VALISE
Video Balise for dependable train positioning

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RDS International

IRSE ASPECT 2019 Conference
24 October 2019

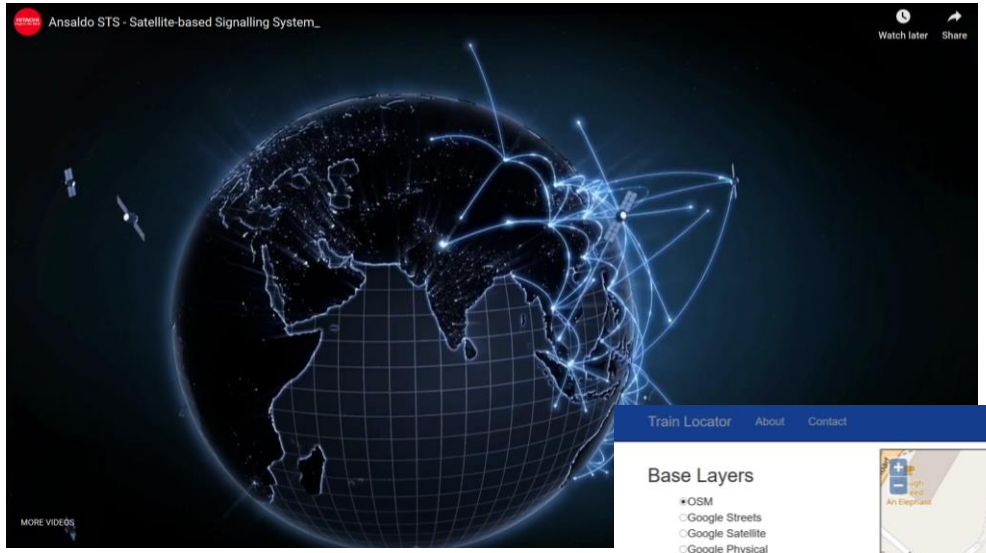
Overview

- Virtual balise concepts
- Video Train Positioning System
- VALISE project

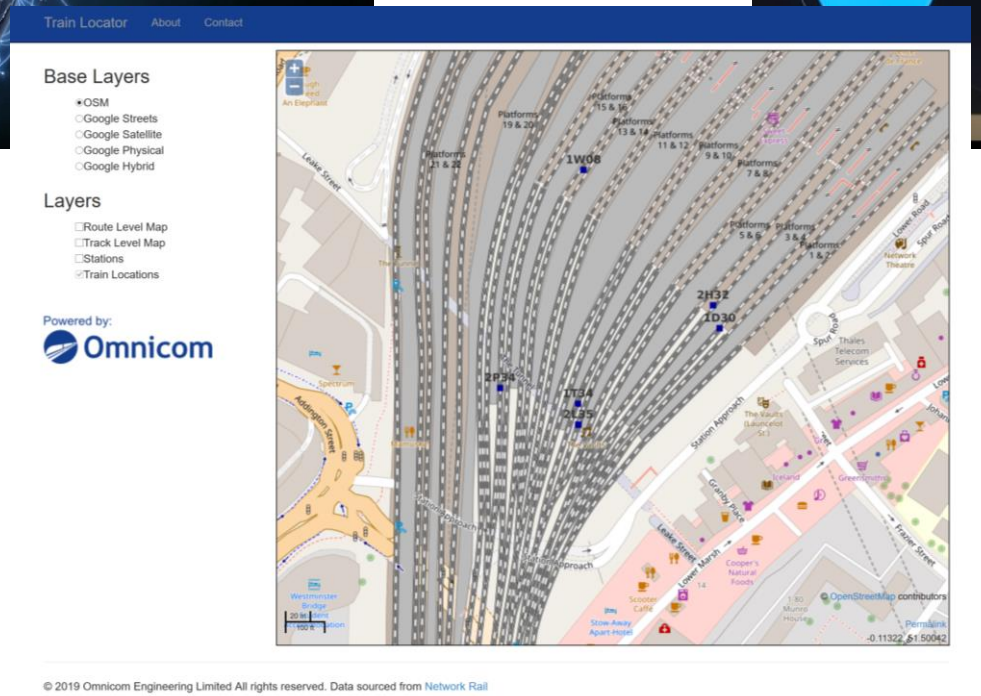
