

PR18 working paper

Working paper 2: Initial views on potential issues and opportunities in system operation

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Overview

This paper is part of a series of working papers to support policy development for our 2018 periodic review (PR18) of Network Rail, following the publication of our [initial consultation](#) on PR18 on 18 May 2016.

These working papers are intended to share some of our early thinking and provide an opportunity for interested stakeholders to comment on more detailed issues, options and proposals. They cover the following areas: route-level regulation, system operation (two working papers), outputs, and enhancements. Working papers on the latter two will be published in the coming weeks.

This paper builds on our work to define what system operation is and what the outcomes of good system operation are, by setting out our initial views around potential issues and opportunities with how system operation is currently delivered. This builds on our previous consultation on the scope of system operation in rail published in August 2015 and entitled “*System operation: a consultation on making better use of the railway network*” (our August 2015 consultation).

Contact details for responding to this working paper

Lead Alexandra Bobocica

Email ORRsystemoperation@orr.gsi.gov.uk

Tel 020 7282 3915

Responses to this paper are requested by 24 August 2016

1. Introduction

- 1.1 In this working paper we set out our initial views around potential issues and opportunities with the way system operation is currently undertaken in rail.¹ This is with reference to the system operation functions we identified in our August 2015 consultation.²
- 1.2 A number of parties³ undertake activities relating to system operation. Reflecting this, we highlight potential issues and opportunities in relation to both Network Rail's system operation functions, but also wider industry arrangements and processes which may be impacting on the outcomes of system operation.
- 1.3 We would like stakeholders' views on our initial understanding of these potential issues and opportunities, including what may be causing them and any evidence from your own experience.

Purpose of this working paper

- 1.4 This working paper sets out:
 - the background to our approach to the issues and opportunities work, including how we have gathered views from stakeholders to identify a number of potential issues and opportunities with system operation; and
 - the potential issues and opportunities that have emerged from our engagement with stakeholders and which we have identified as potentially affecting the outcomes across short-term, medium-term and long-term system operation.
- 1.5 Our aim over the next few months is to work with stakeholders to establish which issues identified are material and prioritise them appropriately for PR18. Some of the potential issues and opportunities highlighted in this working paper could be addressed through PR18 and the ORR's regulation of Network Rail. Other issues could require changes to wider industry incentive structures and processes, which are not within the scope of ORR's duties. It is important however to be aware of

¹ By issues we mean areas in which the outcomes of good system operation are not being achieved. Opportunities refer to the instances of good system operation that we currently see and where changes could realise further benefits. Opportunities also mean features of the evolving rail industry environment which could facilitate better outcomes in the future (e.g. technological change or greater devolution within Network Rail). This is important to ensure that where good system operation is happening, it continues and is facilitated by any changes to the regulatory framework and incentives that we put in place in PR18.

² ORR, *System operation – A consultation on making better use of the railway network*, August 2015 (http://orr.gov.uk/_data/assets/pdf_file/0006/18744/system-operation-consultation-2015-08-13.pdf)

³ This includes Network Rail, funders and/or governments, train operators or the ORR.

these issues and of the wider rail industry environment (including direction of travel), in order to be able to develop effective options as part of PR18.

Related publications

1.6 There are a number of documents that are relevant to this working paper on potential issues and opportunities:

- Our August 2015 consultation which set out our understanding of what system operation is in rail;
- The note concluding on our August 2015 consultation⁴. The note provides our revised understanding of what system operation is in rail and how it is currently undertaken by different parties, building on stakeholders' views. It sets out in more detail what system operation is, highlighting the range of functions that take place over different timeframes and the different organisations that undertake them.
- Another system operation working paper (working paper 3)⁵. This working paper focuses on setting out a possible framework for improving the regulation of Network Rail's system operator functions we have identified (i.e. mostly functions delivered by Network Rail at the centre). These potential changes to how we regulate and monitor Network Rail's routes are set out in working paper 1.⁶

Next steps

1.7 Figure 1.1 provides our current view of our milestones with respect to system operation over 2016-17.

1.8 **Over summer 2016** and reflecting the fact that Network Rail continues to implement its new operating model that provides for a stand-alone system operator business unit, we will seek to establish a clear understanding of how Network Rail undertakes its system operation functions. This will focus on how activities are split between the system operator business unit and the routes.

⁴ Available here: http://orr.gov.uk/_data/assets/pdf_file/0005/21965/pr18-conclusions-to-our-august-2015-consultation-on-system-operation.pdf.

