

AN NRA PERSPECTIVE ON AUTOMATED DRIVING



4th ZalaZONE Trilateral Conference
15.07.2022

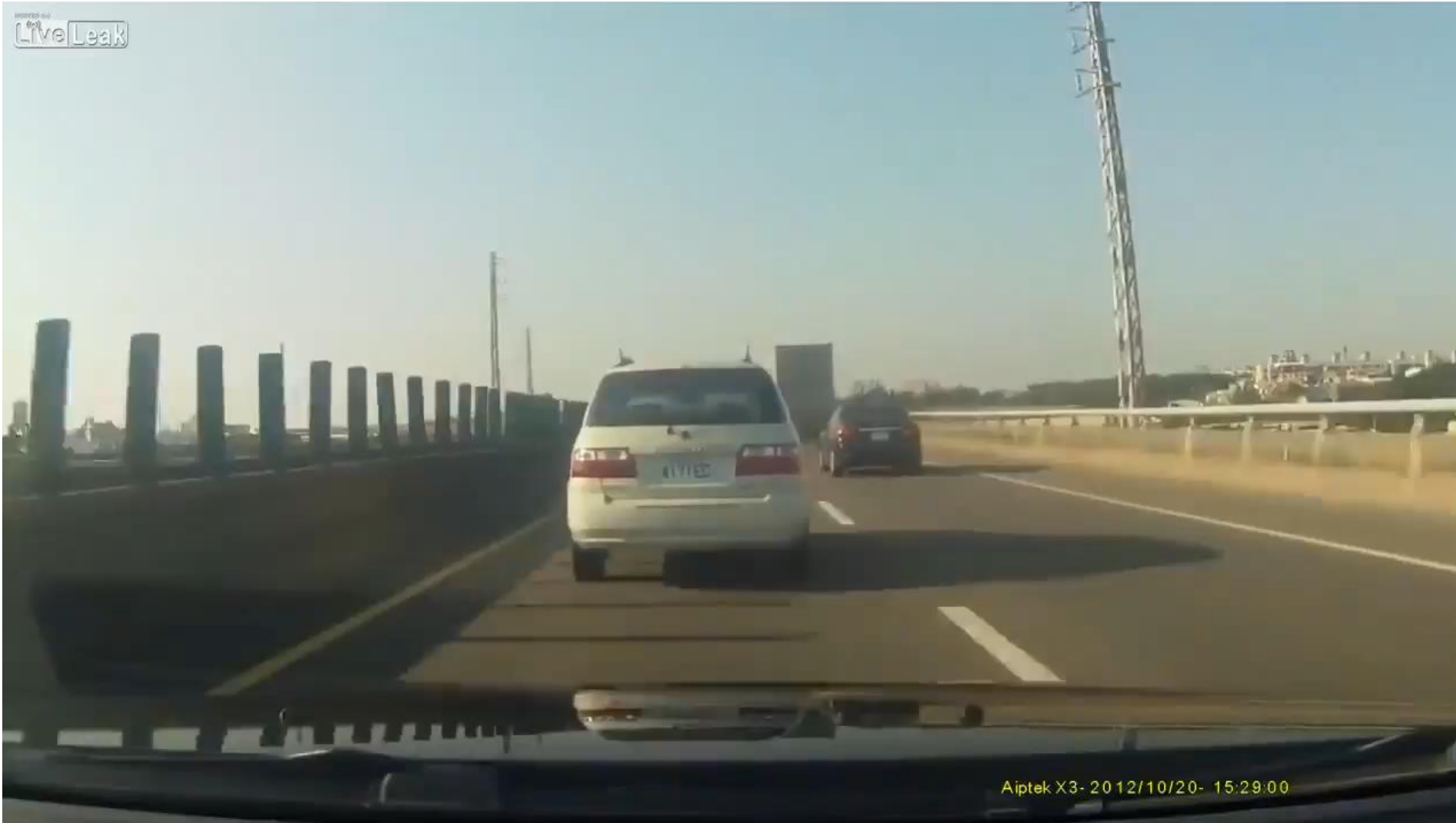
A|S|F|i|N|A|G

GUTE FAHRT, ÖSTERREICH!

