Ansaldo STS

A Hitachi Group Company

Train Conformity Check System

A measuring and monitoring solution for train's maintenance and safety

Nadia Mazzino , V. P. Innovation Project, nadia.mazzino@ansaldo-sts.com

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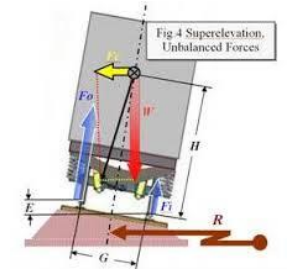
Railway Systems Main Components

Infrastructure



Interaction

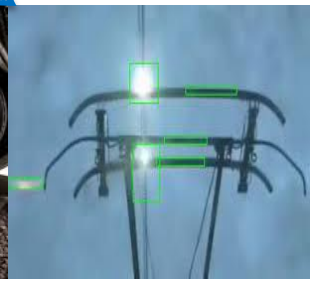
Rolling Stocks

Increase operations safety in response to systems evolution and European standards / requirements.

Increase monitoring capability to support preventive/predictive maintenance (cost reduction).

Railway Monitoring Systems

TECNOLOGY	ASSET: Infrastructure	ASSET: Rolling stocks
Infrastructure	Wayside system monitoring railway infrastructure condition	Wayside system monitoring Rolling Stocks condition
Rolling Stocks	On-Train system monitoring railway infrastructure condition	On-Train System monitoring Rolling Stocks condition



The Train Conformity Check System (TCSS)

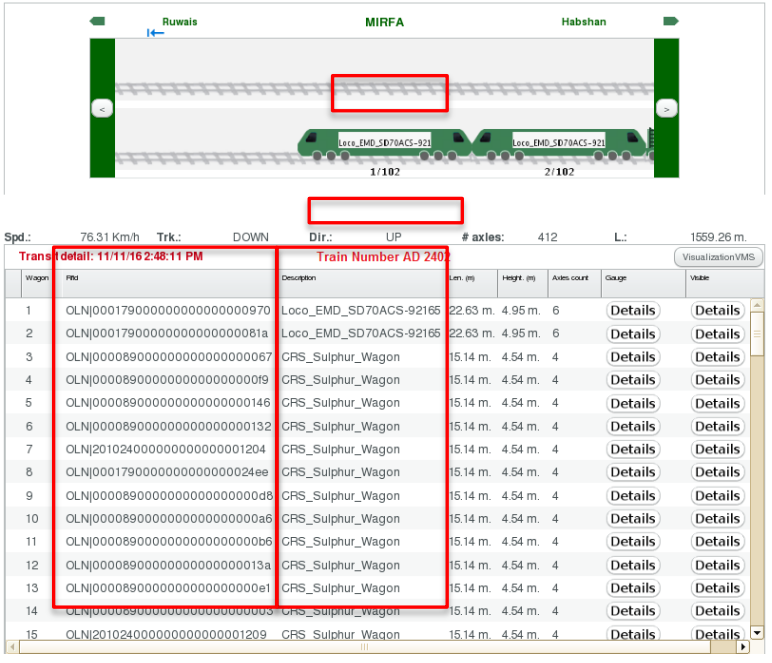
TCCS is a highly technological innovative system aimed to detect rolling stock faults and/or dangerous situations for safety and/or maintenance purposes with wayside analysis and no impact to rolling stocks.

TCCS can be installed on lines up to 330 km/h, operating day & night and under critical weather conditions.

