

# Network-wide effect of WTMS deployment: Czech case study

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# Overview

1. Why WTMS: the technology
2. Network-wide deployment and its effects
3. ICT: the „central brain“
4. Case study: SŽDC (Czech Republic)

# I. Why WTMS, what is to prevent?

- **DAMAGES ON THE INFRA**
  - damaging the structures, tracks, switches
  - damaging overhead lines, buildings...
  - breaking the rail operation
  - revenue loses on railway access fees
- **DAMAGES FOR THE RU**
  - damaging vehicle(s)
  - stopping the train – financial and time loses
  - loss of the business/customer, possible penalty





## I: Why WMTS: the legacy „technology“

- replacing the optical observation by the operational staff
- visual inspection of the vehicles on track
- today obsolete, unreliable – however still used
- CTC forces this out – technology needed

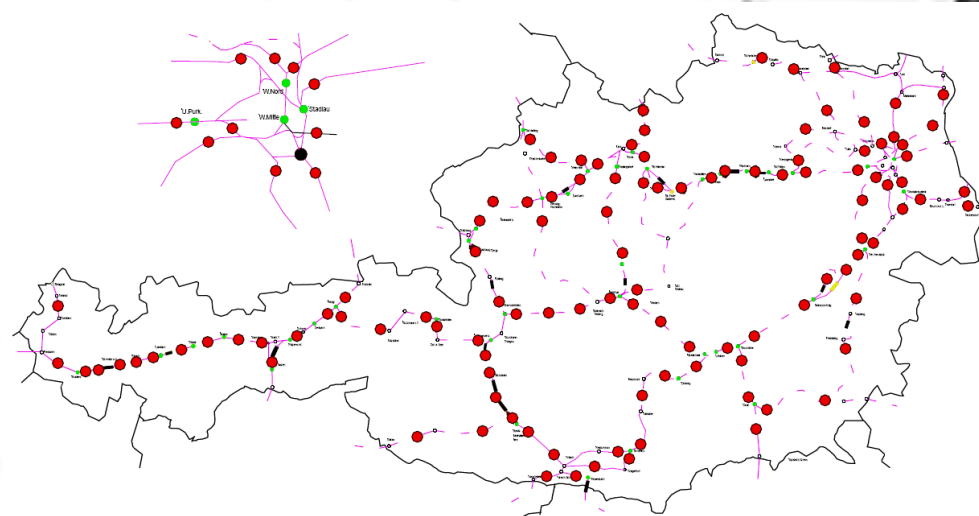
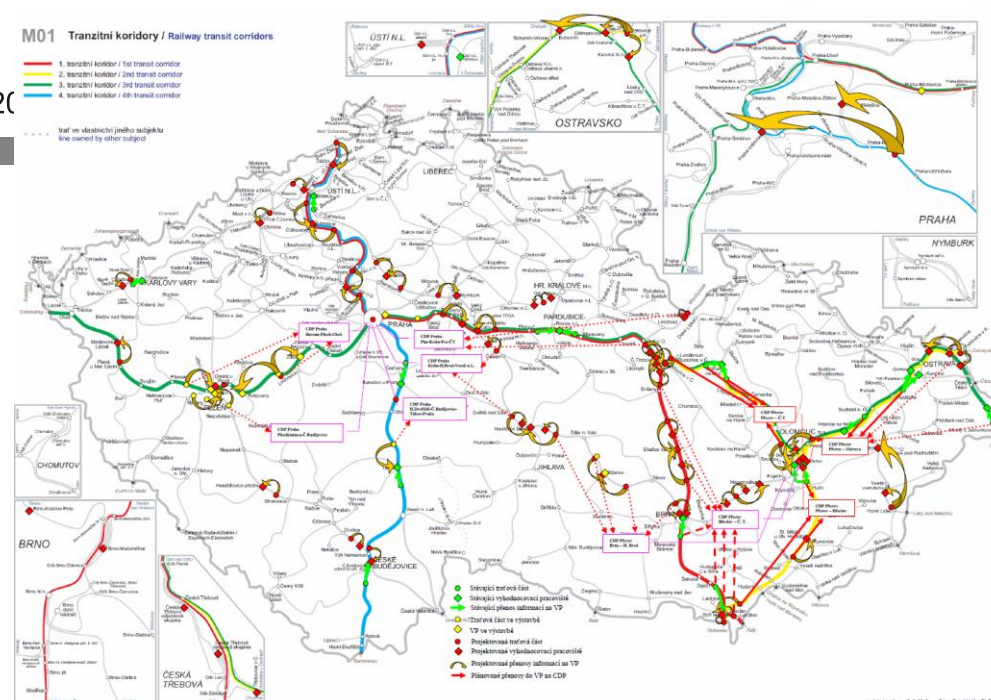


