

X2RAIL 1

TD 2.2 - ATO up to GoA4
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GRADES OF AUTOMATION



Satellite positioning
Adaptable Communication
Virtual coupling
Traffic Management Systems

WORK PACKAGE OVERVIEW

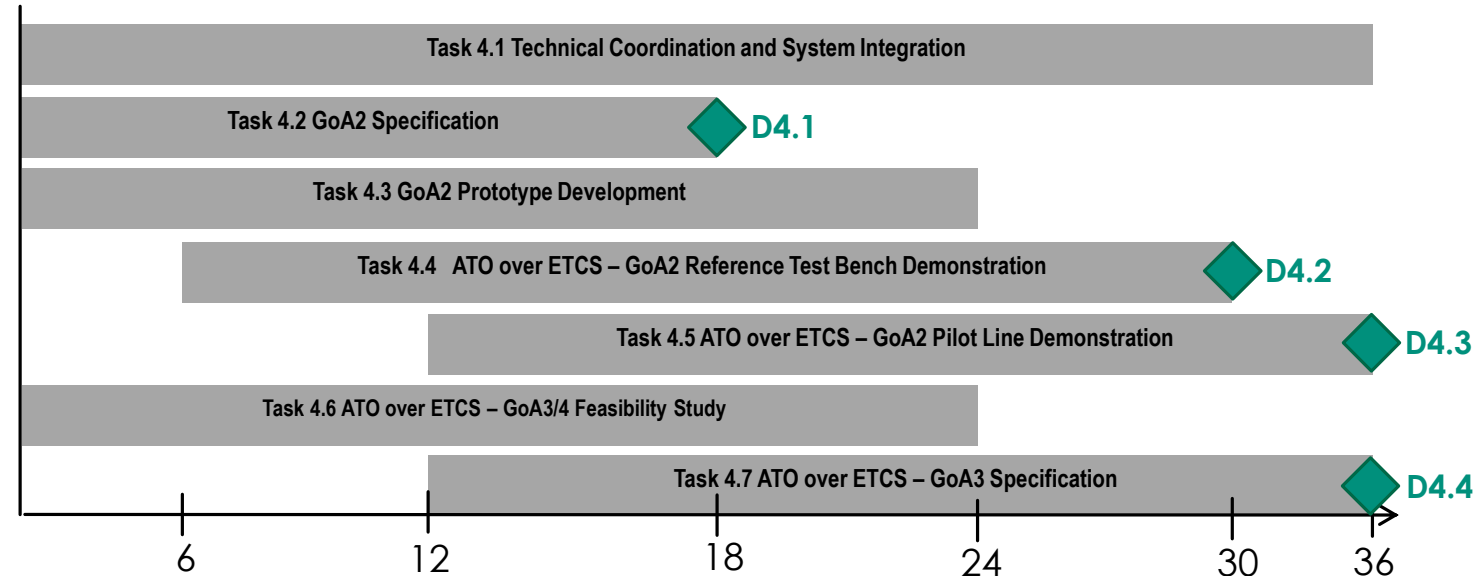
Grade of automation 2 (GoA2)

- Standard specification
- Trackside and on-board prototypes
- Reference Tests on 2 standard Test Benches
- Pilot tests on actual train and line (delayed due to train unavailability)

Grade of automation 3/4 (GoA3/4)

- Preliminary specification:
 - Operation Requirement
 - System Requirement Specification