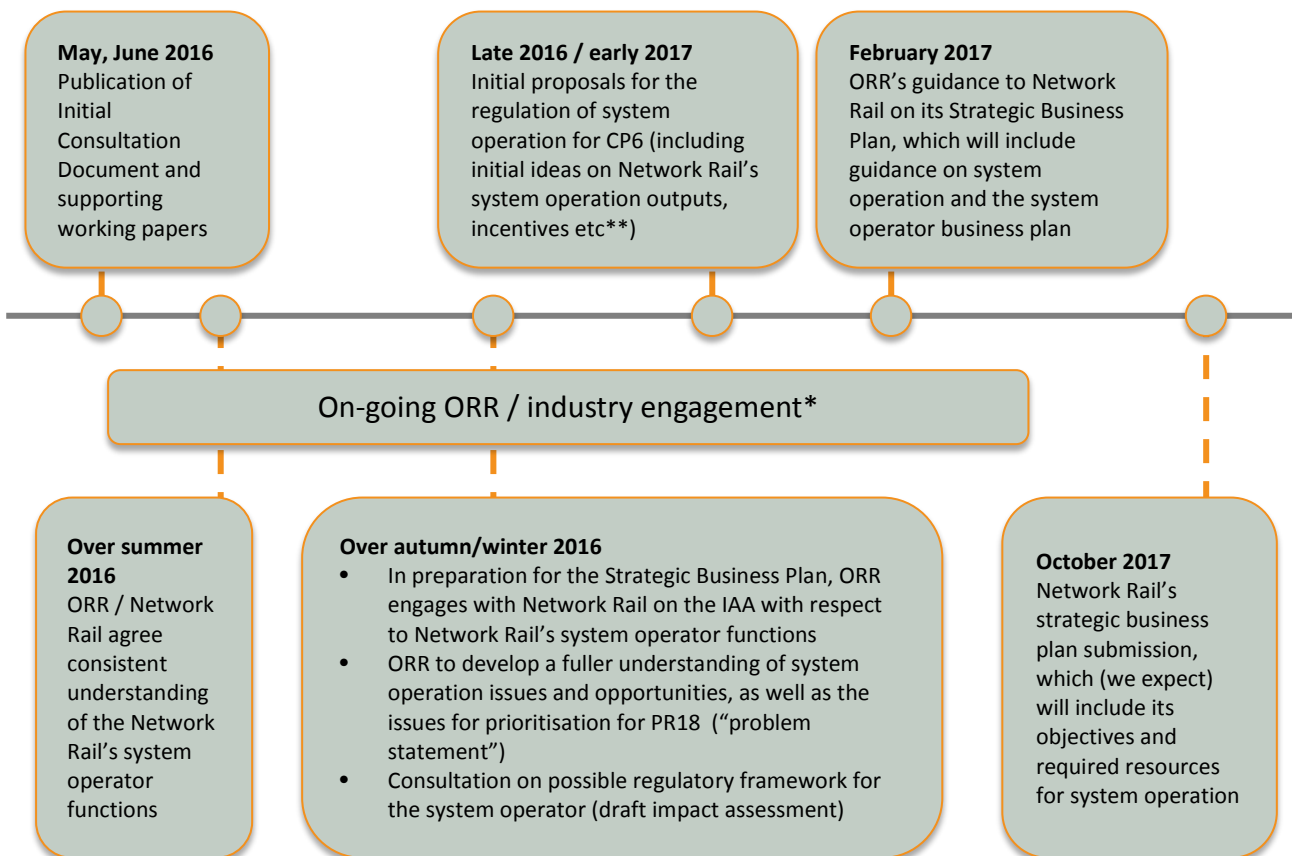
⁵ Available here: http://orr.gov.uk/_data/assets/pdf_file/0020/21962/pr18-working-paper-3-initial-views-on-the-regulatory-framework-for-network-rail-system-operator.pdf.

⁶ Available here: http://orr.gov.uk/_data/assets/pdf_file/0018/21960/pr18-working-paper-1-implementing-route-level-regulation.pdf.

1.9 **Over autumn 2016** we will develop our thinking in relation to three closely related areas of work:

- We will refine our understanding of the issues and opportunities associated with system operation, as discussed in our working paper 2;
- We will develop more detailed proposals for the regulatory framework for the system operator, including ways in which this framework can address the issues and opportunities that we have identified; and
- Related to this, in preparation for the Strategic Business Plan, we will engage with Network Rail on the Initial Industry Advice (IIA) with respect to Network Rail’s system operator functions.

Figure 1.1: Indicative timelines of milestones with respect to our system operation work over 2016-17



* This could involve the RDG’s new system operation working group, as well as engagement with other interested parties on both a cross-industry and a bilateral basis. ** Some system operation issues and options could be taken forward outside of the specific settlement for the system operator (for example, some issues could be addressed in other regulated outputs or through the charges).

Responding to this working paper

- 1.10 We welcome stakeholders' views on the material set out in this working paper, and will be engaging with industry to gather views and evidence around both the potential issues and opportunities and the regulatory framework for the system operator. This will include a series of discussions with the Rail Delivery Group (RDG's) new working group on system operation.
- 1.11 More generally, we would like stakeholder feedback on our initial views set out in this working paper. We want to make it as easy as possible for stakeholders to engage with us and we are flexible about how you do so; Box 1.2 explains the different ways of doing this.