**SŽDC (CZ):**

- „SERVO“ in 1960s-1970s
- CTC Pilsen – Cheb
- today: approx. every 30-70 km; TEN-T, corridors

## ÖBB (AT):

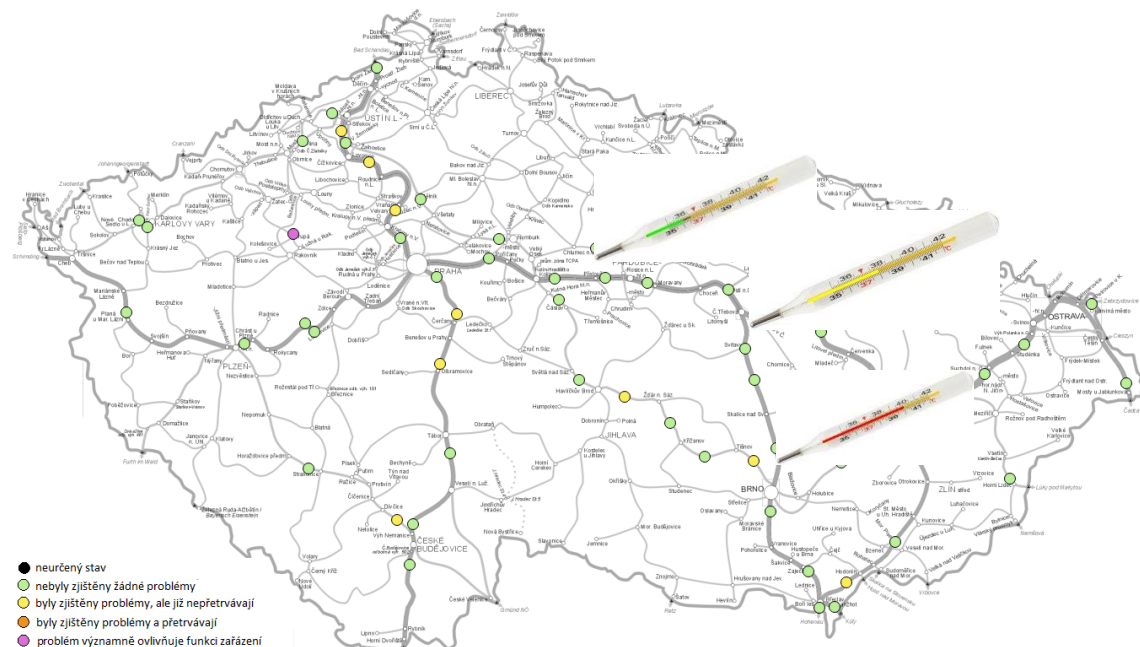
- target strategy – whole network every 30/60 km
- by 2014 – 275 hot-box installations
- Neue Westbahn, Koralmtunnel, Brennerbasistunnel





## II. Network-wide: defects under control

- „case study“: Adamov, 09/2012, derailment
- hot box – gradually increasing
- damaging infra (switches, 10 km track)
- traffic paralysed



## II. Network-wide: both IM & RU to exploit

### Benefits for IM:

- increasing safety, reliability
- reducing damages, reducing downtime
- reducing deterioration of the railtrack, lowering maintenance cost

