



# High-precision train positioning

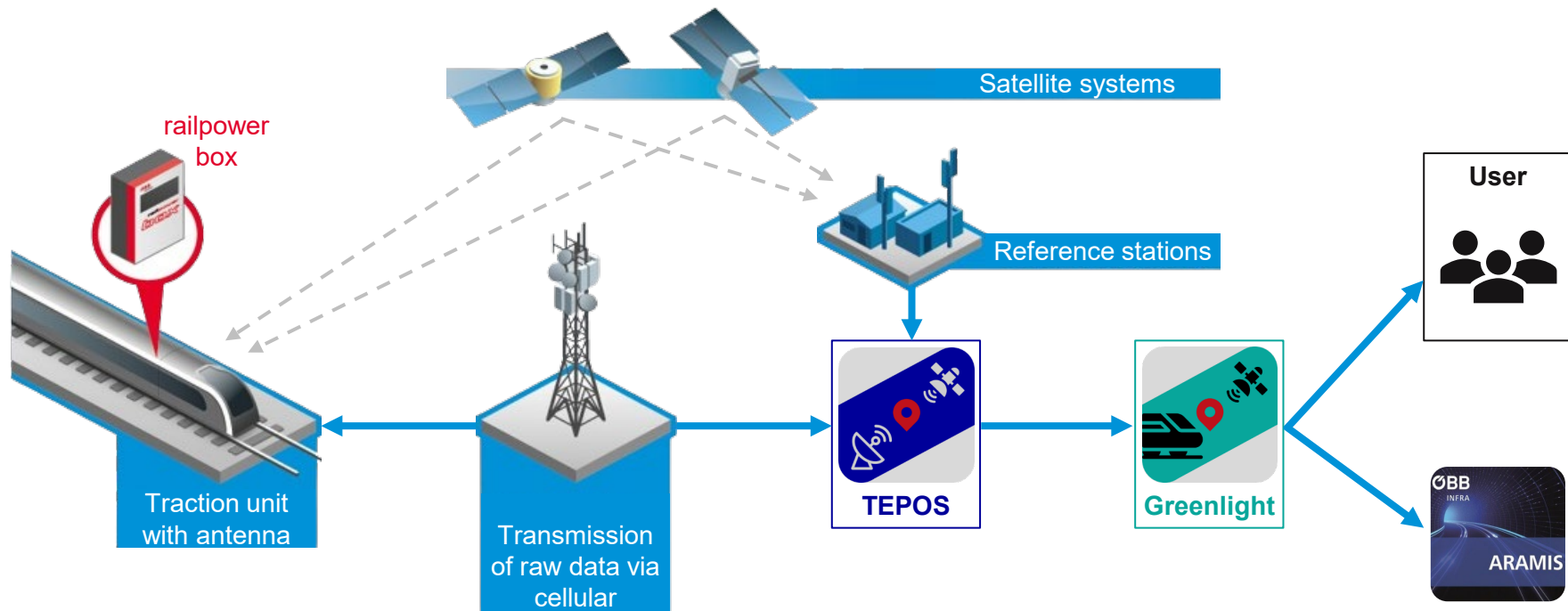
current applications



HEUTE. FÜR MORGEN. FÜR UNS.



