ECDP ETCS Pathfinder: The value of an In-Service Review

John Gunnell

Atkins Réalis

SUMMARY

The East Coast Digital Programme (ECDP) is the largest and most complex signalling upgrade programme in Network Rail history. It requires the deployment of wayside and onboard signalling and communication technologies across more than 100 miles of track and impacting 27 operators and multiple vehicle fleets with mixed classes, all of which must be fitted with European Train Control System (ETCS) onboard equipment to use the route. ECDP impacts on all elements of the Railway System.

London's Northern City Line (NCL), a provided the perfect project ECDP pathfinder to trial the system in operation on the live Network Railway with limited performance impacts on the East Coast Mainline.

It is important, and an industry requirement, to integrate Human Factors in major UK Rail projects with significant operational impact on various stakeholders. Effective Human Factors integration addresses the needs of technology development and business change projects within complex socio-technical systems.

The ECDP NCL 'pathfinder' commissioned in early 2024, introducing one of the only ETCS digital signalling systems in the UK. The early operational ETCS system service on ECDP has provided an opportunity to explore the system performance, and importantly, the users feedback on the changes to their ways of working.

KEYWORDS

Rail, signalling

In Service Review Methodology

The East Coast Digital Programme (ECDP) NCL Human Factors team followed a structured approach, summarised in Figure 1, to harness the know baseline understanding of the system to evaluate the actual operating conditions to aid the projects future priorities.

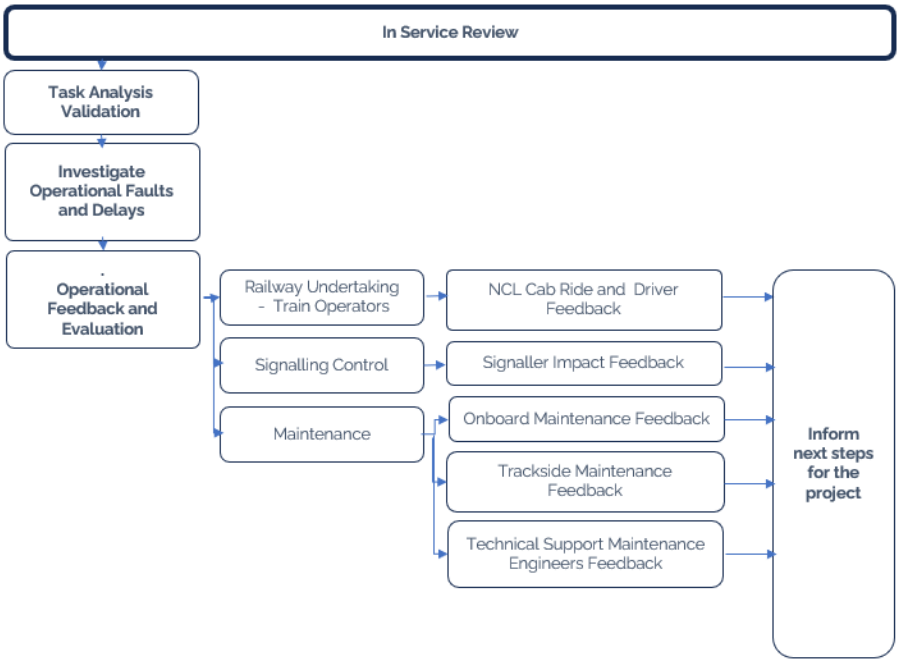

Figure 1: ECDP NCL In Service Review Approach

Work as defined vs work as done

The Task Analysis was developed based on operating principles defined by the project from recognised Industry Standards. With now the experience of training and operating the systems in a various condition, the Task Analysis could be validated with end users. A structured approach to review all normal, abnormal, and emergency scenarios provided a basis that not only the pathfinder scheme, but also for the broader system migration to come.

The clarified scenarios provided the actual human interface demands required with the new signalling system. A fundamental reference point for the ISR testing and analysis to build upon.

The differences, and shortcomings, of the documented processes compared to the reality, provided evidence for operational ambiguity. The validation exercise identified a series of operational demands and decision-making risks in an environmental context of pre-existing functions withstanding.

Reported Incidents and delay data

As expected with any implementation of such magnitude, the migration of new systems requires familiarisation and adaption during transition period. The uptake and effectiveness of both the user and the equipment tend to require learnings for reliability and effectiveness.

A set of ECDP ETCS-related reported incidents and operational delays were recorded by the client, Network Rail, on the pathfinder NCL. The main intention being to ensure the safety and performance of the network. By learning the root cause of the technical or human behaviours the project had dependable data to base improvements to people, process and on the pathfinder and future deployments.

As one would expect, the number of incidents and service delay minutes grew in correlation to the number of train Drivers trained and operating with the new systems.

Interestingly, even with the incident and root cause analysis taking place, the data reports continued to rise post completion of all Driver training on the NCL pathfinder. Certain pertinent issues were reoccurring time after time impacting the business confidence, and acceptance of system change.

The value of HF engineers integrating into investigations of in-service incident data reviews is to support understanding the 'so what' in specific 'human error' issues. Advising investigatory stakeholders that 'human error' is not the resulting issue, but the consequence, broadens the perspective of fault from simply the user's actions to taking the time review the task interfaces in consideration. Understanding the complexities and risks in the operational pathfinder through user centred contextual data and feedback has challenged the design and integration of the system with new HF issues to address for future ECDP deployments.

Takeaways from the pathfinder In Service Review

The In-Service Review on the ECDP pathfinder project has highlighted the need for awareness and anticipation that the adoption of change will not be immediate. The value of focusing efforts on delving into the common teething issues is crucial to the long-term success of the bigger picture.

By harnessing the users of the early operating system to validate an understanding of the working interfaces it builds confidence in the benchmark system and best prepares the business readiness process, as the contextual environment has a large influence on the use.