Intelligent Truck Parking Workshop

Prague – 19th June 2018

Co-financed by the European Union
Connecting Europe Facility

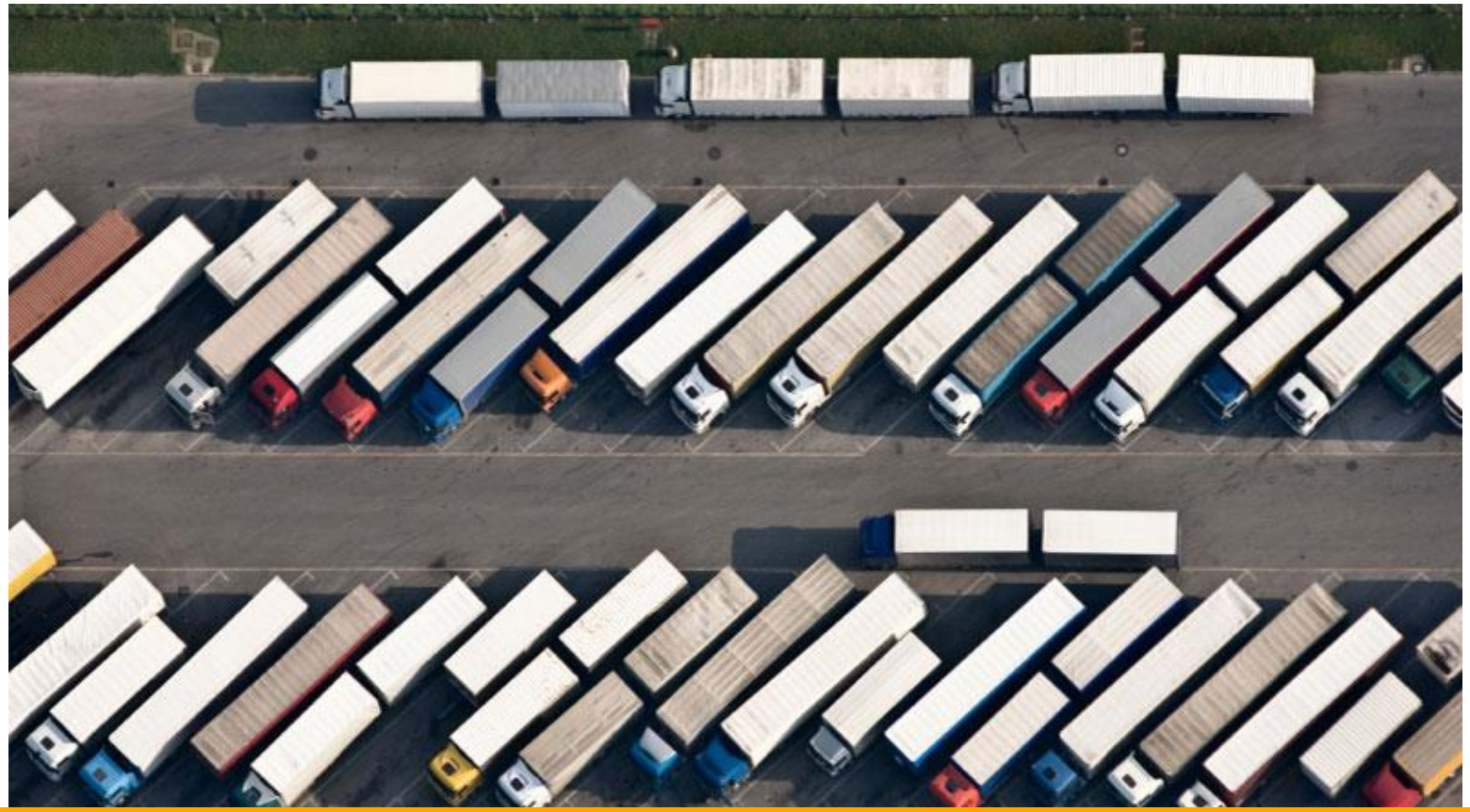
Agenda

Time	Agenda Item	Moderator/Speaker
09:15	***Registration***	
09:45	**Welcome and Introduction**	**Stephanie Kleine, URSA MAJOR &** **Frantisek Sedlacek, URSA CZ**
10:00	**ITS for safe and secure parking of HGV on TEN/T corridors – pilots, deployments, best practices, lessons learned** • Experience with the preparation of an information system on the occupancy of Truck parking areas on the TEN-T network in the Czech Republic • Parking Management System for Trucks in Hungary • Quality of ITP services – EU EIP current steps and future plans • Truck Parking in Bavaria	**Henk Jansma, RWS** Marek Ščerba, CDV, v.v.i. Tamás Tomaschek, DTMNO Rainer Lehmann, BASt Daniel Monninger, ABDSB
11:40	***Lunch Break***	

Agenda

12:20	**User and service provider perspective – information services, specific needs of truck drivers and transportation companies** • What Czech Truck Companies expect from ITP solutions • ITP at the Port of Rotterdam • Freight transport along the Brenner Motorway: measures undertaken to increase drivers' comfort and safety • Specific needs of transportation company	**Zdeněk Lokaj, ČVUT** Vojech Hromir, CESMAD Bohemia Peter Vorenkamp, PoR Ilaria de Biasi, Autostrada del Brennero Richard Latislav, ZDAR
14:00	***Coffee Break***	
14:20	**Cross-border/cross-corridor information and content exchange** • Strategic plan of the future development of the Czech National Traffic Information Centre • Possibilities of spatial data and information services use in ITP • International perspective of URSA CZ • Discussion	**Zdeněk Lokaj, ČVUT** Filip Tyc, Vladimir Faltus, ŘSD ČR Radovan Prokes, CEDA Jan Votoupal, Radan Houser, ŘSD ČR All particpants
16:00	***Conclusions and end of Workshop***	

Experience with the preparation of an information system *on the occupancy of Truck parking areas on the TEN-T network in the Czech Republic*



The State Fund for Transport Infrastructure (SFDI), Program „New technologies"

Introduction

Project supported by the The State Fund for Transport Infrastructure (SFDI)

Realization: 2017 (Evaluation phase ½ 2018)

The AIM of the project:
Development a platform for efficient deployment of the information system about occupancy of truck parking facilities

Main pillars of the project:
- Provide a methodology for digitalization and passport of parking facilities with DATEX II interface
- Create a demonstration site and testing laboratory for testing the compliance
- Roadmap of development nationalwide information system about truck parking facility occupancy

Main pillars of the project

"Information system - Occupancy of parking places for freight vehicles in the TEN-T Czech network“

