This project has received funding from the Shift2Rail Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement no. 777594 (OptiYard)

WP2 DATA ANALYTICS

Current data handling capabilities

Mid-term Conference, October, 5th 2018

OBJECTIVES

- Operating process
- Methods and technics for data gathering
- Most suitable ones for managing the rail freight operation

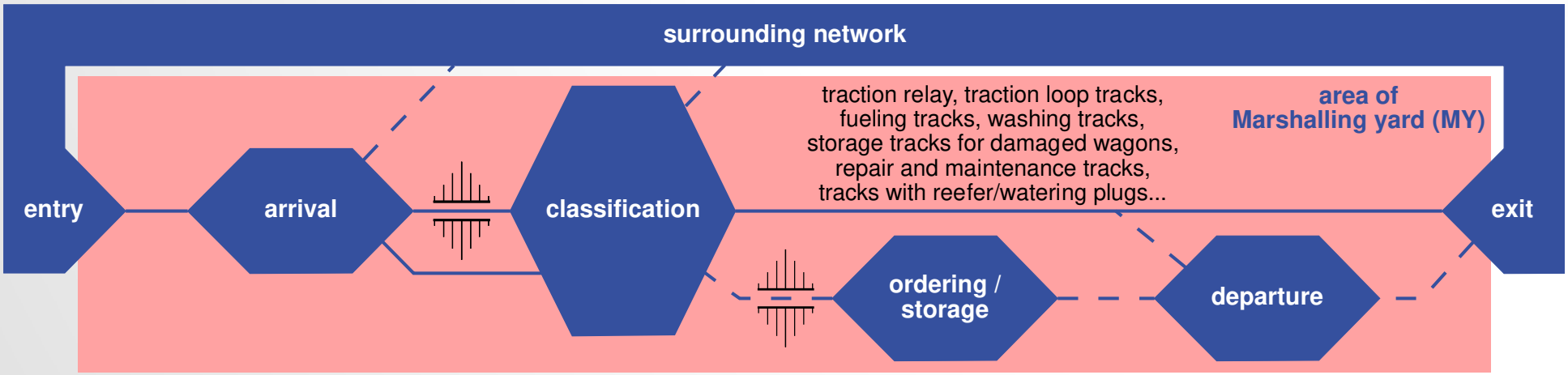
METHODOLOGY

- Operating processes
- EU projects
  - Automated Rail Cargo Consortium (ARCC)
  - SMARTRAIL On-time
  - Capacity4Rail
  - FR8Hub
- Case studies
  - REMAS
  - VAMOS
  - CD Cargo
  - STM
  - OCR for wagon identification
  - SNCF
  - Olin