# System concept

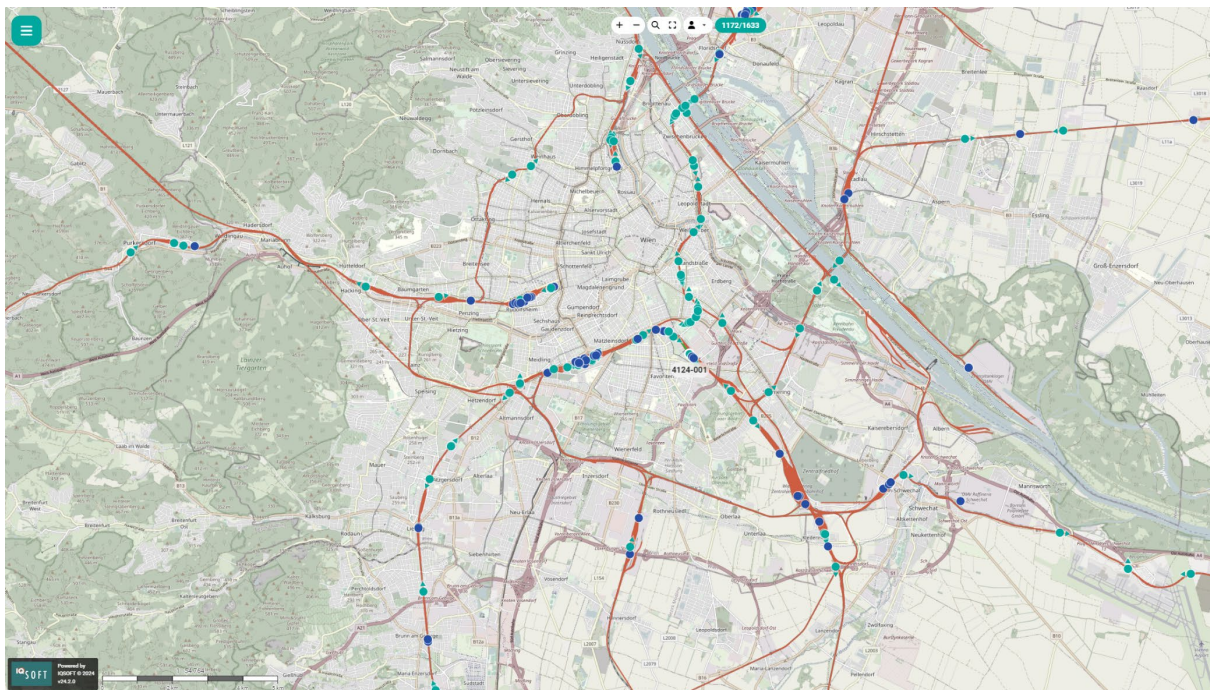


# What is Greenlight?

- is a satellite-based localisation system for the rail sector
- features already 1600+ traction units equipped with railpower box
- uses GPS enhanced by proprietary real-time kinematic positioning
- determines precise and reliable location information and transmits it in near real time
  - accuracy up to 30 cm
  - transmission every second via cellular networks (2G-LTE)
  - latency of ~1 second
- enriches received positions with ÖBB operational and infrastructure information
- visualises processed information in an overview map
- provides position data for third-party systems and data lakes/dumps



# Greenlight in pictures – overview map



**KURZINFO**

Eisenstadt (in E) → Wien Hauptbahnhof (in Wf)