DATA AND INFORMATION PLATFORM FOR NATIONWIDE SYSTEM DEVELOPMENT

Static data

- Pasport
- Digitalization
- Topology
- DATEX II
- Research

Dynamic data

- Occupancy
- Prediction
- Detection
- Networks
- DATEX II

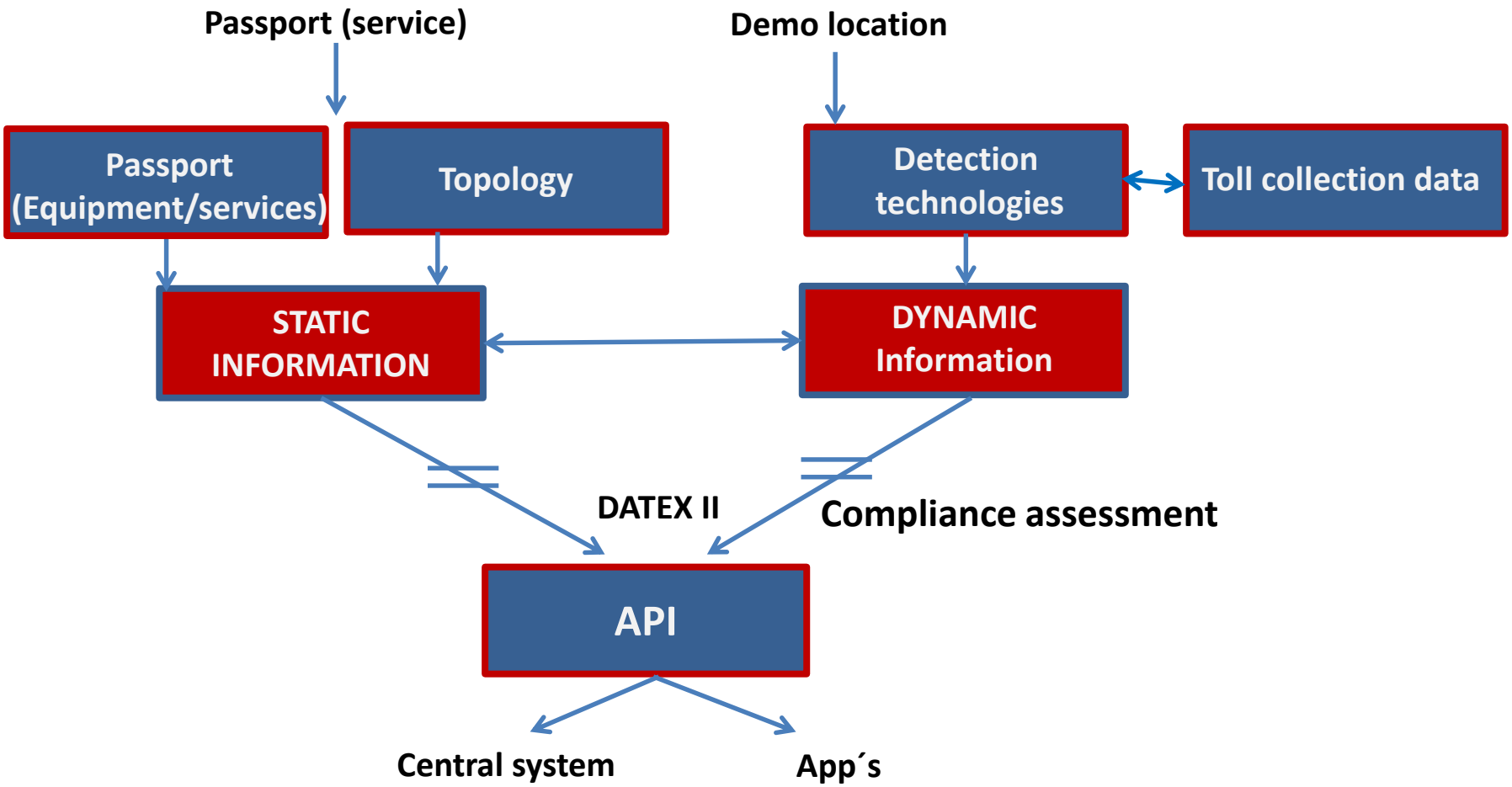
Economic issues

- Testing scenarios
- Investition plan

Evaluation\ Testing

- Testing
- Laboratory
- Compatibility

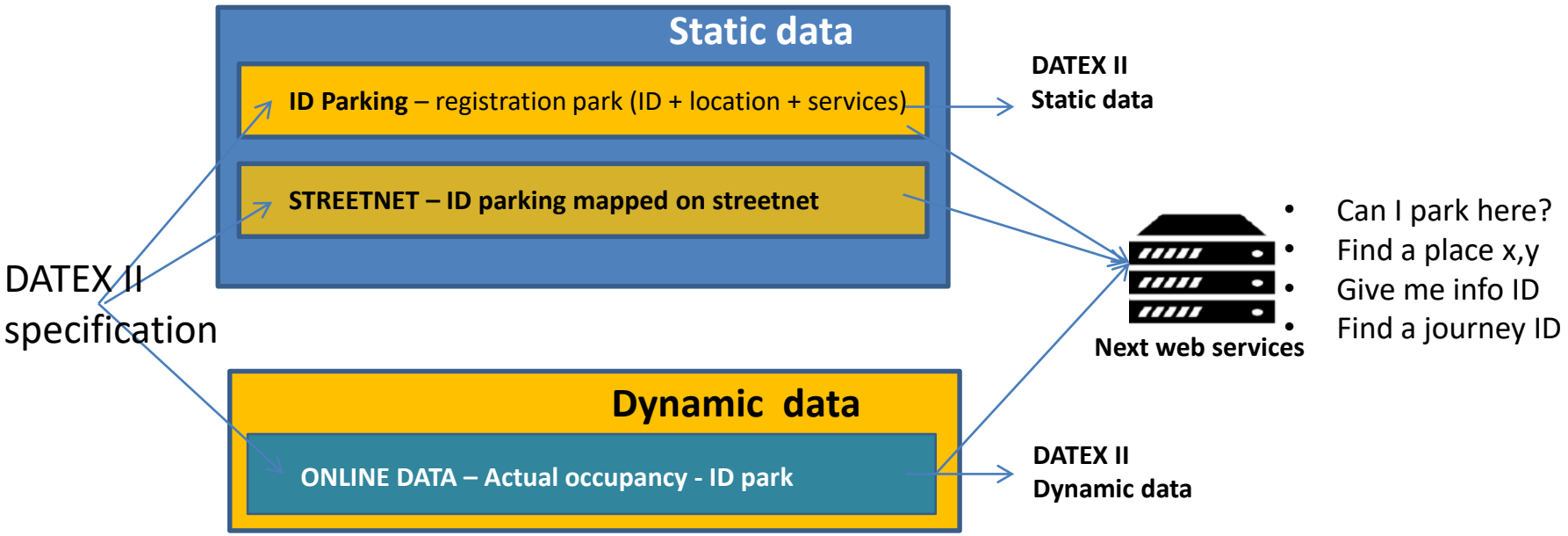
Main project pillars



1. PILLAR – Static data

Static data is divided into two parts for the project (always used in conjunction with dynamic data):

Service description – truck park facilities, number of parking places, etc.
Topology – Hierarchical structure: Location of the entrance, definition of the parking area ID, parking block, parking space



1. Pillars - Passport

Passport of selected Truck park locations on the main TEN-T network:

- Adding a previous passport about temporary inaccessible rest;
- Passport **40 truck parks within 9 clusters** selected for future deployment of the information system on the occupancy of parking places on rest areas;
- During the project progress we were leading by **Delegated act 885/2013;**
- Background material (methodology) for **future passport** technology on rest areas;
- Everything has been created according to **CEN 16157-6 DATEX** for traffic and traffic information management - Part 6: Publishing of parking
- Straight survey with truck drivers – **users needs**