FRAMEWORK

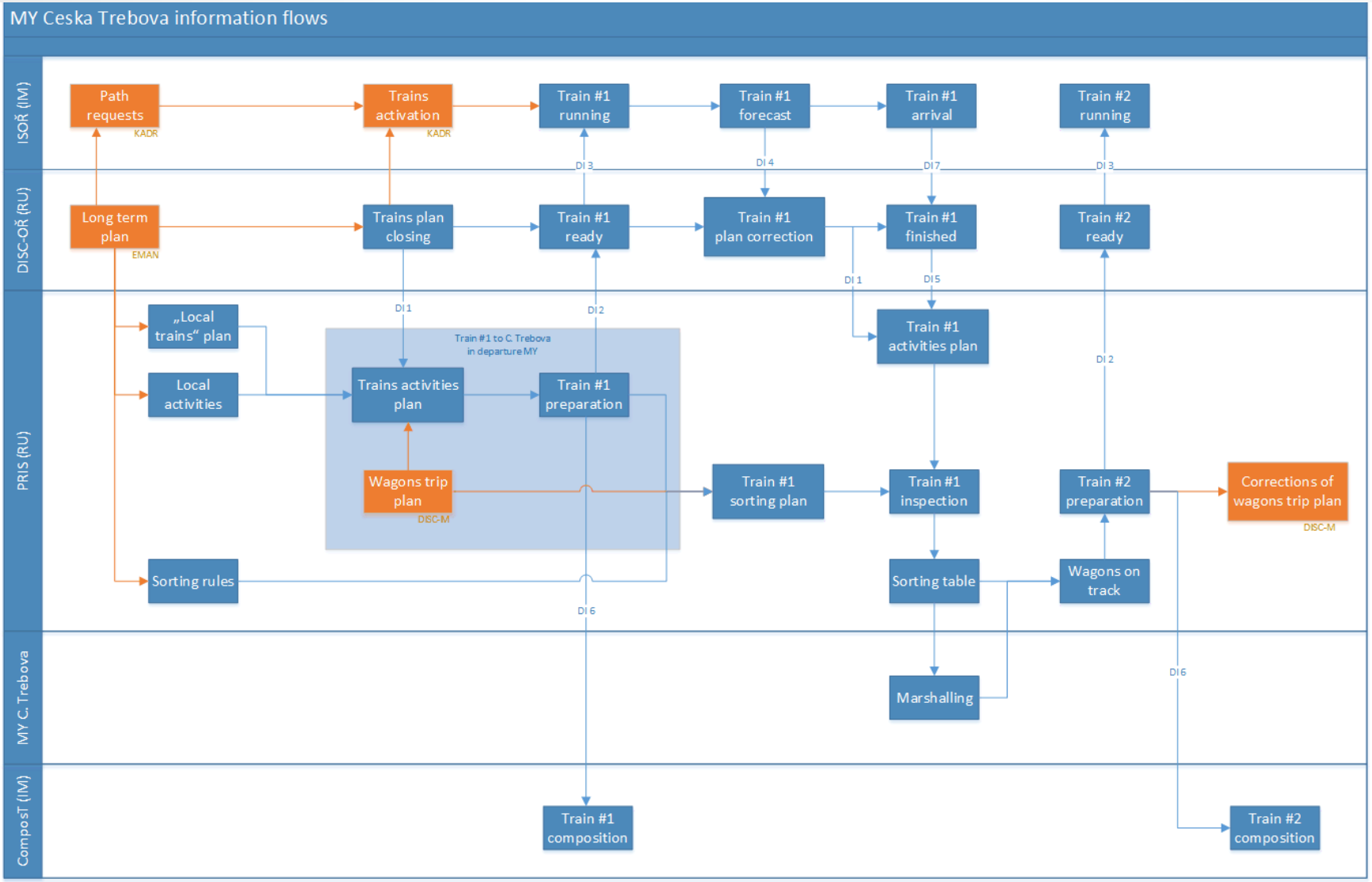
- Regulation and Regulatory Requirements for Data Handling
  - Regulations
    - ✓ TAF TSI
    - ✓ UIC 407
  - Standards
    - ✓ RailTopoModel
    - ✓ railML
  - Tools
    - ✓ RNE TIS
    - ✓ RNE PCS
    - ✓ RailData ISR
- Recommendations for Improved Information and Communications for Marshalling Yard and Network Management

FUNCTIONAL AREAS AT A GENERIC MY



PROCESSES AT A GENERIC MY

DATA EXCHANGE AT CESKA TREBOVA



Source: Oltis

SAMPLE INTERFACE IN CESKA TREBOVA

- DI1 Train Plan Message

Train Plan	Train composition	Train ready	Train forecast	Train running
• Header • Actions • Plan • Route • Tractions • Exceptions • Drivers • Dangerous Goods	• Header • PathID • Train data • Train composition journey • Wagon data • Loco data • Journey section	• Message status • Train ID • Train location • Start time • Ready time • Departure data • Destination data • Event data	• Area Code • RU • Train data • Scheduled dep + arr time • Last GPS • Dep + Arr Track in Station • Dep+ Arr track on line • Dep + Arr confirmed	• Message status • Train ID • Dep station + time • Dest station +est. Time • Scheduled dep. Time • Event data