▶ WP Duration + Deliverables

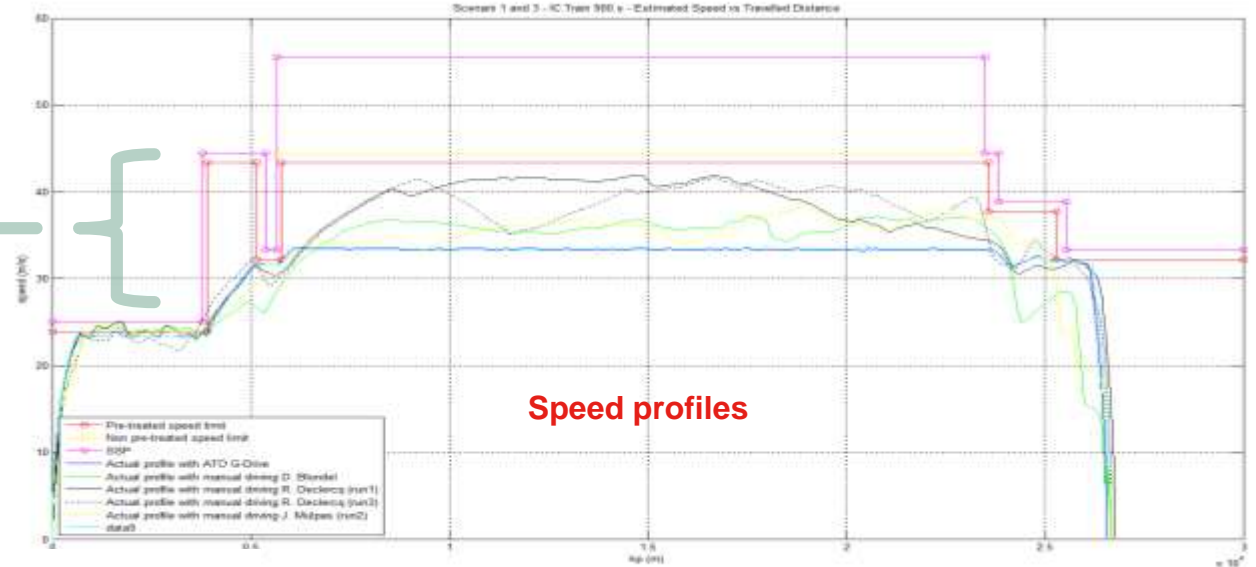


▶ WP Members

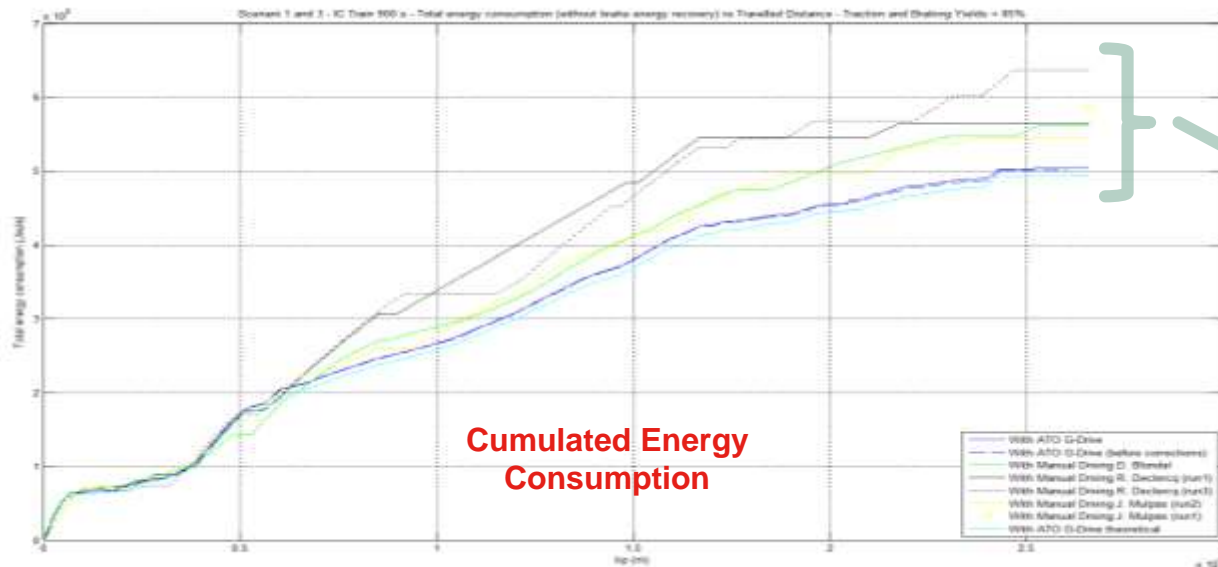


EXAMPLE OF ENERGY SAVINGS – INTERCITY TRAINS

Different driver behaviours on same journey...

