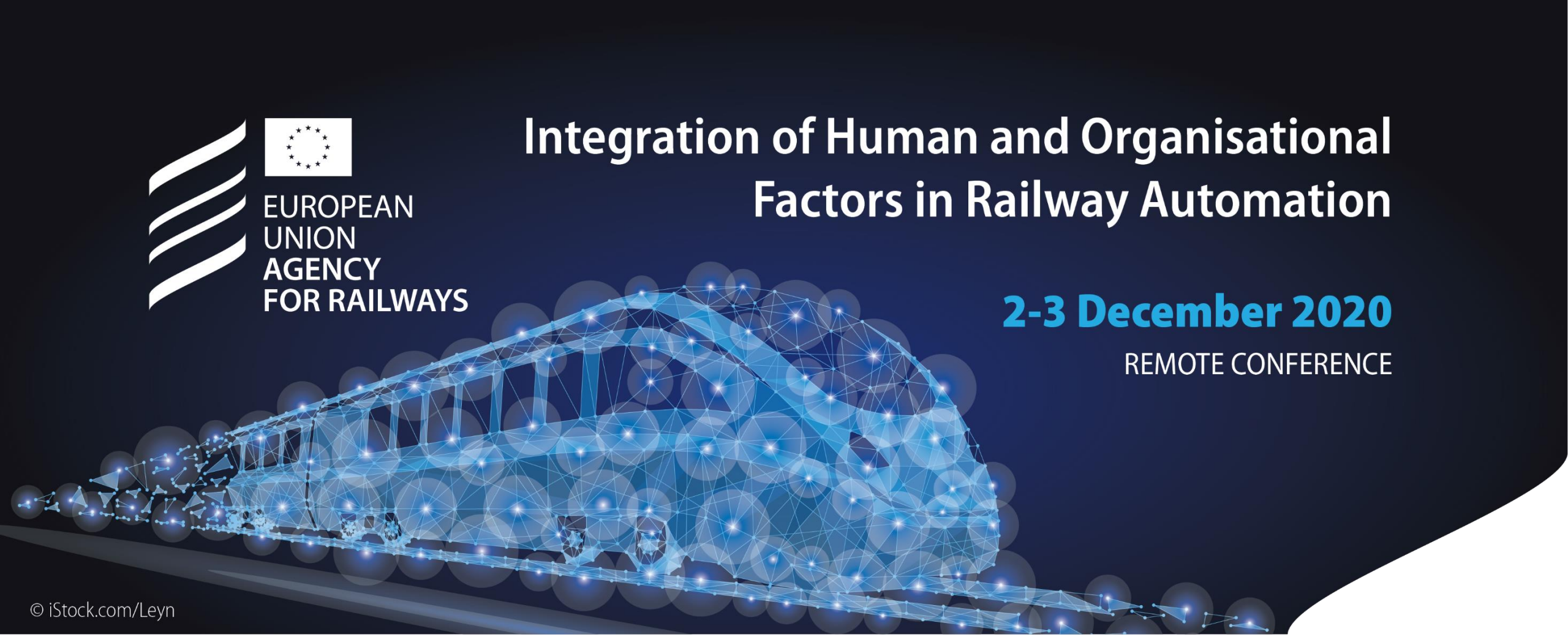

The interplay between human and system as a critical success factor in the experiments of ATO over a class B system

Vera Verstappen & Mark van Dooren – Dutch Railways

EUROPEAN UNION AGENCY FOR RAILWAYS

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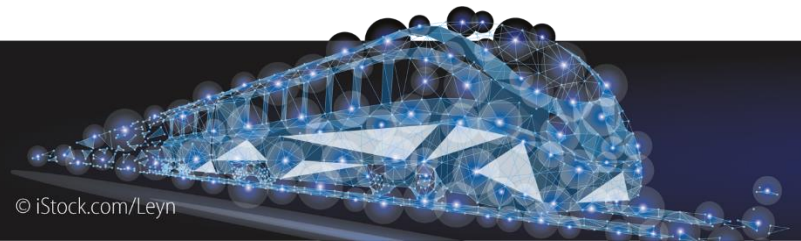
Dutch Railways (Nederlandse Spoorwegen)



