

Digital Railway The Operational Perspective Key Outputs & way forward



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Institution of Railway Signal Engineers

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Following on from the series of round table discussions in 2017 and the publication of the white paper “Making a success of the Digital Railway”, the IRSE/WSP Digital Railway Think Tank Round Table session on 26th April 2018 focused on railway operating issues. The purpose was to identify the issues which may affect the successful delivery of the digital railway on the GB Network.

An analysis of the discussions has resulted in the identification of 8 topic areas for possible future discussion. The objective of the future discussions would be to gain consensus on the issues, develop principles and guidance for the industry, and to make recommendations to support successful delivery of the digital railway.

The topics are :-

1. People development
2. Collaborative delivery
3. Train Operator Franchise Process
4. Focus on Passengers
5. Building Timetables to deliver real benefits
6. Person-machine planning and re-planning
7. Communicating changes to the plan
8. National Network Management

For each of the topics this paper presents a summary of the discussions with further insight and analysis to support the specific topic. These summaries will be subject to further refinement and development as we take this work forward.

In order to do this, WSP proposes to hold further round tables sessions to focus specifically on these topics and take an in-depth view of the proposals in each area. We welcome feedback on the range of topics, alternative proposals for discussion, and any preferences or priorities for discussion of the topics.

Please provide your feedback to Steve.denniss@wsp.com

Topic 1:

People Development

Proposal:- A strong people development programme is required to support DR implementation.

A planned people development programme that is based on a robust skills gap analysis will give people the right skills at the right time to deliver digital railway services timed to the second. It will also reassure employees in the rail sector that they have an important role to play in its success – that they are very much part of a digital future. Changing attitudes towards the introduction of new technology is an important element of the migration to a Digital Railway.

Ultimately, a digital railway should change the nature of jobs, the most obvious example being that of a train driver. Modern technology could reduce the time and cost of training a driver as the role transitions to more of a manager of the systems, rather than an operator of the controls (except in failure scenarios), which should be embraced as a positive shift rather than an erosion of status.

Technology alone cannot deliver the tight timetables which are the aspiration of the high capacity, digital railway. It needs people as well. In the Netherlands, for example, countdown clocks are helping train dispatchers to play their part in the delivery of a “right time” railway. The increasing use of smart phones and tablets are giving more rail staff access to up-to-date status information and timetable updates, both to support delivery of the train service and to facilitate a better customer experience, especially when there are changes to the normal service.

Meaningful, important and exciting jobs will exist as part of a digital railway, but industry needs to show its clear intent to create these jobs. In doing so, it will attract those with new skills and also migrate existing staff to new opportunities that provide career progression and job satisfaction. By working even closer with the unions, and with the professional and academic institutions, we can deliver a clear message that the future railway is committed to develop people and attract new talent. Development of the people programme for operating the railway needs to be a priority task.

Topic 2:

Collaborative Delivery

Proposal:- The Industry needs to establish the best methods of collaboration for successful delivery of the Digital Railway.

Long-term relationships, based on trust and common goals, are required to deliver the level and complexity of change anticipated in the coming years. Strong leadership is required and this must be supported by a practical delivery mechanism that works for everyone.

It may be beneficial to manage asset maintenance within the five-year control period window, while more innovative developments that require a longer-term commitment, such as the implementation of digital technology, exist outside the CP process and are delivered through implementation contracts involving partnerships of the key organisations in a shared incentive-led collaborative contract arrangement. This arrangement will also give visionaries a wider window through which to drive through the necessary innovative changes.

We should look to HS2 as a potential catalyst in this environment. HS2 will introduce digital technology and innovative solutions unfettered by the current industry processes associated with an existing railway. Through its interfaces with the national infrastructure, HS2 could catalyse change in the introduction of digital technology on the existing railway.

The most beneficial partnerships may be those where supplier and operator join forces to deliver the required outputs and outcomes. Examples of routes, operators and suppliers collaborating to deliver real passenger benefits do exist, and we need to learn from these. Innovative contractual arrangements with clear principles behind them need to be established to incentivise the strong collaborative working practices needed to deliver a digital railway.

When proposals are considered and a business case can be established new ideas need to be given a balanced evaluation. In an age of technology and working practice revolution the Product acceptance process should be geared to support innovation.

Topic 3:

Train Operator Franchise Process

Proposal:- The industry should develop a franchise process that incentivises innovation to drive real passenger benefits.