ETIGER/TIGER DEMO

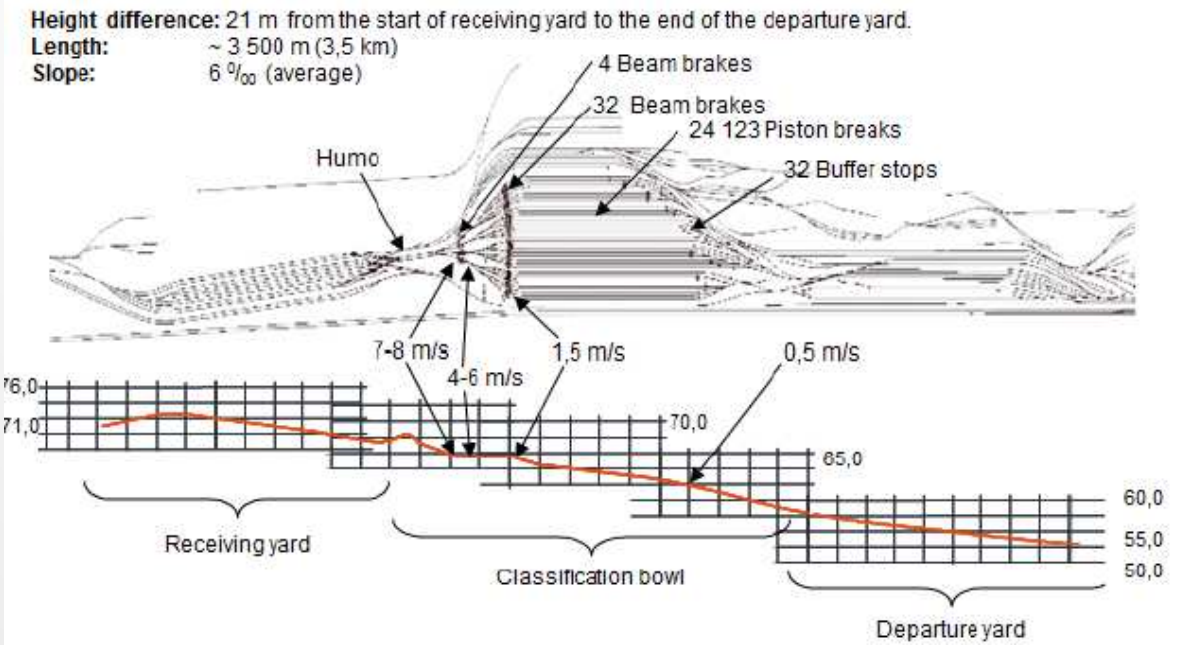
- Develop rail transport solutions in competitive and co-modal freight logistics chains.
- Re-engineering of port layout including design of rail signalling and control systems. ERP intelligent system management and E-Customs control was analised as well signalling and safety train operation (on non RFI railway tracks) and container and train tracking & tracing (E-Customs/security services)

CAPACITY4RAIL

- New concepts for low maintenance infrastructure was analised, using standardised and 'plug-and-play' concepts was proposed.

AUTOMATED RAIL CARGO CONSORTIUM (ARCC)

- Improve quality, efficiency and cost effectiveness in European rail freight operations. Analysis was conducted at three different Marshalling yards:
  - München-Nord/ Germany
  - Mannheim/ Germany
  - Hallsberg/ Sweden



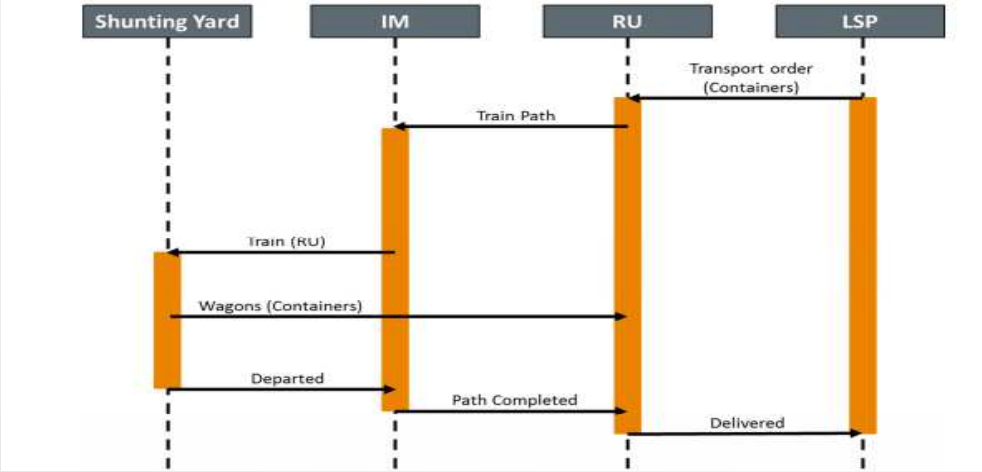
MY München-Nord

VIWAS

- First data collection automatic per wagon with a variety of sensor
- Aiming at the development of:
  - Market driven business models and production systems
  - Security of the critical mass needed for SWL operations
  - New ways for Last mile infrastructure design and organisation