**Stations**

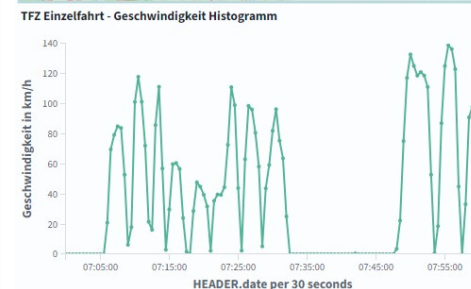
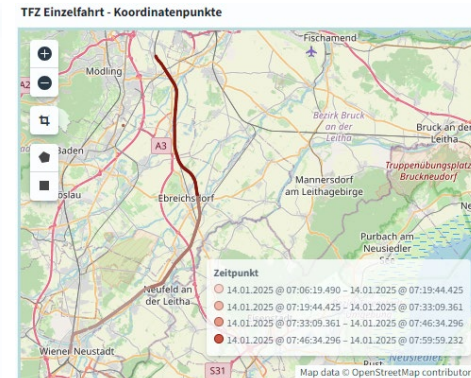
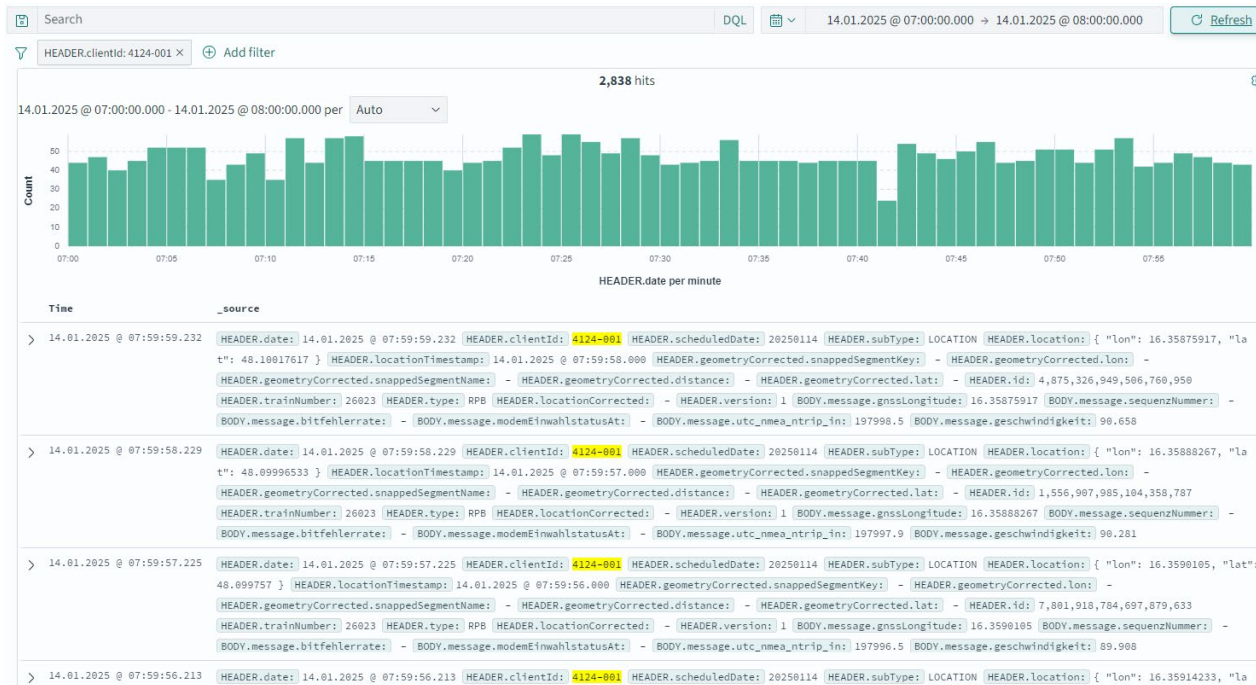
4124-001	2606
Client ID	Zugnummer
34 km/h	15
Geschwindigkeit	Letzte Aktivität

**Info**

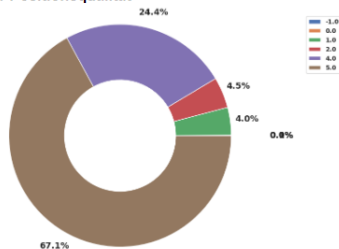
- Zusammensetzung
- Triebfahrzeuge
- Wagenreihung
- Positionen

Box	48°103.83'N 16°24'22.42"E	48.16773250, 16.40622867
Gleis	48°103.81'N 16°24'22.4"E	48.16772512, 16.40622301
	2181.03 Gleis2	0.922m

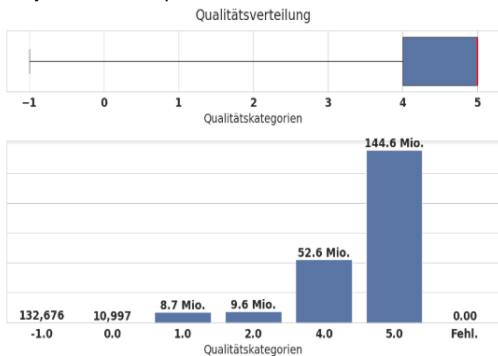
# Greenlight in pictures – OpenSearch search and observability suite



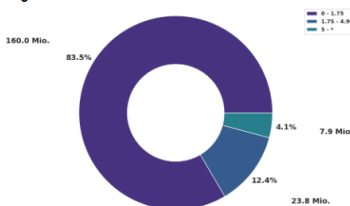
Verteilung der Positionsqualität



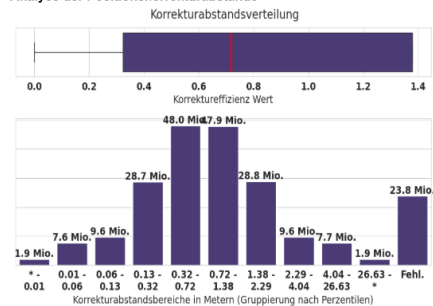
Analyse der Positionsqualität



Verteilung der Positionskorrekturabstände



Analyse der Positionskorrekturabstände



Perzentile der Korrekturabstandsdaten in Metern

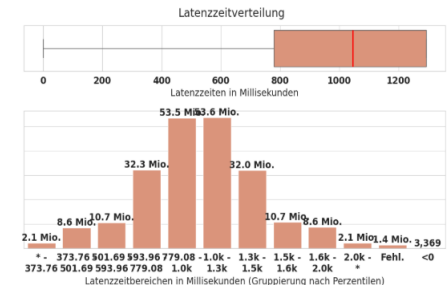
Min.	p_1	p_5	p_10	p_25	p_50	p_75	p_90	p_95	p_99	Max.
0.000	0.011	0.063	0.131	0.324	0.717	1.38	2.29	4.04	26.63	1