### Benefits for RU:

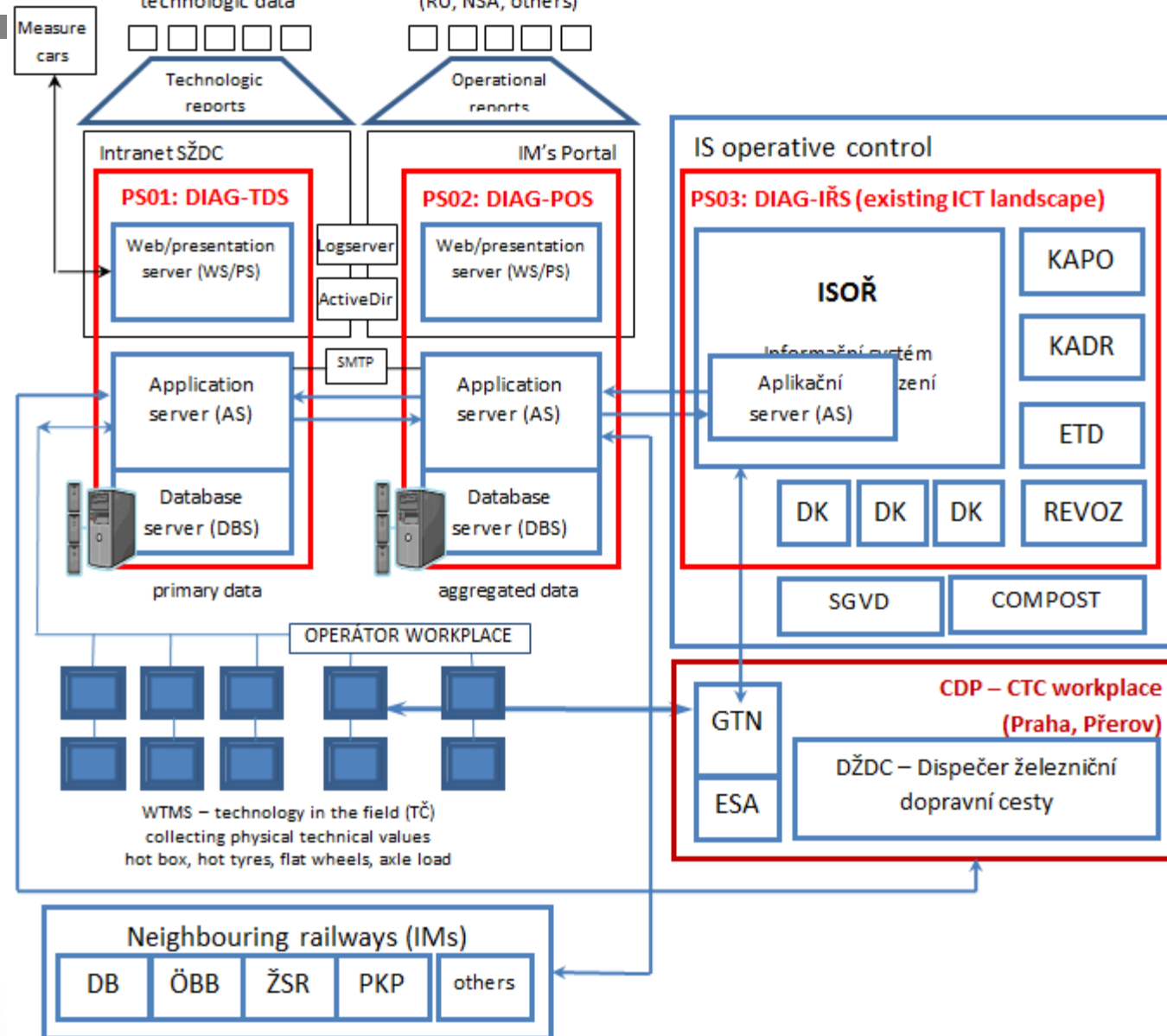
- inspecting tech. state of my rolling stock
- secondary checking real train positions
- preventing accidents





