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Stuck at the signals? Lessons from the experience of automation in the rail sector

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#DriverAhead



In association with





Agenda

Brief history of automation in rail

Metro versus mainline driver automation

Problems encountered with systems for automation

History

Early days – signalling automation driven principally by safety and practicalities





History

Other automated systems include:

- Doors – automatic open and close, locking, sensitive edge obstacle detection
- Level Crossings – automatic barriers and lights, CCTV, obstacle detection systems
- Train despatch systems – Mirrors, CCTV

Metro versus mainline

Grade of Automation	Type of train operation	Setting train in motion	Stopping train	Door closure	Operation in event of Disruption
GoA 1	ATP with driver	Driver	Driver	Driver	Driver
GoA 2	ATP and ATO with driver	Automatic	Automatic	Driver	Driver
GoA 3	Driverless	Automatic	Automatic	Train attendant	Train attendant
GoA 4	UTO	Automatic	Automatic	Automatic	Automatic

ATP - Automatic Train Protection ATO - Automatic Train Operation

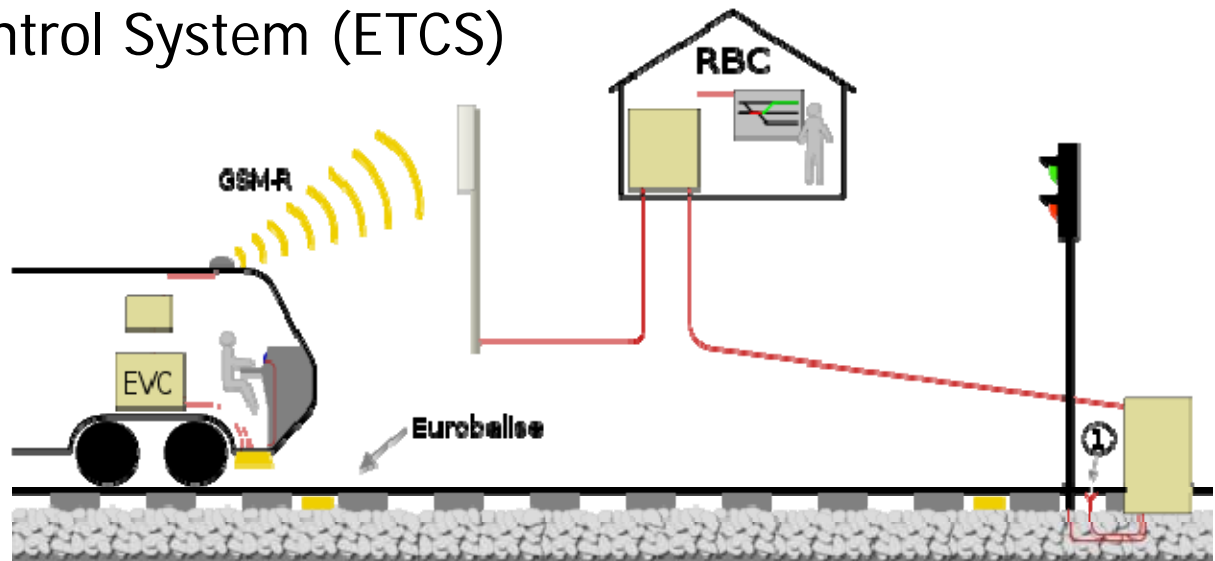
Metro v mainline

Mainline automation?

There are no fully automated (GOA4) mainline railways – and probably no GOA3 either, and maybe a few GOA2

What do we have?

- European Train Control System (ETCS)
- ATO
(Thameslink, Crossrail)