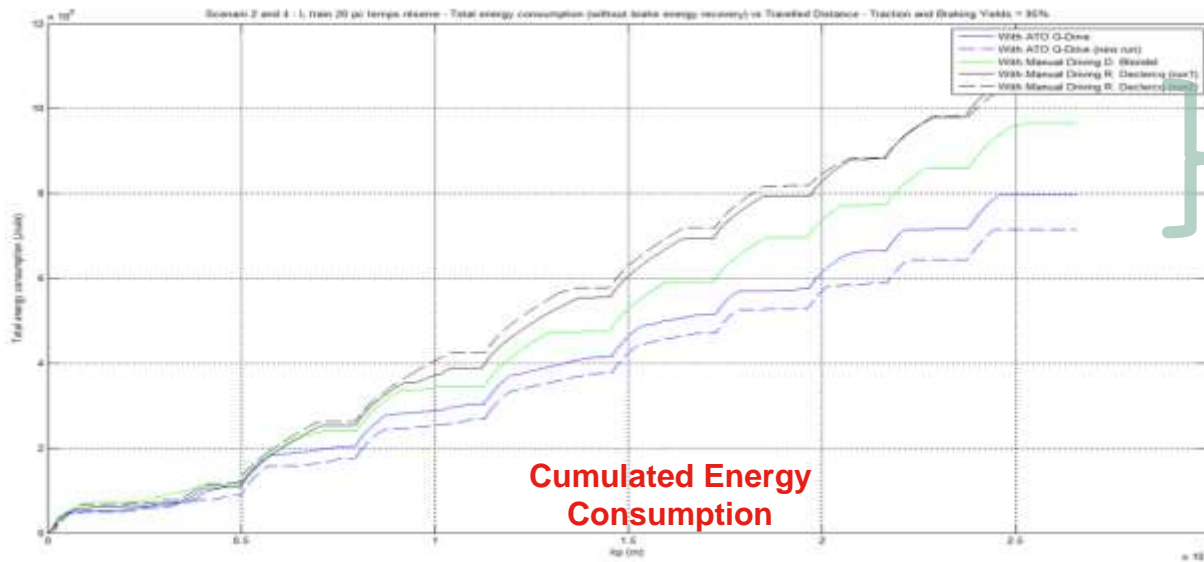
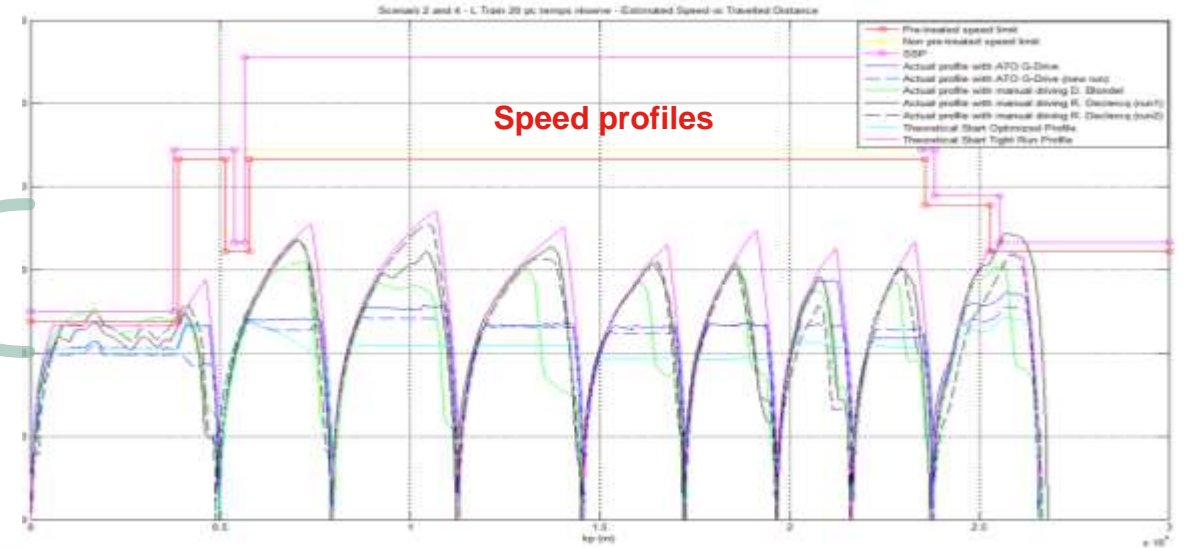