2. PILLAR – Dynamic data

Toll collection data analyses

- Use to evaluate **„Supply and demand“** for parking spaces
- Create a **predictive model** in conjunction with the occupancy data of a particular ITS truck park
- Detectors for measuring **occupancy at a particular location** as an input to tolling data evaluation system

Analysis of available detection systems (in Europe, worldwide):

- Preparation of basic technical conditions for detectors based on the demonstration testing
- Entrance / Exit Detectors, Occupancy Detectors, Surveillance cameras

DATEX II

- Inputs from sensors for absolute and relative occupancy values for parking spaces for trucks
- Uniform output of dynamic data for the entire rest
- Recommendations for the possible further development of DATEX II dynamic data

3. PILLAR – Roadmap

Analysis of data from the tolling system:

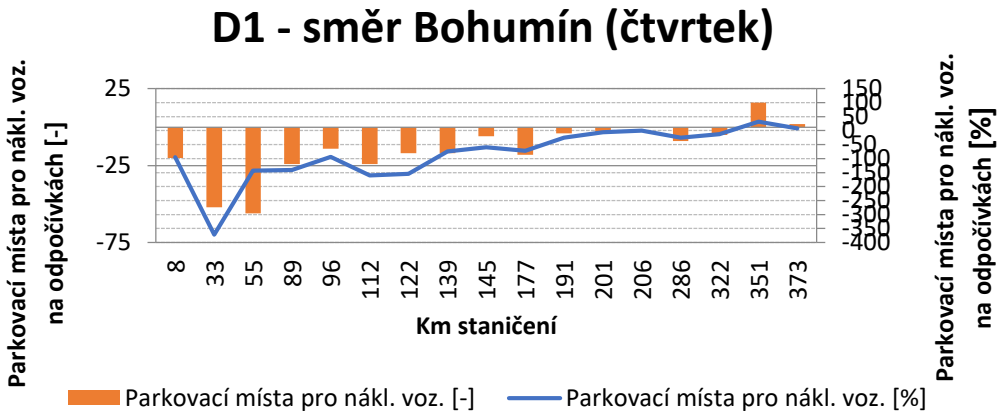
- Assessment of **„demand and supply“** of parking facilities for TEN-T main road network for lorries on motorways;
- Tabular and graphical evaluation for **median and 90% quantum of demand** in the most critical day of the week for selected road and directions;
- **Detailed analysis of the situation on D1** and potential bilateral approach to selected rest areas;
- Identifying **9 Truck parks clusters** with the potential to optimize the use of parking capacity for trucks when deploying an information system;

✓ **D1 (5 clusters)**

✓ **D2 (1 cluster)**

✓ **D5 (2 clusters)**

✓ **D11 (1 cluster)**



3. PILLAR – Economic Issues

ECONOMY

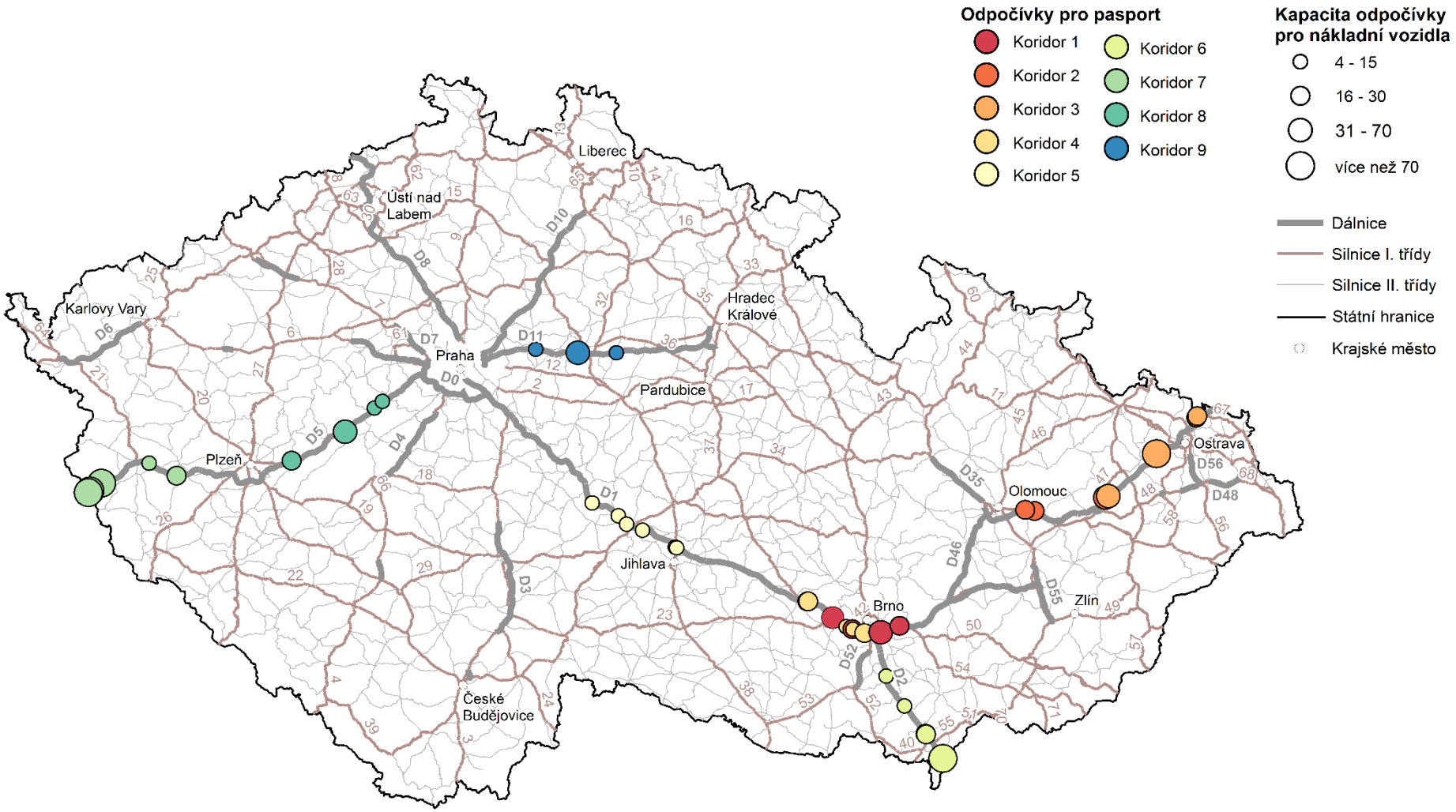
Based on the definition of major motorway sections (clusters), it will:

- Be prepared and elaborated roadmap for the 1st phase of implementation of the information system in Czech Republic – **9 clusters – 40 truck parks**
- **After 1st phase evaluation will be next deployment reccomended**
- **In final phase** - the economic model of implementation of these systems in the Czech Republic
- Benchmark of detection technologies

Compliance assessment

- A **methodology for verifying the accuracy**, reliability and safety of detectors is prepared
- **In preparation** - SW for „Selfcertification" with the provision of static and dynamic data (End of 2018 – 885/886)