Box 1.1: How to respond to this working paper

Working papers are intended to facilitate a more dynamic process of engagement and consultation with stakeholders, to support an iterative approach to developing policy. We welcome all responses to the paper, including less formal responses such as emails, bilateral or multilateral discussions on any aspects covered in the paper, as well as alternative ideas and proposals. We have set a deadline for responses, but this should not prevent stakeholders from sending thoughts to us ahead of this date; indeed, we hope that our ongoing conversations with stakeholders following publication of this paper mean we will be able to make significant progress by the deadline. Earlier responses on this paper, or just on particular issues raised in it, would help us in this respect.

Where written responses are made to us (particularly more formal responses), we may publish these on our website. If you wish any information that you provide, including personal data, to be treated as confidential, please say so in your response (an automatically generated confidentiality disclaimer by IT systems will not necessarily be sufficient in this respect). However, please be aware that regardless of any such request, we may be obliged to disclose or release any submissions made to us under the access to information regimes, such as the Freedom of Information Act 2000 or Data Protection Act 1998. Further information about how we may treat your response is available in paragraphs 6.40-6.43 of our [initial consultation](#) on PR18.

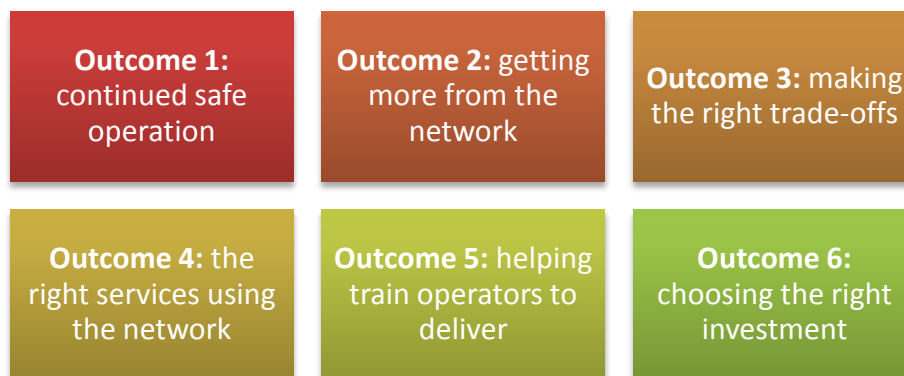
Table 1.1: Working paper 2 questions

Question number	Question
Working paper 2 Question A	To what extent do you agree that the issues and opportunities we have identified with the way system operation is currently undertaken are the most material ones?
Working paper 2 Question B	Are there other issues that you consider material that we haven't mentioned?
Working paper 2 Question C	Does your experience, particularly of the system operation functions that Network Rail is currently responsible for, reflect our emerging views around issues / opportunities.
Working paper 2 Question D	Are there any examples you could provide of how Network Rail undertakes these activities that would either support or contradict our emerging views?

2. Background to our system operation issues and opportunities work

- 2.1 The thinking set out in this paper draws on responses to our August 2015 consultation, as well as subsequent discussions we have had with stakeholders. We have also drawn on internal ORR knowledge and understanding developed through consultations undertaken in previous periodic reviews, through our monitoring of Network Rail or our enforcement work. This has informed some of the potential issues and opportunities set out in this working paper.
- 2.2 To support our work, we have developed a set of high level objectives (or desirable outcomes) of system operation (see Figure 2.1 below taken from our August 2015 consultation). These can inform our approach in PR18 including by helping to ensure that there is a coherent set of incentives for Network Rail's system operation functions (rather than considering different types of incentives separately).

Figure 2.1: The outcomes of good system operation



- 2.3 We have sought to understand what may be causing the potential issues and opportunities highlighted in this paper. We have set out what we understand the relevant root causes of each issue to be in Table 3.1 at the end of section three of this working paper. A detailed explanation of the issues is provided in section three of this paper.
- 2.4 In some instances, a number of 'root causes' may exist for each potential issue or opportunity. This also means that the most effective way of addressing each issue may vary, particularly in light of the fact that different industry parties deliver some of the functions of system operation.
- 2.5 The views we have gathered suggest a number of potential 'root causes' that may prevent the railway from achieving the outcomes of good system operation (see Figure 2.2).

Figure 2.2: The possible root causes of potential system operation issue



- 2.6 We plan to test these 'root causes' with stakeholders, with a view to understanding relative priorities and identifying ways to address them. In some instances, this might suggest changes for implementation in PR18, while other areas may require wider changes to improve outcomes, or may be already subject of changes being put in place by Network Rail or others.
- 2.7 Reflecting this, the next stage of this work will focus on testing the initial views set out in this paper with industry to improve the evidence available on the issues and opportunities. This will allow us to prioritise our work going forward.
- 2.8 In parallel, we have started to consider the implications and options for PR18, and have published a working paper setting out a possible framework for improving the regulation of Network Rail's central system operator functions (i.e. the 'system operator'). That paper describes in more detail an approach to improving incentives for Network Rail which could be implemented through PR18. This framework consists of a number of measures focusing on the regulation of Network Rail's 'system operator' functions (i.e. those functions that sit at the centre of Network Rail under its new operating model).

