SIEMENS
Ingenuity for life

Inovação na Ferrovia Sinalização e Telecomunicações

13º Congresso Nacional ADFERSIT, 14 de Setembro de 2017

Siemens AG 2017

siemens.com/mobility

1. Trends – Digital Transformation
How digital is your life already?

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1. Trends – Digital Transformation

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1. Trends – Rail Digital Transformation

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"Digitalization will change our business , not just our technology."

Rail companies have today set out a blueprint of Britain's railway in the digital age as the industry gathers in Birmingham to discuss the current challenges facing the railway – and how technology will help address them.

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1. Trends – Future of Mobility will be “connected” across different transport modes, powered by Automation & Digitalization

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1. The legacy challenge ……

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Operations have to deal with inconsistent infrastructure and low data connectivity for decision making and automation

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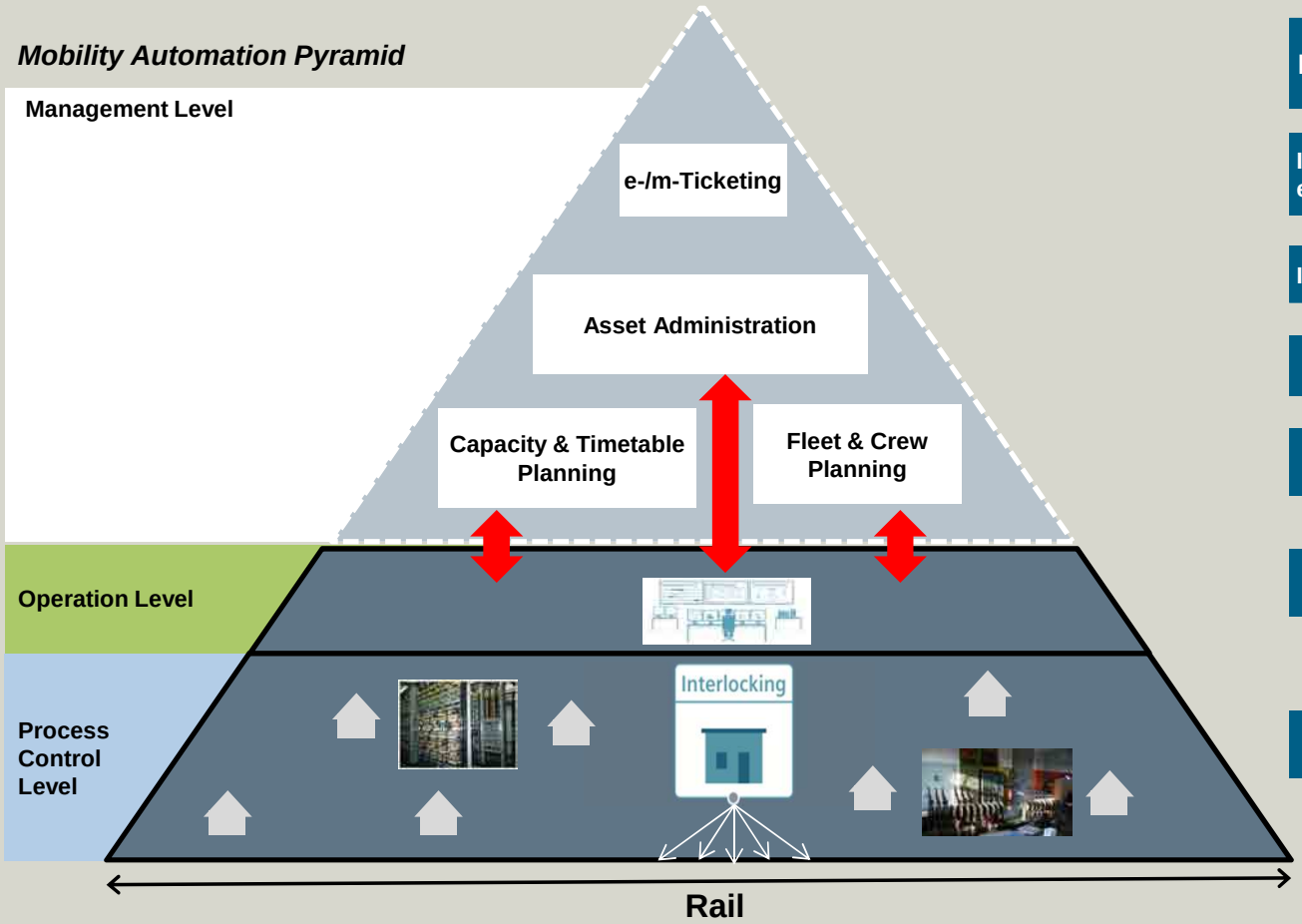

Intermodal and Connected (e)Mobility

Intermodal front- and back-end applications, e.g. Public Transport Info Apps, ticketing, DRT

Intermodal Journey / Route planning

Intermodal Traffic Simulation/ Optimization

Intermodal Transport Control Systems

Centralized Traffic Control Systems

Complete rail portfolio (IxL; point machines, Track Detection; level crossings, signals; ATP, ATO….)