Anzahl der JSON-Nachrichten: 215,596,222  
Anzahl der aktiven Triebfahrzeuge: 1,439

Perzentile der Latenzdaten in Millisekunden

Min.	p_1	p_5	p_10	p_25	p_50	p_75	p_90	p_99
0.000	373.76	501.69	593.96	779.08	1,044.56	1,293.14	1,479.93	1

Analyse der Latenzzeit

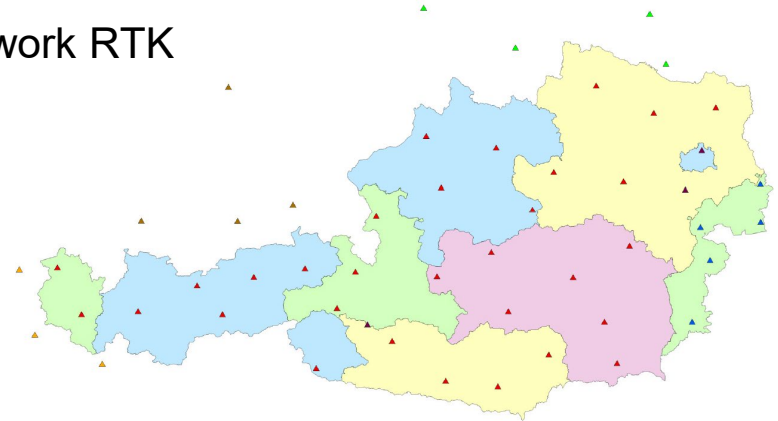


Analyse der Fahrzeuggeschwindigkeit

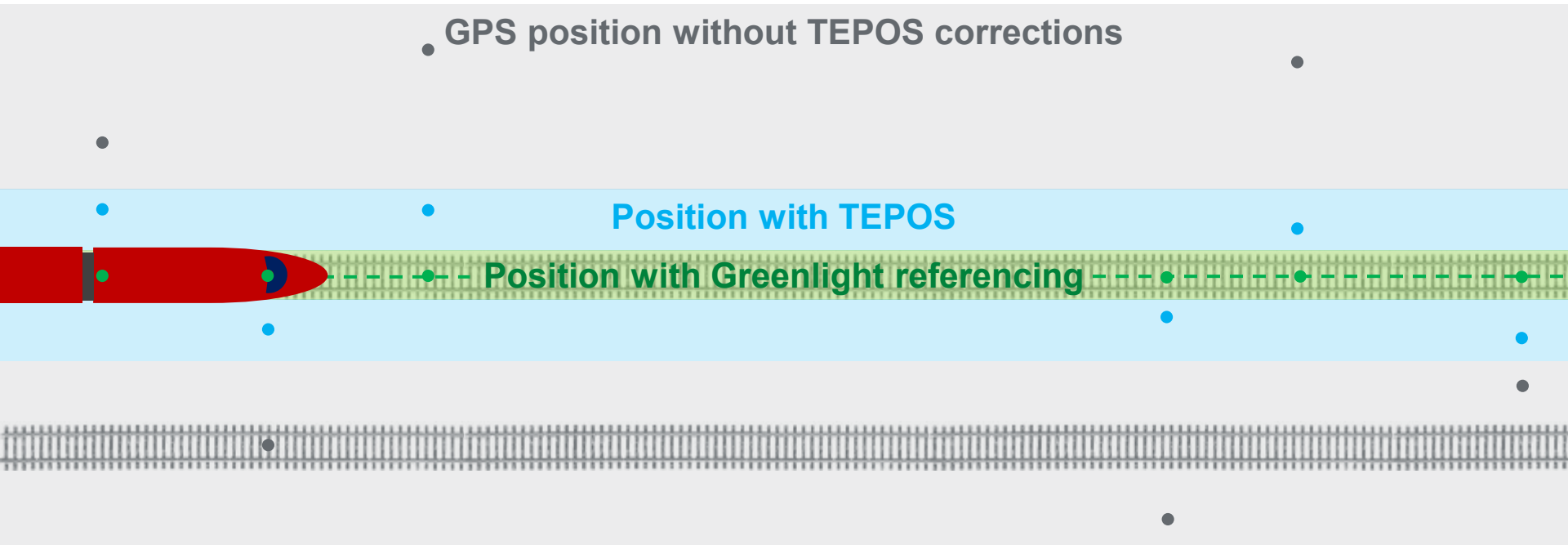
Stationär (0-3 km/h)	Mobil (>3 km/h)
154,473,228 (71.65%)	61,107,825 (28.35%)