3. Potential issues and opportunities in system operation

- 3.1 In this section we set out the potential issues and opportunities we have identified in relation to system operation across the range of time frames (short-term to long-term) and across the range of organisations currently involved in delivering system operation in rail. These are not conclusions. Rather, they represent themes that have emerged out of our consultation with stakeholders, and which we want to test further in order to understand how important they are and prioritise our further work.
- 3.2 In setting out the potential issues and opportunities, we have highlighted what we understand to be causing them, i.e. the potential 'root causes'. For some of the issues, we have identified a number of possible causes. We would welcome feedback from stakeholders on our understanding of these, and on which root causes they believe are most relevant for each issue / opportunity. We have summarised our current understanding of the potential issues / opportunities, and their root causes in Table 3.1, at the end of this chapter.

Potential issues and opportunities in short-term system operation

Box 3.1: Definition of short-term system operation

Short-term system operation refers to the functions of accommodating requests for capacity outside of the bi-annual timetabling process (e.g. the freight spot market), and operating the system on a day to day basis to enable services to run. Operating the system day-to-day includes for example making trade-offs between capacity use and performance, through decisions about which services to prioritise during disruption, in keeping with the operational rules established nationally. It also includes operating the signalling system and managing the impact of disruption on the network. All these activities have a significant impact on customers' experience of the railway, and are therefore very important in order to maximise benefits from the network.

- 3.3 Based on views gathered to date, we have not identified significant or systemic issues around how short-term system operation functions are delivered themselves. With a few exceptions, stakeholders' experience of these short-term functions has been positive. Nevertheless, there are likely to be improvements that could be secured in this area over the medium to long-term. For example, the digital railway initiative could represent a step change in how Network Rail can deliver these short-term functions, such as signalling. Any framework for regulating Network Rail's system operation functions should enable it to continue pursuing such initiatives at a network wide level, where this is beneficial.

- 3.4 In relation to Network Rail's delivery of short-term system operation, and the outcomes experienced by passengers and freight users in this area, we note that to date in CP5, Network Rail has struggled to meet its punctuality and wider performance targets. This has had a significant impact on passengers and freight customers.
- 3.5 Evidence from a performance investigation undertaken by ORR in relation to Network Rail's performance delivery to Southern, Govia Thameslink (GTR) in 2014-15⁷ highlighted that some of this poor performance occurred as a consequence of weaknesses in the data which informed new timetables and issues in relation to Network Rail's assessment of the impact of the new timetable on performance. This suggests that in some instances performance issues may in fact be symptoms of issues in medium-term system operation (i.e. allocation of capacity and modelling of capacity / performance trade-offs), rather than of the way in which short-term system operation functions are delivered. In the next stage of this work we intend to discuss this issue in more detail with stakeholders to better understand what the underlying causes of these kinds of short-term performance issue are.
- 3.6 Additionally, in light of possible changes to wider rail industry arrangements, for example as a result of the Shaw review, we need to continue monitoring the effectiveness of these short-term functions. Increased devolution of responsibility to Network Rail's routes could increase the need to ensure coordination and safeguard users against discrimination in the delivery of these functions. This is particularly important in respect of freight and national operators, who operate substantial numbers of services across route boundaries (although most operators do this at least to some degree).

⁷ *Investigation report: Network Rail's performance delivery to Southern and Govia Thameslink Railway in 2014-15*. August 2015 (http://orr.gov.uk/_data/assets/pdf_file/0006/18699/performance-investigation-report-southern-gtr-august-2015.pdf).

Potential issues and opportunities in medium-term system operation

A. Determining capacity from the network and understanding its potential use

Box 3.2: Definition of medium-term system operation – determining capacity from the network and understanding its potential use

Activities are currently undertaken by Network Rail and others which affect how capacity is delivered, given the physical characteristics of the network (see Figure 1 in the conclusions note to our August 2015 consultation that we have also published today). The Timetable Planning Rules (TPRs), which are overseen by Network Rail and developed in consultation with industry, affect how much capacity there is on the network and are therefore an important aspect of system operation. These rules underpin the timetable production process and have a significant impact on what capacity is can be allocated, given the prevailing level of demand.

There is also a role in medium-term system operation to understand how network capacity could be used in different ways to produce different levels of output, and associated performance. This activity is also currently undertaken by Network Rail through ad-hoc capacity studies, as needed.