Integration of Human and Organisational Factors in Railway Automation

2-3 December 2020 | REMOTE CONFERENCE

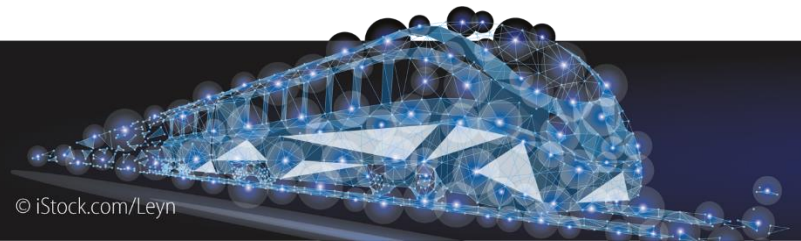
EUROPEAN UNION AGENCY FOR RAILWAYS

Vera Verstappen, Senior Human Factors Specialist at Dutch Railways

- Programme Human Factors/HMI@NS
- Programme ATO@NS
- Programme C-DAS (Driver Advisory System)

Mark van Dooren, Senior operational ERTMS expert at Dutch Railways

- Programme ERTMS@NS
- Programme ATO@NS
- Dutch national ERTMS programme



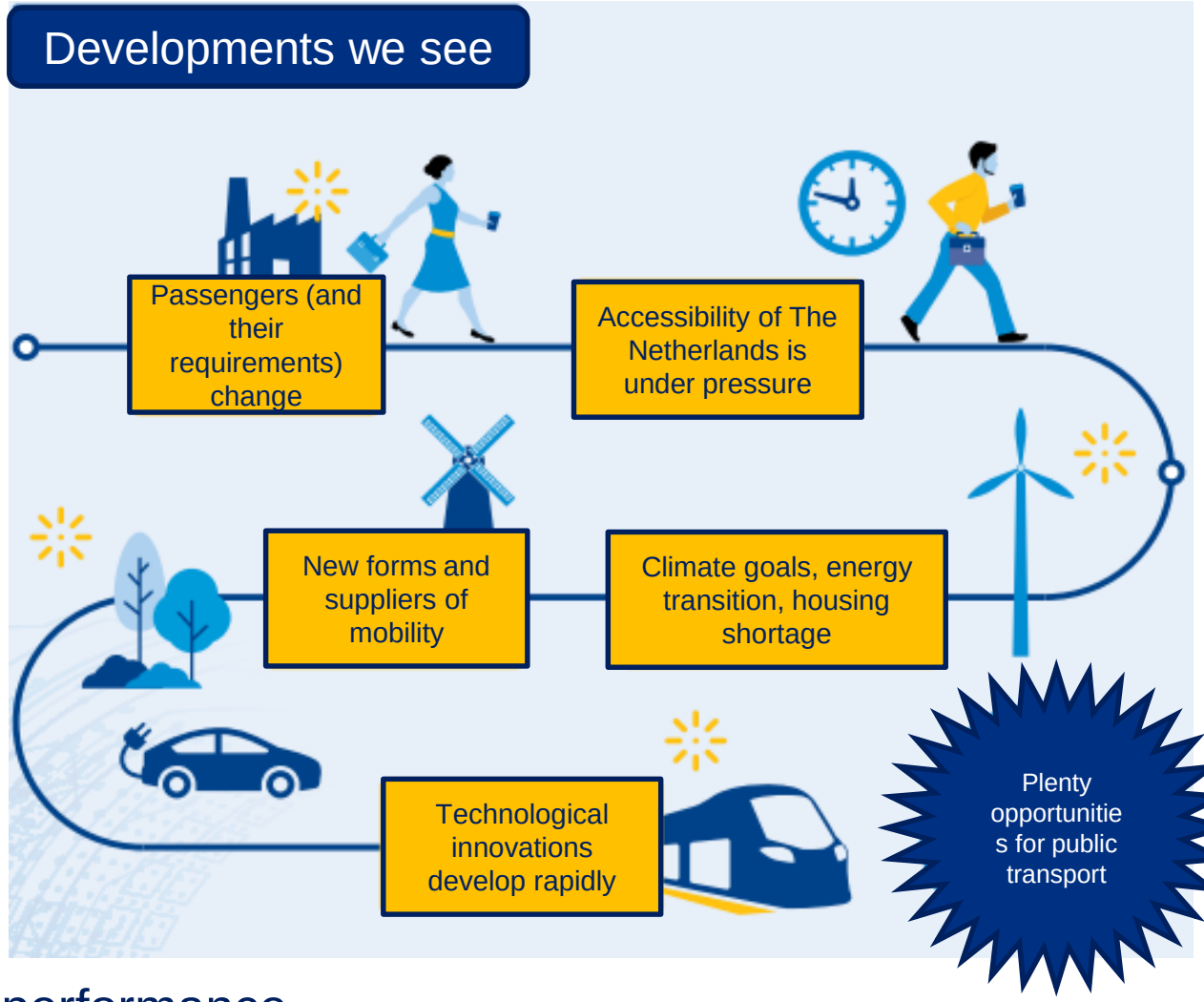
Challenges of ATO experiments at Dutch Railways

