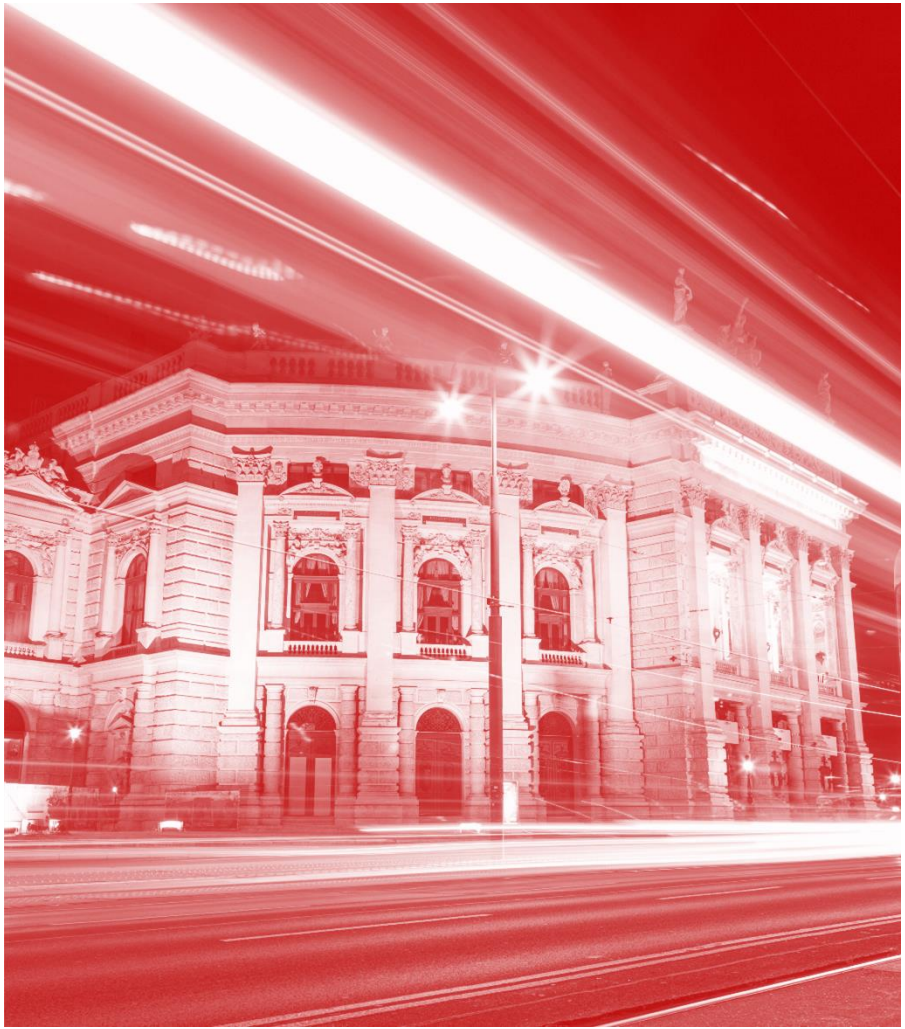
Top Building Blocks:



4_Engaging with Cities

Collaboration Framework of States & Cities (& Stakeholders)

Austria, Germany & Switzerland



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Collaboration Frame: Connected and automated Mobility in Cities

- Strategic Allignment
- Common measures & common ressources
- Learning and knowledge exchange
- Common positions & Anwareness