Okay, but what does **TEPOS** mean?

- stands for **T**elematics Real-Time **P**ositioning **S**ystem
- enables GNSS equipment to be located within centimeters
- contains 32 exact measured ÖBB reference stations and additional ones from partners
- corrects for common errors in current GNSS - using real-time kinematics
- uses the GNSMART solution from geo++ for network RTK

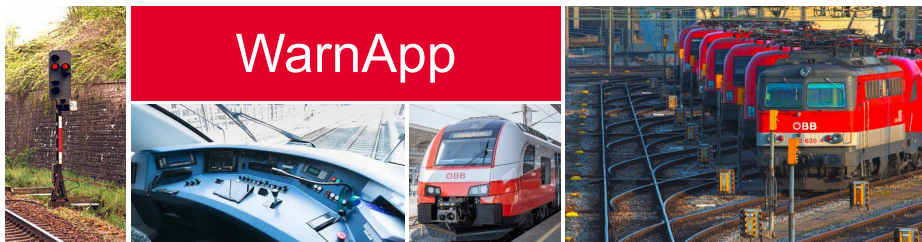


# How does **Greenlight** work its magic?



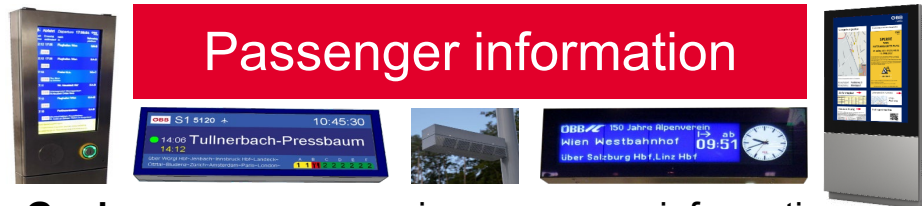


# Where is **Greenlight** already being used? Some examples...



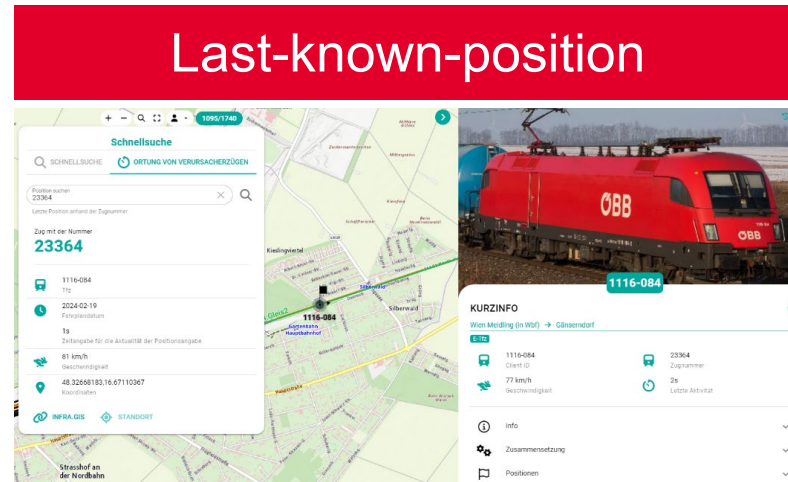
## WarnApp

- Goal:** prevention of signal overruns
- User:** train drivers, dispatchers etc.
- Principle:** providing user application with positions to alert when a stop sign is approached