3.7 We highlight below the potential issues and opportunities that have emerged from our engagement with stakeholders and which we have identified as potentially affecting the outcomes across this function of medium-term system operation:

- A. Network Rail’s incentives may not be balanced in a way that encourage it to make the right trade-offs between costs, capacity and performance when determining capacity from the physical network.** Only a small proportion of Network Rail’s income varies with traffic (around 16%).⁸ In the absence of any mitigating measures, generally performance can be expected to deteriorate as more traffic comes onto the network. Network Rail faces strong reputational and financial incentives in terms of network performance (e.g. punctuality of services), which, given the public sector nature of the company, may be more material than the revenue incentives associated with additional services.⁹ This may affect the way Network Rail manages the TPRs, and could mean that Network Rail does not have balanced incentives to release capacity by optimising them.

⁸ Network Rail currently receives additional income in the form of variable track access charges when it allows additional traffic on the network.

⁹ HS1 in its response to our August 2015 system operation consultation suggested that measures like PPM do not create incentives for Network Rail to increase the number of train services and provide weak incentives for effective system operation.

- B. The way that changes to the TPRs are made may limit the maximum amount of capacity delivered.** There may be instances where Network Rail might need to make difficult decisions in optimising some of the TPRs (which might create winners or losers). However the way that changes need to be made (through consultation and potentially involving an appeal to the ORR or a panel) may make this difficult.

Network Rail and operators are currently undertaking an exercise to review some of the TPRs to update the assumptions that underpin them in order to optimise them. As part of this process, Network Rail has brought together a range of stakeholders and has facilitated discussion, which is a positive aspect of its role in system operation.

- C. In places, the TPRs are out of date and based on inaccurate information about network assets and operational performance.** Train operators have cited examples where some of the TPRs are based on an out-dated understanding of network assets and operational performance of rolling stock.¹⁰ We note the early progress Network Rail has made with industry to update the TPRs, through the Timetable Rules Improvement Programme currently underway, as well as the importance of ensuring this exercise has as wide a scope as possible to maximise capacity benefits.

¹⁰ A freight operator highlighted an instance where the TPRs assumed that a diesel train was still in operation and allowed for shunting time, even though the line had since been electrified. In its response to our August 2015 consultation, Chiltern highlighted a number of improvements to the TPRs that it considered Network Rail should lead on and implement as system operator, before considering major schemes to drive improvements across the network.

B. Allocating capacity in the medium-term

Box 3.3: Definition of medium-term system operation – allocating capacity in the medium term

The function of allocating capacity in the medium-term refers to those decisions and activities that affect how capacity is used for a period of more than one year (but less than the thirty year long-term horizon).¹¹

Funders play a significant role in this area through their specification of passenger services in franchises (or concessions), which affects the overall balance between franchise, passenger open-access and freight use on the network. ORR takes decisions on access contracts between Network Rail and all operators, deciding which services are allowed to operate, taking into account all of its duties including to protect the interests of users. Network Rail determines the overall balance between engineering access and rail services, while also undertaking a number of other functions that facilitate the allocation of capacity to operators, such as its Sale of Access Rights Panel (SoAR) or timetabling. It also provides information to ORR and to governments on the operational impacts of access applications and franchises.

3.8 The range of different activities involved in medium-term system operation, which are delivered by a number of different parties, is reflected in the complexity of the potential issues / opportunities we have highlighted below. Consequently, most of these issues could be explained by a number of root causes. The next stage of this work will focus on gaining further clarity in terms of which ‘root causes’ are most significant, and which could be addressed through PR18.

3.9 We highlight below the potential issues and opportunities that have emerged from our engagement with stakeholders and which we have identified as potentially affecting the outcomes across medium-term capacity allocation:

- A. It may be difficult, and there may be a lack of incentives for operators and other industry parties, to develop the data and systems required to improve aspects of capacity allocation, such as timetabling.** The data that the system operator might find useful in improving capacity allocation might be owned or more easily collected by TOCs, FOCs or ROSCOs, for example on passenger loadings. Currently, the way that this data is collected might not make it easy to integrate with Network Rail’s systems. Additionally, it is not clear that there are currently incentives for these parties to collect or share this data with Network Rail.

¹¹ The specific activities we have identified as being part of this function are set out in Figure 1 of our conclusion note in more detail.

- B. The time-limited nature of franchises and the need for agreement to specified requirements may limit flexibility and / or incentives to make better use of capacity.** It may limit flexibility in deploying more operational resources at stations and / or making modifications to train fleets. Changes would likely need to result in a pay-off within the franchise term, while in reality the benefits might be longer-term.
- C. Network Rail's incentives may not be balanced in a way that encourages it to make the right trade-offs between cost, capacity and performance when allocating capacity.** As already set out, a small proportion of Network Rail's income varies with traffic and the company faces strong reputational and financial incentives in terms of performance. The balance of these financial and reputational incentives means that Network Rail may face insufficient incentives to find and sell more capacity on its network. Further, at the moment it is not able to recover the additional costs of measures it might deploy to maintain performance when traffic increases (for example deploying additional operational staff). It can however recover the additional performance payments it can expect to incur as a result of additional traffic through the capacity charge. There is also a Volume Incentive in place for Network Rail to encourage it to accommodate additional traffic, above what is forecast at the time of the periodic review. It is not clear whether the balance of incentives faced by Network Rail in relation to capacity is the right one.
- D. Industry incentives may not be aligned when it comes to delivering performance.** Train operators' franchise punctuality targets can be different from Network Rail's national PPM target. This may cause tension in how Network Rail prioritises achieving targets on different parts of the network and may misalign incentives between operators and Network Rail to achieve targets.¹²
- E. The current approach to medium-term capacity allocation may be overly focused on delivering current timetables and service patterns through consensus, rather than considering more radical options and potentially securing a higher value from the services that operate on the network.** A number of Network Rail and industry processes are involved in capacity allocation (e.g. event steering groups, SoAR¹³ discussions). These processes