... lead to potential consumption of up to **15%**



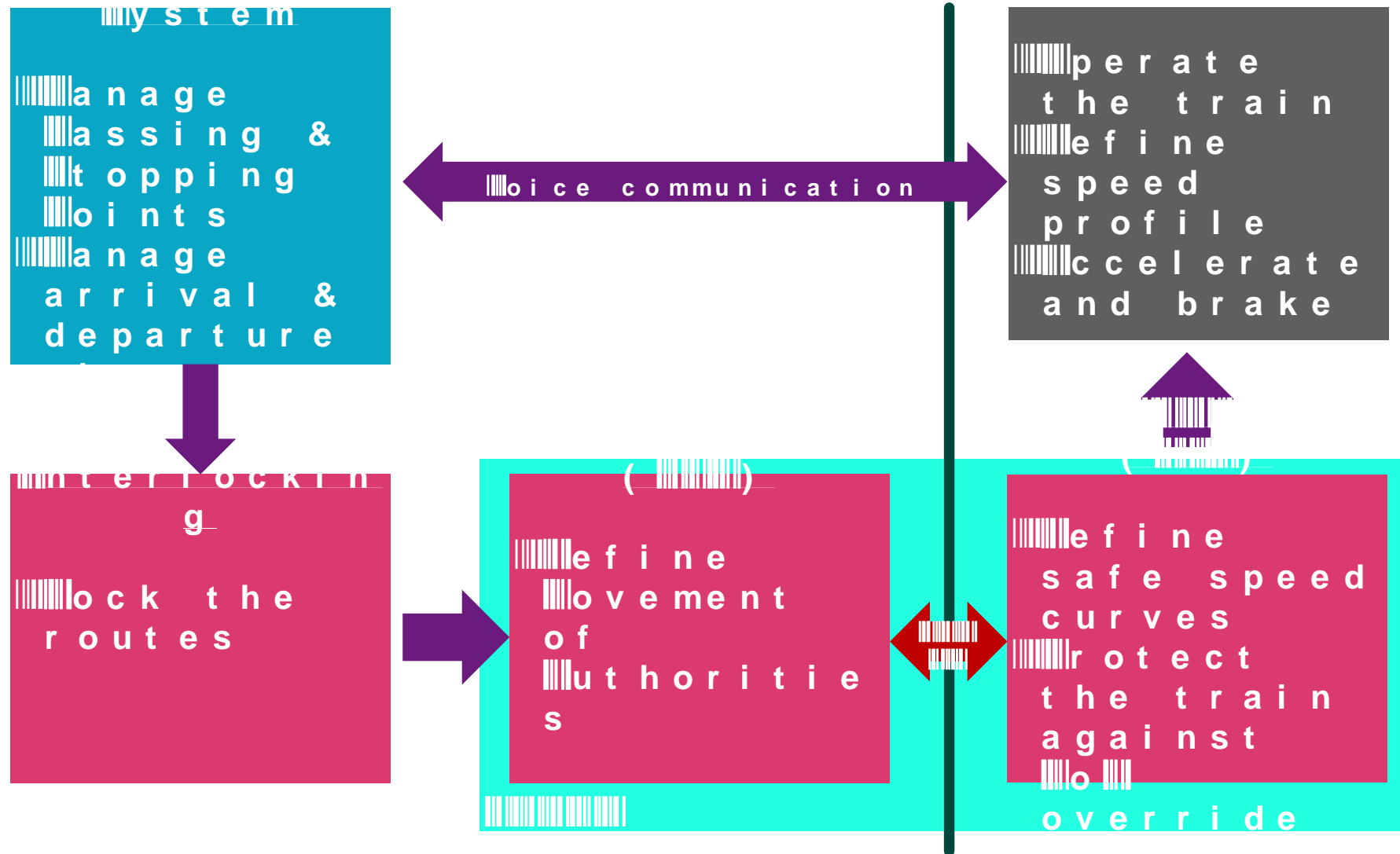
EXAMPLE OF ENERGY SAVINGS – LOCAL TRAINS

Different driver behaviours on same journey...