## Passenger information

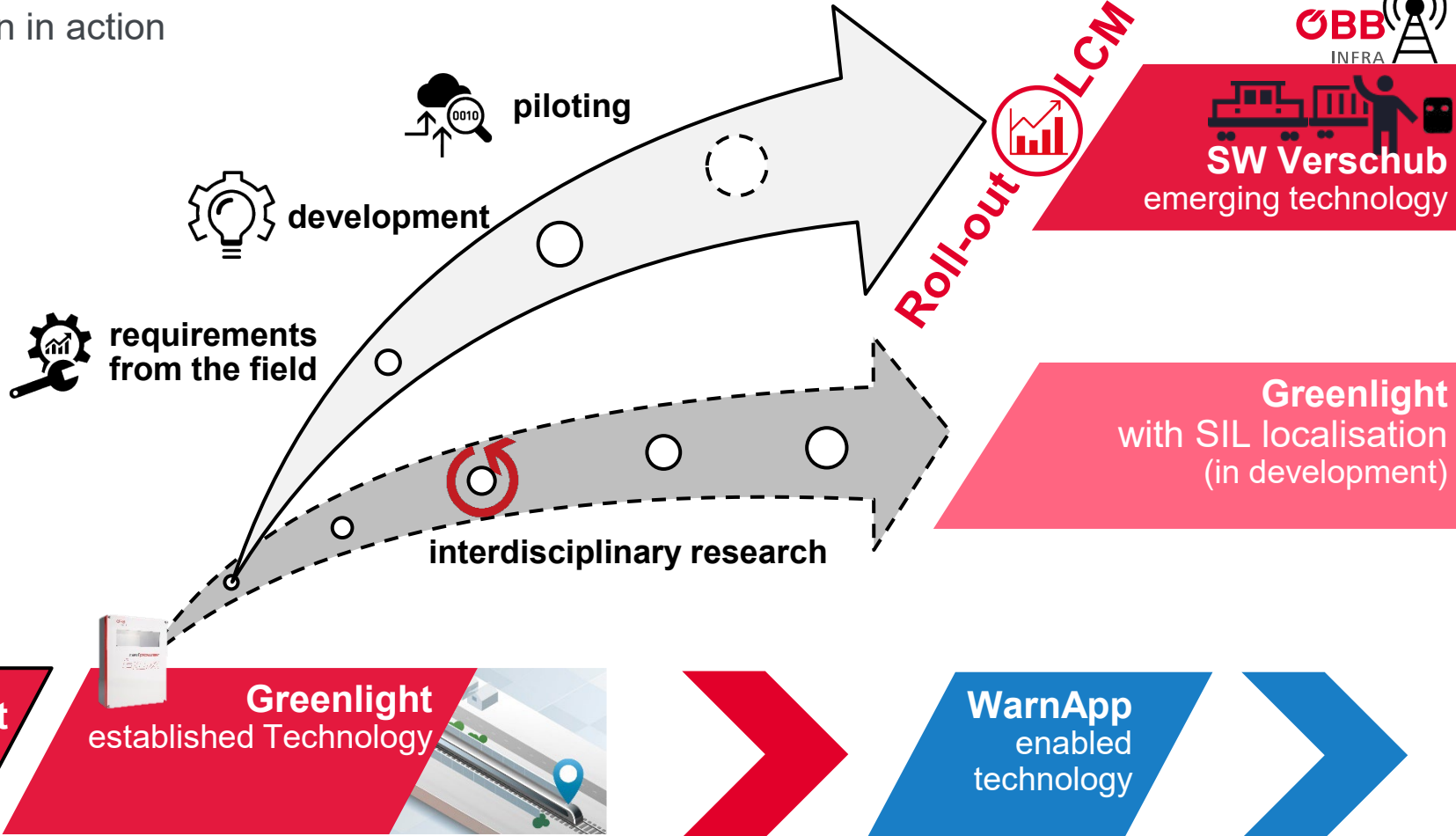
- Goal:** more precise passenger information
- User:** passengers, operators and carriers
- Principle:** supporting train run forecasts with GPS



## Last-known-position

- Goal:** search for last known position
- User:** operational coordinators
- Principle:** locating the last online position of the traction units for various applications such as logistics and emergency coordination

# Innovation in action



A wide-angle photograph of a large rail yard at dusk. Numerous freight trains are parked on parallel tracks, illuminated by overhead lights. The sky is a deep blue, and the scene is framed by a yellow triangle in the top-left and a red triangle in the bottom-right.