## III. ICT controlling system: the „central brain“

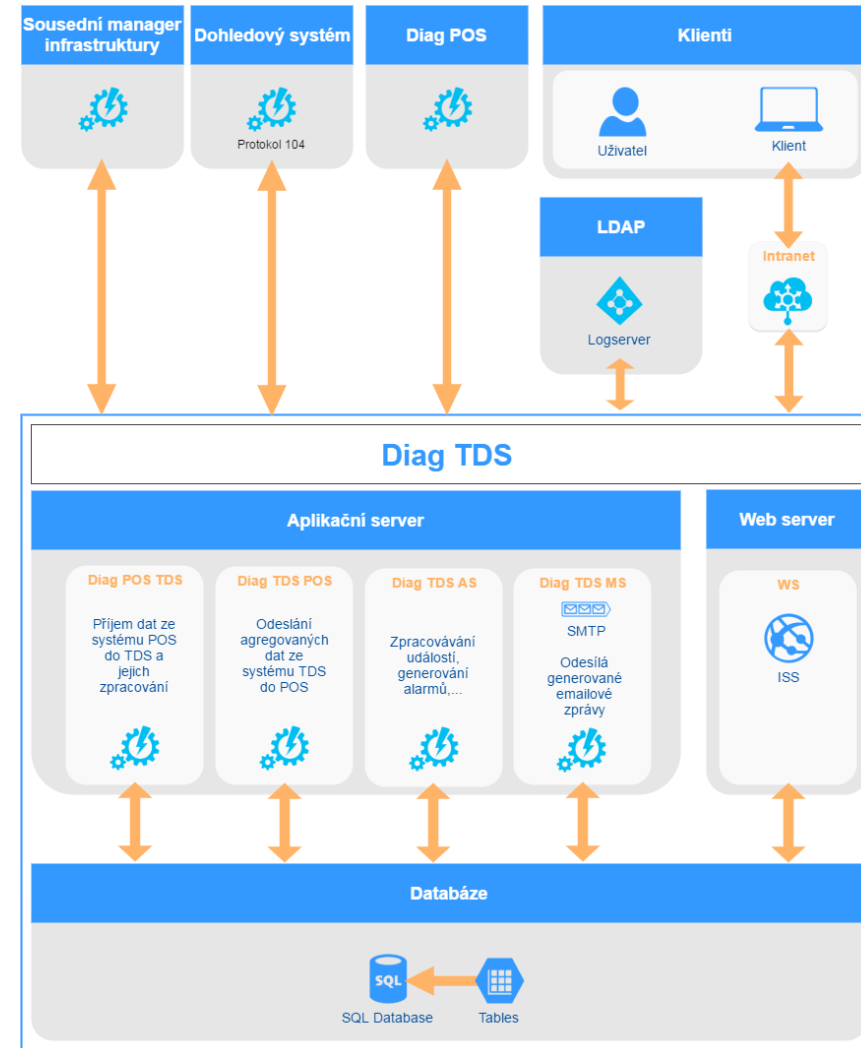
- ROSA – TDS: Technology monitoring server
- POS: Traffic operation system
- Implementing data interfaces, adjusting the existing ICT landscape





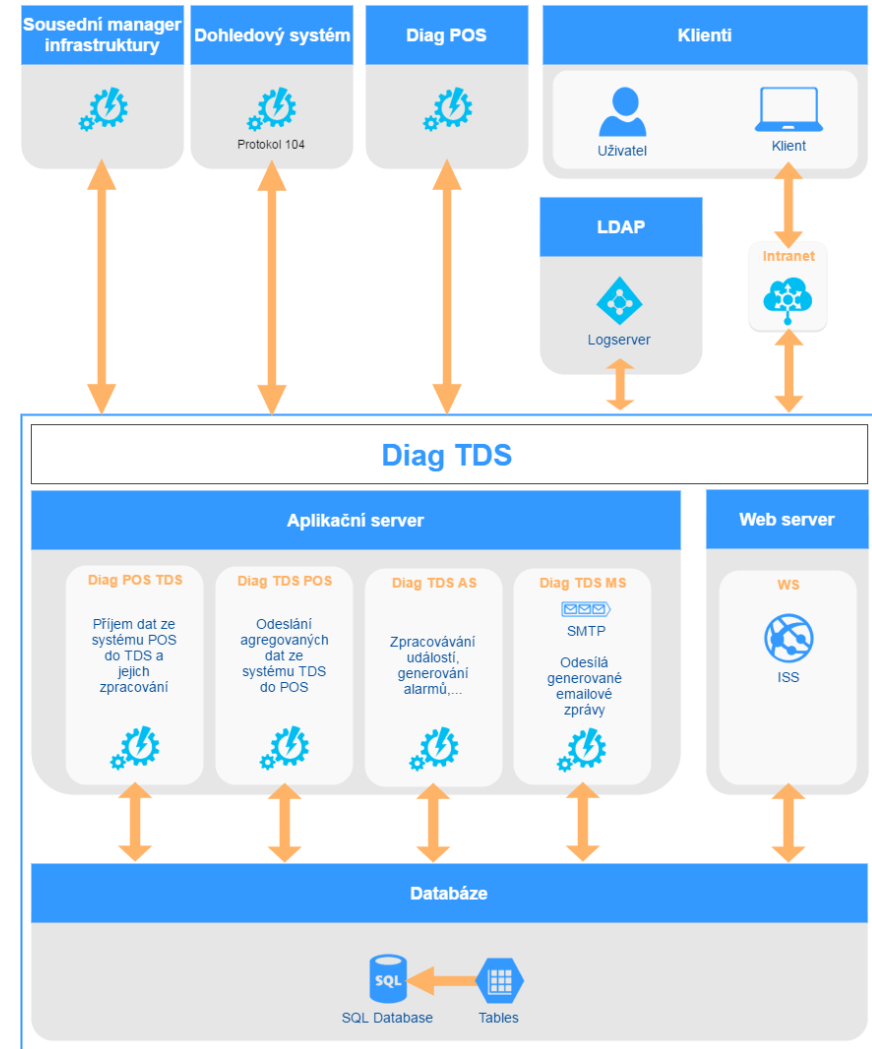
## III. ICT controlling „brain“: the core services