New Partners

New Spaces

New Data

New Governance

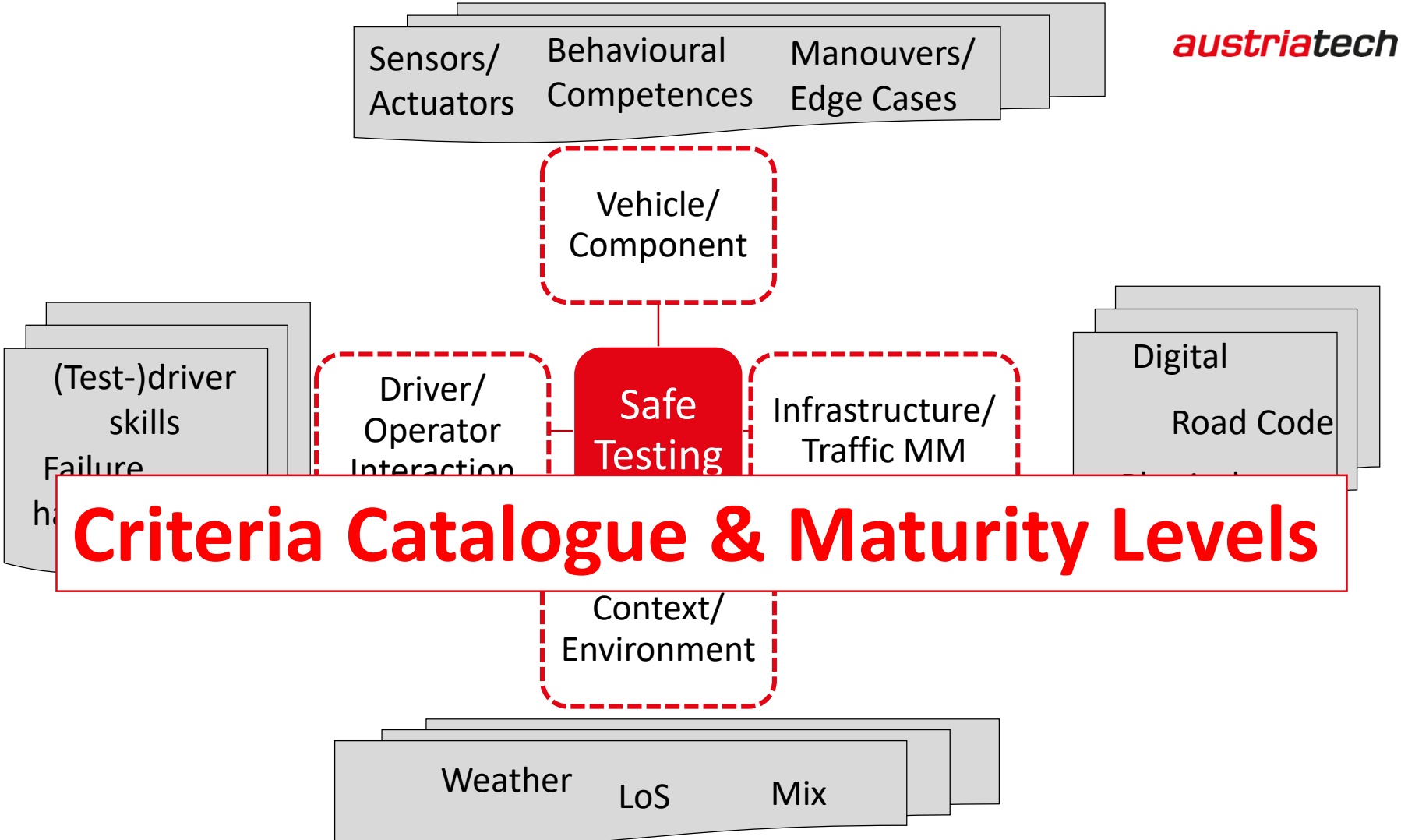
5_legal moonshots

legal framework for create **efficient and effective testing** environments

Operations = next…

Safety, data protection & **human** obligations as actual challenges

“**sandboxes**” for future tests and **performance based regulation**


Sensors/
Actuators
Behavioural
Competences
Manouvers/
Edge Cases
Vehicle/
Component
(Test-)driver
skills
Driver/
Operator
Interaction
Safe
Testing
Infrastructure/
Traffic MM
Digital
Road Code
Criteria Catalogue & Maturity Levels
Context/
Environment
Weather
LoS
Mix

6_ Examples

Experiments & Learning

The flagship project Digibus® Austria

Digibus® Austria

Digital infrastructure & connectivity

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY · salzburgresearch · kapsch >>> · EASY MILE · PRISMA SOLUTIONS