Off-Line

On-Line

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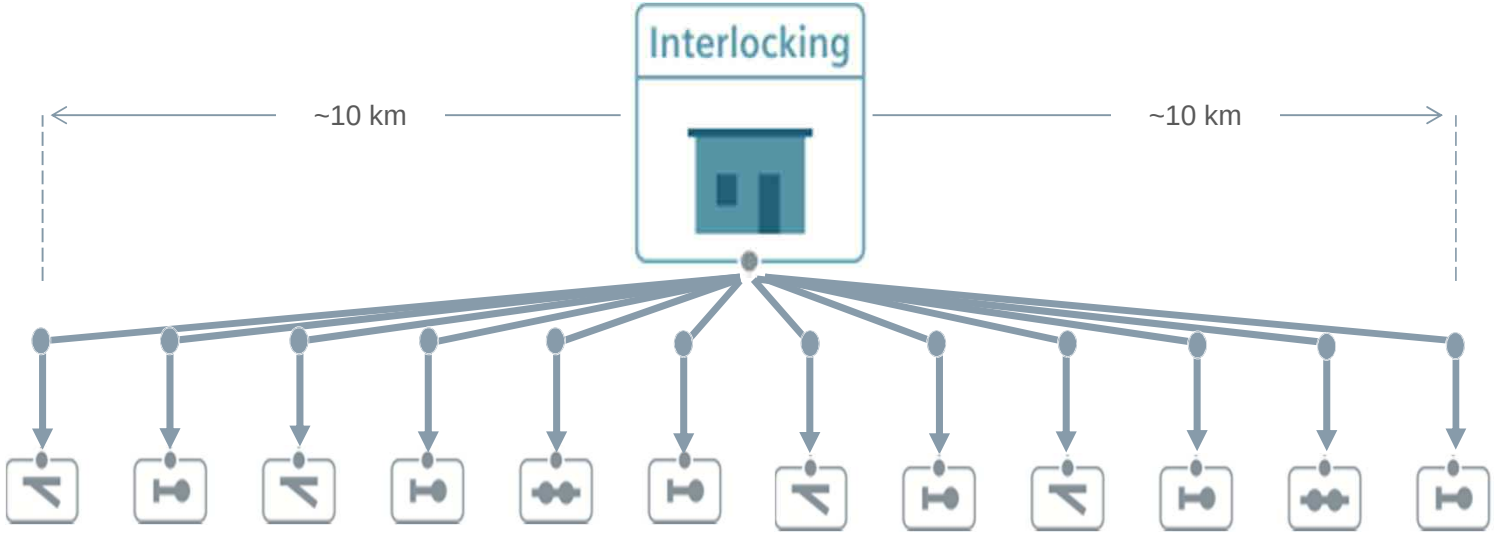
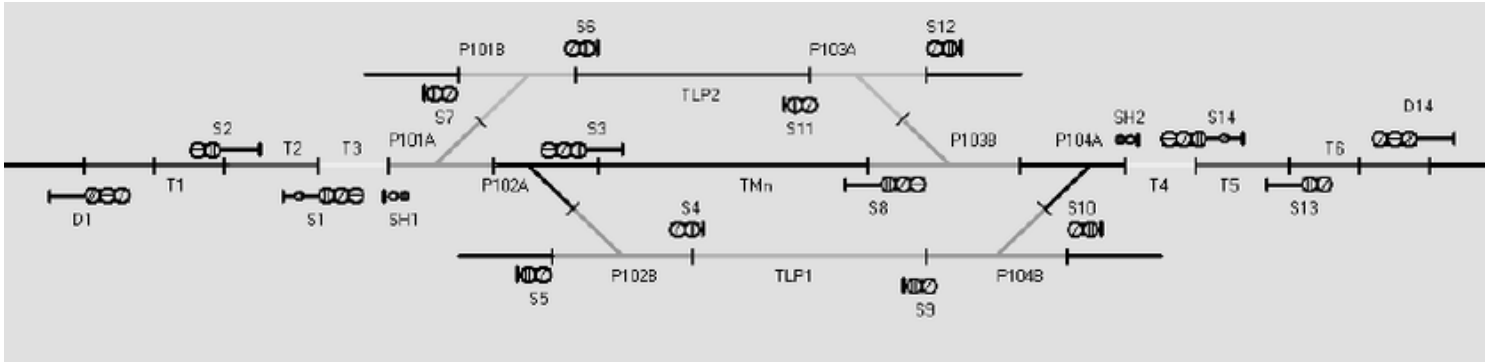
1. The legacy challenge …
Today's interlocking architecture allows a reach limited distances