Virtual balise concepts

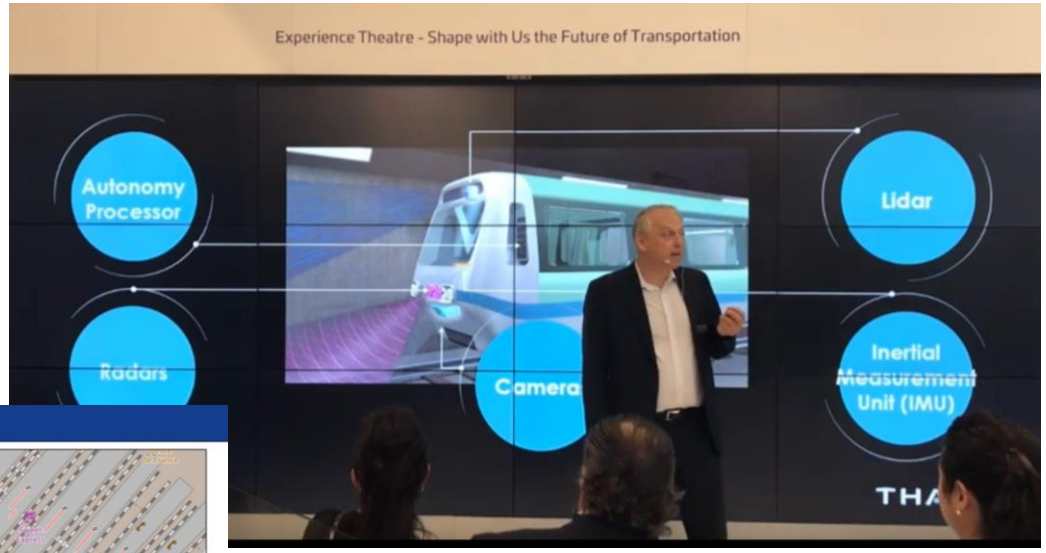
RDS INTL

Virtual balise enabling technologies



Hitachi STS: GNSS

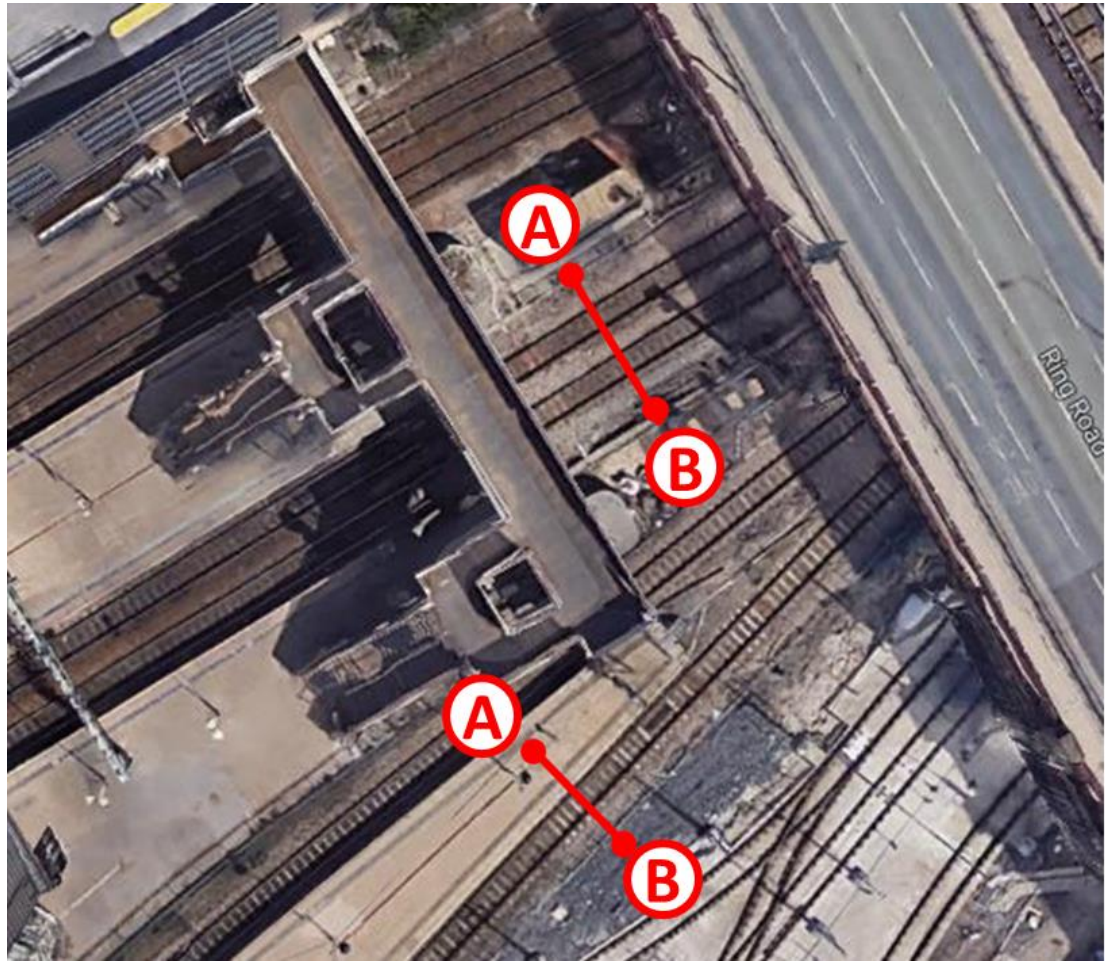


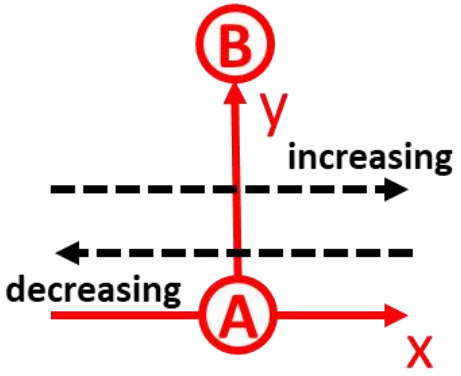


Thales: Autonomous Train

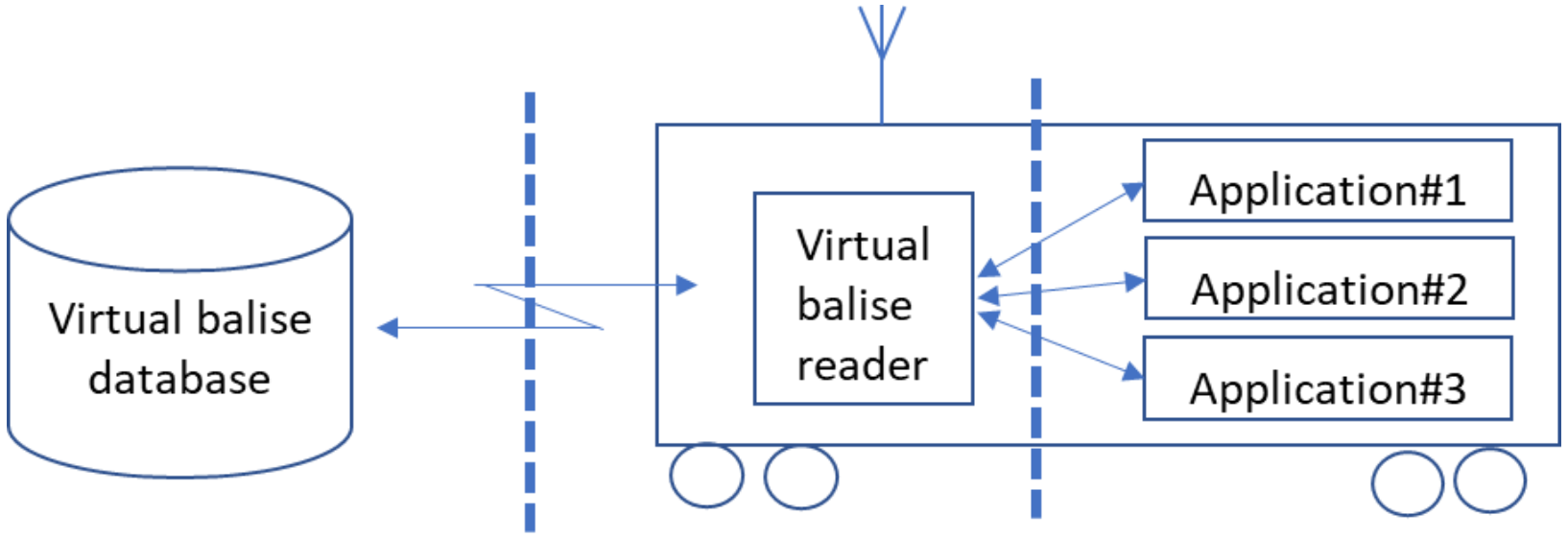
Omnicom Balfour Beatty:
Track circuit to geospatial