- Diag TDS service
  - Sending info on train passing
  - Sending selected aggregates
- Diag POS service
  - Receiving train composition
  - Matching trains, vehicles, axles; identifying the rolling stock
  - Verifying train length and params
- User authorisation – LDAP



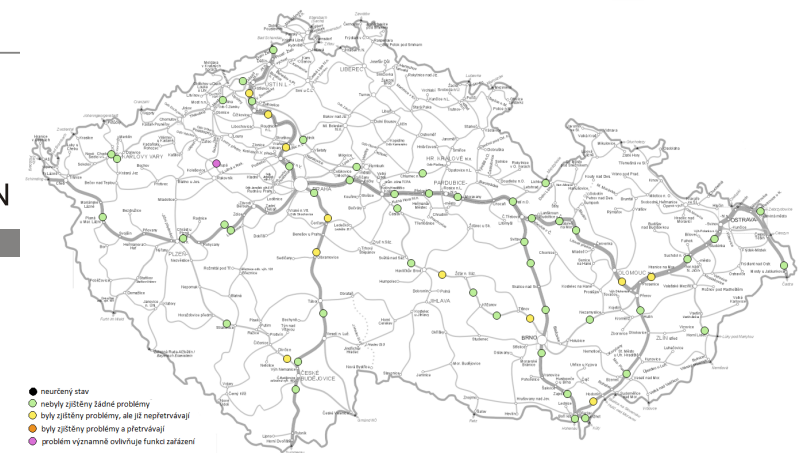
## III. ICT controlling „brain“: application server

- Application server service
  - Alarms, warnings
  - Trends, timelines
  - Inspections
- E-mail service
- Interface with the neighbouring IMs



## III. ICT controlling system: different views

- List of alarms
- List of warnings
- List of trains passed
- Tabular and graphical view of a train
- Map rendering with all checkpoints
- Forecasting trends, timelines
- Reports, e-mail alerts



ROSA-TDS technologický a dohledový systém

Průjezdy • Sledování vozidel • Trendy • Měření vozů • Sestavy • E-maily • Indikátory • Administrace • odstavení 1