AUTOMATIC ROLLING STOCK IDENTIFICATION AND TRAIN CLASSIFICATION

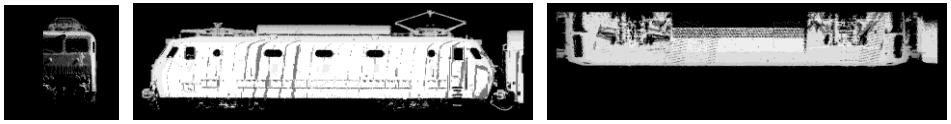
Rolling Stock classification can be performed using:

- Axle pattern based recognition
- RFID identification
- Information coming from Traffic Management Systems
- Plate recognition through Image based analysis



GAUGE ANALYSIS

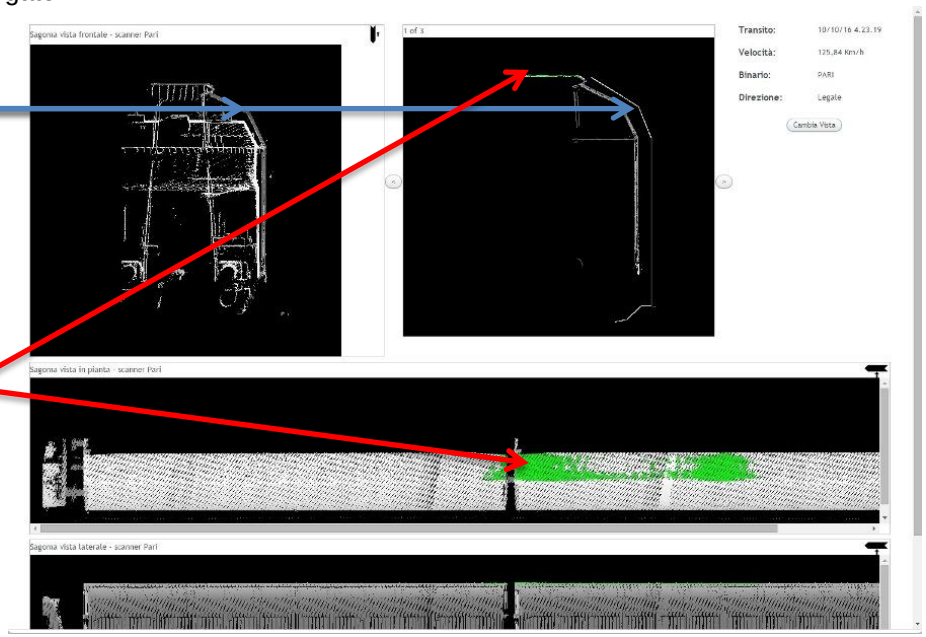
As a train approaches and passes through the measurement area, TCCS is able to scan each railcar, produce 3D images and evaluate potential non conformity