Virtual balise specification





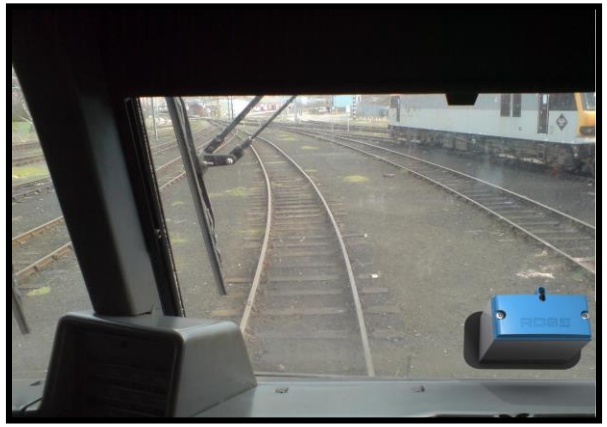
High level architecture



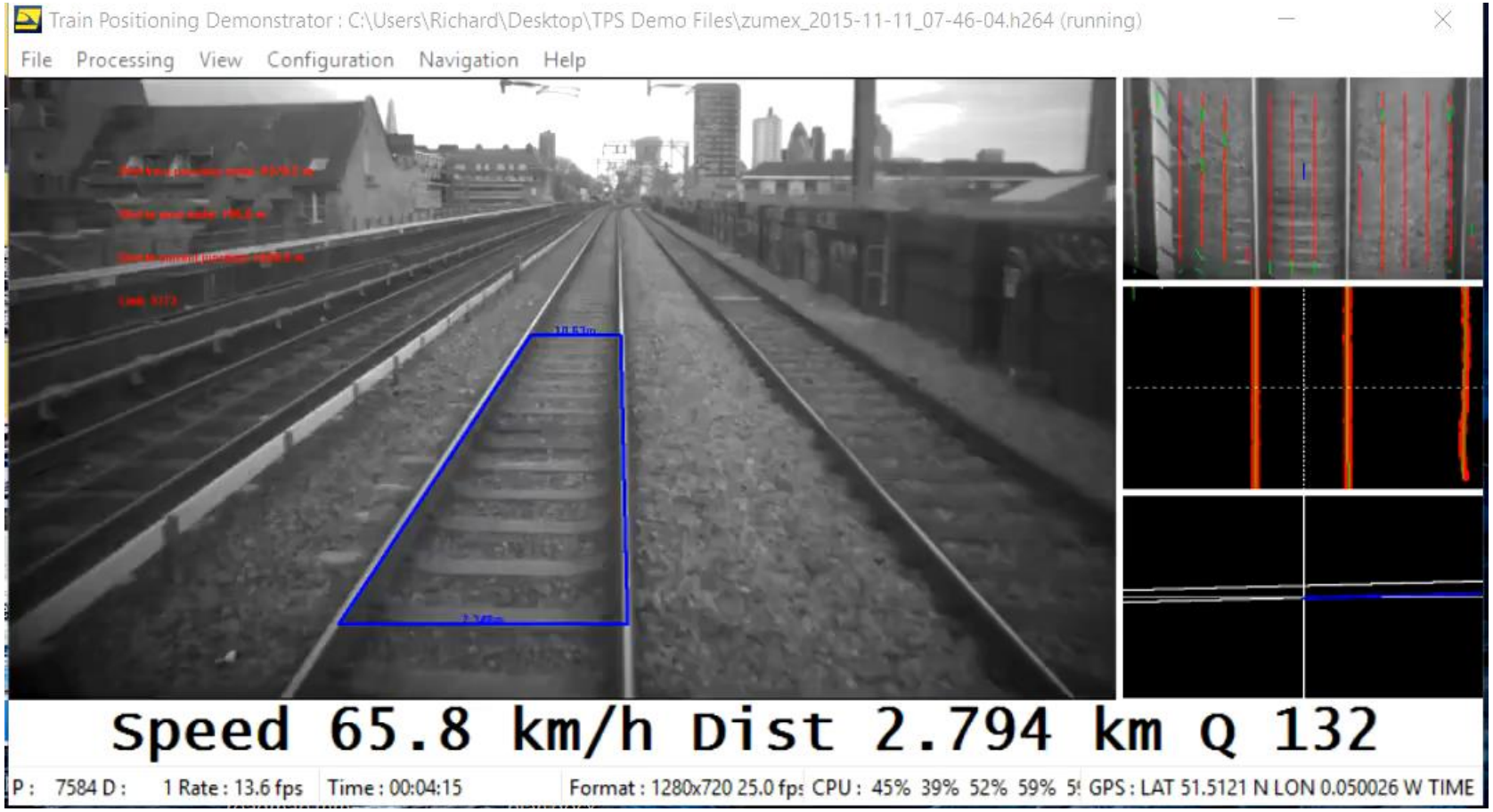
Video Train Positioning System

Video Train Positioning System (VTPS)

- Forward facing camera installed in cab windscreen
- Video processed in real-time
- Main functions:
  - Video odometer
  - Marker recognition (‘visual balise’)



Video Train Positioning System



Spot positioning

- Spot location
  - corrects odometry errors
- VTPS reads marker boards
- Alternative to static balises

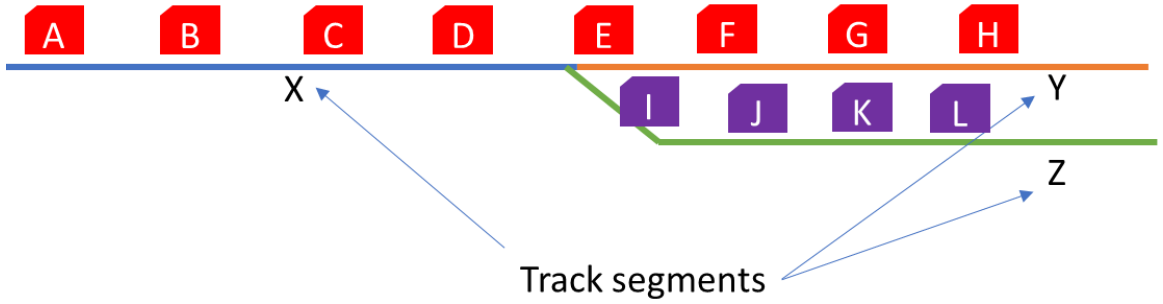
This marker can encode a Eurobalise telegram with the same degree of error protection

Video ‘fix’