The high profile failure of some Rail Franchises over recent years, coupled with their short term nature and the focus on delivering specific targets that inherently discourage innovation, mean that a review of these arrangements is required if the introduction of digital technology is to succeed.

Franchises bids generally perpetuate the status quo. Although they may include requirements to fit and implement Digital Railway Technology, they do not on the whole incentivise innovative proposals. The franchise bid process should, therefore, be structured and evaluated to recognise and reward proposals which improve passenger service through innovative digital implementation.

Once awarded, the franchise train operating companies (TOCs) work to very tight margins, making them understandably risk averse and short-term in their planning. But, with a focus on longer-term business opportunities, and by extension to longer-term franchise agreements, more significant passenger benefits can be realised. Within longer term Franchise agreements there needs to be provision for evolution of the service and real incentives for TOCs to deliver better benefits to customers.

In our White Paper we welcomed the thinking in the DfT document 'Connecting people a strategic vision for rail' and we continue to believe that the strengthening of longer term integration of track and train to be the way forward.

Requirements capture, driven by the needs of the end user, passenger, community, freight user and other customers and supported by the franchise process agreements and schedules is needed to ensure the right focus for Train Operators.

Topic 4:

Focus on Passengers

Proposal:- There needs to be greater focus on what passengers want from the new systems and services.

The focus of the infrastructure manager is as to be expected, on delivering their Key Performance Indicators and meeting obligations defined by the industry schedules. This can drive the "customer requirements" to be focused too much on the performance regime and operability for the industry rather than on providing the tangible benefits that end customers (passengers and freight companies) actually want.

TOCs and FOCs are the closest part of the industry to their customers. Network Rail, by contrast, is with the exception of major stations, one or two levels removed. TOCs and FOCs should therefore drive implementation of the systems and processes that give most benefit to the passengers, but they need to be incentivised and have the authority to make decisions that are in the interests of customers. It is recognised that not all passenger aspirations can be met, and with a finite capacity available there will be winners and losers. Closer communication of the reasons for changes with passengers can only help in this respect. It is recognised that this change of emphasis would not be without some risks and we would propose that the mechanisms for delivery are thoroughly reviewed and agreed by the industry before proceeding. As an example, the national rail passenger survey published by transport focus in Spring 2018 identified that top of the list of passenger aspirations, and accounting for nearly half of the reasons for dissatisfaction, was "Dealing with delays". If this topic was made top of the list of requirements for any new system the industry would be going some way to putting passenger needs first.

This could be achieved by giving TOCs and FOCs a stronger input in the Digital Railway Programme governance and steering bodies and more ownership of the industry consultation process. Thameslink made significant and meaningful progress when the operator was fully engaged and absorbed into the specification and development of the new systems and practices. Understanding the real needs of the operators and their customers and giving decision making power to operators in the requirements development process could revolutionise the quality of the "customer requirements" contained in the system ITTs to be issued to suppliers.

There needs to be a focus on future transport needs and an awareness of the changing environment. For example, it is unclear whether the historical increases in passenger travel will continue. Industry needs to be aware of trends and cognisant of potential disrupters in order to compete with emerging transport options. Germany is starting to get the focus right. German railways struggled for many years not focussing on who the real customer was. They started to change this when they turned their focus on customer needs. As an example of this the German rail industry is funding start-up companies who have ideas which will provide tangible passenger benefits. We need to learn from this and other international good examples if we are to keep UK rail competitive and attractive to our customers.

Topic 5:

Building Timetables to deliver real benefits

Proposal:- New timetables must deliver what is best for the customers as well as the industry.

Traffic Management (TM) tools are starting to replace the more traditional timetable development and management processes, and are being used to test and scrutinise proposed timetables in a more robust and informative way. In many cases the first output from TM analysis is to find conflicts, which can then be resolved through further analysis.

The timetable that is produced by any process will reflect the requirements of the company, organisation or person deciding the value of certain parameters during the development process. TM tools can support delivery of a more optimum service for the end customer if used in conjunction with new practices which are tailored to make use of the power of the tools themselves.

In deciding, for instance, how to balance frequency of train service with robustness and recoverability from disruption, passenger needs should be the primary driver.