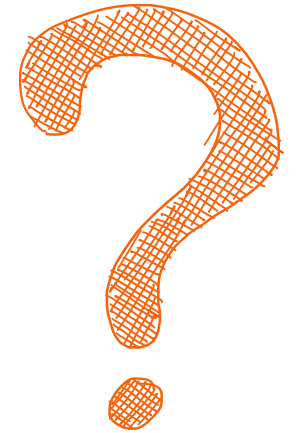
AGENDA

- 📍 Cooperative Intelligent Transport Systems (C-ITS) in general
- 📍 C-ITS testing
- 📍 Infrastructure support for AD (IAD)
- 📍 IAD evaluation
- 📍 Development C-ITS
- 📍 Take-away

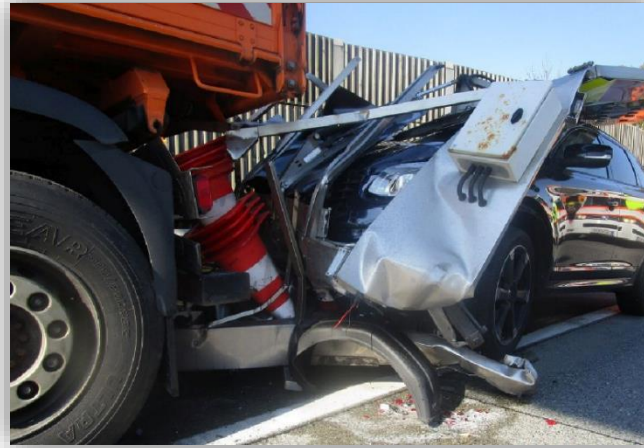
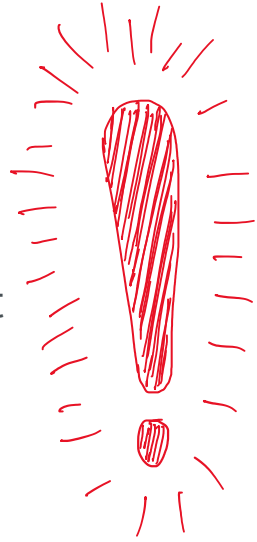
AGENDA



📍 Do we *really* need another system?



📍 Roughly 10% of our fleet is lost every year due to accidents.



C-ITS



- 2021
- 2022
- 2023
- 2024 - 2025



RSUs

- 📍 525 units until 2025
- 📍 2249 km network
- 📍 every 4 km in average

Mobile warning trailers

- 📍 video, radar, TTE, C-ITS
- 📍 operational in all regions of Austria

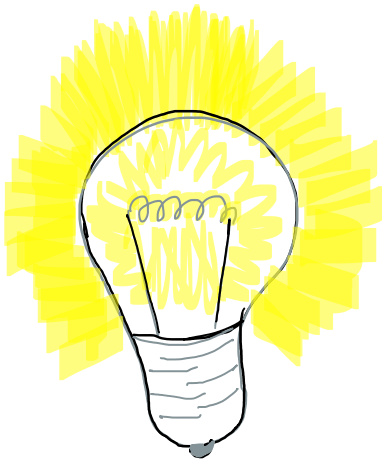
Road operator vehicles

- 📍 100 units until 2025



C-ITS

- 📍 C-ITS is already available as standard (VW Golf 8, ID.3, ID.4, Seat Cupra Born).
- 📍 No additional devices, apps or subscription needed.