‘Live’ image

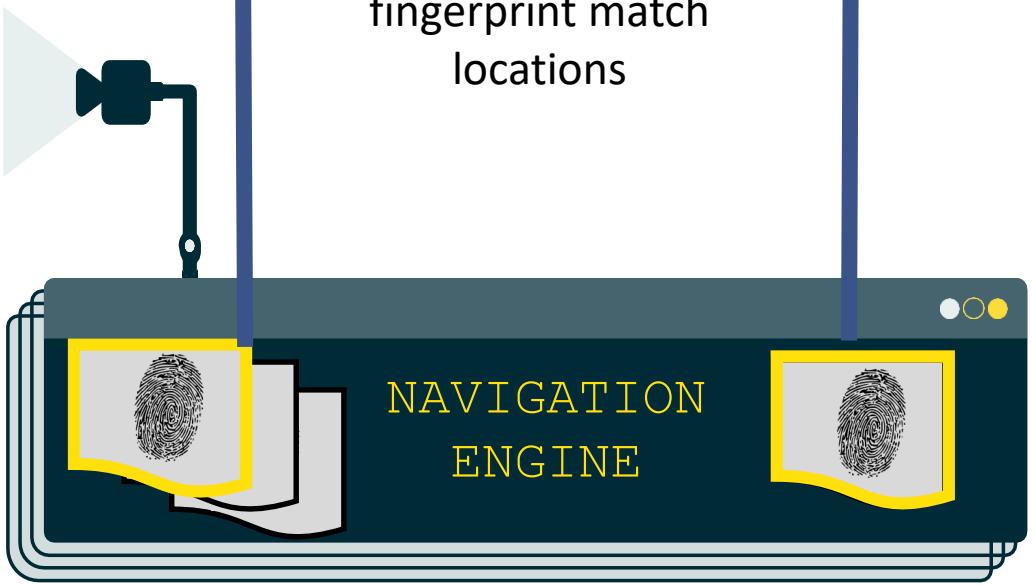
Matched location

Track discrimination

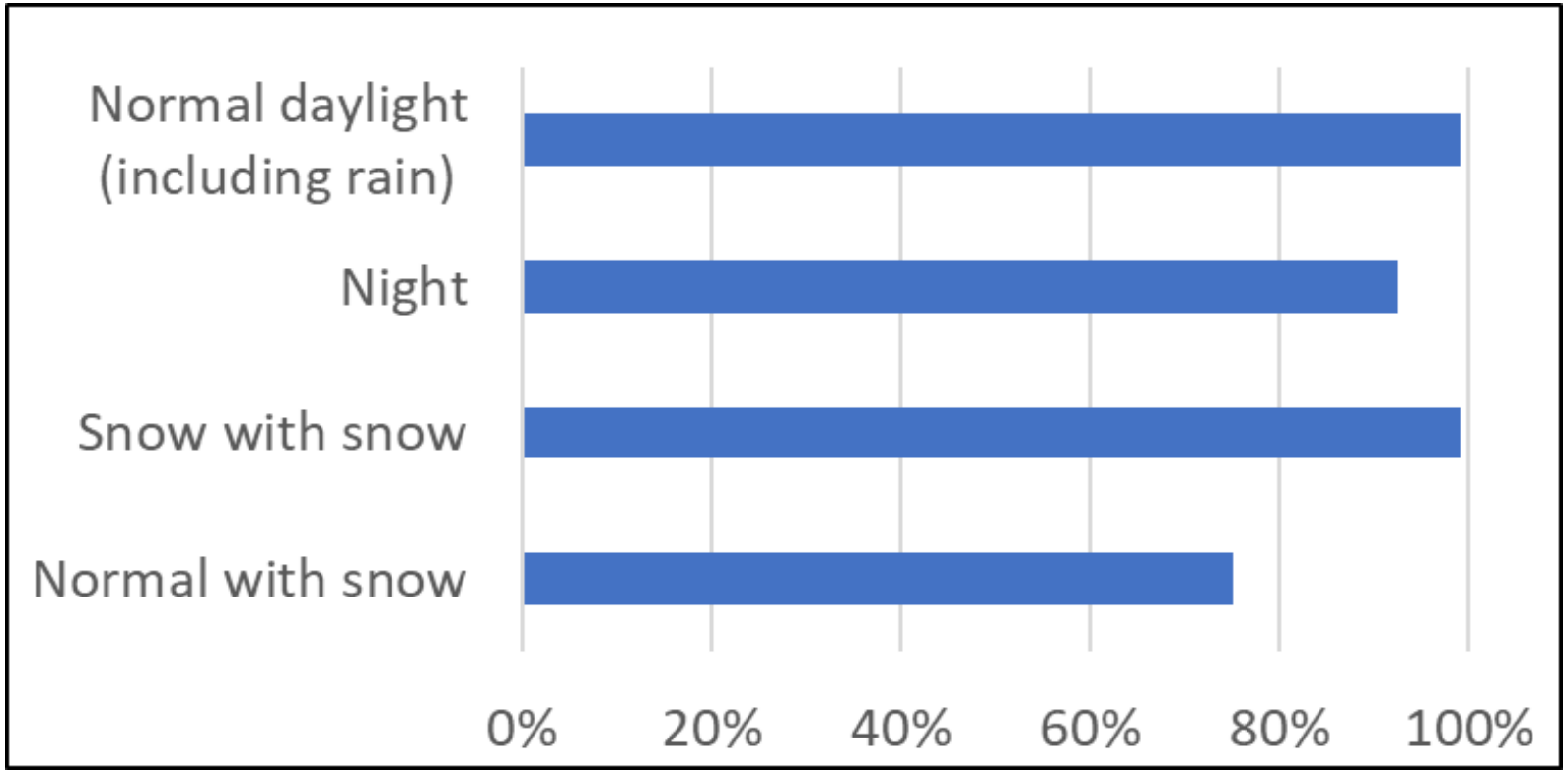


Video frame	Journey X->Y	Journey X->Z
1	A	A
2	B	B
3	C	C
4	D	D
5	E	I
6	F	K
7	G	K
8	H	L