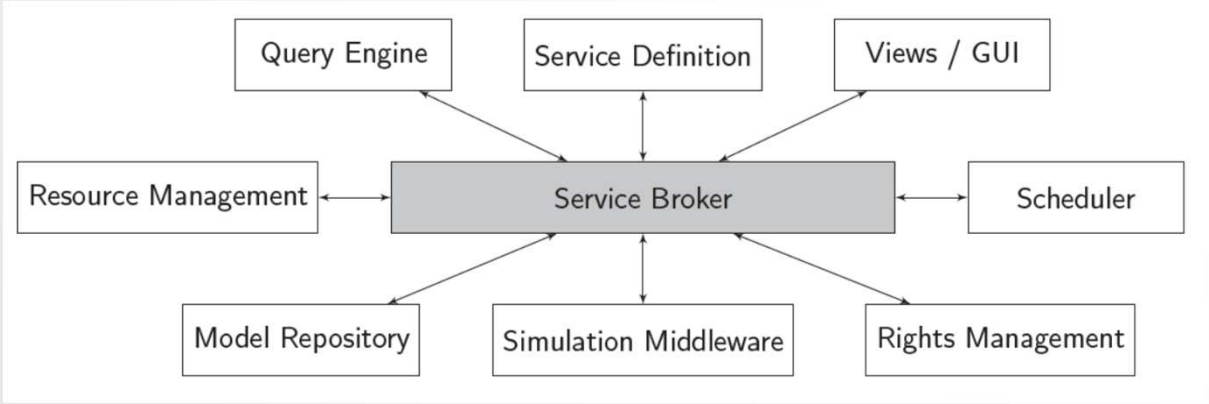
SMARTRAIL

- Currently in use within BD Rail Services
- Utilise QR codes (Quick Response Codes) attached to the side of wagons
- Required info : Real Time Information – most notably the Train Position



REMAS –
RESOURCE MANAGEMENT SYSTEM FOR AUTOMATED DRIVING

- New ADAS hindering by economic and safety risks make simulation permissive before rollout (automated driving) ; and changing juridical and bureaucratic conditions
- System design of REMAS with the RTI (Run-time infrastructure) as Simulation Middleware



VAMOS - VERKEHRS-ANALYSE-, -MANAGEMENT- UND OPTIMIERUNGS-SYSTEM (SYSTEM FOR TRAFFIC ANALYSIS, MANAGEMENT AND OPTIMISATION)

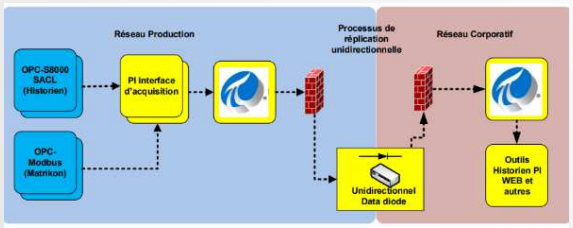
- Cyber physical system wherein the traffic state is measured using different detector techniques in real (time intelligent traffic control) for optimal use of infrastructure with control of demand for motorised individual traffic raising attractiveness of public transport

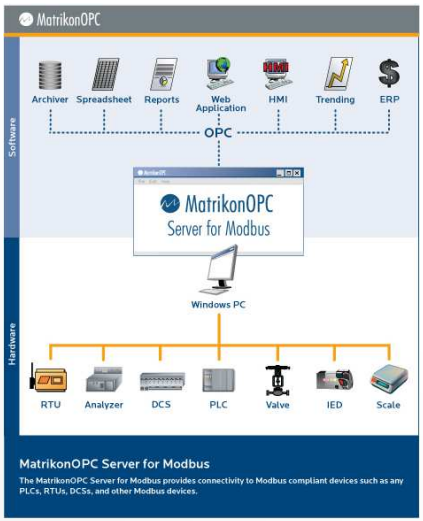
OCR AND RFID AT CD CARGO

- OCR (Optical Character Recognition-based technology) and RFID systems for freight wagon number reading
- Faster check-in (clearance) of wagons to be processed/being processed/having been processed.
- Potential savings of direct labour in the yard before (check-in of arriving trains/wagons) and after the hump processes (check-out of outbound wagons)

STM (SOCIETÉ DE TRANSPORT DE MONTREAL)