Všechny Export Nastavit filtr

Aplikované filtry: Datum a čas od 15. 9. 2016 0:00 Výběr filtr

| Číslo průjezdu | Čas průjezdu         | Indikátor           | Směr | Číslo vlaku | Počet náprav | Délka [m] | Rychlost [km/h] | HL | HO | PK | Operace |
|----------------|----------------------|---------------------|------|-------------|--------------|-----------|-----------------|----|----|----|---------|
| 153841         | 15. 9. 2016 12:01:40 | Zábřeh - Litavá     | S    |             | 32           | 201,3     | 138             | ●  | ●  | ●  | ●       |
| 153840         | 15. 9. 2016 12:01:06 | Prerov - Břest      | N    |             | 24           | 148       | 156,1           | ●  | ●  | ●  | ●       |
| 153839         | 15. 9. 2016 12:00:15 | Ústí nad Orlicí     | S    | 149         | 24           | 149,6     | 129             | ●  | ●  | ●  | ●       |
| 153837         | 15. 9. 2016 11:59:33 | Damílkov            | S    | 116         | 28           | 176,6     | 132             | ●  | ●  | ●  | ●       |
| 153836         | 15. 9. 2016 11:58:55 | Ostrava - Jistebník | S    | 6501        | 22           | 125,8     | 86              | ●  | ●  | ●  | ●       |
| 153836         | 15. 9. 2016 11:58:41 | Okrouhlice          | N    |             | 4            | 15,3      | 18              | ●  | ●  | ●  | ●       |
| 153836         | 15. 9. 2016 11:58:34 | Lanžhot             | S    | 130         | 36           | 226,1     | 118,4           | ●  | ●  | ●  | ●       |
| 153834         | 15. 9. 2016 11:57:57 | Dolní zářezy        | S    | 267629      | 12           | 54,6      | 68,4            | ●  | ●  | ●  | ●       |
| 153833         | 15. 9. 2016 11:57:46 | Zábřeh - Hynčova    | S    | 1357        | 12           | 88,1      | 129             | ●  | ●  | ●  | ●       |
| 153832         | 15. 9. 2016 11:56:57 | Chodová Planá       | N    |             | 24           | 115,6     | 87              | ●  | ●  | ●  | ●       |

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## III. ICT controlling system: monitoring the vehicles

- List of vehicles passing on the checkpoint
- Filtering on specific vehicle
- Reports for IM
- Reports for RU – technical inspection of my rolling stock (optional)

ROSA-TDS technologický a dohledový systém

Průjezdy • Sledování vozidel • Trendy • Měřicí vozy • Sestavy • E-maily • Indikátory • Administrace • edrysavka1

Záznamy Export Nastavit filtr

Aplikované filtry: Datum průjezdu od: 15. 9. 2016 0:00 Výchozí filtr

| TR                                  | Indikátor | Číslo vozu         | Čas průjezdu         | Číslo průjezdu | Číslo nájezdu | Horká ložiska<br>L [°C] P [°C] | Horká obruce<br>L [°C] P [°C] | Plochá kola - měření<br>1. [cm] 2. [cm] | Plochá kola - zatížení<br>L [t] P [t] |
|-------------------------------------|-----------|--------------------|----------------------|----------------|---------------|--------------------------------|-------------------------------|---|---------------------------------------|
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2847 402 - 4 | 15. 9. 2016 12:14:14 | 153879         | 33            | 13 13 57                       | 0 0                           | 4,368                                   | 5,772                                 |
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2847 402 - 4 | 15. 9. 2016 12:14:14 | 153879         | 34            | 12 12 57                       | 0 0                           | 4,836                                   | 4,88                                  |
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2847 402 - 4 | 15. 9. 2016 12:14:14 | 153879         | 35            | 12 12 57                       | 0 0                           | 4,524                                   | 5,304                                 |
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2847 402 - 4 | 15. 9. 2016 12:14:14 | 153879         | 36            | 10 17 57                       | 0 0                           | 4,992                                   | 4,056                                 |
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2789 039 - 4 | 15. 9. 2016 12:14:14 | 153879         | 21            | 17 19 57                       | 0 0                           | 5,46                                    | 6,708                                 |
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2789 039 - 4 | 15. 9. 2016 12:14:14 | 153879         | 22            | 15 17 57                       | 0 0                           | 5,928                                   | 6,24                                  |
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2789 039 - 4 | 15. 9. 2016 12:14:14 | 153879         | 23            | 18 19 57                       | 0 0                           | 6,552                                   | 6,396                                 |
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2789 039 - 4 | 15. 9. 2016 12:14:14 | 153879         | 24            | 15 17 57                       | 0 0                           | 5,46                                    | 6,24                                  |
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2789 004 - 0 | 15. 9. 2016 12:14:14 | 153879         | 5             | 15 16 57                       | 0 0                           | 5,928                                   | 6,864                                 |
| TR/3145/---1049304A00/2016/20160915 | Svtavy    | 83 80 2789 004 - 0 | 15. 9. 2016 12:14:14 | 153879         | 6             | 27 23 57                       | 0 0                           | 6,084                                   | 5,816                                 |