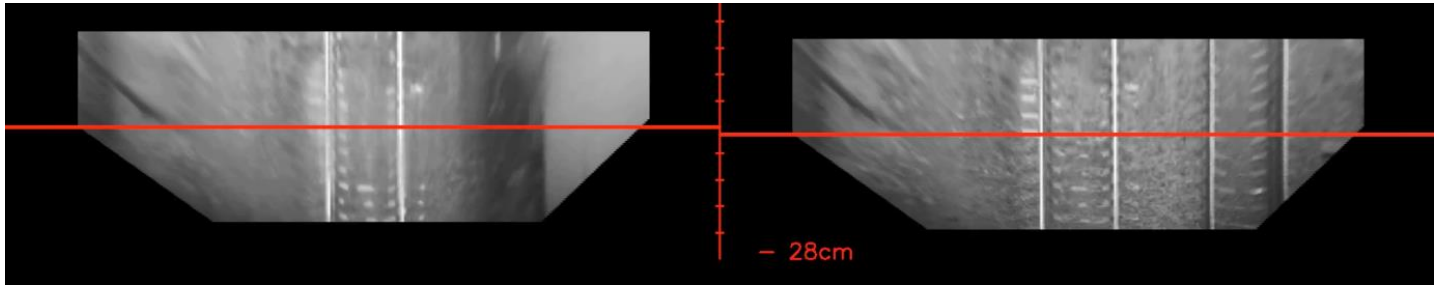
Camera images at fingerprint match locations

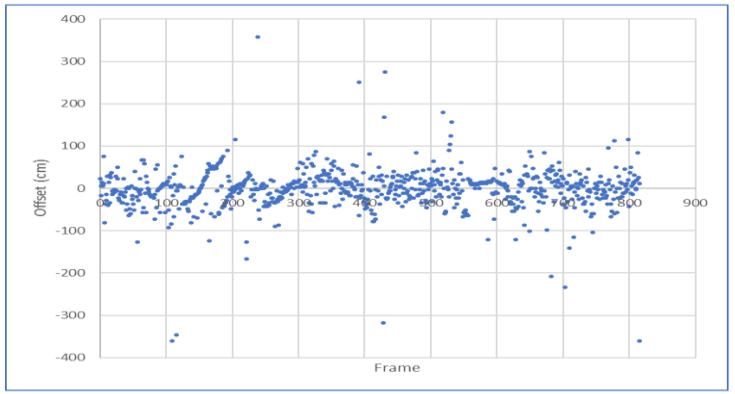


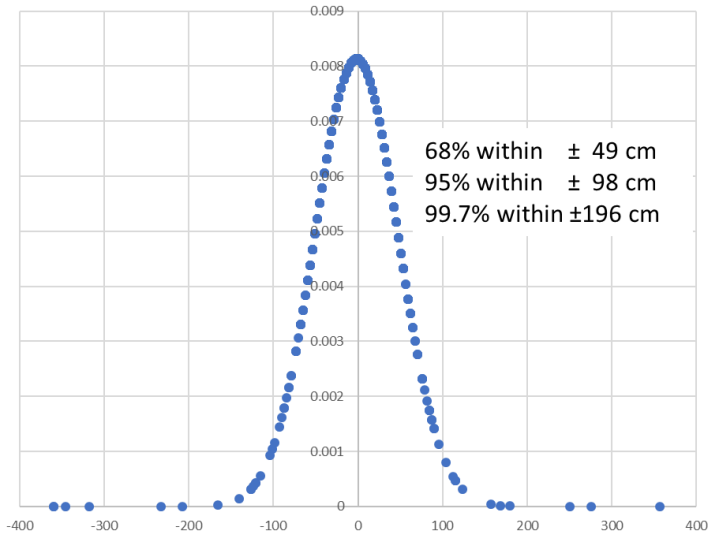
Track discrimination – single fingerprint