¹² Chiltern Railways for example in its consultation response suggested that: "Network Rail is currently incentivised to deliver on asset stewardship and performance, with the latter measured through PPM. We believe this can drive perverse incentives, with the risk of encouraging Network Rail to pursue a levelling down approach. This is where resources are reallocated from a strongly performing route to a weaker one".

¹³ SoAR provides network wide governance of the process to negotiate and agree the sale of access to train operators. SoAR authorises all of Network Rail's sale of access rights, before industry consultation and submission of the agreed track access contract to the ORR for its approval.

are important because they support collaboration and they allow industry to come together to produce a timetable that meets the needs of passengers and freight customers. However, there is a question about whether more controversial changes can be considered as part of these processes, for example where there would be winners and losers.

It has been noted that closer industry collaboration processes have resulted in fewer (expensive and time-consuming) legal challenges between Network Rail and others and that it has led to better alignment of UK timetables with international Infrastructure Managers' (as highlighted by HS1).

- F. Timetabling is largely an incremental exercise, with additional requests often being fitted into existing timetables.** On many parts of the network, full timetable recasts have not been undertaken in recent years, with service patterns sometimes being based on historical demand patterns. While on some parts of the network this approach might be proportionate, effective system operation could involve considering more fundamental timetable recasts in order to understand whether capacity is being used in the most effective way, particularly on congested parts of the network. When timetable recasts have been undertaken in the past, these have sometimes found spare capacity.¹⁴ However, changes to timetables can be controversial and have significant impacts on some users and prompt political interest.
- G. It is difficult to estimate the relative value of services on different parts of the network. Additionally, Network Rail does not currently seem to have a good understanding of the cost of providing different levels of performance for a given level of capacity.** Capacity is currently mostly allocated via administrative processes. Information about the relative value of services on different parts of the network and about the cost of delivering different levels of performance should inform these administrative processes, i.e. access right allocation or timetabling, in order to maximise the value (commercial and social) of services running on the network. However, this information is likely to be difficult to establish with a high degree of accuracy.¹⁵

¹⁴ However, these timetable recasts are often associated with the delivery of enhancement projects – for example the 2008 West Coast Main Line timetable recast which released capability and capacity, including improved journey times and increased service frequency levels.

¹⁵ In our consultation on the structure of charges for Network Rail published in December 2015, [Network Charges - a consultation on how charges can improve efficiency](#), we assessed the option of introducing charges that would reflect this relative value of services on different parts of the network (i.e. value-based capacity charging). We highlighted the different benefits that could be secured by implementing such charges (which may be limited under the current state of the world), versus the information benefits that could be secured by having better information in this area (including to inform administrative processes). We concluded in a letter to industry issued in April 2016 that we would not continue developing this option for Control Period 6 (CP6) (access this letter [here](#)). In this letter we also said that we continue to think it is

This may reflect the inherent difficulty of modelling capacity and performance with current technologies.

Separately, it may be useful to consider whether the allocation of access rights could be supported by the system operator providing a clearer view of which services it thinks should be granted access, in order to optimise allocation.

H. Timetables contain conflicts, some of which are due to planning errors.

Planning errors may occur because of the quality of supporting data (e.g. around the capability and features of the network) that planners use during the timetabling process. To illustrate this we note that some of the data currently used has not yet been digitised¹⁶. This may be hindering Network Rail's ability to improve its timetabling.

We note the efforts Network Rail is making to address its limitations in this area.¹⁷ Additionally, the modelling tools currently used to plan and test robustness of timetable changes may not be sufficiently robust to assure industry that both capacity and performance will be achievable.¹⁸

important to consider carefully the overall effects of any charging options we implement for CP6 to ensure they send sensible signals about use of capacity and do not, for example, lead to a reduction in charges where demand for capacity is high. We will consider this both as part of the structure of charges project but also as part of the system operation work in terms of sending appropriate signals about use.

¹⁶ Network Rail's recent study to consider how its Train Planning System could be improved to better identify timetable conflicts highlighted the scale of inaccuracies with respect to the input data. Using the case study area of Oxford to Birmingham Moor Street (which represents approximately one per cent of the network), Network Rail spent nearly 300 hours checking and 'cleaning' the relevant network data (e.g. regarding junctions, stations etc), with a significant proportion of the existing data requiring amendments.

