

Project B6: Human-Automation Interactions in Rail Network Control

Partners: Network Rail, Arup

Investigators:

Dr. S. Sharples (University of Nottingham)
Prof. J. Preston (University of Southampton)

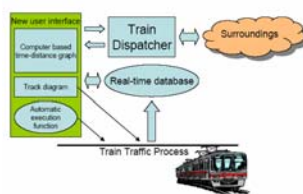
Researchers:

N. Balfe (University of Nottingham/Network Rail)
S. Harris (University of Nottingham)
Dr. J. Armstrong (University of Southampton)

Background:

Signallers and controllers are crucial for the efficient, reliable and safe running of railways. Understanding the skills and expertise of these key workers is particularly important in the case of modern technical support systems, such as ARS, ERTMS and the prototypes tools developed by B1, which may require new organisational systems.

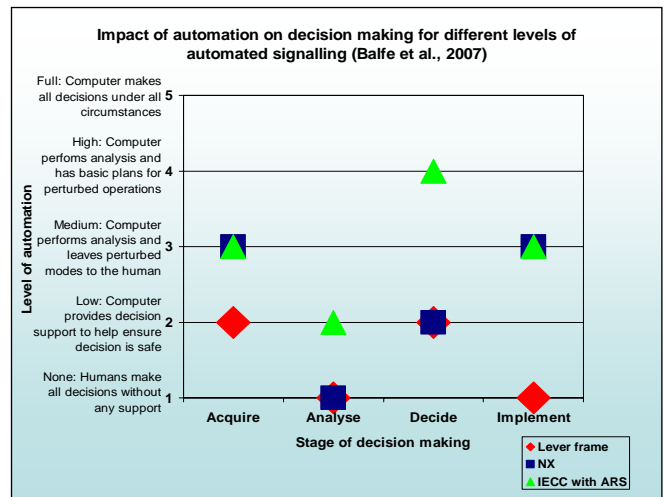
In practice, automation often fails to provide the expected benefits in functionality and reliability compared to human-centred systems. The skills that people can bring to a hybrid (automation plus people) system are difficult to develop and maintain if the design philosophy is for them to be monitors only. Failure of automatic systems can then be catastrophic for performance continuity.



Example of a Hybrid System
(from Wikström et al., 2006)

Objectives:

- To explore and define the technical and organisational systems which best allow a hybrid control option
- To identify decision and communications support that make best use of staff skills to interpret, prioritise, intervene and optimise.



Progress:

Work has been conducted to analyse the possible benefits of automation as examined in the previous project B1 (Preston et al., 2007). Related work has examined automating the import of rail timetable data (Armstrong et al., 2007) and possible railway futures (Armstrong & Preston, 2007).

Structured observation of rail signallers has identified the different patterns of activity that are present with different types of signalling automation. This work will now be extended to gain a further understanding of the relationship between different types of automation use, signalling environment and perceived levels of workload.

The significant "ironies of automation" (Bainbridge, 1983) for the modern railway control environment have been identified. These will be used as a basis for analysis of ethnographic data to be collected in rail control environments in the future.

References

- Armstrong, J., Preston, J. and Carlsson, M. (2007) Automating the Import of Electronic Timetable Data to EMME/2-Based Public Transport Models. *International Association of Railway Operations Research Conference*, Hannover, Germany.
- Armstrong, J. and Preston, J. (2007) Possible Railway Futures. Presented at *Transport – the Next 50 Years*, Christchurch, New Zealand.
- Bainbridge, L. (1983) Ironies of automation. In J. Rasmussen, K. Duncan, and J. Leplat (Eds) *New Technology and Human Error*, 1983, Wiley: Chichester. p. 271-283
- Balfe, N., Wilson, J.R., Sharples, S. and Clarke, T. (2007). Analysis of current UK rail signalling systems. Paper presented at the *Human Factors and Ergonomics Society European Chapter conference on Human Factors for Assistance and Automation*, Braunschweig, Germany, October 2007.
- Preston, J., Armstrong, J., Bouch, C., Goodman, C., Weston, P. and Takagi, R. (2007) Decision Support System for Dynamic Re-Scheduling of Trains under Disturbance. *11th World Conference on Transport Research*, Berkeley, California.
- Wikström, J., Kauppi, A., Andersson, A.W. and Sandblad, B. (2006) Designing a graphical user interface for train traffic control. Technical Report 2006-025. Department of Information Technology, Uppsala University.

Contact:

Dr. Sarah Sharples (sarah.sharples@nottingham.ac.uk) and Prof John Preston (J.M.Preston@soton.ac.uk)

Rail Network Control