3. PILLAR – Corridors plan



Podklady:
ŘSD, 2016; Global Network, CEDA, 2017; ©ArcČR, ARCDATA PRAHA, ZÚ, ČSÚ, 2016

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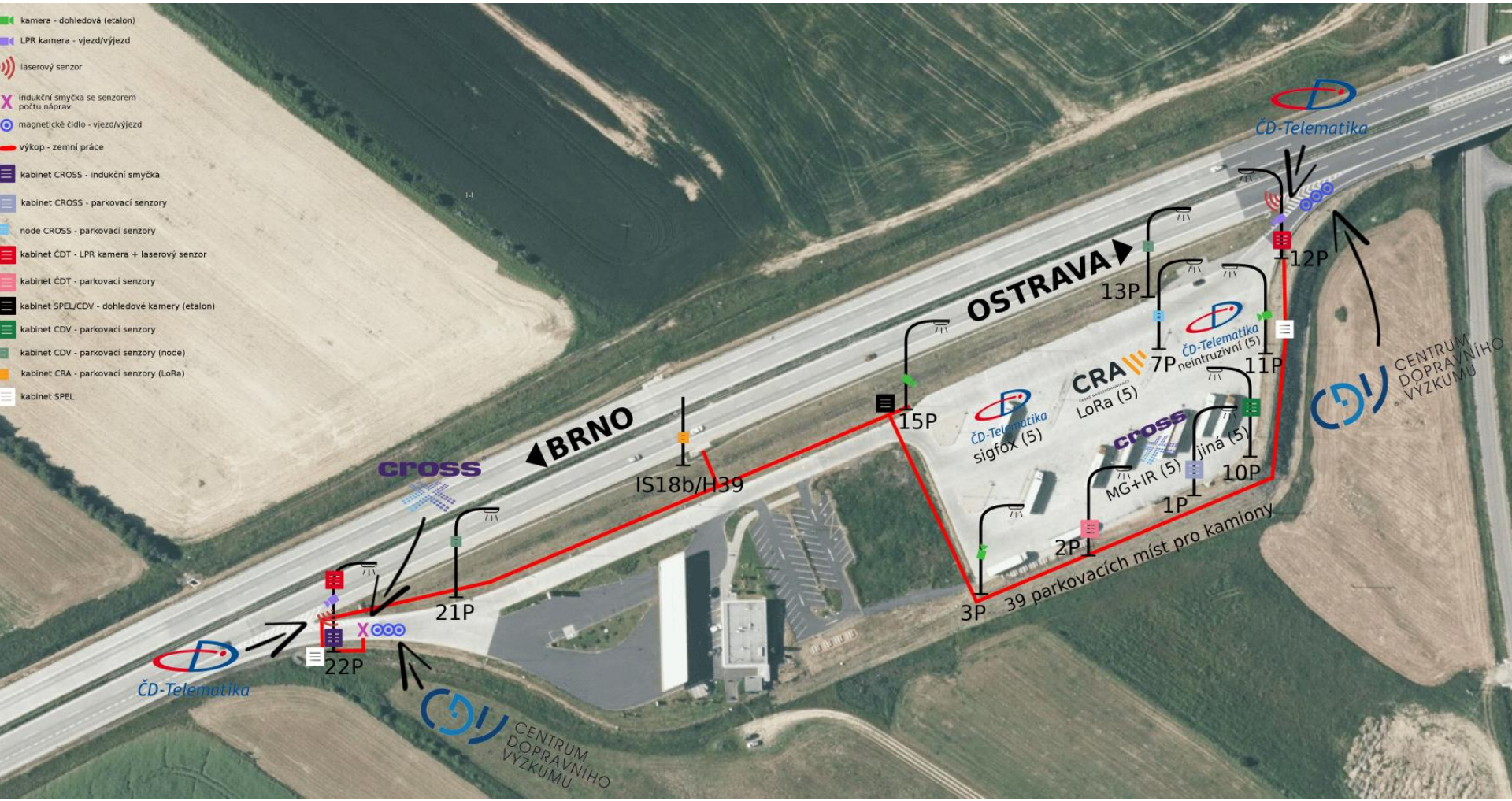
Centrum dopravního výzkumu, v.v.i.
Brno, 2018

4. Pillar – Testing and evaluation

Current situation:

- **D1 Vražné (Ostrava direction) – testing site**
- **Cooperation with ŘSD** (approval process Ministry of Transport)
- **Public procurement** – possible technologies has been chosen. Entrance x Exit technologies, Occupancy technologies and CCTV surveillance
- **SW design – Database structure** (SW for cross verification). Unique SW for Living lab
- **Guidelines for detection evaluation** (reliability, accuracy)
- **11 detection** moduls with installation – public procurement realized
- **Project documentation** - a building permit issued by the Ministry of Transport
- Tender for the **communication and power network** (700 m of excavation works)

DEMONSTRATION SITE



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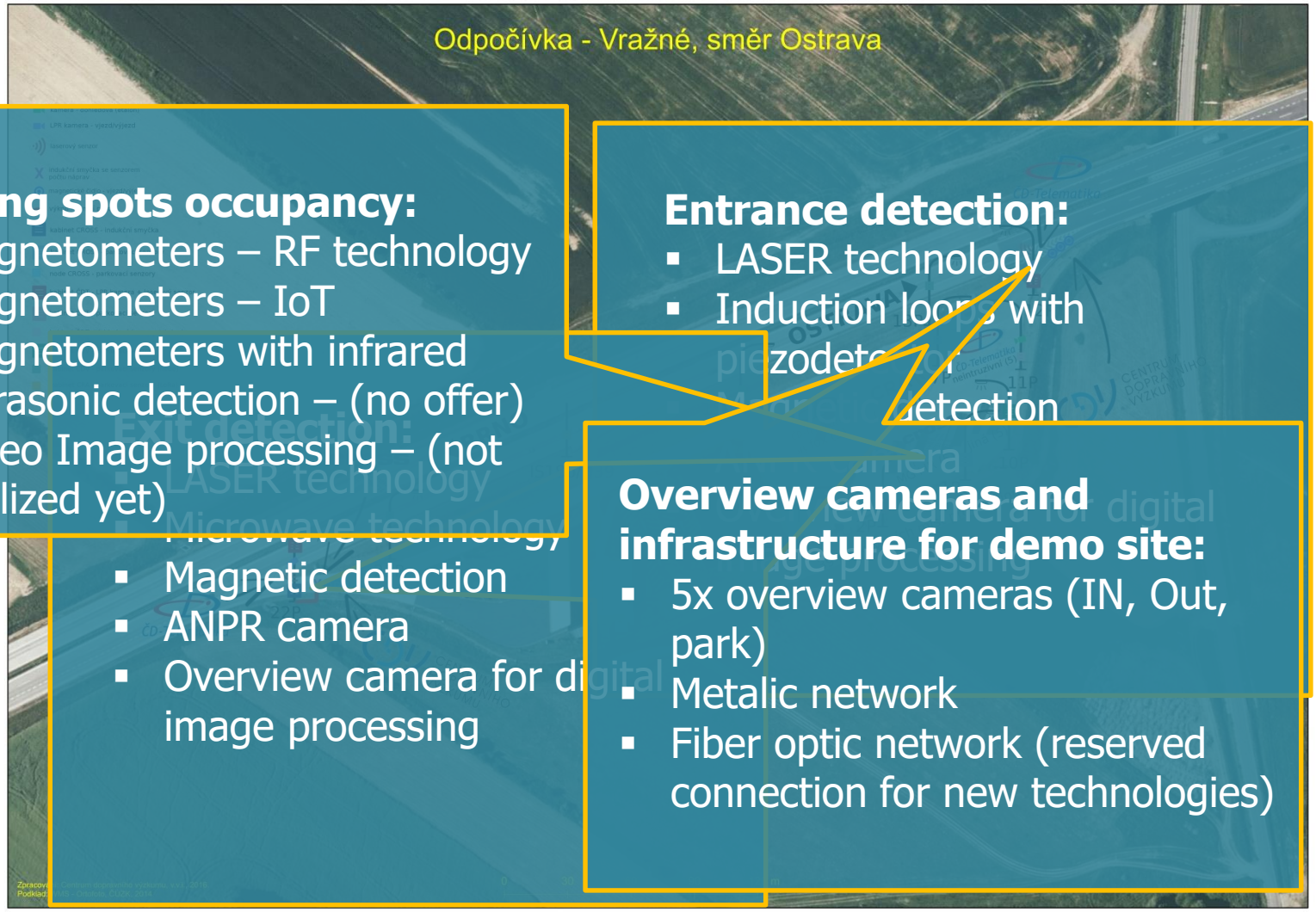