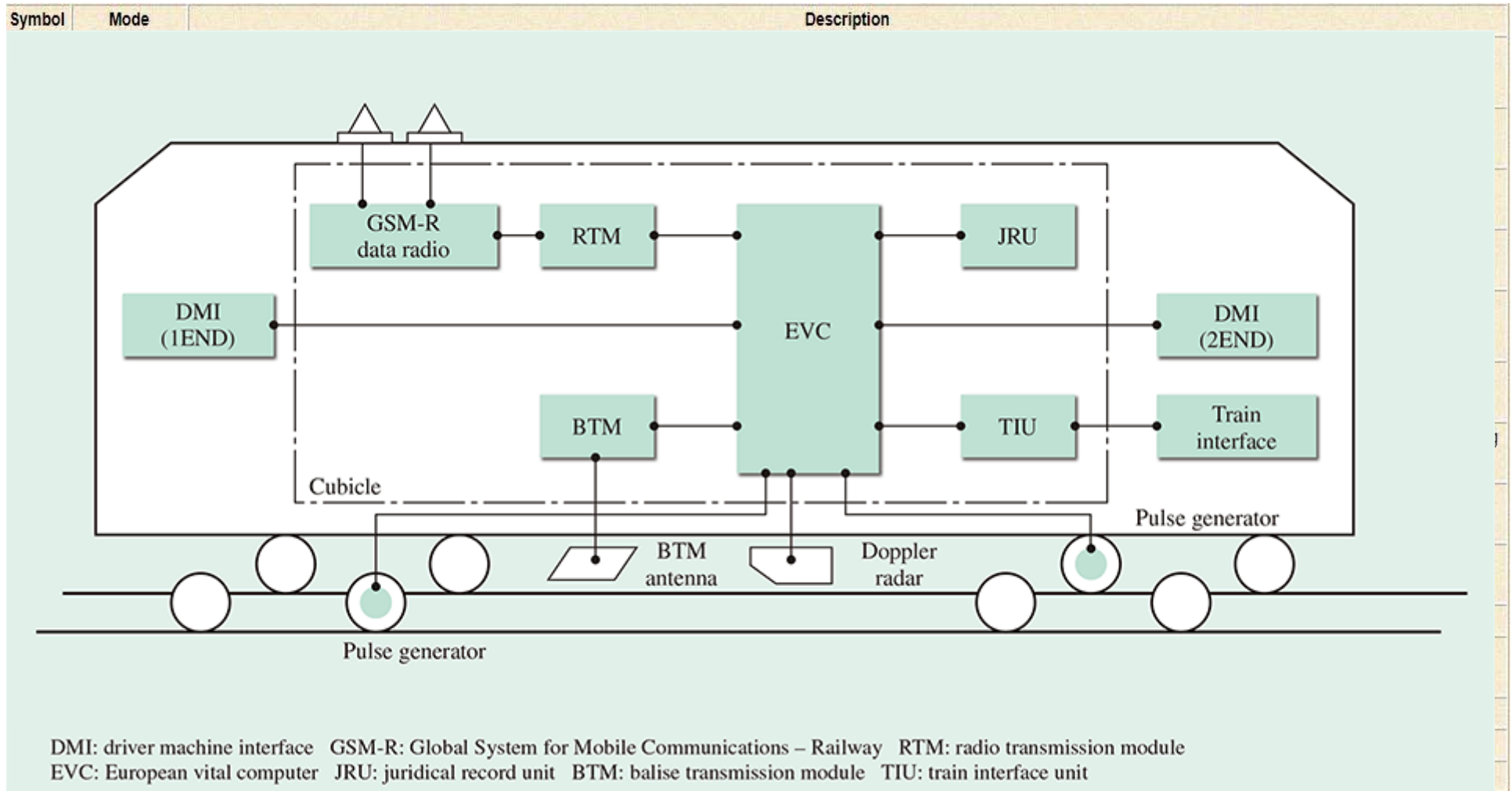


Metro versus mainline

Complexity of mainline – range and types of railway, different operating conditions and scenarios

And also -

- Cost of implementation – sheer size and spread of railway
- Large fleets – all trains need to be fitted, and dealing with different types
- Integration with existing systems – hard to implement interfaces and to make them practical





Problems

More practical matters:

- new reliability/availability challenges
- changes to skills and competence for operators/maintainers
- testing in the field
- phasing of roll-out and integration with other systems
- challenges to standards
- impact on other users



Problems

Management of systems:

- configuration control and ownership/stewardship
- the need to make many (software) changes to make complex systems work well
- management of obsolescence
(the life of electronics hardware is relatively short)
- security issues



Problems

Over-selling and under-delivering

- development of a specification is easy
- practical issues always impact on functionality delivered and timescales to implementation

The rail industry is littered with failed or downscaled technology projects:

Jubilee Line Extension (JLE)

West Coast Mainline Train Control System

Traffic Management System



Conclusions

Providing functionality

Controlling complexity

Managing safety

Being practical