Example of 3D images produced during passage through TCCS gate

Reference gauge

Out of gauge alert

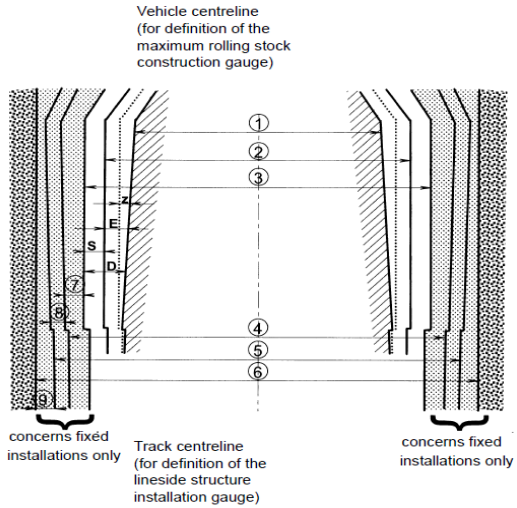


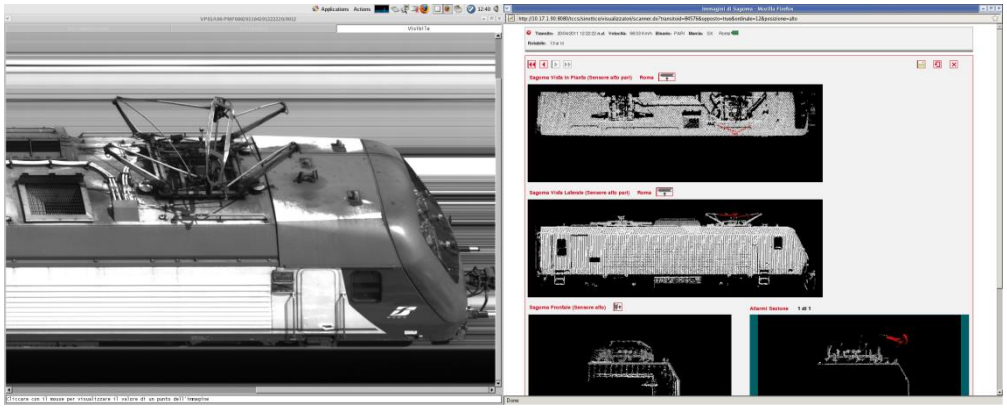
GAUGE ANALYSIS

Safety oriented:

Out of gauge detection based on:

- Standards (UIC 505);
- Specific loading gauge.



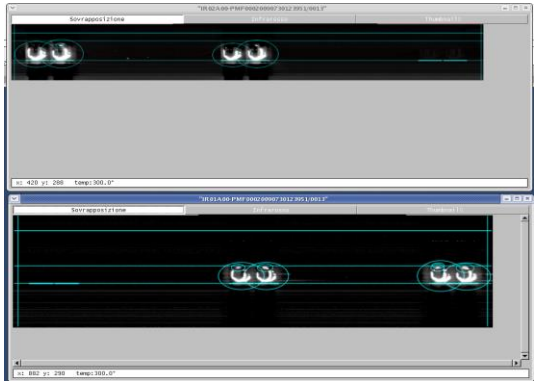


Maintenance oriented:

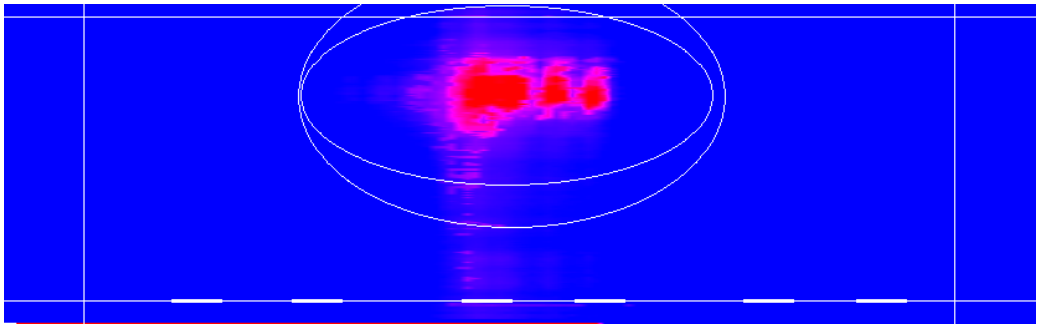
- **Out of alignment** components
- **Damaged** areas
- **Unbalanced** wagons

THERMAL ANALYSIS (1/2)

As a train approaches and pass through the measurement area, the TCCS is able to scan the surfaces of each railcar producing thermal maps useful to perform automatic overheating detection and / or fire on board



Example hot wheels detection



Example hot braking rheostat

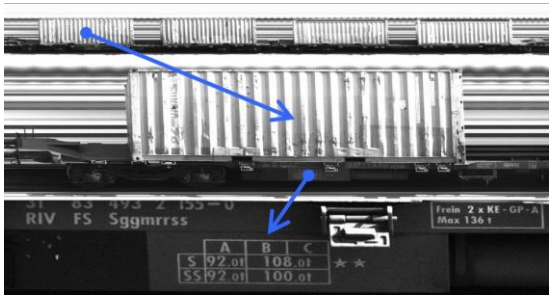
THERMAL ANALYSIS (2/2)

The system can produce a thermal maps useful to perform automatic detection of overheated components