Conventional Architecture with radial cabling…



… for

- **Track Vacancy**
- **Signals**
- **Point Machine**
- **Level Crossing**



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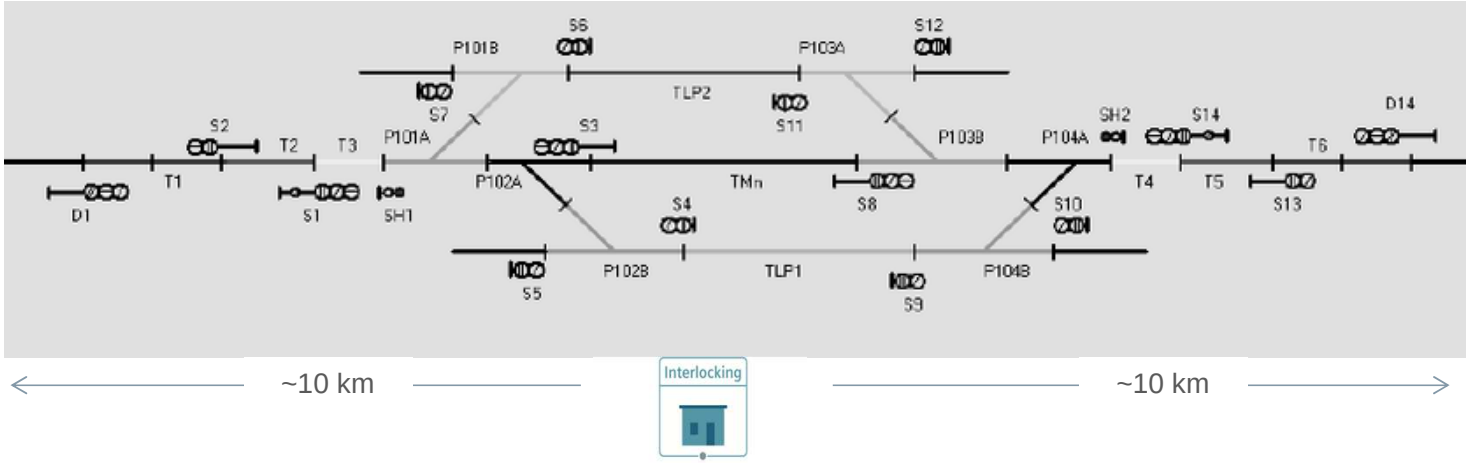
1. The legacy challenge ….
Specialized hardware controls and intensive field installations along the line

Module houses

Interlocking Cabinets



For 100km line, 6 stations with radial cabling:

22 Module houses
48 Cabinets
600 Printed Circuit Boards

48 Point machines
96 Signals
142 Axle counter and/or track circuits

> 180 km Cables

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2. Our Vision of the Future

2. Our vision – Digitalization
Cloud-based solutions automatically control wayside components and trains……. engineered and tested automatically and installed wireless

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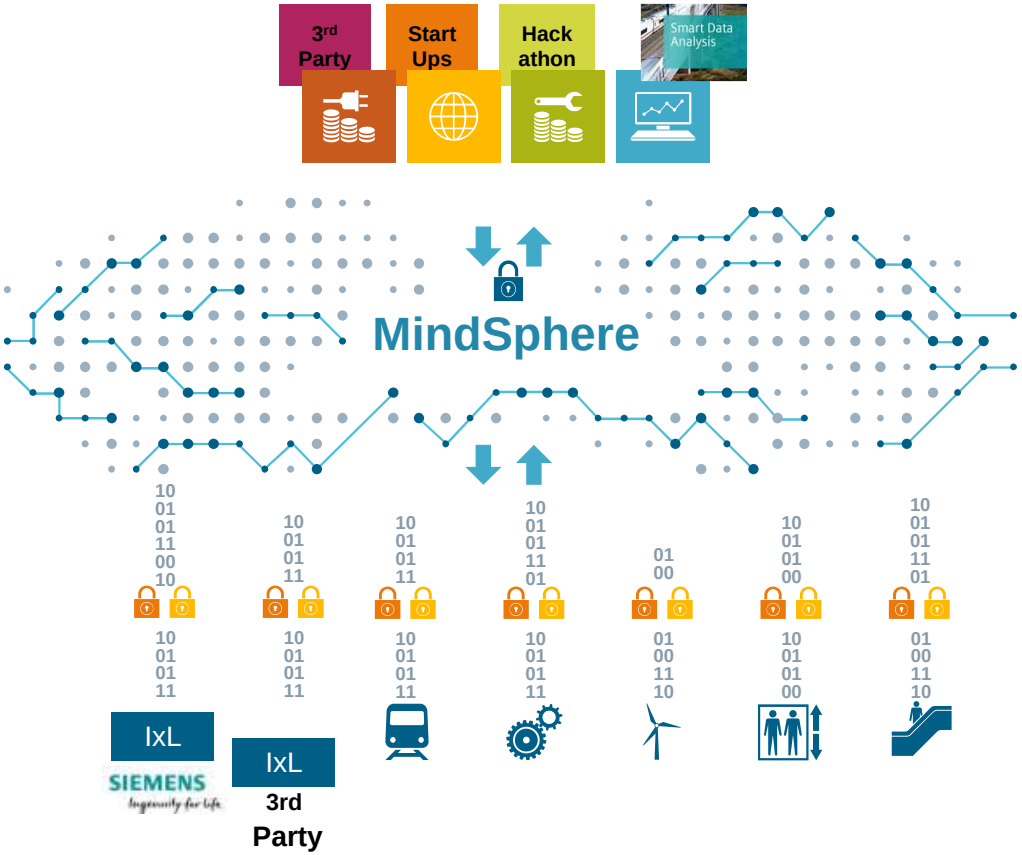

MindApps

- Use **apps from Siemens, partners or develop own** apps
- Gain **asset transparency** & **analytical insights**
- Subscription based **pricing model**

MindSphere

- Open interface for development of **customer specific apps**
- **Various cloud infrastructures:** SAP, AtoS, Amazon Web Services, Microsoft Azure offered as public or private

MindConnect

- **Open standards** for connectivity, e.g., OPC UA
- **Plug and play connection** of Siemens and 3rd party products
- **Secure** and **encrypted** data communication

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2. Our vision
Digitalization – our dream!!!