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Záznamy: 1-10 / 74917

ROSA-TDS technologický a dohledový systém

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Záznamy Export Nastavit filtr

Aplikované filtry: Datum průjezdu od: 15. 9. 2016 0:00 Výchozí filtr

**Filtr**

Doprava: (nevytvářeno)

TR:

Indikátor: (nevytvářeno)

Číslo vozu: Nic není vybráno

Datum průjezdu od:

Datum průjezdu do:

Horká ložiska [°C]:

Horká obruce [°C]:

PK - měření [cm]:

PK - zatížení [t]:

Aplikovat Storno

| TR                                  | Indikátor        | Číslo vozu         | Čas průjezdu         | Číslo průjezdu | Číslo nájezdu | Horká ložiska<br>L [°C] P [°C] | Horká obruce<br>L [°C] P [°C] | Plochá kola - měření<br>1. [cm] 2. [cm] | Plochá kola - zatížení<br>L [t] P [t] |
|-------------------------------------|------------------|--------------------|----------------------|----------------|---------------|--------------------------------|-------------------------------|---|---------------------------------------|
| TR/1154/---0002936A00/2016/20160915 | Trnec - Bystrice |                    |                      |                |               |                                |                               |   |                                       |
| TR/1154/---0002936A00/2016/20160915 | Trnec - Bystrice |                    |                      |                |               |                                |                               |   |                                       |
| TR/1154/---0002936A00/2016/20160915 | Trnec - Bystrice |                    |                      |                |               |                                |                               |   |                                       |
| TR/1154/---0002936A00/2016/20160915 | Trnec - Bystrice |                    |                      |                |               |                                |                               |   |                                       |
| TR/1154/---0009673A00/2016/20160915 | Vraňany          |                    |                      |                |               |                                |                               |   |                                       |
| TR/1154/---0009673A00/2016/20160915 | Vraňany          |                    |                      |                |               |                                |                               |   |                                       |
| TR/3145/---1049304A00/2016/20160915 | Svtavy           |                    |                      |                |               |                                |                               |   |                                       |
| TR/3145/---1049304A00/2016/20160915 | Svtavy           |                    |                      |                |               |                                |                               |   |                                       |
| TR/3145/---1049304A00/2016/20160915 | Svtavy           |                    |                      |                |               |                                |                               |   |                                       |
| TR/3145/---1049304A00/2016/20160915 | Svtavy           |                    |                      |                |               |                                |                               |   |                                       |
| TR/3145/---1049304A00/2016/20160915 | Svtavy           | 83 80 2789 039 - 4 | 15. 9. 2016 12:14:14 | 153879         | 34            | 15 17 57                       | 0 0                           | 5,46                                    | 6,24                                  |

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Záznamy: 1-10 / 74923

## III. ICT controlling system: technical params

- Managing the checkpoints
  - Adjusting threshold
  - State indication – map or list rendering
- Managing inspections
  - Regular and ad hoc inspections
  - Participants, inspection protocol
  - E-mail template
  - State discovered



Prahové hodnoty

|  | Platnost od | 1. 6. 2016 0:00:00 | 29. 7. 2016 7:43:26 |
|--|-------------|--------------------|---------------------|
|  |             | <b>Aktuální</b>    | <b>Nové</b>         |
| Výstraha teplot horkých ložisek [°C]         |             | 60                 | 60                  |
| Alarm teplot horkých ložisek [°C]            |             | 110                | 110                 |
| Výstraha rozdílu teplot horkých ložisek [°C] |             | 48                 | 48                  |
| Alarm rozdílu teplot horkých ložisek [°C]    |             | 48                 | 48                  |
| Výstraha teplot horkých obrudí [°C]          |             | 200                | 200                 |
| Alarm teplot horkých obrudí [°C]             |             | 300                | 300                 |
| Výstraha délky plochých kol [cm]             |             | 4.5                | 4.5                 |
| Alarm délky plochých kol [cm]                |             | 6                  | 6                   |

Zavřít

Průjezdy • Sledování vozidel • Trendy • Měřicí vozy • Sestavy • E-maily • **Indikátory** • Administrace • Pavel Ryšávek