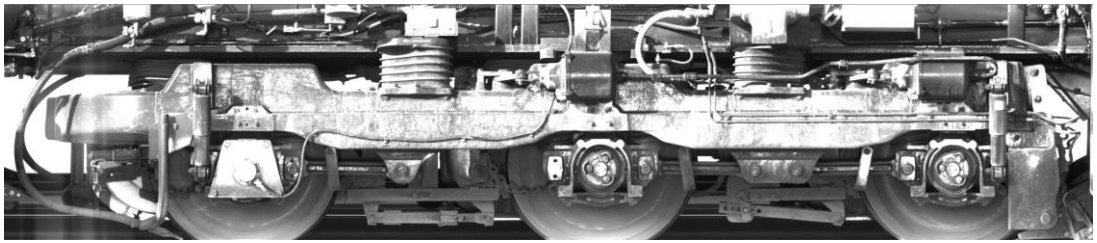
- CAD image
- Thermic image
- Thermic zoomed image
- False-color legend
- Temp. value

HIGH DEFINITION IMAGING

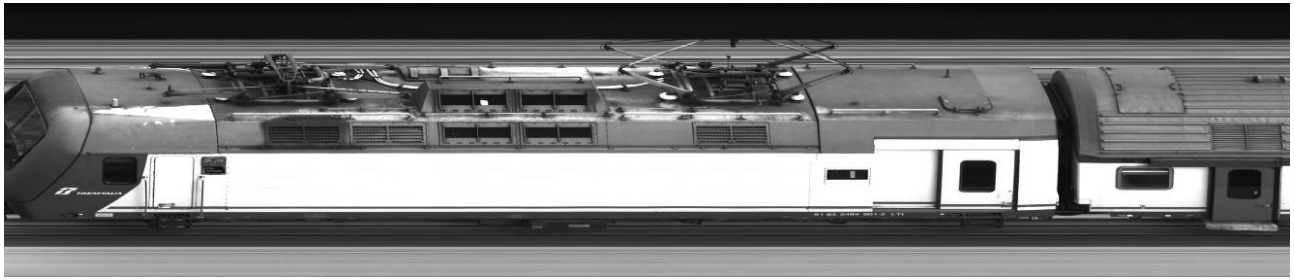
As a train approaches and passes through the measurement area, TCCS is able to acquire high definition images for each railcar useful to perform automatic recognition of visible items



Example of high definition imaging for automatic plate recognition



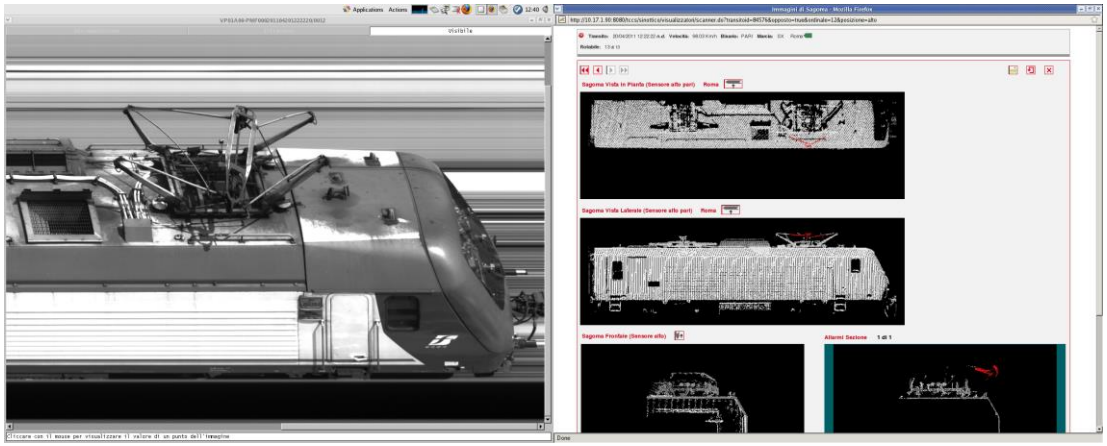
Example of high definition imaging for automatic mechanical defect recognition