C-ITS TESTING

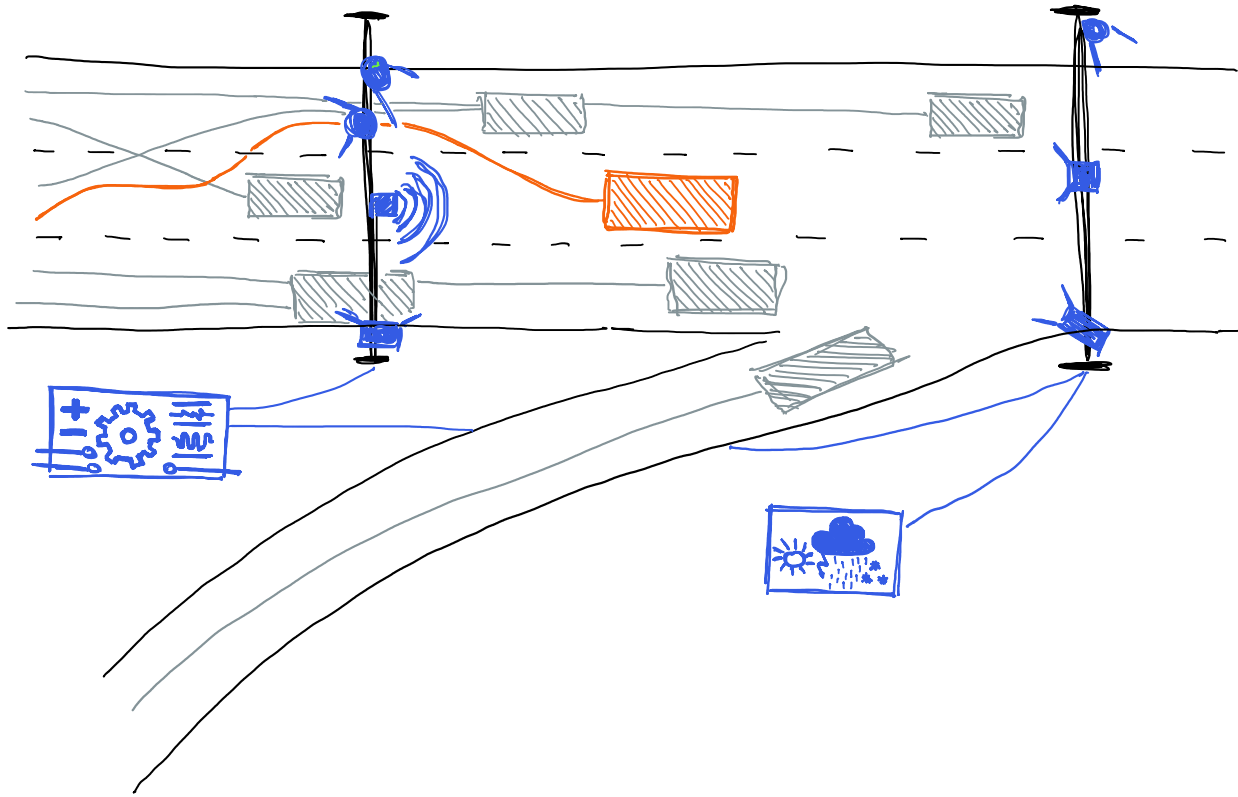
The screenshot shows the CANoe software interface for C-ITS testing. The main workspace is divided into several panels:

- ControlPanel:** Displays security settings (Visitor Screen Repeater) and C-ITS vehicle counts (002). It also shows message counters for unsecured and invalid messages.
- Map Window:** Shows a 3D map of a road network with various vehicle models (PassengerCar 3, RoadSideUnit 133-136) and roadwork warnings (Roadworks: Major Roadwork).
- Trace all:** Displays a detailed log of CAN bus messages. The selected message is a WLAN LPD packet with the following details:

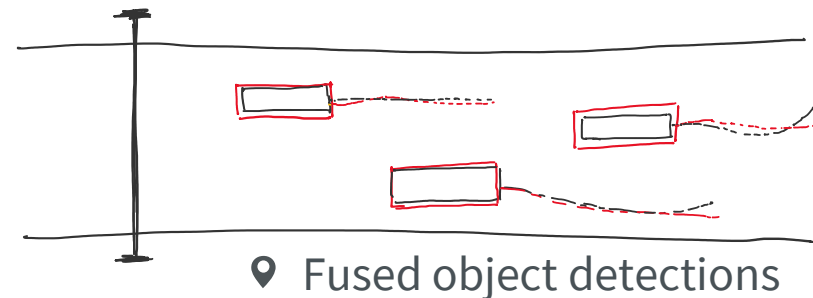
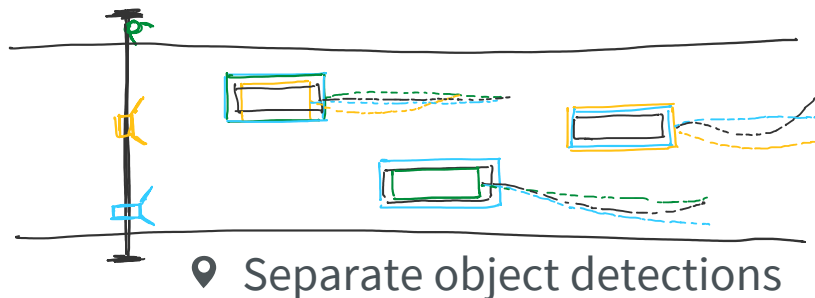
Time	C	Dir	Signer Hashed...	Source GN Addr...	Source MAC	Proto...	Protocol Info	Packet Le...
263.623703	Ath 1	Tx	1DE2C7E3EEF95435	14 00 C6:E3:EE:F9:54...	C6:E3:EE:F9:54...	CAM	Unknown Signature; ASN.1 defined	371
262.716992	Ath 1	Tx	-	3C 00 00:00:41:FF:...	00:00:41:FF:3A...	CAM	ASN.1 defined	324
261.685015	Ath 1	Tx	-	3C 00 00:00:41:FF:...	00:00:41:FF:3A...	DENM	ASN.1 defined	256
263.602654	Ath 1	Tx	-	14 E8 04:ES:48:01:...	04:ES:48:01:76...	CAM	ASN.1 defined	131
49.711961	Ath 1	Tx	-	3C 00 00:00:41:FF:...	00:00:41:FF:3C...	DENM	ASN.1 defined	256
46.387916	Ath 1	Tx	-	3C 00 00:00:41:FF:...	00:00:41:FF:3C...	CAM	ASN.1 defined	324
261.662977	Ath 1	Tx	-	3C 00 00:00:41:FF:...	00:00:41:FF:3D...	DENM	ASN.1 defined	256
262.946912	Ath 1	Tx	-	3C 00 00:00:41:FF:...	00:00:41:FF:3D...	CAM	ASN.1 defined	324
228.152855	Ath 1	Tx	-	3C 00 00:00:41:FF:...	00:00:41:FF:3A...	CAM	ASN.1 defined	324



INFRASTRUCTURE SUPPORT FOR AD (IAD)



- 📍 Goal: Send ETSI Collective Perception Message ([ETSI CPM](#)) to a vehicle containing the data about its surrounding.
- 📍 Data can originate from different vehicles, sensors, sensor types and can be processed to a varying degree.