Parking spots occupancy:
- Magnetometers – RF technology
- Magnetometers – IoT
- Magnetometers with infrared
- Ultrasonic detection – (no offer)
- Video Image processing – (not realized yet)

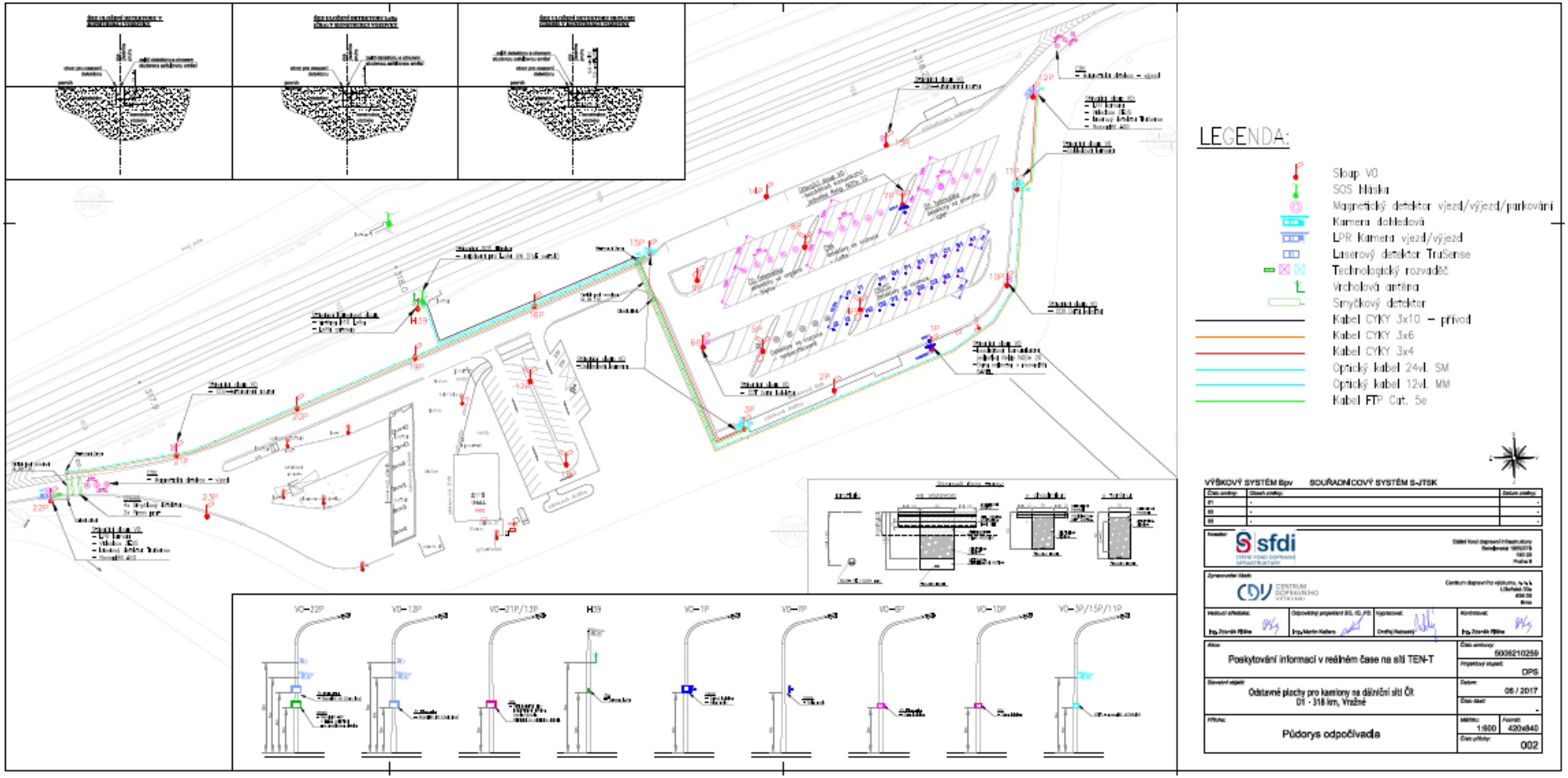
Entrance detection:
- LASER technology
- Induction loops with piezodetectors
- Microwave detection

Exit detection:
- LASER technology
- Microwave technology
- Magnetic detection
- ANPR camera
- Overview camera for digital image processing