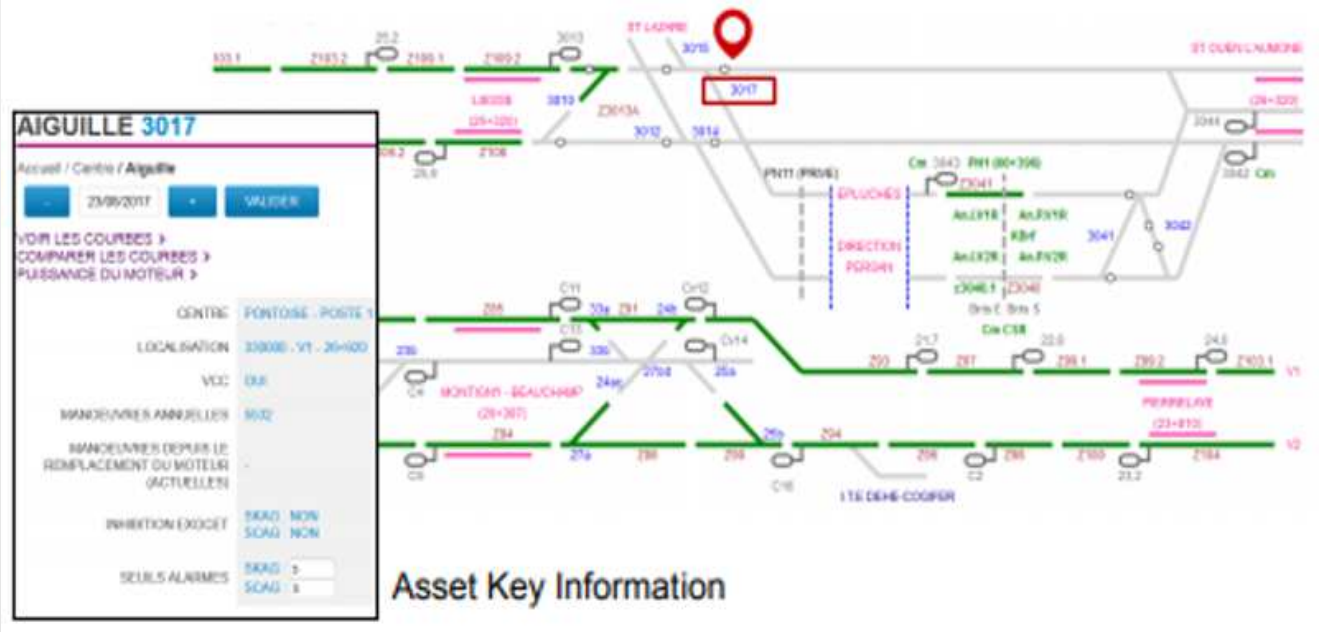
- Real-time asset monitoring using PI System architecture (OsiSoft) for escalators to improve the control over the fixed asset (pilot experience)
  - Aiming at maintenance cost reduction





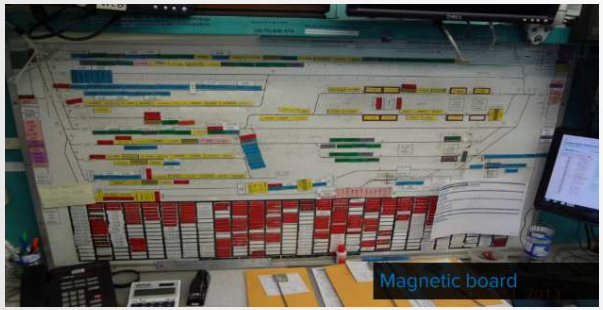
OPERATIONAL DATA FOR FUTURE MAINTENANCE AT SNCF RÉSEAU