Accuracy performance







VALISE Project

Valise Project Consortium

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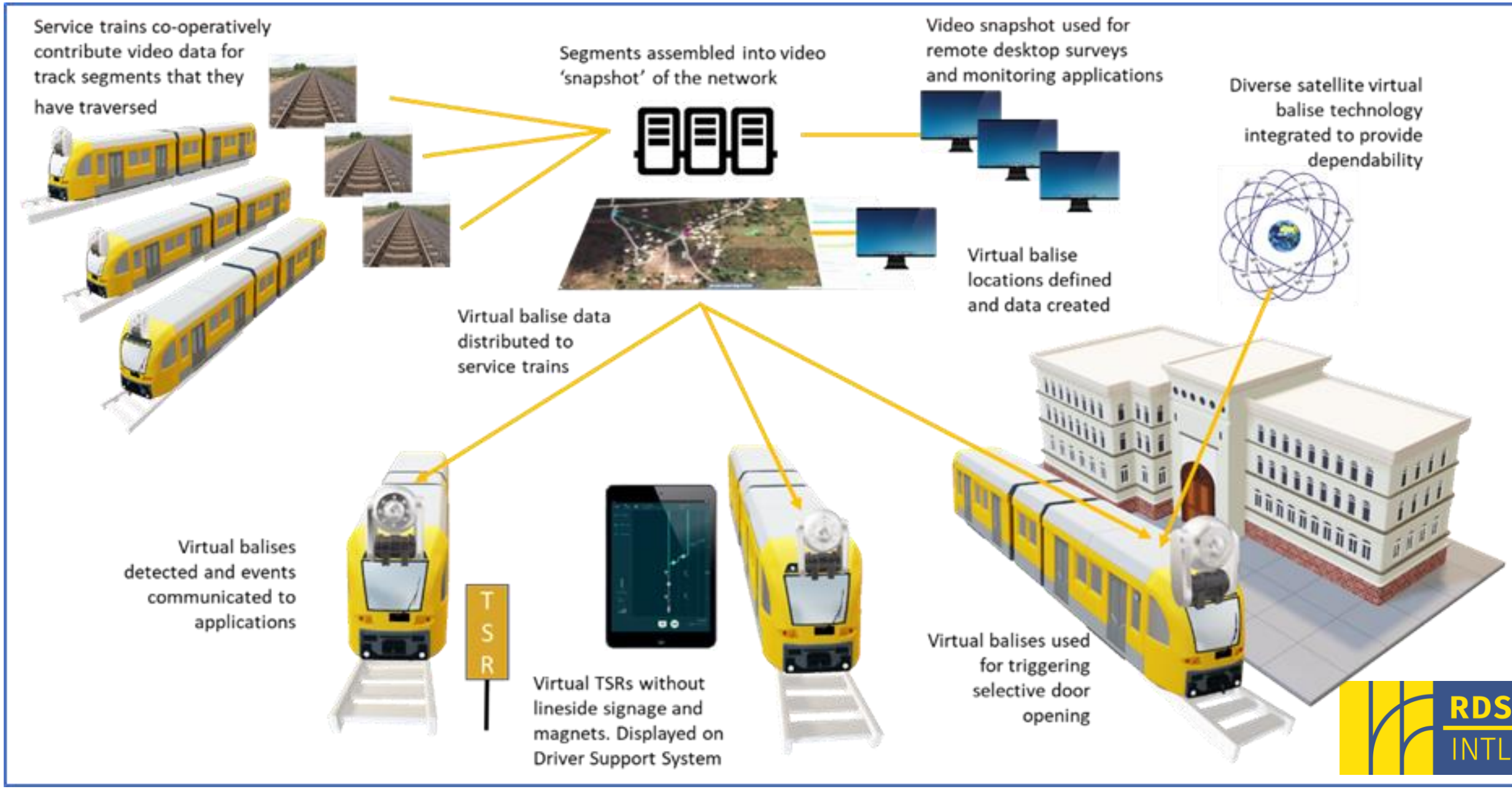
Service trains co-operatively contribute video data for track segments that they have traversed
Segments assembled into video 'snapshot' of the network
Video snapshot used for remote desktop surveys and monitoring applications
Diverse satellite virtual balise technology integrated to provide dependability