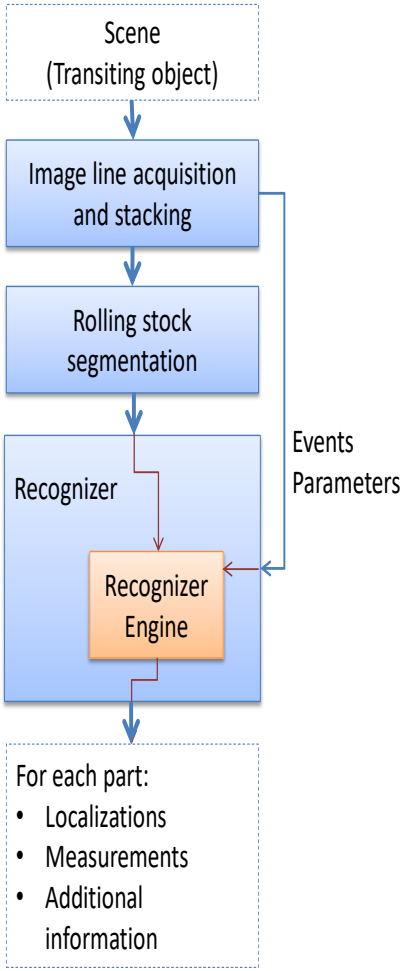
Example of high definition imaging:
panoramic view

HIGH DEFINITION IMAGING

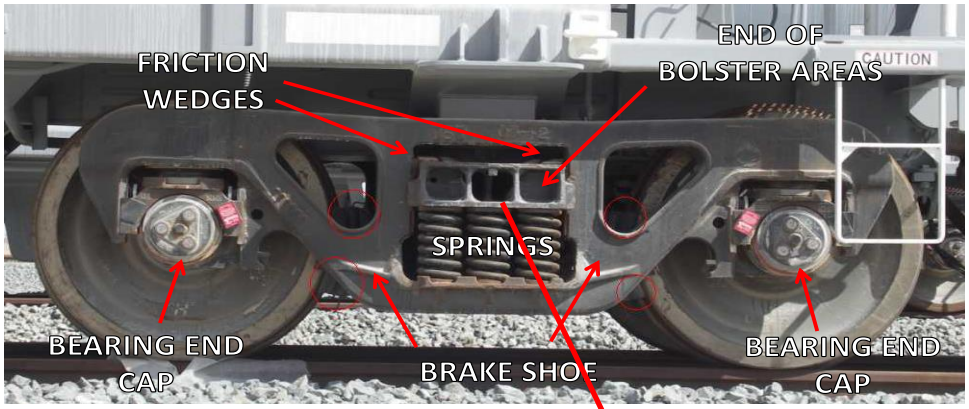
Safety: Use of High Definition Images for visual alarms verification

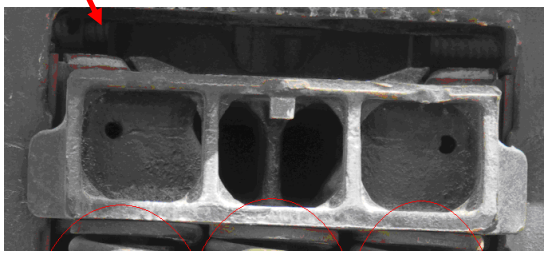


HIGH DEFINITION IMAGING

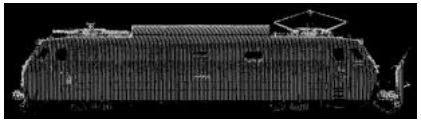


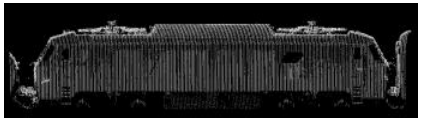
Maintenance: Use of pattern recognition and image based measurement techniques