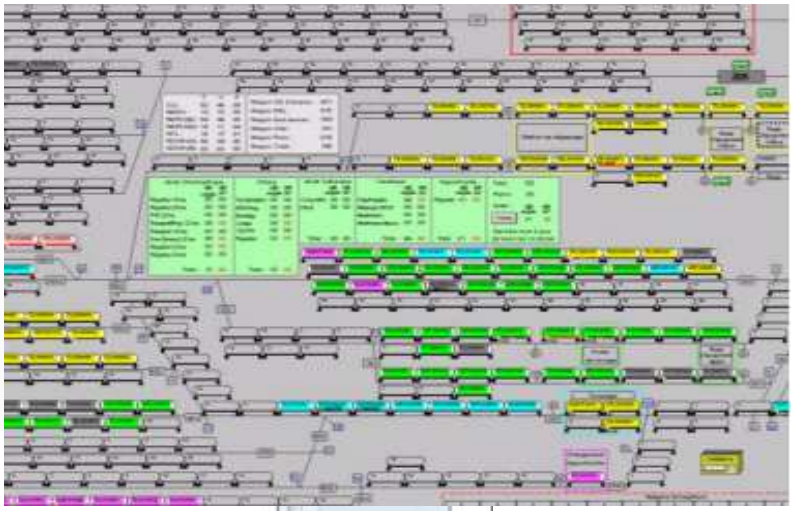
- OsiSoft package was to reduce the impact of maintenance activities on rail traffic, improving asset surveillance and anticipating/preventing possible incidents

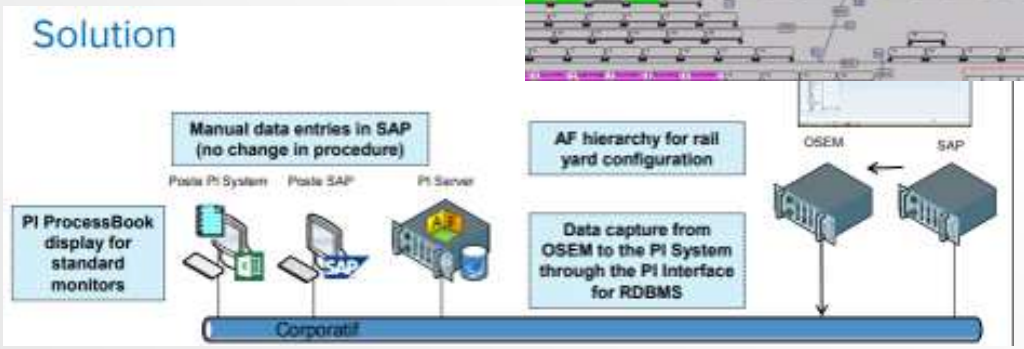


RAIL YARD MANAGEMENT AT OLIN- BÉCANCOUR

- Fleet collecting and tranforming data from multiple sensors in shareable real-time data to spread the information efficiently across the plant