Automated mobility system & passenger interaction

ÖBB · Fluidtime · BOKU · AIT AUSTRIAN INSTITUTE OF TECHNOLOGY · COMMEND

Source: Salzburg Research / wildbild

Driving scenarios & interaction with other road users

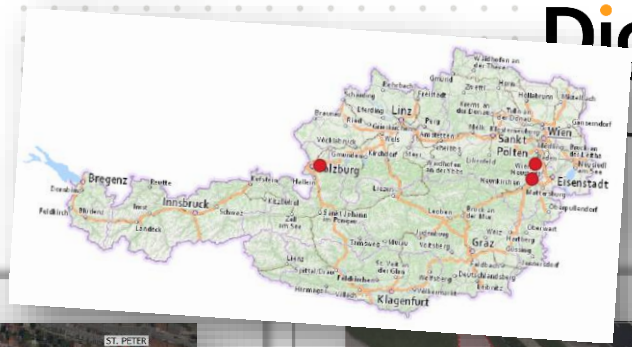
virtual vehicle · Center for Human-Computer Interaction University of Salzburg · FACTUM MOBILITY · RESEARCH · INNOVATION · EASY MILE

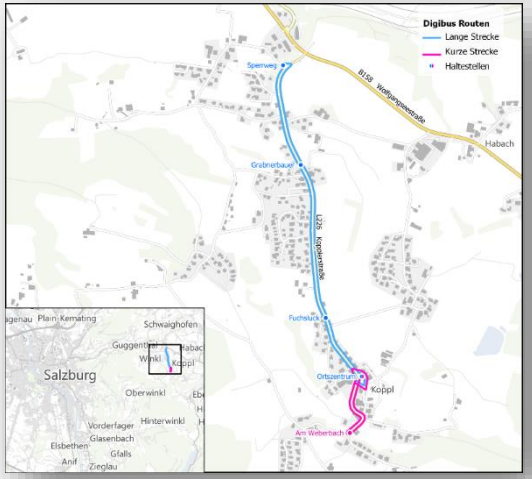
Reference model for planning, deployment & operation of automated shuttles

salzburgresearch · HERRY Verkehrsanalyse · Beratung · Forschung · PRISMA SOLUTIONS

3 years runtime (2018-2021)
13 partners
4.2 million EUR budget

Sites for pilot tests





Koppl / Salzburg

Wiener Neustadt

Teesdorf

Impressions of the pilot tests

Digibus® Austria

Koppl / Salzburg

Wiener Neustadt

Teesdorf

Video: https://www.youtube.com/watch?v=wt4djna5Ans

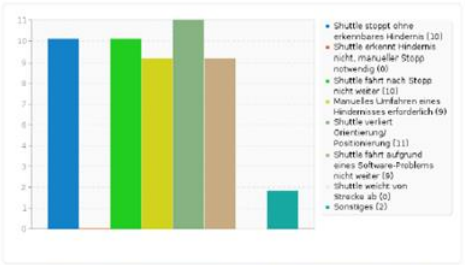
Systematic learning from pilot tests

Digibus® Austria

Risk analysis / risk assessment

Harmonization

Test protocols / test data



Harmonization

Scientific experiments

Publishing of results

Bericht zu den Testfahrten 2017 unter:
https://www.digibus.at

And the future? Vision of driverless operation

Digibus® Austria

1. The shuttle is able to reliably manage all driving maneuvers automatically up to a speed of **20 km/h, without human intervention**, on all days and in all weather situations

2. The shuttle observe its automated driving capabilities, can be controlled remotely from a **control center** und can be anytime brought to a safe state

3. Shuttle is **fully integrated** into an automated **mobility system** including transfer management, ticketing, seat management, aso.