¹⁷ A priority of Network Rail's capacity planning improvement programme (CPIP) is to develop a conflict-free timetable. We note the early improvements (e.g. in PPM) this programme has delivered.

¹⁸ For example, the models are not capable of reliably testing the Thameslink 2018 timetable change for perturbation recovery.

Potential issues and opportunities in long-term system operation

Box 3.4: Definition of long-term system operation

Long-term system operation consists of the functions of developing proposals for changes to the network, and picking projects to deliver these changes. In practice, these functions are carried out through a number of processes such as the industry LTPP¹, the governments' High Level Outputs Specification (HLOS) and the Strategic Business Plan (SBP) prepared by Network Rail with input from industry.

3.10 We highlight below the potential issues and opportunities that have emerged from our engagement with stakeholders and which we have identified as potentially affecting the outcomes across long-term system operation:

- A. Parties involved in developing proposals for changes to the network take decisions over different time frames.** This could mean that their incentives may not be aligned. Network Rail's long-term planning processes (LTPP) typically looks at a 30 year time horizon (although the process also looks at the medium-term, i.e. up to ten years ahead), while the majority of operators' incentives may be more focused on delivering their obligations over their current or prospective franchise agreements.
- B. Decisions around changes to the network involve local and national politics and need to reflect a wide range of social benefits that are difficult to measure.** Electoral cycles at both the national and local level might also have an influence on which projects are chosen to be delivered, and when, as does the wider fiscal environment. This can have an impact on the outcomes of system operation, which may not be easy to address (due to the nature of the rail industry which involves significant public resources and delivers a wide range of important social benefits). This is, in any case, an issue principally for funders.

Additionally, and as highlighted in the Bowe and Shaw reports¹⁹, a lack of clarity around roles and responsibility in terms of enhancement may have contributed to some of these issues.

¹⁹ Please see: *Shaw report: the future shape and financing of Network Rail* (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/510179/shaw-report-the-future-shape-and-financing-of-network-rail.pdf) and *Report of the Bowe Review into the planning of Network Rail's Enhancements Programme 2014-2019* (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/479560/bowe-review.pdf)

- C. It is difficult for funders to specify enhancements in detail, well ahead of delivery.** This is due to the inherent difficulty of specifying projects to meet long-term requirements when the future use of the network is uncertain and is affected by a wide range of factors (for example, the future demand on different parts of the network can be affected by economic activity, changes in passenger preferences, changing availability of alternative ways to travel, etc). This also makes it difficult to measure the benefits achieved from projects once they are completed, as the forecast and actual use of the enhancement might differ.

An additional issue is the potential for infrastructure projects to be configured around particular timetables, which may make it difficult to incorporate innovation, changing circumstances or more radical approaches as circumstances change.

- D. The balance of regulatory incentives may create a bias towards undertaking large scale capital projects to deliver improvements in performance or capacity.** This may be as a result of the fact that enhancement projects can be added to the regulatory asset base (RAB)²⁰ and remunerated at a rate of return. The reclassification of Network Rail as a public sector body as of September 2014 has arguably affected this balance of incentives.²¹

Another issue that some stakeholders have raised is regarding those involved in the LTPP, which may cause the process to favour investment in new, capital solutions over operational solutions that may be more cost-effective.²²

- E. Network Rail does not face significant revenue risk if projects do not deliver the improvements assumed. The financial benefits from capability improvements that do not have short-term performance benefits are also limited.** Network Rail does not currently have regulated outputs or metrics to measure how much capacity it is delivering from the network. Therefore, there are currently no reliable metrics that would allow us and industry to assess

²⁰ The RAB is ORR's calculation of the value of Network Rail's assets, and typically forms an important role in determining Network Rail's allowed revenue.

²¹ In contrast, operational expenditure (OPEX) is remunerated on a pay as you go basis and subject to efficiency targets. Furthermore, availability of funding for capital projects has not been a significant constraint for Network Rail in the past, which may have contributed to this bias (both from Network Rail and from the wider industry); however this has changed with NR's reclassification and the availability of debt.

²² Some stakeholders suggest that those with local knowledge about the geography and capability of the network are not party to discussions about long-term planning, minimising the scope to identify operational solutions over capital enhancements.

whether the projects specified deliver the capacity benefits initially envisaged.²³ However, Network Rail is able to recover the costs of these projects regardless of whether they have delivered all of these benefits.

Further, decisions by parties other than Network Rail can impact the capacity (and benefits) that becomes available as a result of infrastructure enhancements (for example through the choice of rolling stock or the pattern / mix of service), so the end user capacity benefits are not wholly within Network Rail's control. Additionally, it is difficult to assess Network Rail's contribution towards securing these benefits from investment projects as reliable metrics of capacity do not currently exist (existing metrics mostly measure throughput),.