Challenges

- Transition to automation
- Capacity
- Flexibility
- Energy efficiency

Aim of ATO@NS

- GoA2 experiments
- Develop knowledge and skills
- Optimal use of learning potential
- Changing role train driver
- Develop Human Machine Interface for ATO performance



Human Factors challenges in ATO experiments

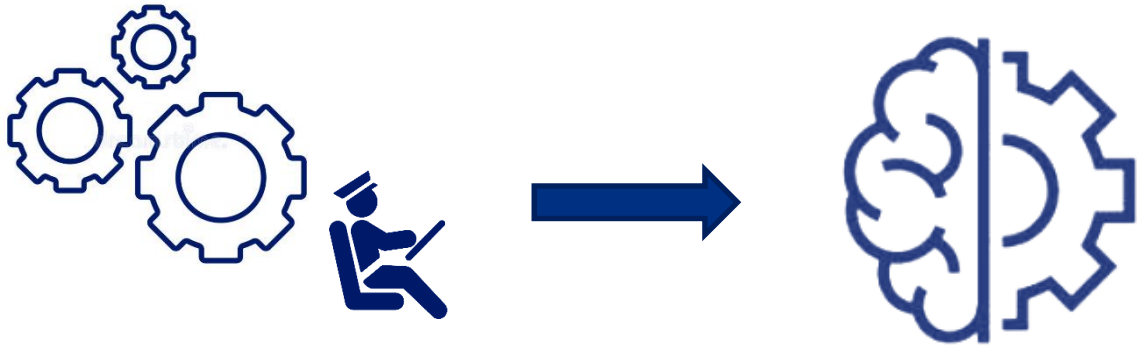
Human Factors research questions

- Which interplay arises between human and technology?
- Which human factors aspects should be further studied and integrated in the ATO design?
- How to design the interplay between train driver and ATO to achieve optimal performance?

Challenges ATO over Class B

- Communication between ATO and train driver
- Joint situation awareness
- Trust and acceptance
- More driver – ATO interaction compared with ATO over ETCS