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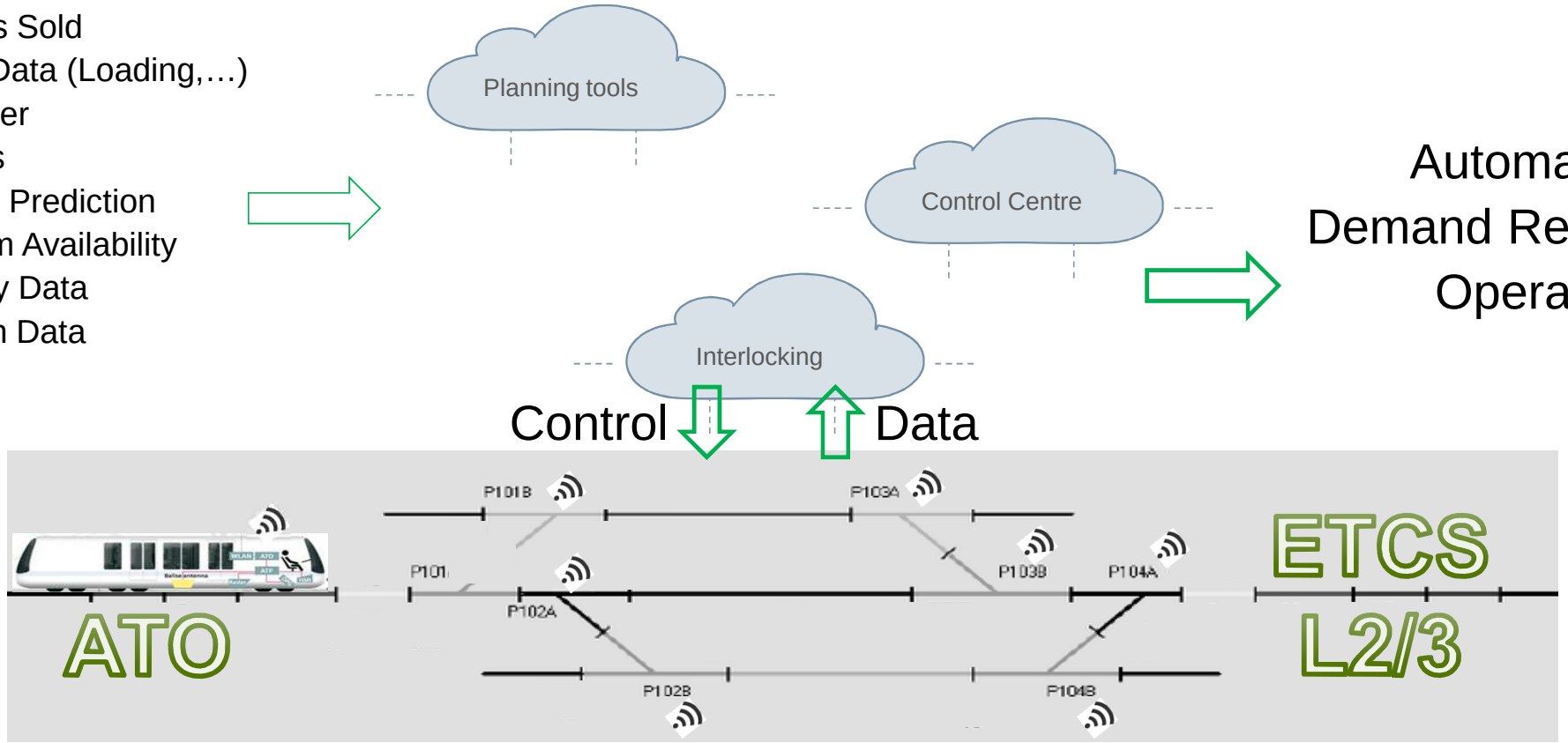
Cloud-based solutions automatically control intelligent wayside components and trains

- Tickets Sold
- Train Data (Loading,…)
- Weather
- Events
- Usage Prediction
- System Availability
- Energy Data
- Station Data
- …



Automated,
Demand Responsive
Operation

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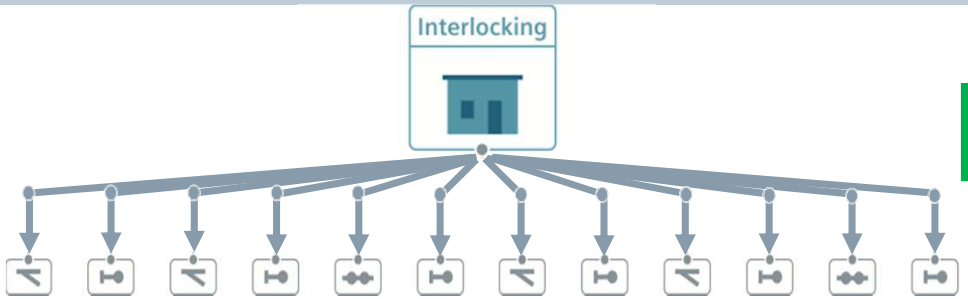
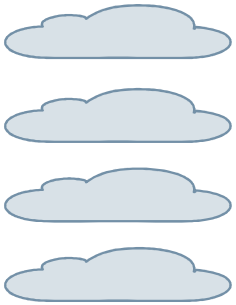
2. Our vision
Digitalization – our dream!!!