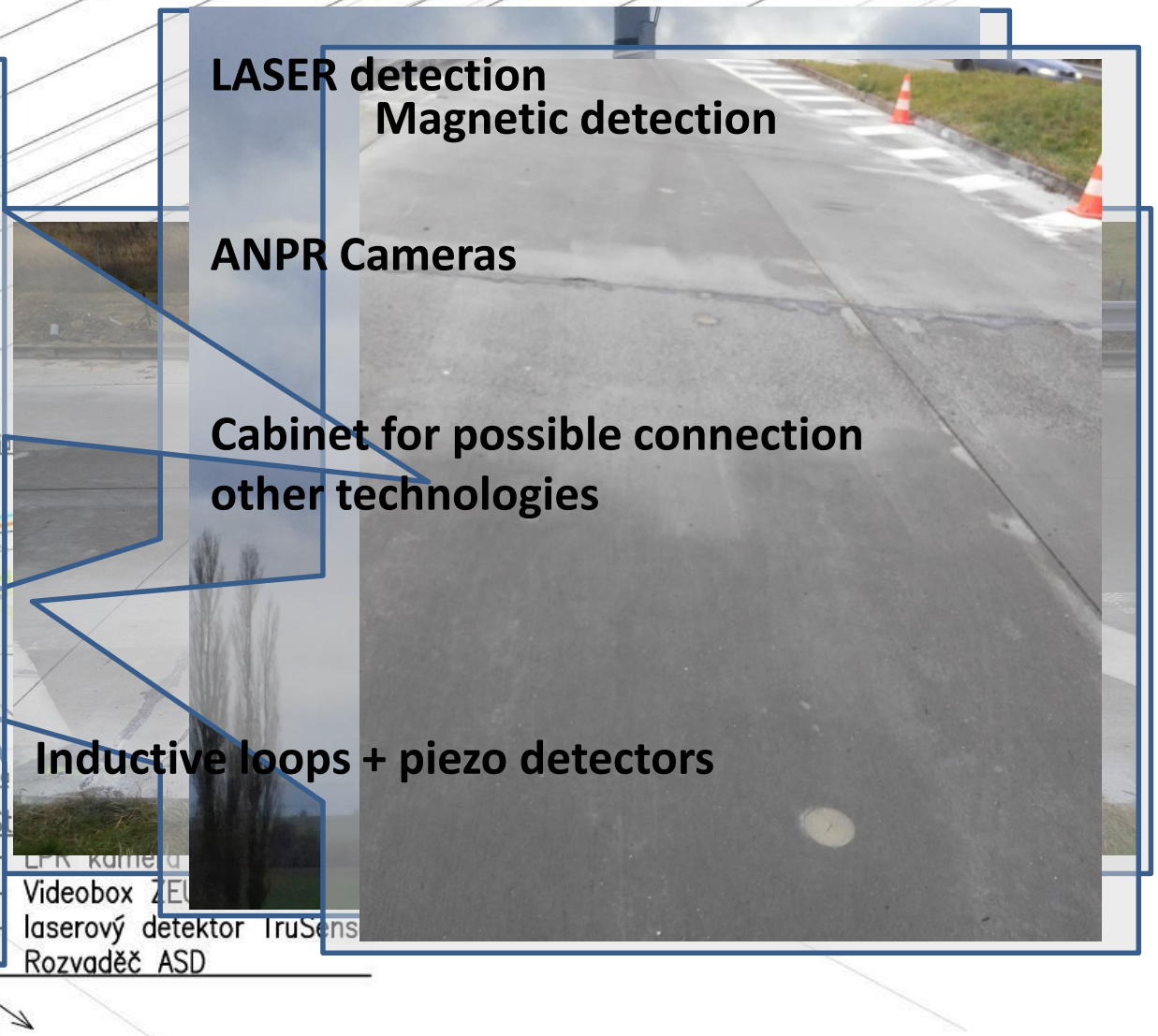
Overview cameras and infrastructure for demo site:
- 5x overview cameras (IN, Out, park)
- Metalic network
- Fiber optic network (reserved connection for new technologies)