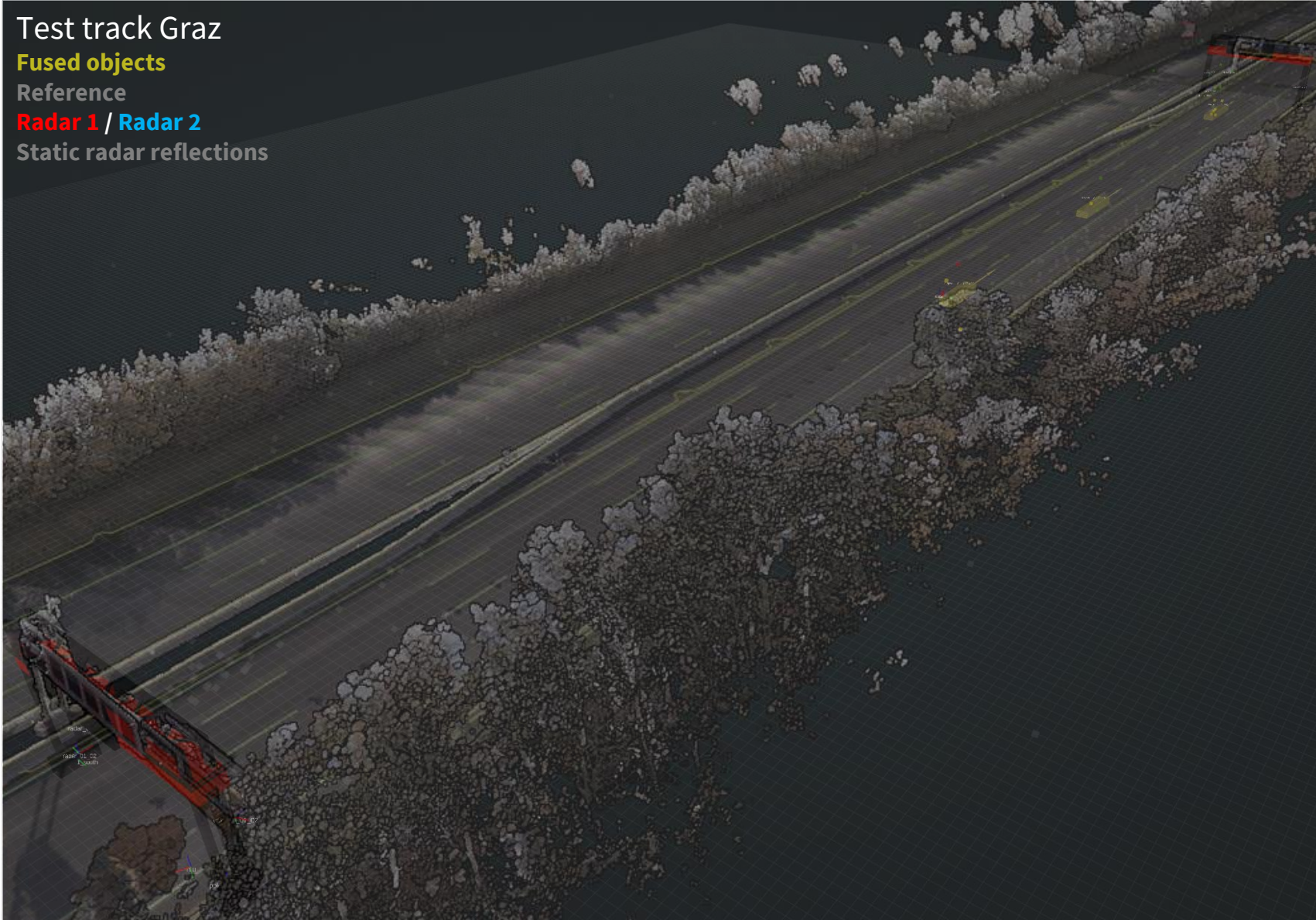
Test track Graz

Fused objects

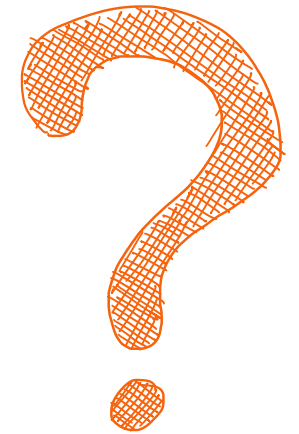
Reference

Radar 1 / Radar 2

Static radar reflections



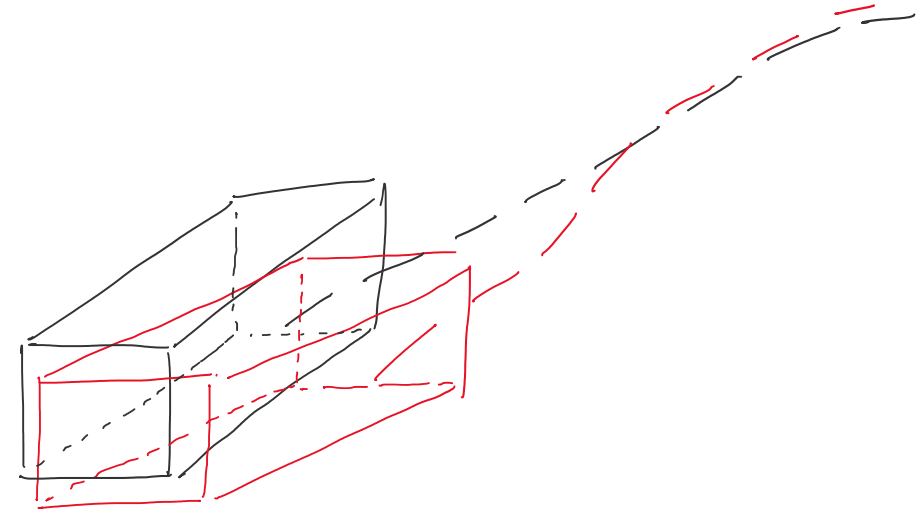
- 📍 How to measure performance of our systems?
- 📍 How to guarantee the correctness of the system?