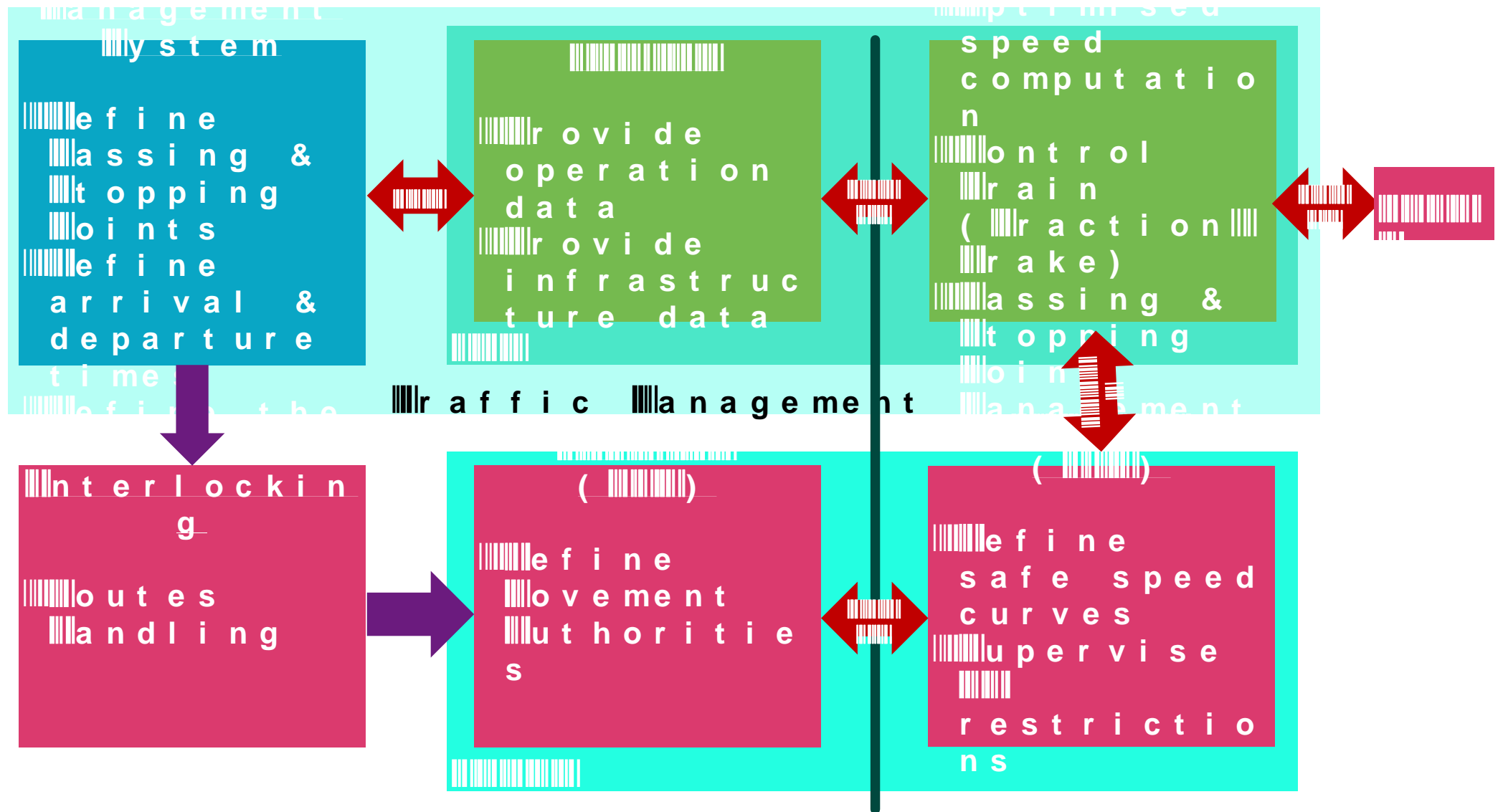


... lead to potential consumption of up to **42%**

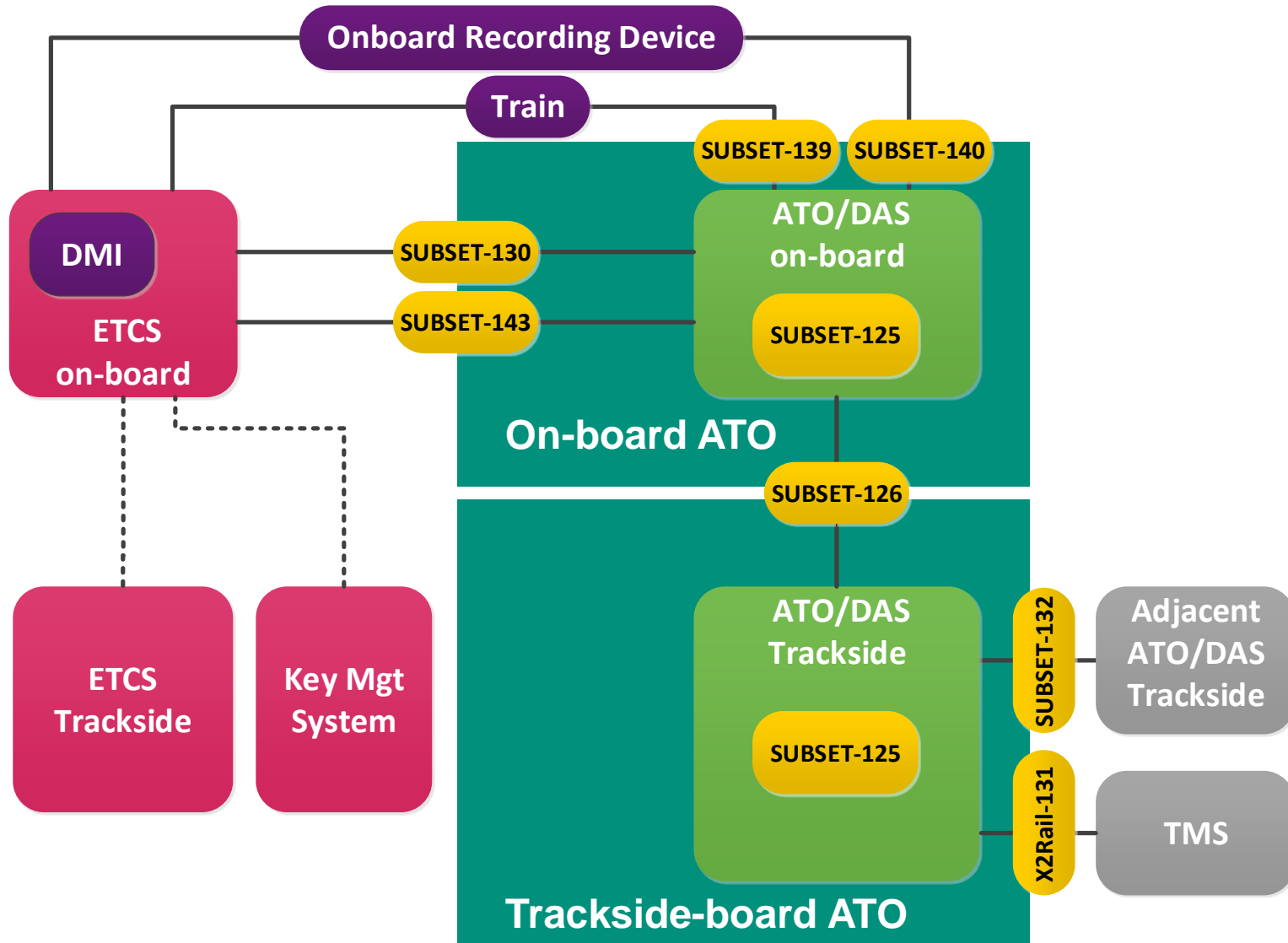
GOA1 ARCHITECTURE



GOA2 ARCHITECTURE



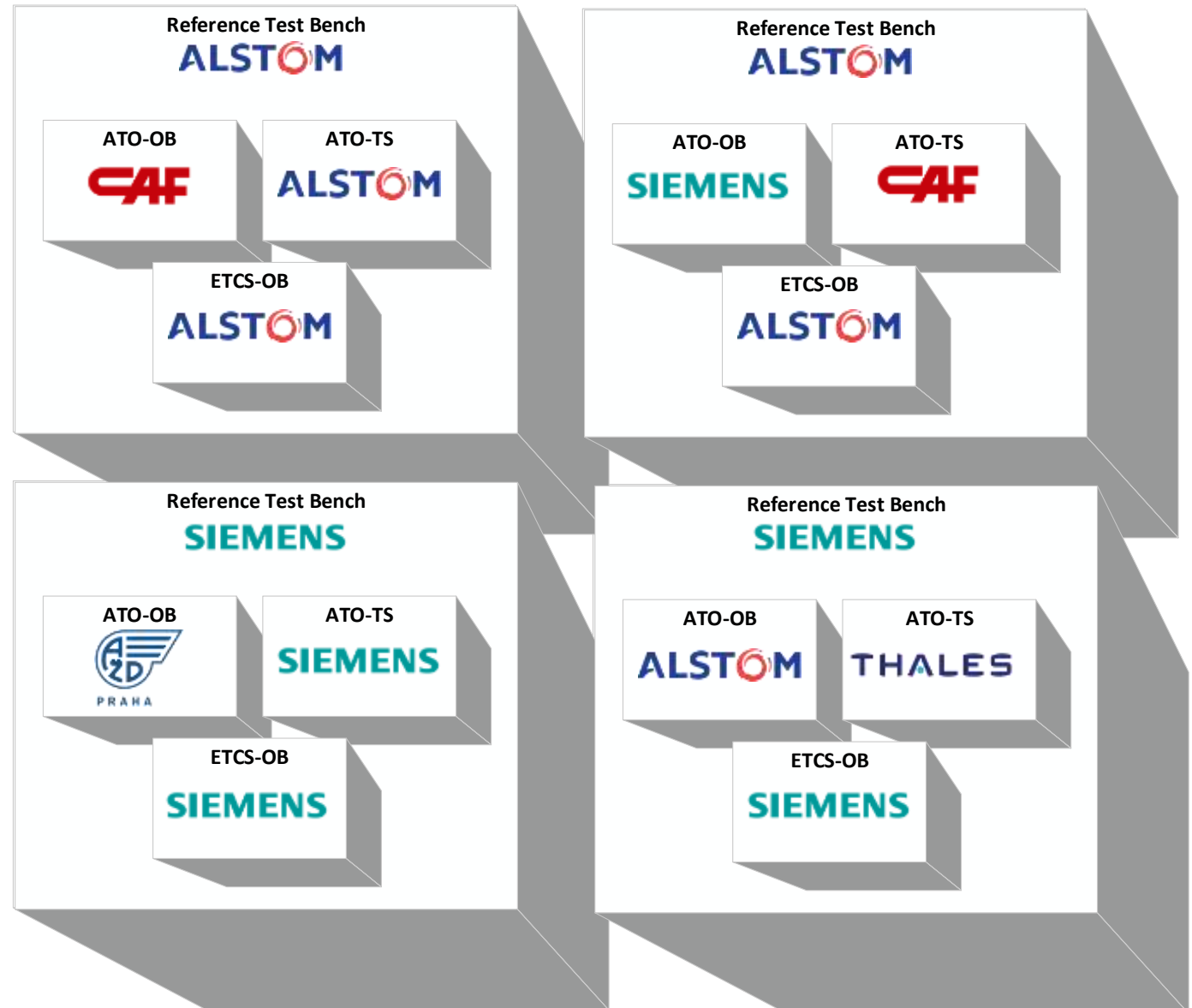
DOCUMENTS ASSOCIATED WITH GOA2 SOLUTION



- The ATO trainborne is defined as a SIL0 sub-system adjacent to the ETCS trainborne system.
- The ATO trackside is defined as a SIL0 sub-system.
- The ATO trackside and ATO trainborne interface via using the GSM-R PS communication bearer.

INTEROPERABILITY TESTS ON REFERENCE TEST BENCHES

- Two Reference Test Benches
- Four different configurations
- Interoperability Tests performed in 12/18 and 1/19



CONCLUSION



- ▶ Different Grades of Automation meet Operators expectation
- ▶ GoA2 brings already benefits (quick win):
 - ▶ on capacity, smooth riding, energy savings...
 - ▶ on customer satisfaction and Quality of Service
- ▶ ATO features are being standardised:
 - ▶ To guarantee ATO interoperability
 - ▶ To permit cross compatibility of ATO with ETCS
 - ▶ To maintain open competition
- ▶ Large Innovation programmes such as S2R are in place to further enhance benefits and coverage



Train Automation is on its way for a sustainable transport system!

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Thank You For Your Attention!

Questions?