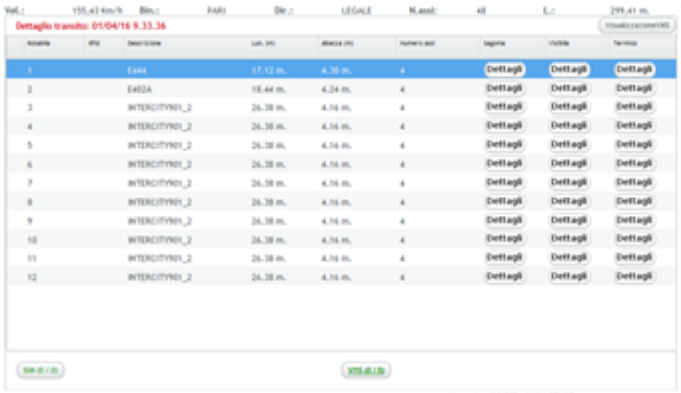


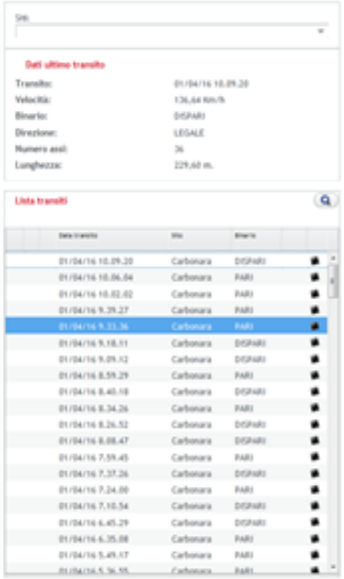


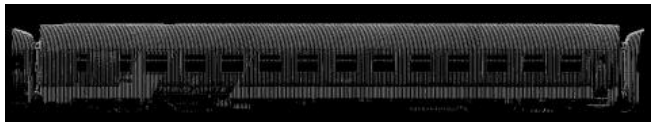
Human Machine Interface

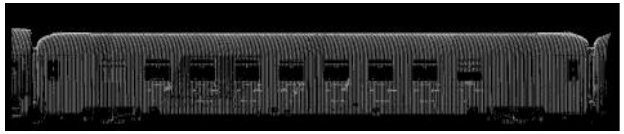






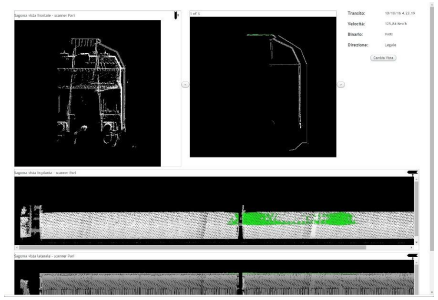




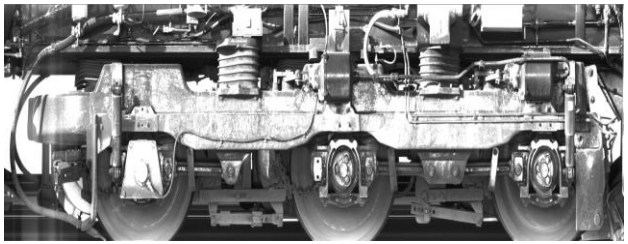


TCCS & Safety

Out of gauge analysis



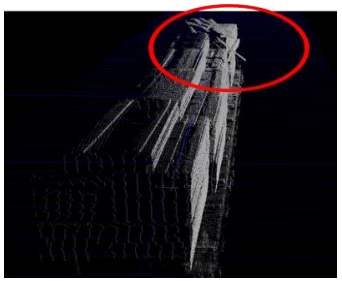
High definition Images for visual verification alarms