Automation philosophy & Human Factors approach @ NS



Philosophy

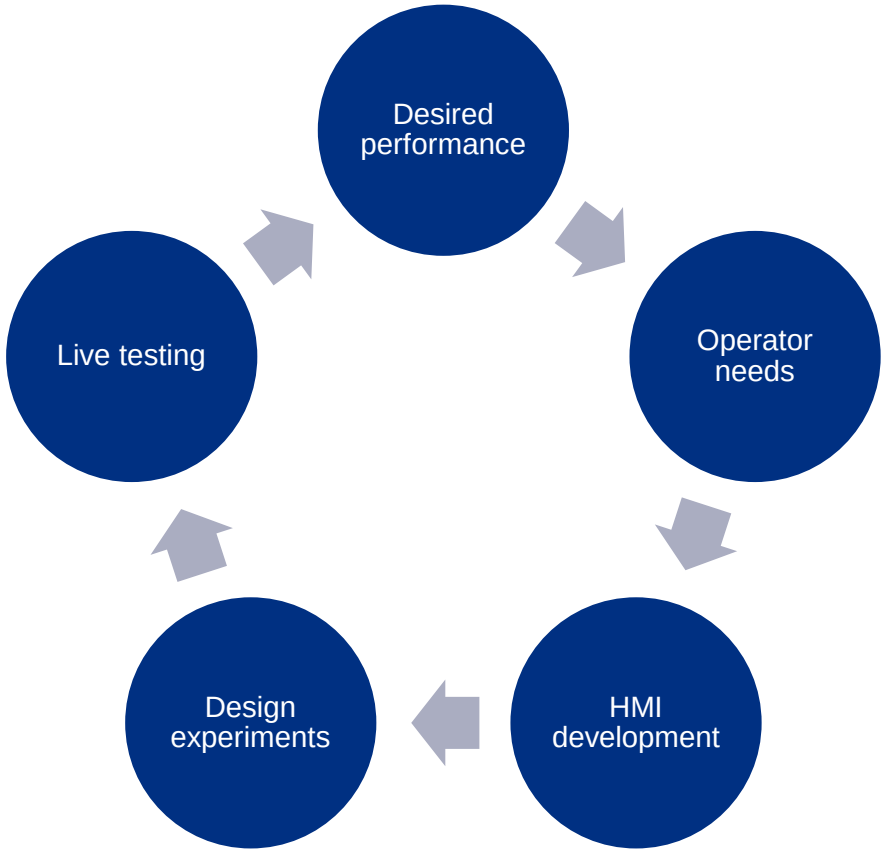
- Classic left-over principle
- Joint cognitive system of human and ATO

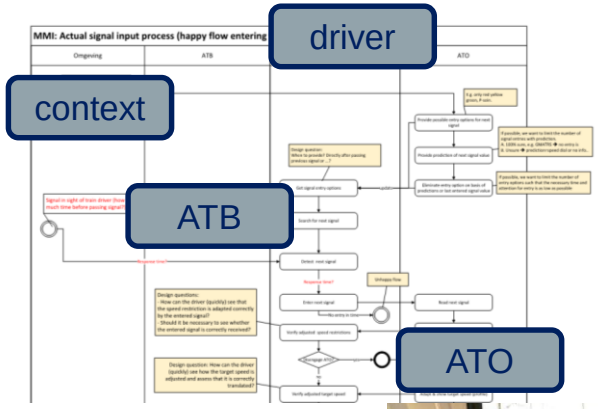
Phase 1 - ETCS: Left-over principle

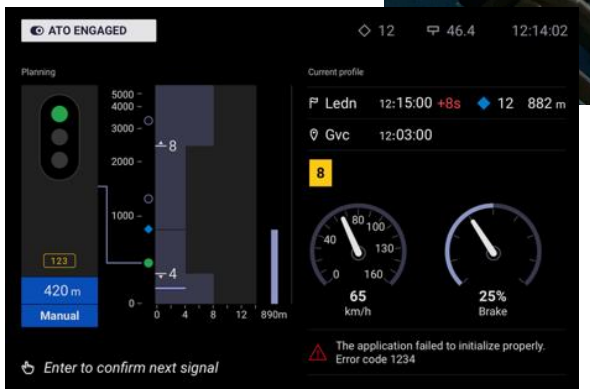
- Camera & observations
- Driver journey reconstruction
- Debriefings with drivers
- Live experiments during test runs
- Human factors themes identified

Human Machine Interaction Design ATO over Class B

Phase 2 – Class B system: Joint cognitive system driver & ATO







Benefits & Conclusions

Involve human factors from the start in the development of ATO to achieve optimal performance by the driver and automated system

Benefits:

- Effective design process, resulting in an intuitive DMI based on the drivers' needs
- Optimal interplay between driver and ATO: Interaction between driver and ATO is intuitive and driver is prepared for new monitoring task
- Driver acceptance and trust in ATO

Set-up for success
By creating the right conditions from the start, ATO and driver can achieve the desired performance together

Thank you for your attention!

Questions?

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