In some instances, smaller scale projects may be identified that do not have significant short-term performance or capacity benefits. Because there is no identified demand for the capacity, there is no direct financial benefit attached to that investment. However, such projects might improve capability in the longer term and/or open up other options for future investment or network use (e.g. by allowing later investment to deliver greater capacity or by facilitating improvements to services at the next franchising round and/or major rewrite of the timetable). It is difficult to measure this value.

- F. The LTPP may focus on new, large investment projects, rather than options that may deliver benefits at a lower cost, but create winners or losers.** Views from stakeholders suggest that the LTPP may not put sufficient weight on the overall cost to users and taxpayers of investments, and may have a tendency towards exploring large projects rather than exploring more controversial options that create winners and losers.

Summary of system operation issues and opportunities

3.11 The table below summarises the potential issues and opportunities we have discussed in this paper, and sets out, at a high level, their potential root causes. We welcome stakeholder feedback on whether you have observed any of these issues / opportunities, and whether your understanding of potential root causes is different or similar to ours.

²³ We note that, currently, the benefits of projects are often specified in terms of improvements to PPM, the impact on journey time and/or the change in train length and/or number of trains (per hour or day). While these measures reflect (to differing degrees) the capacity of the system, they do not provide a single measure of the capacity benefits.

Table 3.1: High level summary of potential issues and opportunities and their possible root causes

System operation function	Potential issue / opportunity	Potential root cause
<p>Medium-term system operation</p> <p>Functions in scope:</p> <p>Determining capacity from the physical network</p> <p>Allocating capacity and performance</p>	Network Rail's incentives may not be balanced in a way that encourages it to make the right trade-offs between costs, capacity and performance when determining capacity from the physical network.	<ul style="list-style-type: none"> • Lack of / skewed financial incentives on NR
	The way that changes to the TPRs are made may also limit the extent to which the maximum amount of capacity is delivered.	<ul style="list-style-type: none"> • Industry incentive structure
	In places, the TPRs are out of date and based on inaccurate information about network assets and operational performance.	<ul style="list-style-type: none"> • Data availability and technical capability
	It may be difficult, and there may be a lack of incentives for operators and other industry parties, to develop the data and systems required to improve aspects of capacity allocation, such as timetabling.	<ul style="list-style-type: none"> • Industry incentive structure
	The time limited nature of franchises and the need for agreement to specified requirements may limit flexibility and / or incentives to make better use of capacity.	<ul style="list-style-type: none"> • Industry incentive structure, including TOCs' incentives due to franchising
	Network Rail's incentives may not be balanced in a way that encourages it to make the right trade-offs between costs, capacity and performance when allocating capacity.	<ul style="list-style-type: none"> • Lack of / skewed financial incentives on NR
	Industry incentives may not be aligned when it comes to delivering performance.	<ul style="list-style-type: none"> • Industry incentive structure
	The current approach to medium-term capacity allocation may be overly focused on delivering current timetables and service patterns through consensus, rather than considering more radical options and potentially securing a higher value from the services that operate on the network.	<ul style="list-style-type: none"> • Industry incentive structure

	<p>Timetabling is currently an incremental exercise, with additional requests often being fitted into existing timetables.</p>	<ul style="list-style-type: none"> • Risk aversion and industry culture • Passenger behaviours / preferences
	<p>It is difficult to estimate the relative value of services on different parts of the network. Additionally, Network Rail does not currently appear to have a good understanding of the cost of providing different levels of performance for a given level of capacity.</p>	<ul style="list-style-type: none"> • Lack of detailed information about different types of costs (and benefits)
	<p>Timetables contain conflicts, some of which are due to planning error.</p>	<ul style="list-style-type: none"> • Data accuracy / availability and technical capability
Long-term system operation	<p>Parties involved in developing proposals for changes to the network take decisions over different time frames.</p>	<ul style="list-style-type: none"> • Industry incentive structure, including the time limited nature of franchises
Functions in scope:	<p>Decisions around changes to the network involve local and national politics and need to reflect a wide range of social benefits that are difficult to measure.</p>	<ul style="list-style-type: none"> • Industry incentive structure • Complexity of information
<i>Developing proposals for changes to the network</i>	<p>It is difficult for funders to specify enhancements in detail, well ahead of delivery.</p>	<ul style="list-style-type: none"> • Industry incentive structure
<i>Picking projects for changes to the network</i>	<p>The balance of regulatory incentives may create a bias towards undertaking large scale capital projects to deliver improvements in performance or capacity.</p>	<ul style="list-style-type: none"> • Lack of, or skewed financial incentives for Network Rail
	<p>Network Rail does not face significant revenue risk if projects do not deliver the improvements assumed. The financial benefits from capability improvements that do not have short-term performance benefits are also limited.</p>	<ul style="list-style-type: none"> • Lack of / skewed financial incentives on Network Rail • Data availability and technical capability
	<p>The LTPP may focus on new, large investment projects, rather than options that may deliver benefits at a lower cost, but create winners and losers.</p>	<ul style="list-style-type: none"> • Industry incentive structure



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