DEMONSTRATION SITE

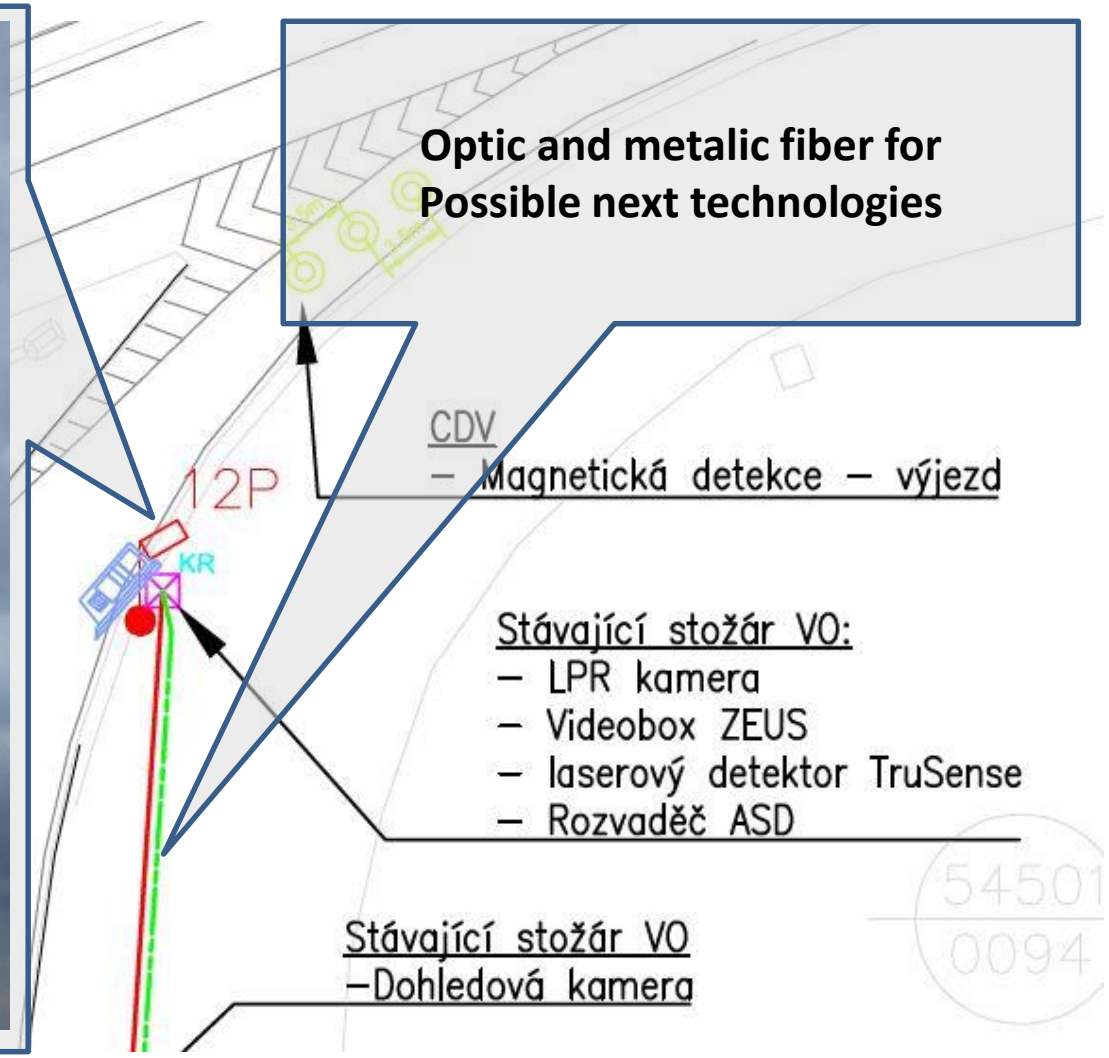
Project documentation



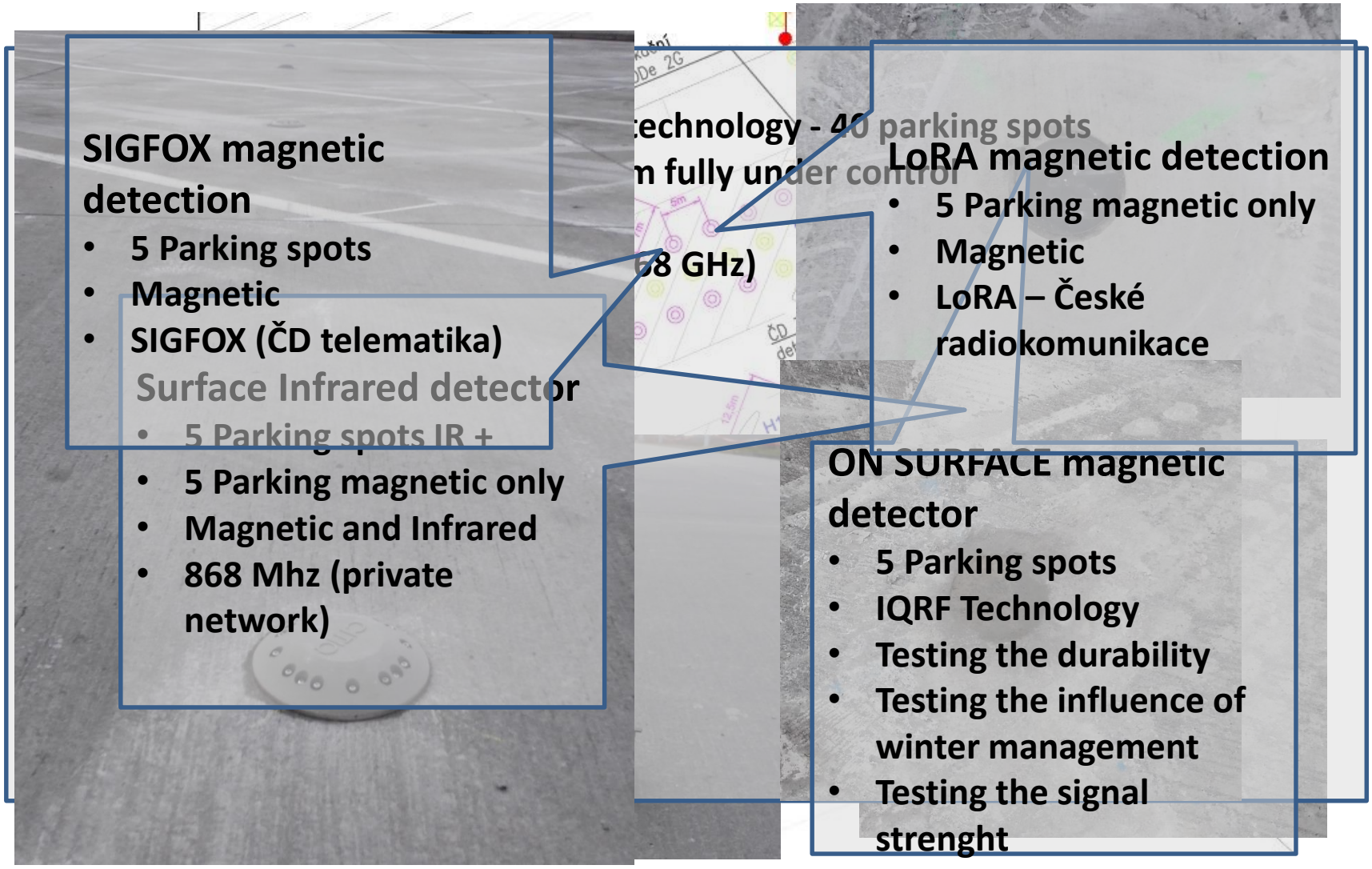
Technologies instalation – Entr



Instalation EXIT



Occupancy detection



SIGFOX magnetic detection
- 5 Parking spots
- Magnetic
- SIGFOX (ČD telematika)

Surface Infrared detector
- 5 Parking spots IR +
- 5 Parking magnetic only
- Magnetic and Infrared
- 868 Mhz (private network)

technology - 40 parking spots
m fully under control

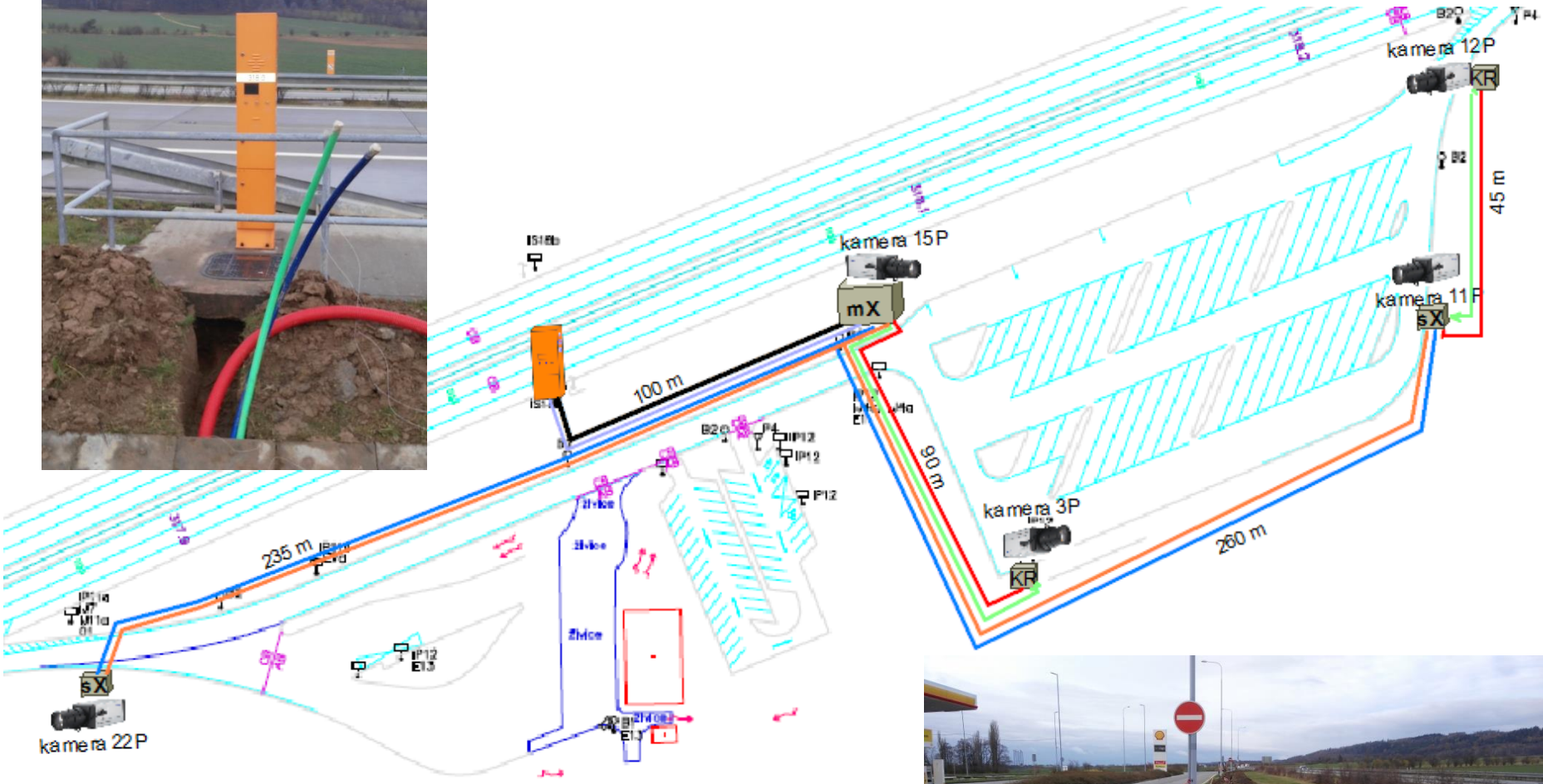
68 GHz)