Virtual balise locations defined and data created
Virtual balise data distributed to service trains
Virtual balises detected and events communicated to applications
T S R
Virtual TSRs without lineside signage and magnets. Displayed on Driver Support System
Virtual balises used for triggering selective door opening
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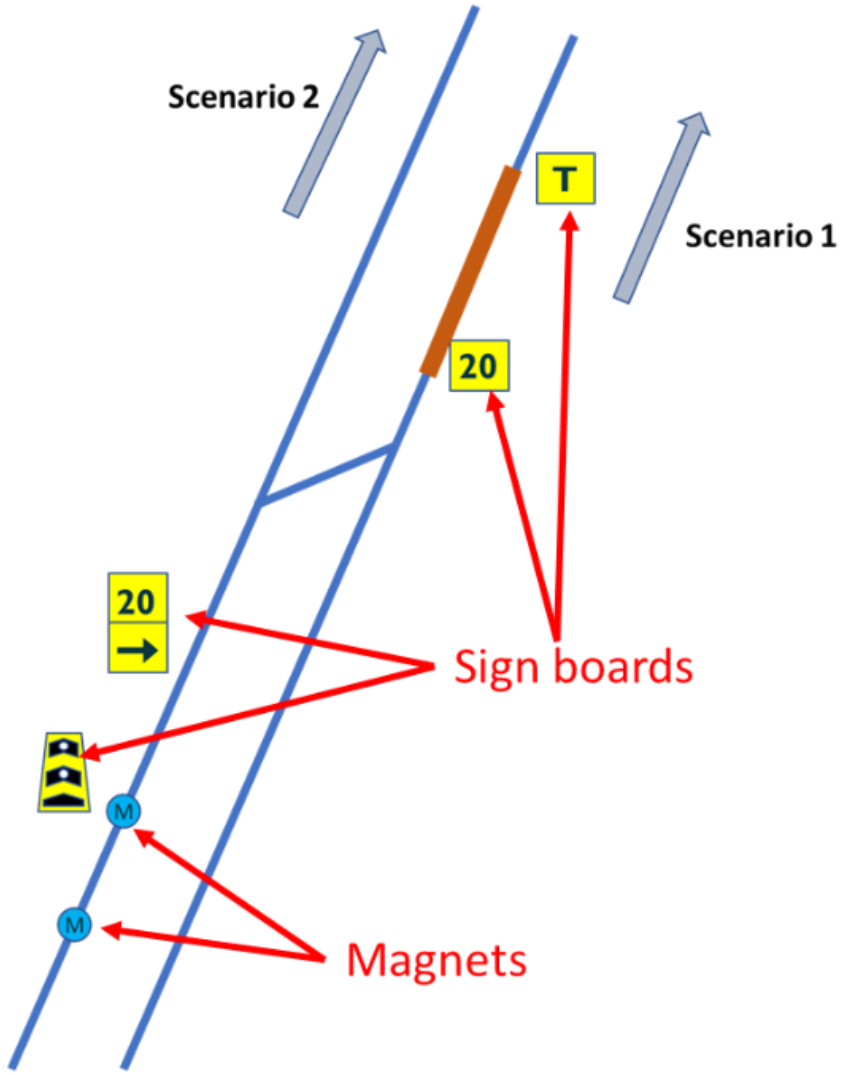
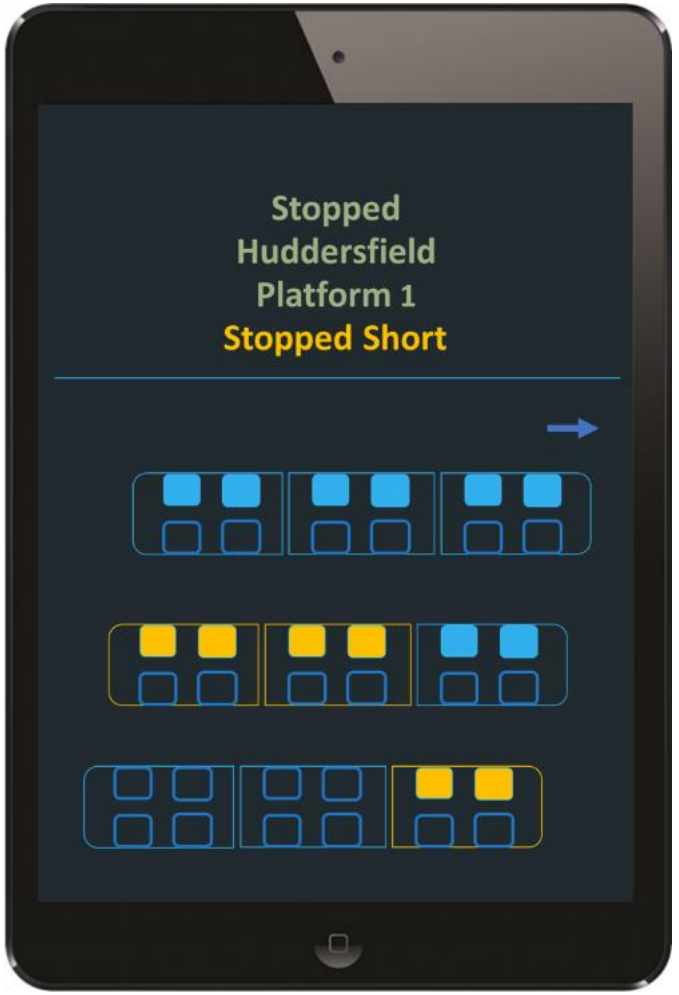
On-board equipment