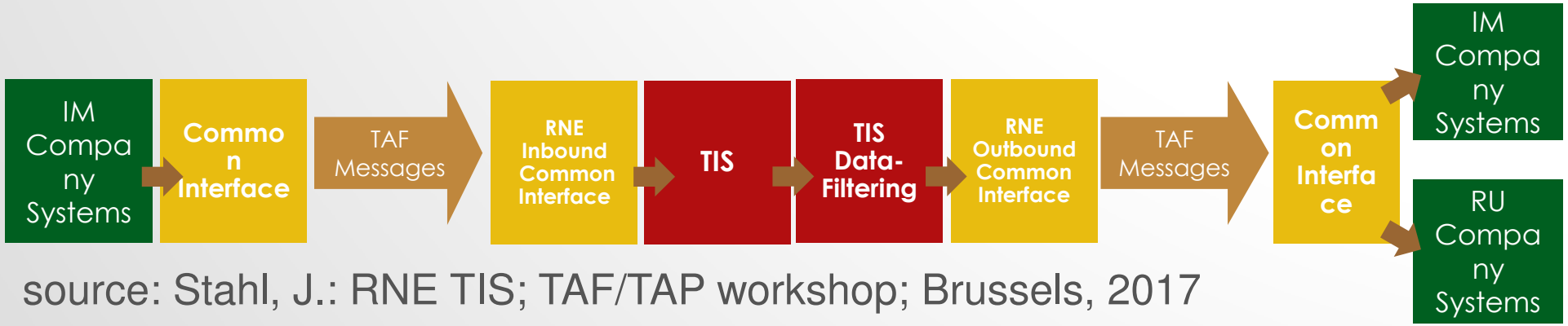






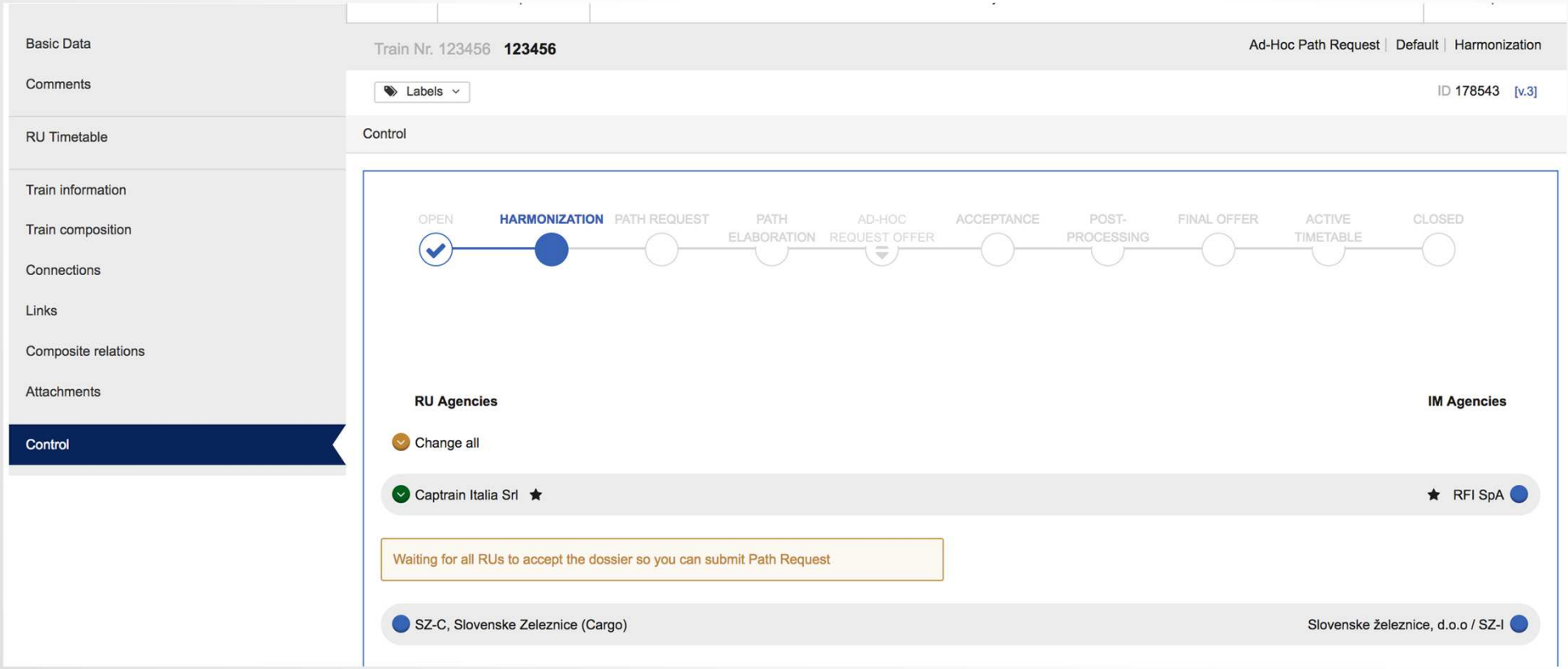
RNE TIS

Joint IM-RU Functions	RU (freight) Only Functions *
Reference Files Common Interface Short Term Path Request Train Preparation Train Running Information Train Forecast Service Disruption Deviations from plan (TAP) (Train Identifiers)	Consignment Note Data WIMO Wagon Movement Shipment ETA * Commercial part of TAP is not considered in the table