6	Interlocking Locations
22	Onsite Module houses
48	Cabinets
600	Printed Circuit Boards
48	Point machines
96	Signals
142	Axle Counter circuits
180km	Cables



48	Point machines
0	with ETCS L2/3
0	with ETCS L3
<50km	Cables

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Automated Train Operation (ATO) over ETCS allows an optimal utilization of capacity through a shortened headway

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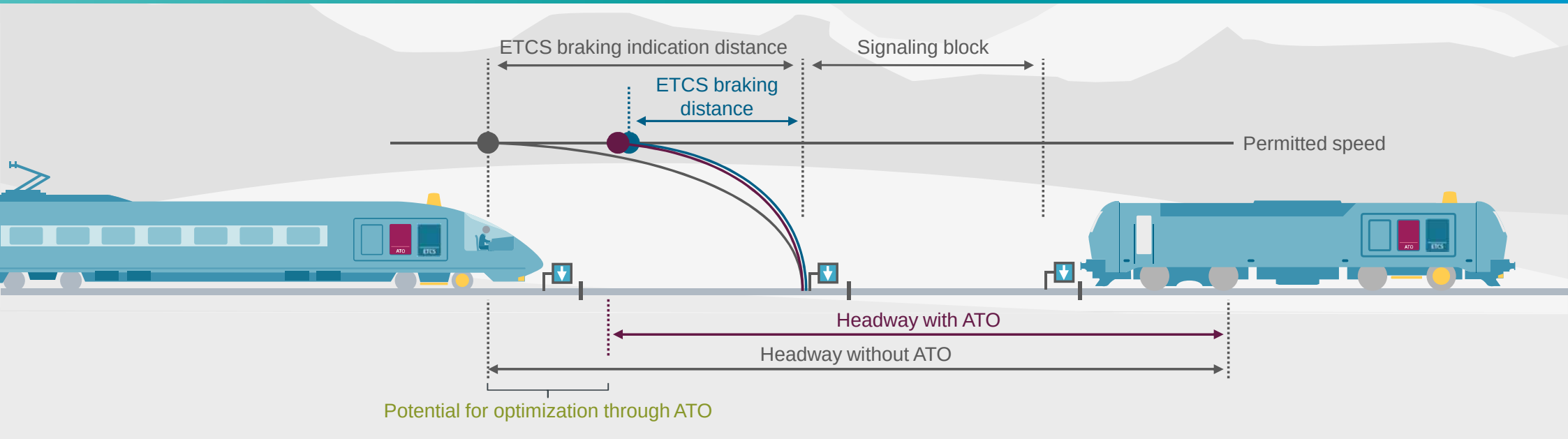
- ATO ensures exact realization of speed profile at any time
- Trains per hour / throughput increased up to 25%
- ATO can reduce energy consumption by 15-20 percent



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Operational Control centre integrates operations & dispatching - Efficient decision-making through seamless data integration

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3. How we will get there

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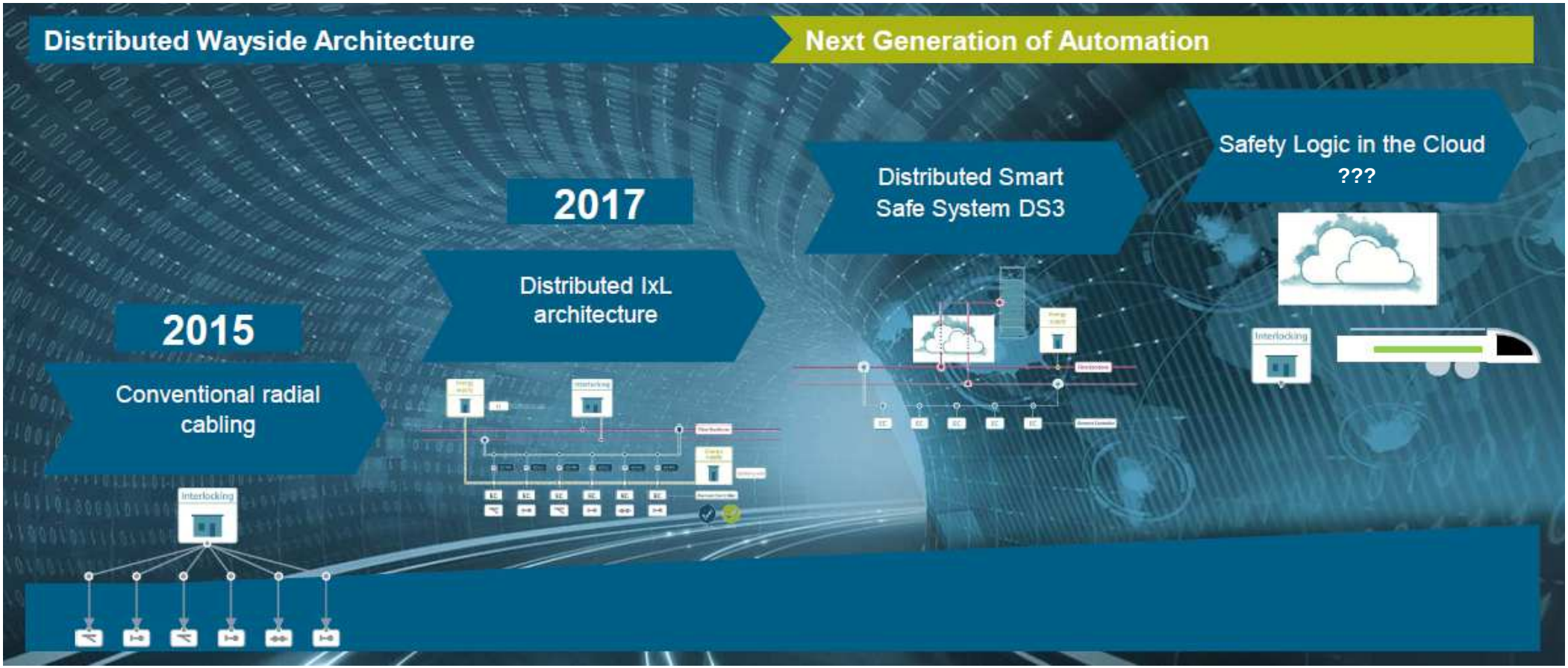

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3. How we will get there
…total connectivity would come built in!