LoRA magnetic detection
- 5 Parking magnetic only
- Magnetic
- LoRA – České radiokomunikace

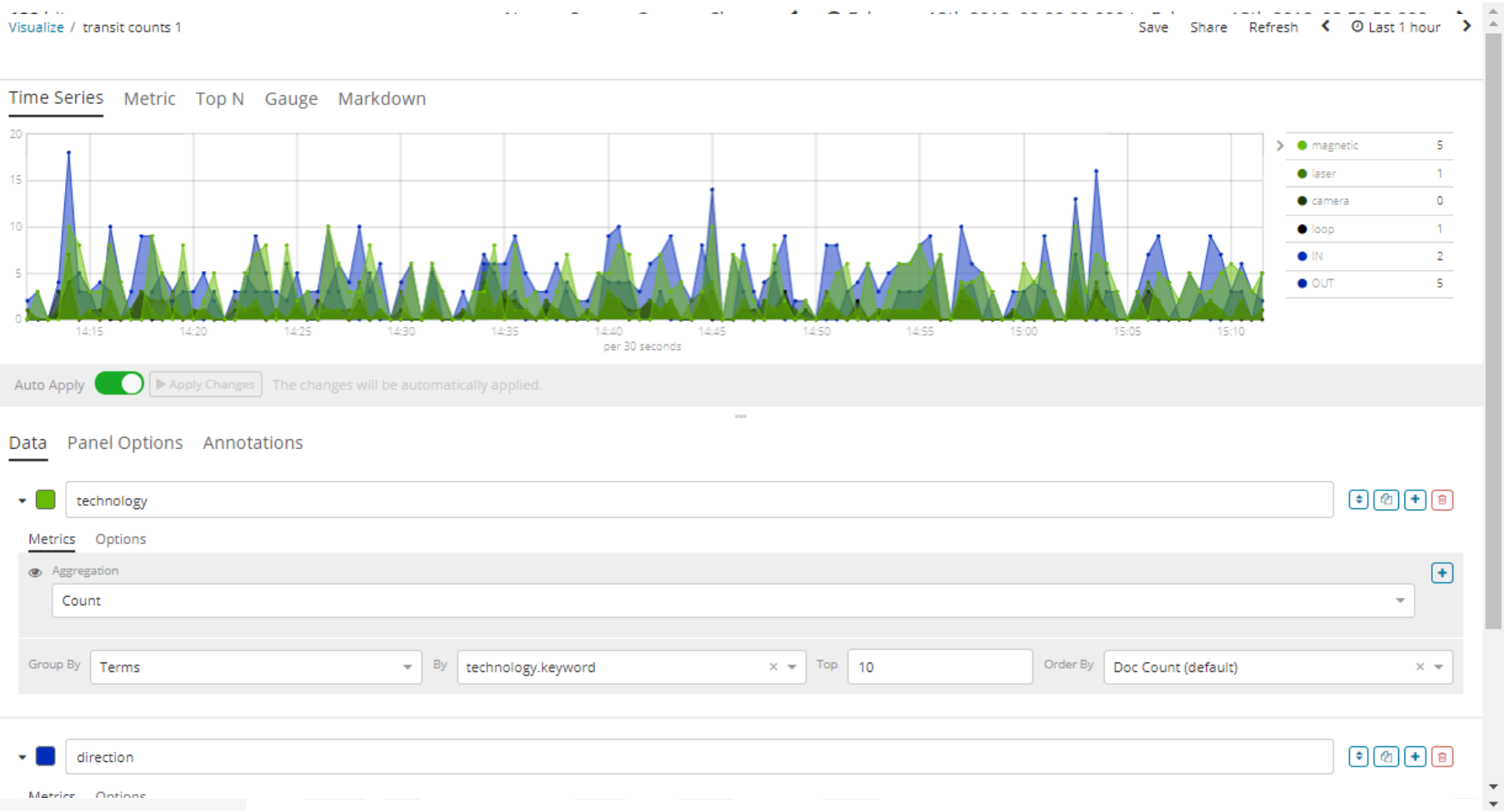
ON SURFACE magnetic detector
- 5 Parking spots
- IQRF Technology
- Testing the durability
- Testing the influence of winter management
- Testing the signal strenght

Surveillance cameras

Cable network



Evaluation Software



Testing results

Occupancy detection

LORA	SIGFOX	IQRF - mag	IQRF - surface	MAG+IR
+94%	+71%	+94%	+85%	+96%

Detection error is mostly caused:

- wrong parking behaviour
- Magnetic – in cases where vacancies are surrounded by standing trucks – could be calibrated
- specific driver behavior depending on time of day and occupancy rate – could be setup the level of occupancy based on the depending on the specific occupied places

SIGFOX – a relatively high percentage of packet loss caused by a lower signal level
LORA – has been supported by the installed gateway withing the parking area
ON-surface detection is not recommended – during winter we lost 2 from 5 detectors
Under surface detectors are not disrupting the surface of the parking area
Occupancy detectors could be valuable type of detection – could be installed even on non-parking spots – **level of occupancy above the 100%**

Testing results

Entrance/EXIT detection

Entrance

LASER	IL + PIEZO	ANPR	MAGNETIC
105%	109%	+93%	+92%

EXIT

LASER	IL + PIEZO	ANPR	MAGNETIC
+74%	x	+60%	102%

Detection error is mostly caused:

- **non-observance** of safe distances when entering the parking area
- **non-standard behavior** of drivers at entry/exit from the parking area (parking above sensors, reversing, strong braking, etc.)
- **Lasers/loops** divides long vehicles and overcounting
- **Magnetic -** vehicles were driving near the edges of the roads and detectors did not detect passage - detection needed in the quadrant
- **Laser at the Exit** – vehicles were driving in very different angles – wrong placement

Conclusions

- All detectors **are evaluated** according the new created guidelines
- **Automatic SW** for comparing the detectors outputs has been created
- The ideal **combination of technology has been search**
- Comparison Investition cost x service cost x reliability x accuracy will be provided in final study
- **The toll collection data** are in testing for the usage for occupancy prediction
- The final evaluation will be used for the **nationwide strategy** for the technology use on other truck parking locations (until the end of July 2018)
- The demonstration parking facility is planned for next using **as conformity compliant infrastructure and testing laboratorz**
- **Cooperation with Highway directoriate of Czech Republic**

Conclusions

- The **roadmap of implementation** detection technologies is just in final phase of preparation. **Different layouts** of truck parks will be taken into acount
- **It is not the truth** – Expensive technology = better technology
- Because of truck behaviour and experiences, **the logic above the data should be established**
- **Combination of technologies** and continuous calibration (auto) proccess needs to be established
- Every truck park needs to **be analysed before the technology installation** – trends (favourite places, non-favourite places, occupancy level detections based on the magnetic detection)
- **The quality criteria** – detection accuracy should be setup for the total value, not only on different detection technologies
- **Output from cameras** is also very important for police forces

Thank you for your attention!!!

Questions?

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