IAD EVALUATION



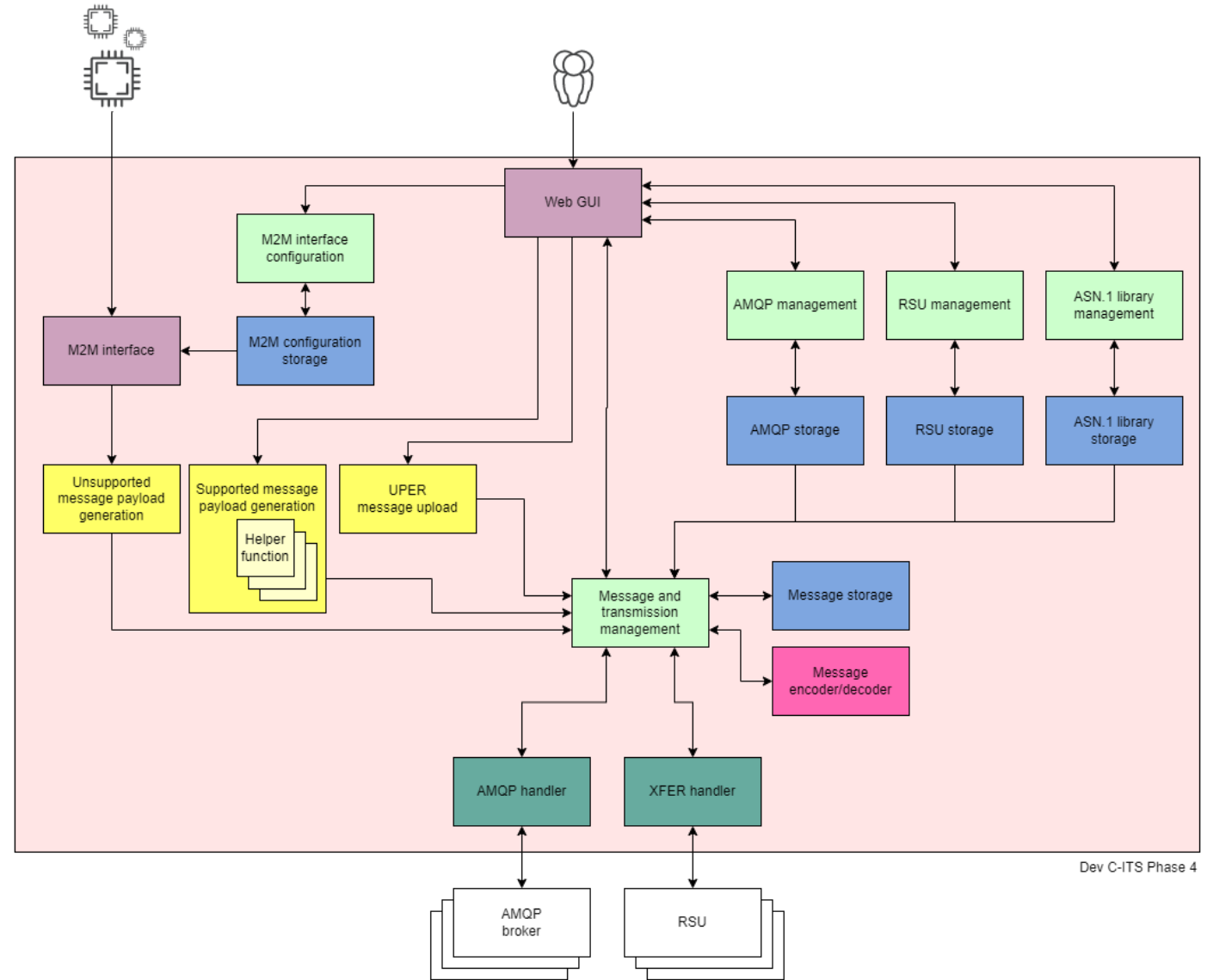
- Record highly accurate reference trajectories using [RTK GNSS](#).



- Evaluate detected object trajectories against reference trajectories:
 - detection accuracy
 - localization accuracy
 - association accuracy
- Higher order tracking accuracy ([HOTA](#))

DEVELOPMENT C-ITS

- Non-standardized C-ITS messages not allowed in the productive environment.
- Such messages are needed for further C-ITS development or specific research projects.
 - [HADRIAN](#)
 - [ESRIUM](#)
 - [INFRAROB](#)
- New, modular C-ITS which allows us to define custom message types, easily integrate it with different devices over M2M interface and establish hybrid C-ITS communication over RSUs (short range) and AMQP broker (long range).



Dev C-ITS Phase 4

**QUESTIONS?
WE ARE HERE FOR YOU!**



Srđan Letina

ITS Services

IT Expert CCAD & Digital Infrastructure

srdan.letina@asfinag.at

+43 664 60108 12461

asfinag.at



A|S|I|F|i|N|A|G

GUTE FAHRT, ÖSTERREICH!