Plán prohlídky

Číslo 7

Indikátor Blansko

Datum plánu 16.09.2016 12:27

Poznámka Zdá se že dneska Veselka nestihá

Typ prohlídky Pravidelná prohlídka

Šablona emailu Nová prohlídka

Účastníci vybráno: 2 z 2

Realizace prohlídky

Datum realizace

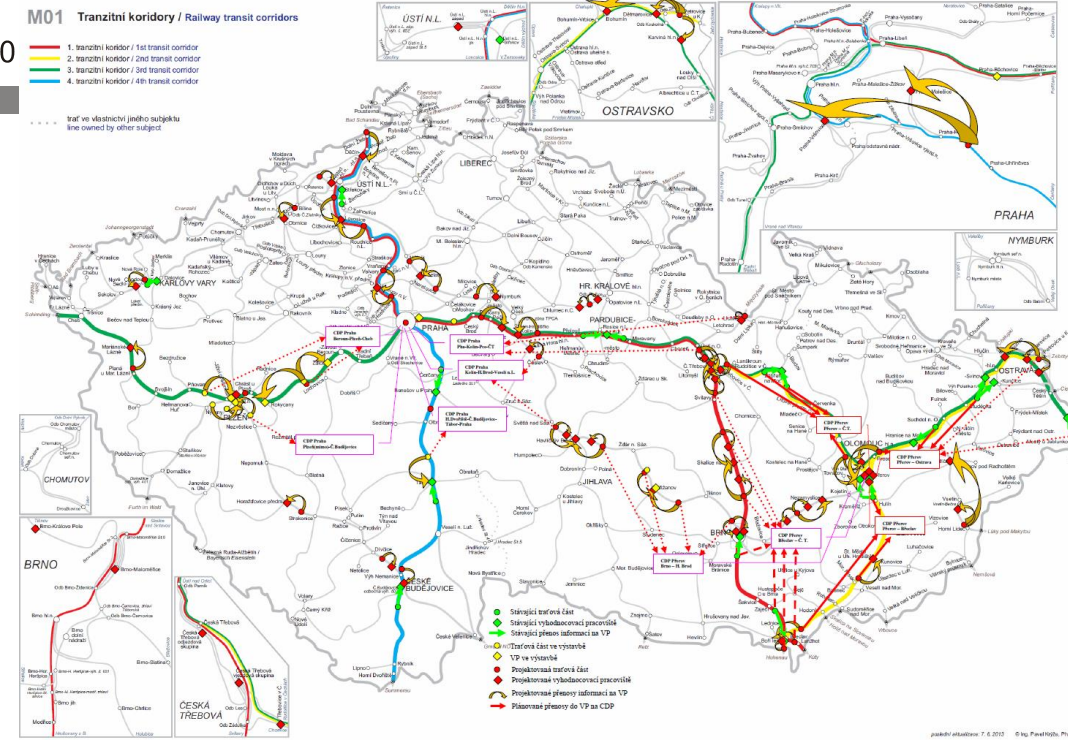
Poznámka k realizaci

Realizoval (nevybráno)

Přiloha

## IV. Case study SŽDC: facts & stats

- target state = 65 checkpoints total
- corridor and major freight lines covered
- 130 technology PCs (Linux RH8, Windows)
- 57 evaluating PCs (Linux RH8)
- 2 servers (3 virtual systems Win Server 2012)
- WTMS: 40 new spots with cabinets, with security alarm of STARAlarm





## IV. Case study SŽDC: the project timeline

### Timeline:

- from 1999 – single dispersed instals (15 spots, 9 more in 2014)
- Nov 2014 – a tender opened for WTMS delivery, 41 spots
- Jan 2015 – winning consortium EŽ + STARMON“, controlling system OLTIS Group + STARMON
- technology: ASDEK, voestalpine SIGNALLING Sopot (TENS)
- funding: Operational Programme Transport (OPT I)

### Project deadlines:

- project start on 20.7.2015, 3 months preparation, 12 months to realize
- deployed from 06/2016 to 11/2016



## V. WTMS: summary

- important technology to monitor the health of both vehicles and infra
- achieving a higher safety and reliability on the network
- present stats on SŽDC: daily cca 3500 trains, multiple alarms/warnings
- majority of trains matched in the data
- benefits for the future



# Thank you for your attention

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