Temporary speed restrictions



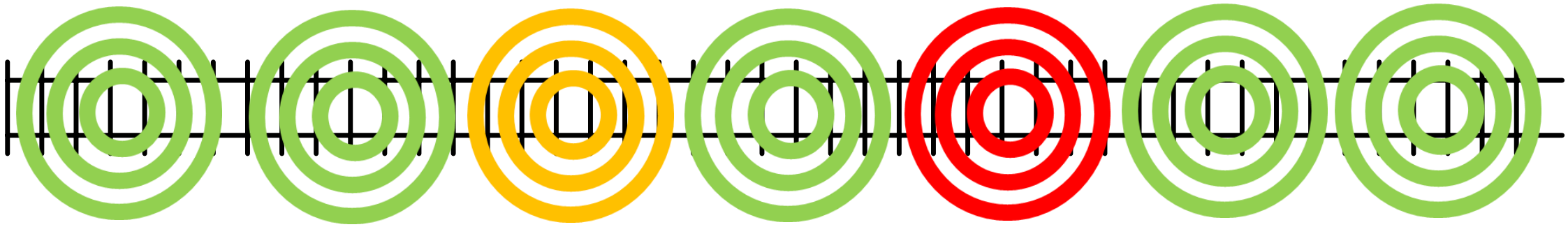
Automatic Selective Door Opening



Safety

- Independent positioning ‘channels’
  - Video ‘fix’
  - Others
- Implementing GNSS/inertial comparator
  - Checker using GNSS protection limits and map matching
- Safety in service evidence
  - Non-safety: infrastructure monitoring and survey
  - Safety related: speed restrictions, platform stopping, train protection
  - Safety critical: train control

Valise maintenance



Summary

- Virtual balise concepts
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- VALISE project

VALISE demonstration day
UK, March 2020

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