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- Tickets Sold
- Train Data (Loading,…)
- Weather
- Events
- Usage Prediction
- System Availability
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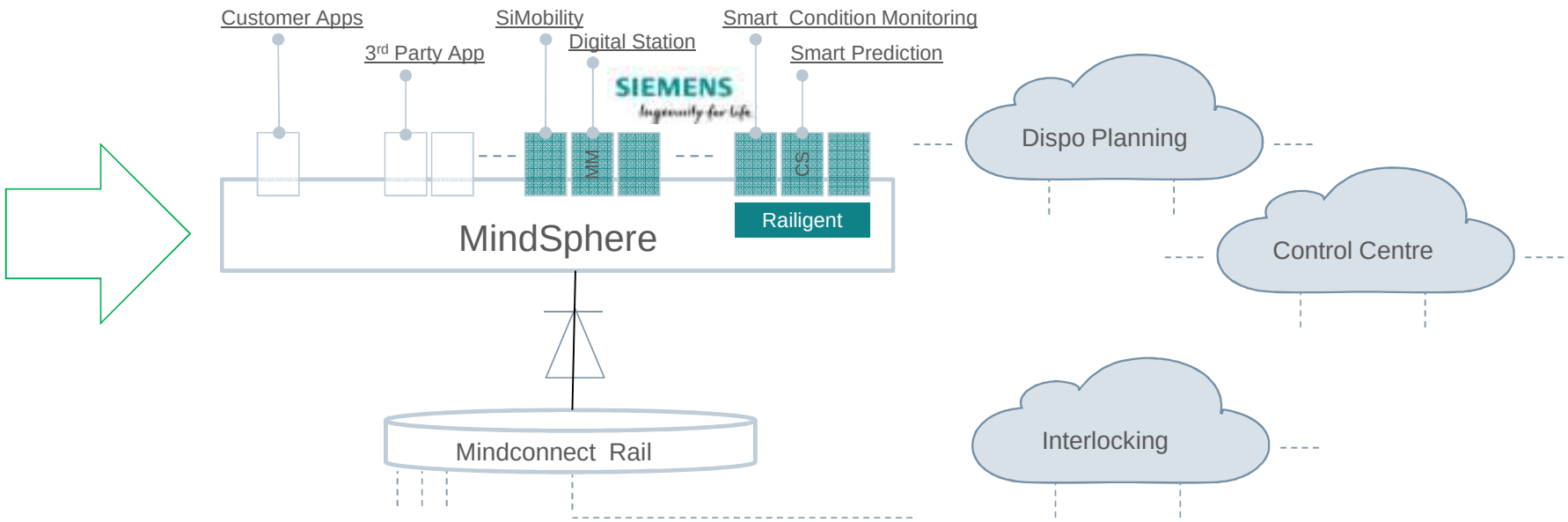
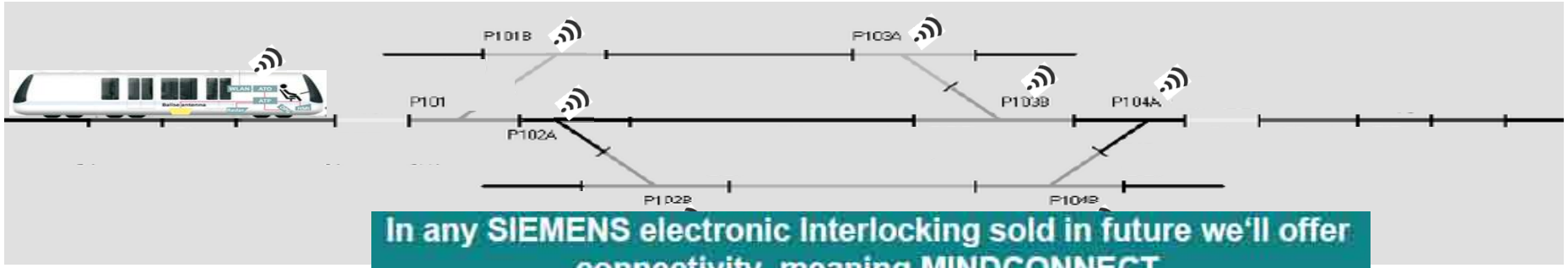
- Station Data
- …





In any SIEMENS electronic Interlocking sold in future we'll offer connectivity, meaning MINDCONNECT

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3. How we will get there
Achieving connectivity and melting offline planning with online control will pave the way to the dream of Automated Demand Responsive Transit