4. Passengers perceive a similar **level of trust** in a driverless vehicles compared to vehicles with drivers and are able to contact a control center person at any time

5. **Shuttles communicates** with passengers and other road users and informs effectively on driving state as well as driving maneuvers

6. For driverless operation the **regulatory frame is adapted**, at least as exceptional regulation for pilot testing

First driverless test on September, 18th 2019

Digibus® Austria

- Shuttles was operated driverless on a pre-defined test track on a private site
  - First external test of a EasyMile EZ10 shuttle
- All drives were remotely monitored/controlled (vehicle control + voice communication)
- 18 test persons
- 4 experiments
  - Passenger rides alone
  - 2-persons-ride with annoyance
  - Capacity test
  - Disruption of the ride due to a technical problem
- Video: https://www.youtube.com/watch?v=2quigToQhlI

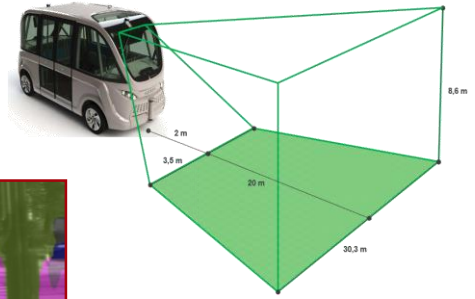
WIENER LINIEN
TÜV AUSTRIA
KFV Kuratorium für Verkehrssicherheit
AIT AUSTRIAN INSTITUTE OF TECHNOLOGY
navya be fluid
SIEMENS Ingenuity for life

auto.Bus Seestadt

Bundesministerium Verkehr, Innovation und Technologie
FFG Forschung wirkt.

Advanced perception capabilities and system safety

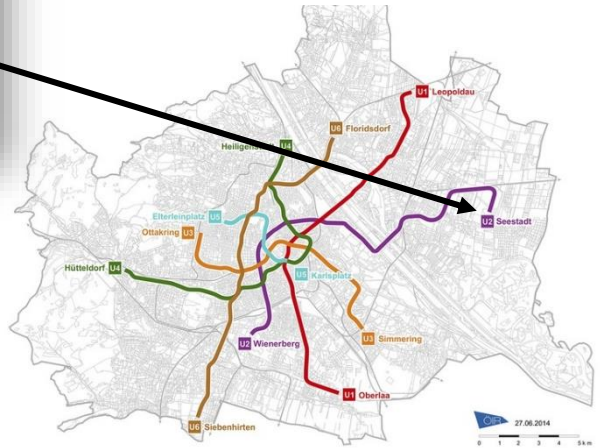
- Semantic labeling - object classification
- Scene understanding through machine learning



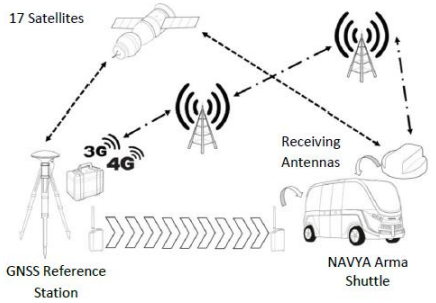
Combination of vehicle and infrastructure information

- The combination of vehicle and infrastructure information will lead to improved traffic safety and a better ease of traffic
- The sensors work reliably, even in the case of changing weather and light conditions, e.g. rain, snow, fog or glaring sunlight
- The sensor infrastructure helps to identify potential risks, even if they are not in the immediate surrounding of the vehicle
- WLAN-based radio module transmits real-time information to passing vehicles and receives data from cars, environmental detectors, traffic controllers and traffic control centers

Test Track Vienna



- City of Vienna
  - 1.7 M inhabitants, ~40% PT
- Physical infrastructure of test track
  - 2,2 km (per direction)
  - Maximum allowed speed of 30 km/h
  - Adaptations: bus stop bays, GNSS reference station (via 3/4G and radio)
- Digital infrastructure
  - Digital map (pre-recorded and manually edited)
  - Mobile data connection (3/4G)



Take home messages

The project goals of auto.bus - Seestadt are:

- Advanced perception capabilities and system safety
- Ensuring passenger trust
- Design vehicles and bus stops for CAM
- Make it CAD street legal, user participation & dissamination
- Investigation of todays C-ITS (V2X) capabilities
- Assure safety and security of CAD
- Integrate autonomous shuttles into a non-automated fleet!


Thank you for your attention!
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