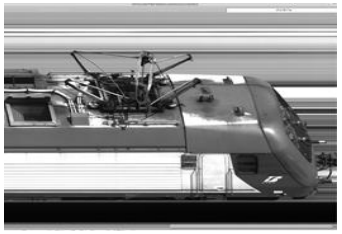
Fire on board

TCCS & Maintenance

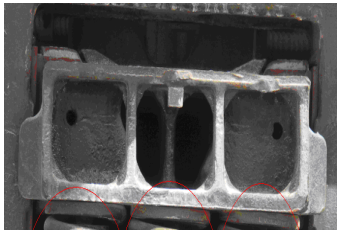
Out of alignment components



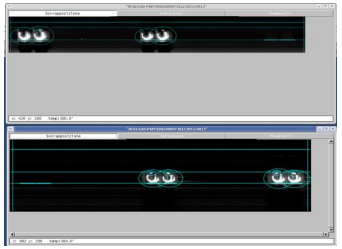
Damaged Areas



Components wear



Overheating



TCCS System Integration

Signalling

Automatic train stop

Yards

Intelligent Video-gate

Maintenance

From On Condition to Predictive

TCCS integration with signalling

- SIL4 certification through:
  - 2oo2 architecture
  - Diversity
  - Continuous auto-diagnostic of components and of calibration

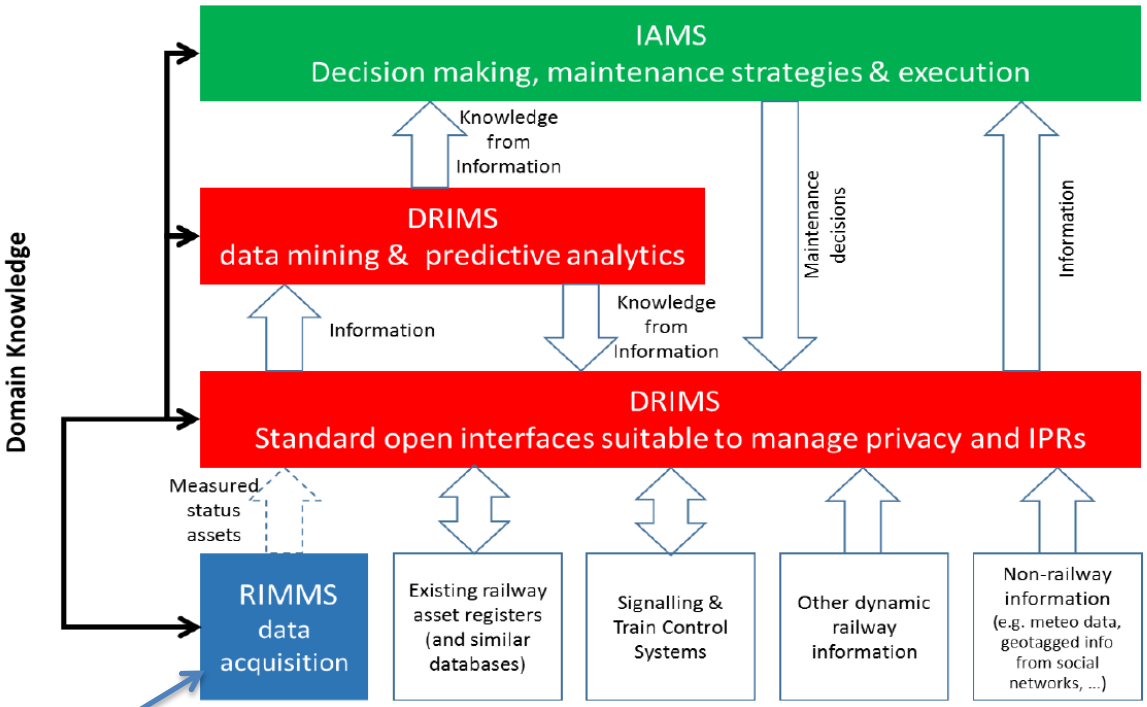
- Low FAR and high POD through:
  - High performing sensors
  - Sensors and algorithms parameters fine tuning

Yard Management

Impact the inbound and outbound yard procedures through:

- Automation of relevant logistic procedures
- Optimization of resources and activities

Maintenance-Oriented Systems – In2Smart Case



TCCS

Thank you for your kind attention

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