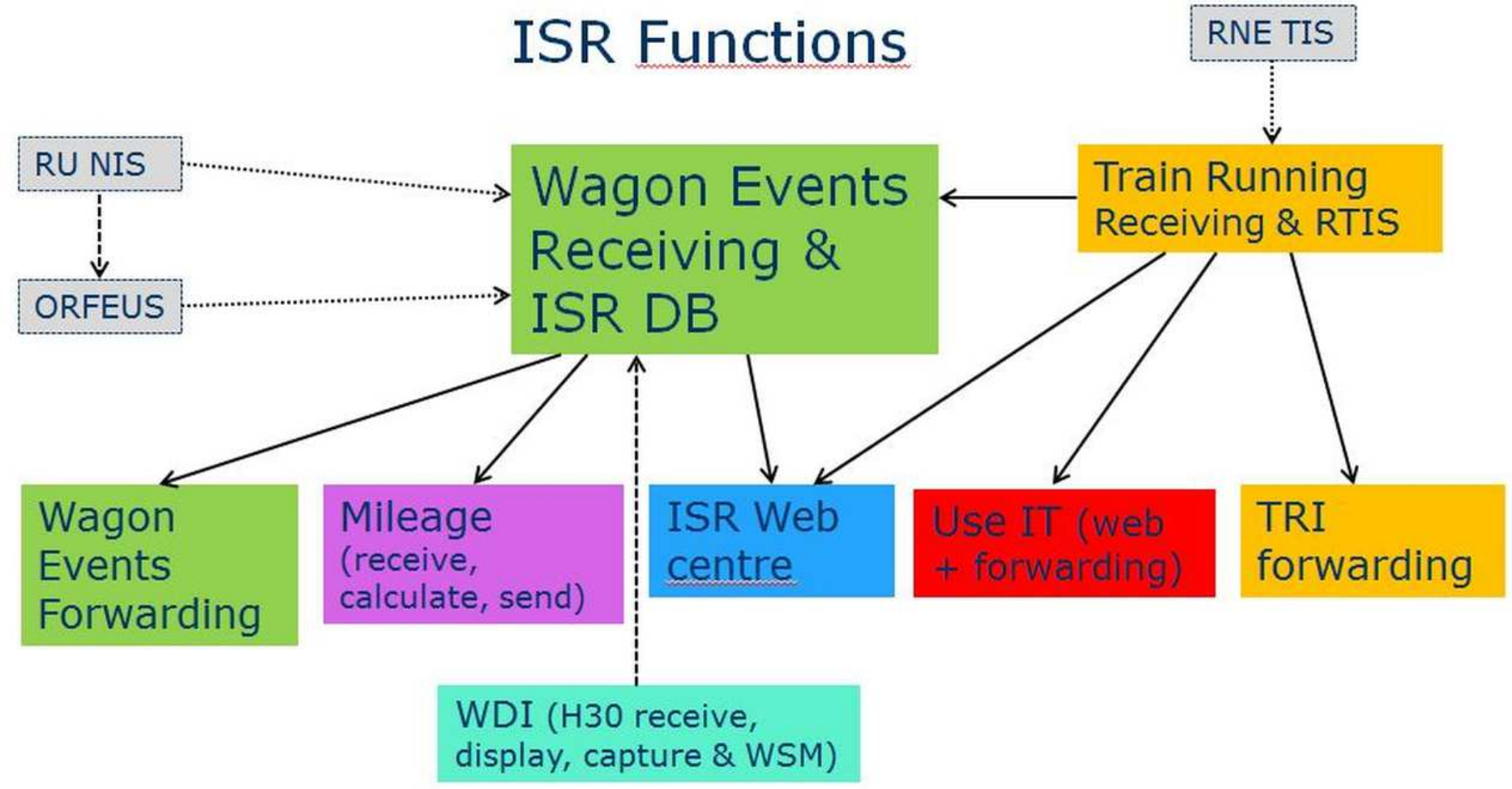


source: Stahl, J.: RNE TIS; TAF/TAP workshop; Brussels, 2017

RNE PCS (PATH COORDINATION SYSTEM)



RAILDATA ISR



RECOMMENDATION FOR YARD AND NETWORK COMMUNICATION

- Optimisation module and algorithms at large and complex yard infrastructures
- integrate with the existing IT environment and with activities toward yard automation, e.g. intelligent assets and automated shunting in yards
- Long distance monitoring of incoming trains from the external network on screens enabling to prepare pre-advanced work planning
- Interaction with the IM for accurate ETA as soon as the train enters the relevant network
- Interaction with the IM using real-time optimisation to deal with unexpected events during the approach of the train or the operation in the yard
- Interaction between IM and MY to find the best solution for both yard and network
- Reset the work plan and new ETD and ETA accepted by the IM, thus enabling the client to have accurate updated information on the situation and the future progress of the train

CONCLUSIONS

- Partial use of commercial use possible for those RUs that own licenses
- Otherwise use of proprietary systems
- TAF TSI messages already partially in use, maybe broaden
- Recommendations for data management at MY will be developed in WP5

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QUESTIONS

Thank you for your kind attention!

TU Dresden, Susanne Wunsch
Newcastle University, Dr. Marin Marinov
University of Leeds, Prof. Ronghui Liu, Dr. Anthony Whiteing