Given the choice, passengers want reliability of service and a certainty of reaching their destination rather than more services. The national rail passenger survey published by transport focus in Spring 2018 identified that the key issue to provide passenger satisfaction was reliability, scoring 36%, as compared with 10% for frequency of service. Overcrowding is, of course, an issue. Longer trains are generally not possible, therefore more trains is the obvious answer. However, if those trains are all delayed and disrupted when something goes wrong then delivering this objective quickly becomes unattainable.

Topic 6:

People and Machine planning and re-planning

Proposal:- The new rules and methods for train planning and re-planning need careful consideration, with an integration of manual and automated methods.

The operators are required to deliver the best service to the end customers in a dynamic environment where system failures, passenger action, intrusion and many factors outside of their control can impact on delivery of the normal plan. In order to deliver in this environment, people and machine must work together, with highly skilled operators harnessing decision-supporting tools that engender cooperation and communication.

Changes in the status of the infrastructure or the systems affecting the running of the timetable need to be communicated and captured in an update to the plan. The updated plan is the “single source of truth” timetable for all train movements as validated and agreed by all parties prior to introduction. Similarly, if changes in the operator’s rolling stock or crew arrangements are likely to impact the timetable, this also needs to be captured in the updated plan and the impact identified and mitigated. In all cases, the impact of a change of status can be analysed and a new plan determined according to a set of rules and applied experience.

The use of intelligent TM will enable recalculation that reduces delays to a minimum. It can do this in a fraction of the time and with far greater accuracy than most human minds. However, the evidence shows that traffic management might be poor at interpreting all of the factors affecting the success or failure of an action. Manual decision-making at the front end, combined with traffic management, could help to control the consequences. The development of this person-machine network control process needs to be given an equal focus with the other parts of the technical system. The person-machine interface is too often relegated to an ergonomic or user interface analysis. This will be insufficient to support the highly complex and time pressured decision making processes required by a high capacity digital railway.

Giving signallers and operators better information that is easily and intuitively interpreted will enable them to make better decisions. Ensuring that those signallers are highly trained to make best use of the information is a key element of the implementation of the TM systems.

Topic 7:

Communicating changes to the plan.

Proposal:- Intelligent methods of communicating information are essential when the plan changes.

Having a common operating plan that is accessible electronically to all parties and communicating changes to the train delivery plan to everyone will support better decisions by everyone affected by the change. Using clear language to describe the impact of every change will improve the ability of everyone to react in a suitable way.

These changes are all encompassing and could involve anything from a driver implementing a different stopping pattern, or a platform dispatcher delaying departure of a service, to a signaller re-ordering services which have suffered a previous delay. The outcome might be a whole range of actions such as a passenger needing to go to a different platform or a depot dispatcher preparing new stock for service.

The real advantage of the TM system is that it produces a common plan that everyone can access, operators and passengers alike. This coupled with the speed of dissemination offered by digital technology offers real benefits. If everybody in the operational system has the correct information at the right level of detail at the right time, this will support delivery of the changed plan. Passengers and other customers will then need information about how this change affects them so they can make their own informed decisions.

Topic 8:

National Network Management.

Proposal:- National specification for integration of ROCs and TM systems is vital to ensure overall optimal network service delivery.

Monitoring of the current network has demonstrated that delays and disruption in one geographical area can have an impact on other adjacent and sometimes more distant areas. These impacts can manifest themselves for long time periods after the cause of the initial delay has been resolved.

Deployment of TM systems within Rail Operating Centres (ROCs) tends to be bespoke to the specific area of control. There are many commercial and technical reasons for this, including the need to integrate with existing equipment in the area. Whilst TM can help to recover from perturbations within their area of control, the bespoke nature of TM systems in a geographical area can have a detrimental impact if a wider understanding of railway status and the effect of traffic in one area on another is required.

Where delays in one area can impact adjacent and even remote areas this information should be communicated intelligently and used in a collaborative manner across the network. The problem is quite complex. Some predictions of future impact down the line can be overtaken by subsequent events and reacting to these changes too early can cause problems. Conversely, ignoring a delay to a service could ripple through and into an adjacent area and harm the service when it could have been easily avoided. Determining the optimum amount of interaction and integration is key.

The Digital Railway Programme has recognised this and has announced a request through the Joint Delivery Group process for support in determining the best way to interface TM systems across ROC boundaries. This requires careful consideration and an understanding of the complex interactions and dependencies within the network. Integration of existing TM systems may not provide an optimal solution. Having a set of overall TM interface rules at the start would most likely produce a better outcome.

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