# High-precision train positioning

future applications

**ÖBB**  
INFRA

HEUTE. FÜR MORGEN. FÜR UNS.



# What does our shunting warning system do?

continuous speed monitoring

exceeding the speed limit

alerting the shunting stuff

emergency braking

20 km/h

15 km/h

10 km/h

**WARNING ZONES**

base function

trigger event

system response

driver's reaction

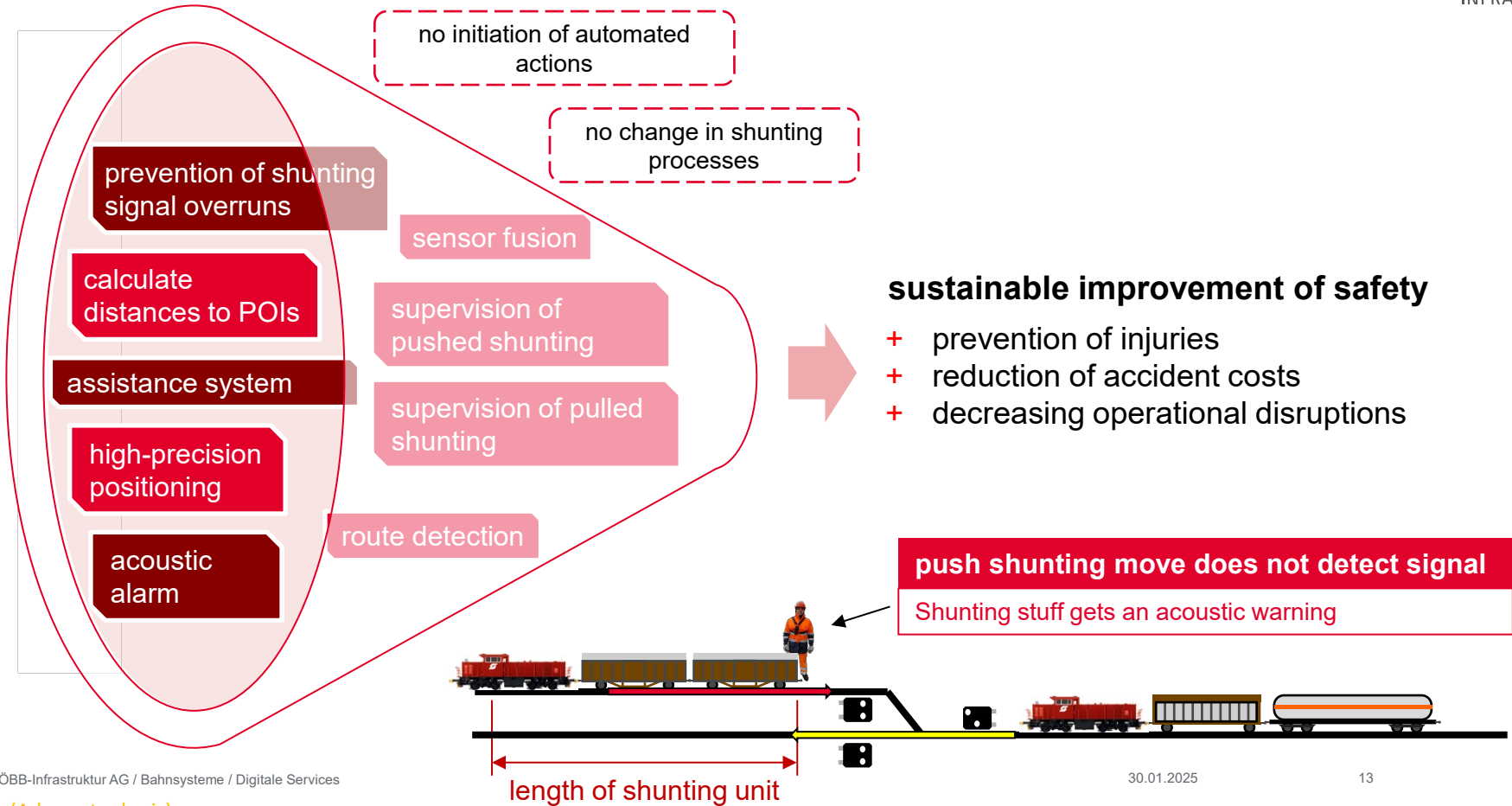


supervision of:

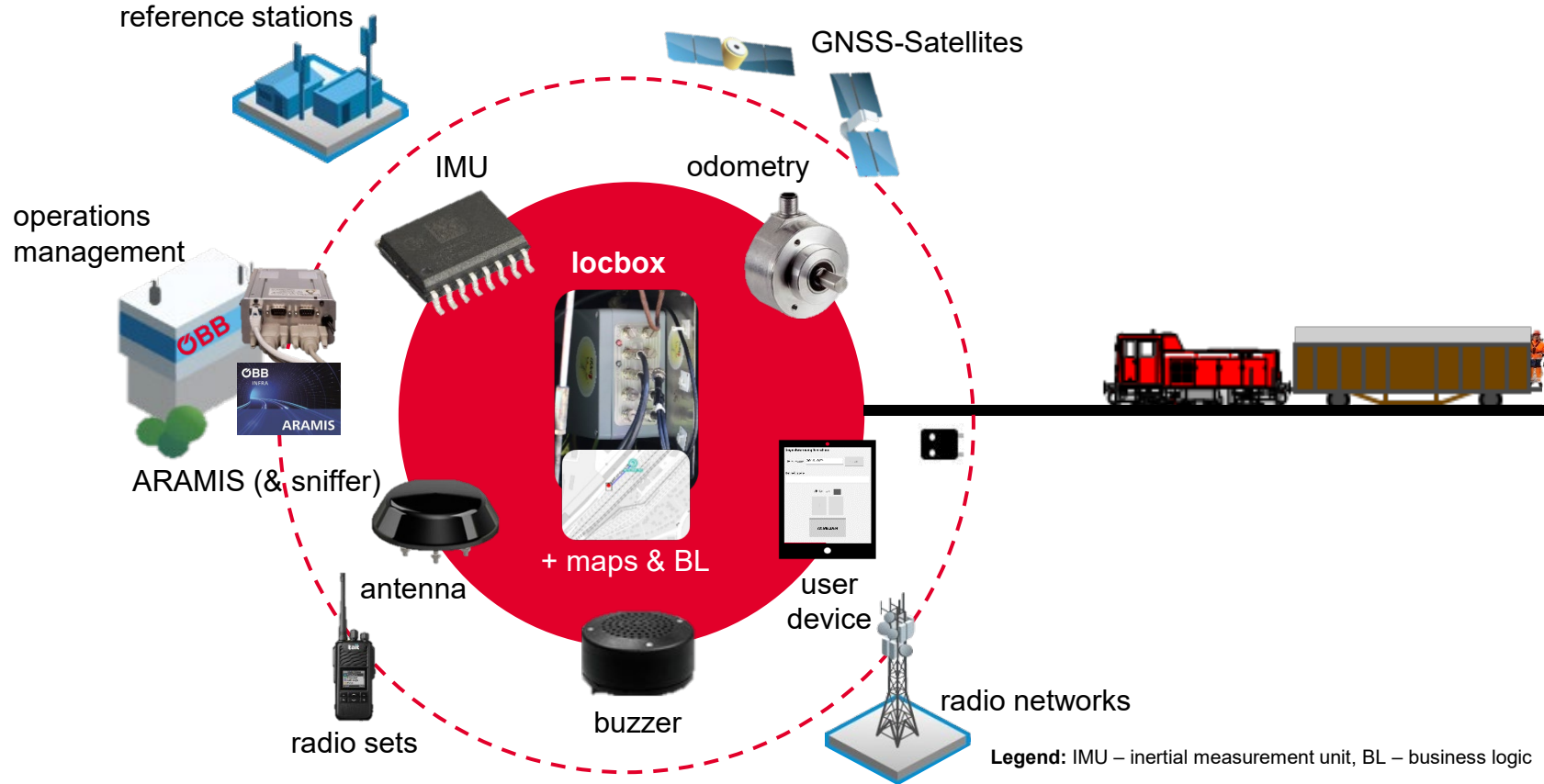
- pull shunting moves
- **push shunting moves with shunting stuff**



# Key features of our system



# Which system elements are needed to assist our shunting stuff?



Thank you.

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INFRA - Bahnsysteme  
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