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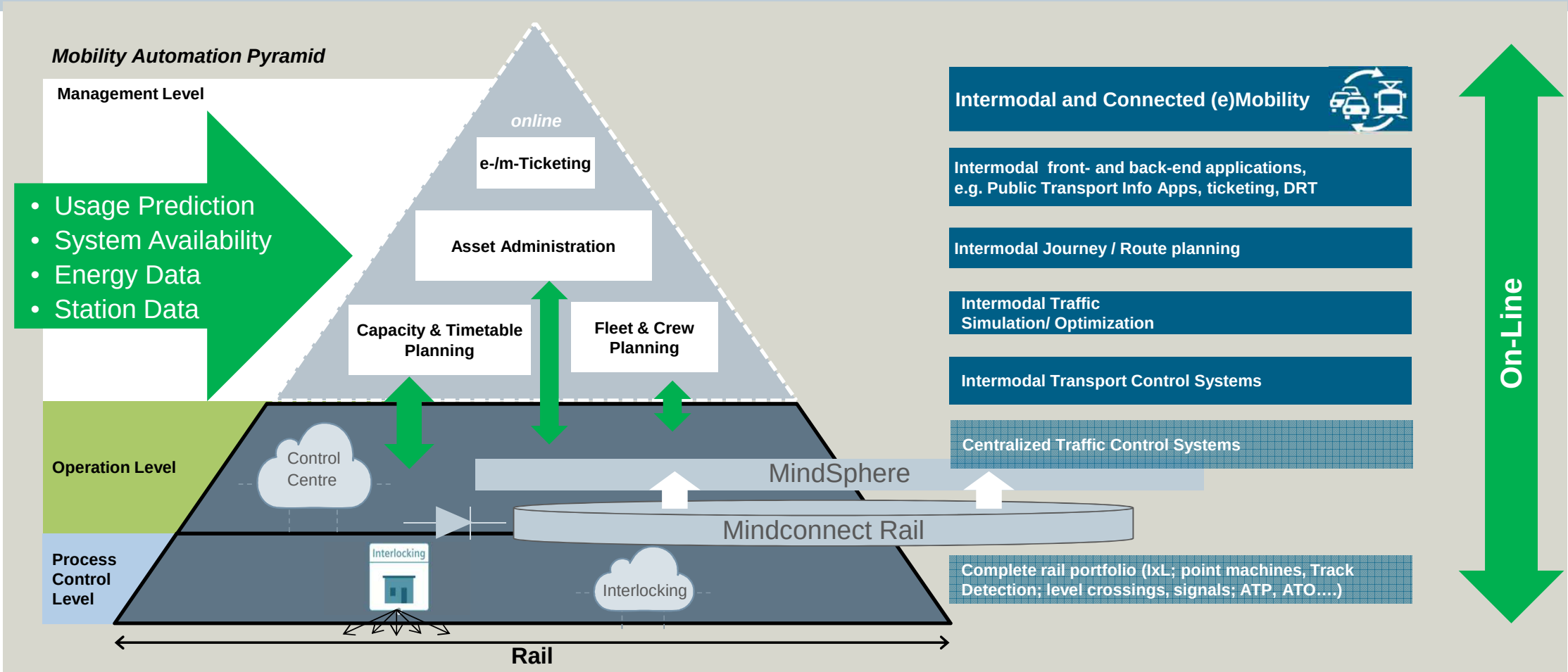

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3. How we will get there
Customer value proposition – Improve maintenance of assets

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Vehicles

- **Visualization** of vehicle health status and location
- **Root-cause analysis** of component failures
- Prediction of **component failures** for gearboxes, bearings, traction motors, doors, power transformers etc.
- **Abrasion modeling** for e.g. break pads and wheels
- **Outage statistics**

Infra-structure

- Analysis of error conditions of **ETCS and interlocking**
- Prediction of **point machine failures**
- **Throughput analysis** for rail networks
- Analysis of **infrastructure conditions** with vehicle based data

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4. Smooth migration with strong business logic

4. Smooth migration with strong business logic
Customer value adding

The appeal of comfort and convenience: Connectivity is the key to raise the appeal of rail transport. With Siemens communication solutions, passengers use the Internet, enjoy customized services, get real-time travel information and save time with e-ticketing.

- No/less buildings
- No (special) hardware
- 90% of the field components and wires will be gone
- Cloud-based solutions = less IT equipment
- Higher process automation (semi-automated engineering and tests installed wireless will:
  - speed up project execution
  - increase flexibility in project delivery
- Lower energy consumption from systems and trains
- Data availability allows prespective maintenance
- Reliable telecommunications infrastructure
- IT Security

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4. Smooth migration with strong business logic
Customer value adding

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Lever	Example	Key Performance Indicator (KPI)
Asset investment	Better asset utilization leads to reduced investment in trains for overall fleet	Investment savings of 5 – 10%
Asset utilization	Asset utilization can lead to increased revenue	Revenue increase of up to 5 – 10%
Maintenance cost	Based on digital services maintenance can be optimized (integrated services, condition based and predictive maintenance)	Maintenance cost decrease 5 – 10%
Inventory cost	Optimizing inventory cost by reducing inventory, reducing obsolete inventory and its carrying cost	Inventory cost decrease 5 – 10%
Material cost	Less material through condition based maintenance (scheduled)	Material cost decrease of up to 5%
Labor cost	Less manual effort for installation, maintenance, and analyze diagnostic data	Labor cost decrease of up to 5%

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4. Smooth migration with strong business logic
Customer value adding

Make the most of your infrastructure: Maximize your throughput with Siemens solutions for automated driving, integrated resource and asset management.

- **Automatically control wayside components and trains (ATS, ATO; ETCS L2/L3, CBTC…)**
- **Real time data from/to external sources (demand, events, weather…) allows traffic optimizations**
- **Enhanced Passenger Experience**
- **Data availability allows prespective maintenance with data analysis preventing faults**
- **Integrated resources and asset management**

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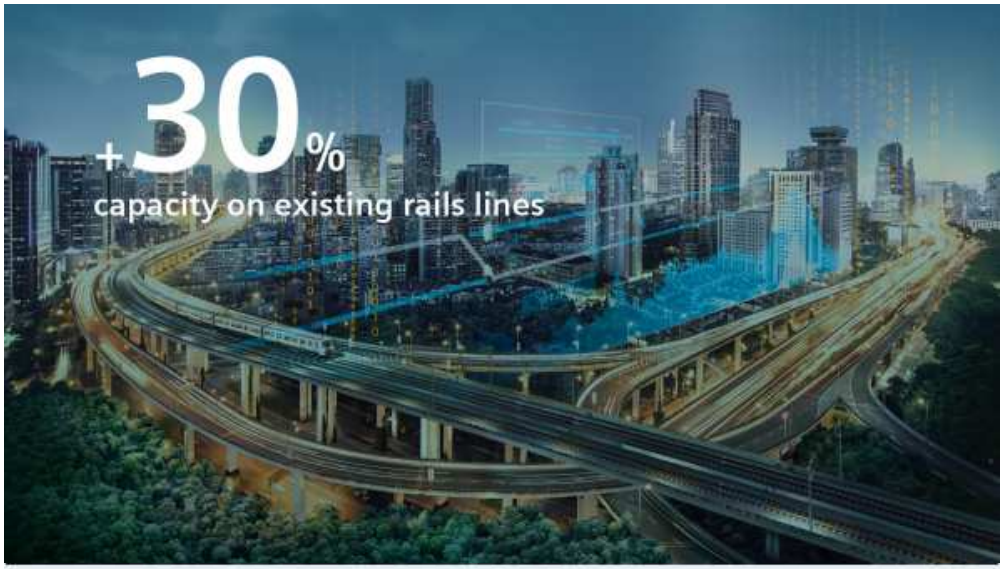
4. Smooth migration with strong business logic
Customer value adding



Spot weaknesses before they're an issue: Decrease downtimes, increase availability and capacity: Siemens Digital Services monitors and analyzes data in real time for prescriptive services and intelligent energy management.

- **Prescriptive maintenance due to real time data gathering, monitoring, and analysis**
- **Decreased downtimes due to faults,**
- **Decrease downtimes due preventive maintenance time consumption (less equipment)**
- **Integrated resources and asset management**

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For more information

https://www.mobility.siemens.com/mobility/global/en/interurban-mobility/rail-solutions/rail-automation/train-control-system/european-train-protection-system/Pages/european-train-control-system.aspx

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https://www.siemens.com/global/en/home/products/mobility/rail-solutions/services/digital-services/railigent.html

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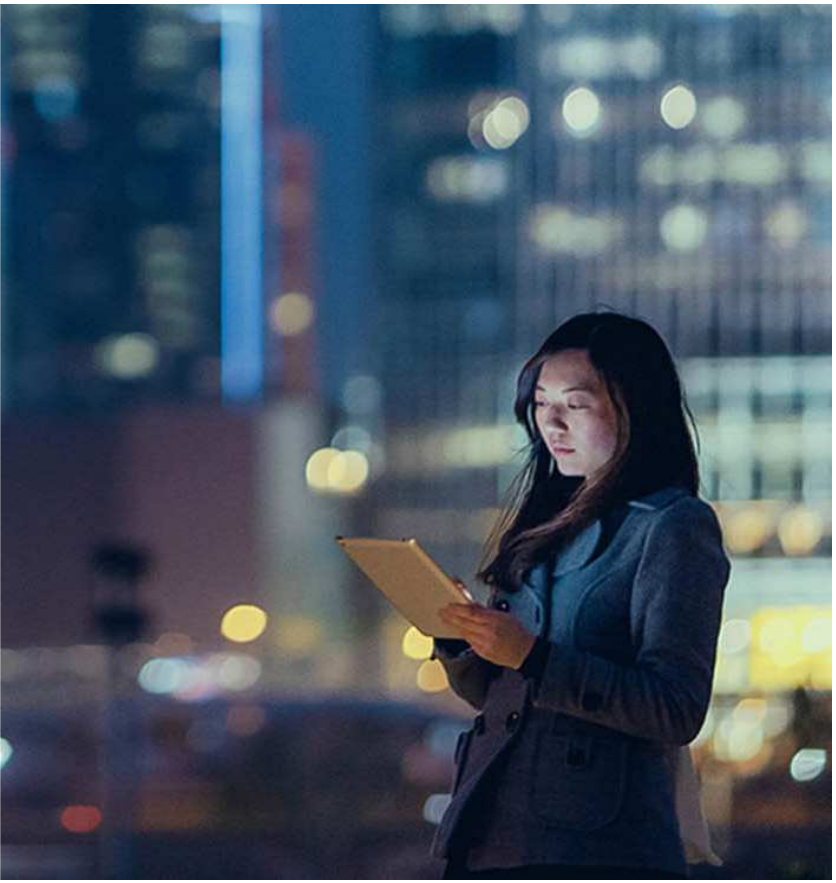
Contacts



Eduardo Craveiro
Siemens Portugal
Mobility Management / Main Line, Mass Transit and Freight

Mobile: +351 91 706 7595

Email : eduardo.craveiro@siemens.com

LinkedIn: linkedin.com/in/eduardocraveiro

siemens.com/mobility

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