Network Rail Maintenance

Comparator Study Report

Executive Summary

Given the need to ensure efficiency in delivery, particularly in view of the considerable financial support the rail industry has had through the pandemic, Network Rail is considering a number of changes to how they undertake maintenance of the rail network that they expect will reduce cost whilst preserving performance on safety and reliability.

Their thinking comprises two main themes:

1. Changes to practices designed to ensure the right maintenance is done at the right time, and not more than is necessary, to keep the railway safe and reliable. This includes increased use of technology and further adoption of risk-based maintenance practice.

2. Changes to working practices designed to ensure that the right number of staff, with the right skills are deployed at the right time. This includes changes to how staff are rostered to ensure availability when needed, broadening the skills base of frontline operatives so they can be more flexibly deployed and introducing multifunctional teams that can undertake a broader range of tasks.

Network Rail engaged Nichols to undertake a short, independent comparative study to look at the extent to which the working practice changes they are considering are used by organisations in other industries. We spoke to a range of individuals with experience of managing assets in safety critical, transport and regulated sectors – all characteristics that are common with Network Rail. This study did not involve in depth or quantitative research and the organisations we spoke to varied considerably in their approach to maintenance.

We held 15 interviews with individuals representing a variety of sectors, to understand the extent to which the changes being considered by Network Rail are adopted by others. Our summarised findings are as follows:

Use of technology – Network Rail has made significant advances in its use of technology and understands its importance in providing the ability to make informed decisions about maintenance. Overall, in its use of technology, we found that Network Rail compares well against the sectors we spoke to. However, to take full advantage of technology deployment, Network Rail needs to have the flexible and responsive working practices we heard others are using.

Maintenance practices – Moving to more condition and/or risk-based maintenance is consistent with what we heard from similar organisations. Network Rail review their standards every five years or when there is an event that prompts a change. Network Rail also encourages suppliers and stakeholders to challenge standards and propose changes. Despite the volume and complexity of Network Rail's standards catalogue, other companies we heard from tend to review their standards more frequently.

Independent rostering – Current Network Rail practice appears to be less flexible than most organisations we spoke to who roster staff individually, have a shorter roster cycle managed centrally and did not report issues with deploying staff when needed.

Individuals with broader skills – Frontline operatives in Network Rail are managed in discipline-based teams and operate independently of each other. This contrasts to elsewhere in the UK where, in particular, entry level maintenance practitioners were expected to be able to cover a wide range of tasks.

Multifunctional teams – Network Rail practice is to have individual teams by discipline. However, we heard that multi-disciplinary teams who can cover the great majority of most maintenance needs was a very common model with other organisations that appears to be more efficient.

Whilst we heard about a range of different practices reflecting the variety of organisations we spoke to, overall, we found that the two change themes Network Rail is considering aligns with practice commonly adopted by others who could point to operational advantages through their deployment.

It was also evident that the advantages of more efficiently targeted maintenance practice, such as using technology to enable more responsive maintenance, can only be fully enabled with working practices that allow asset maintainers to capitalise on the benefits.

1. Introduction and purpose

It is over a decade since Network Rail has made significant changes to the working practices associated with maintenance of the 20,000-mile[1] GB rail network. Much has changed in that time, including the introduction by Network Rail of new technologies to monitor the condition of the railway. In view of the £1.9bn[2] annual cost of maintaining the network and the pressures on the public finances, Network Rail is now considering implementation of a series of changes to working practices to improve efficiency and effectiveness, making their maintenance workforce more flexible and adaptable whilst also ensuring it remains safe.

Network Rail engaged Nichols to undertake a short, high-level comparator study as to how the potential changes to working practices and use of technology compare to those employed in other similar organisations responsible for maintaining safety critical assets. This report is a summary of the findings from that study.

[1] Network Rail Website: About Us

[2] Office of Rail and Road Annual efficient and finance assessment of Network Rail 2020/2: July 2021

2. Method

This is a high-level, short study that aims to provide a qualitative view on whether Network Rail's strategy is aligned with other, comparable industries in terms of working practices and use of technology. It did not involve in-depth or quantitative research. We held 15 interviews with individuals involved in the maintenance of assets for organisations in the heavy rail, light rail, water, roads, maritime and aviation sectors. This included maintenance of European rail networks. These organisations have in common some, or all, of the following characteristics of the UK rail network, in that they:

- Have safety critical assets
- Are linear in nature
- Are subject to external safety regulation

We refer to these organisations in this report as the 'comparator organisations'. To preserve their confidentiality, we do not cite specific organisations in this report, instead referring to their sectors when drawing comparisons or citing examples. We have also drawn on a limited selection of reports and other available material as a further source of evidence and information on Network Rail's maintenance practice.

In Network Rail and for the purpose of this report, asset maintenance comprises both reactive and preventative maintenance of the track, signalling and telecoms equipment and electrification and power equipment. It therefore excludes stations and structures (such as embankments or bridges) as well as renewals or enhancements projects.

3. Structure of this report

This report takes the following structure:

1. Networks Rail's current position. This includes Network Rail's asset maintenance operation, cost challenge and the changes to working practices Network Rail is considering.

2. How Network Rail's thinking on changes to working practices compares with those in the other organisations we spoke to. Our key findings from our interviews are highlighted in lilac boxes at the appropriate points.

3. Conclusions on the extent to which Network Rail compares with practice elsewhere alongside a brief assessment of whether Network Rail's proposed changes will more closely align them to practice as understood elsewhere.

Given the differing nature of assets being maintained in the comparator organisations as well as how working practice has evolved over time, there are inevitably a range of working practices adopted and full, direct comparisons are not always appropriate. We have therefore drawn on the comparisons and examples that are most relevant to Network Rail's consideration of changes.

4. Network Rail's current position

This section summarises Network Rail's asset maintenance operation, its cost challenge and the changes to working practices they are considering.

Maintaining the UK's rail network is a task of significant complexity and scale and delivering it effectively is vital to ensure safe and reliable journeys. Network Rail is responsible for maintaining 20,000 miles of track (including all the associated railway systems such as signalling, power, switches and crossings) with a workforce of approximately 10,000 frontline staff (excluding managers). Prior to the pandemic, Britain's rail network accommodated approximately five million passenger journeys a day[3] and overall it has the highest levels of safety performance in Europe.

Overview of maintenance organisation and planning

Most of Network Rail's maintenance operations is done in-house and comprises three areas:

Maintenance Scheduled Tasks (MST's) – Planned maintenance that is normally cyclical set by standards.

Fault response and fault rectification – Generally unplanned and require specific discipline teams to be mobilised.

Work arising – Such as changes to components identified as being necessary during inspections.

Maintenance responsibility of the infrastructure is divided into 14 routes and then further into Maintenance Delivery Units. These are organised into separate discipline-based maintenance teams: Track, Signalling and Telecoms, and Electrification and Plant (E&P). Whilst these teams will work together on site as required, they are managed independently with separate rosters and separate transport to site.

[3] Office of Rail and Road, Passenger Rail Usage Data to December 2021 – March 2022

A standard team for each of these disciplines is usually made up of three to four people: a Team Leader, Technician(s) and Operative(s) trained in skills only required within that discipline. A Section Manager has responsibility for managing teams and their rosters. Team leaders are skilled in their specific discipline and sign off work for safety and compliance purposes. Operatives are not required to have previous experience and will work under the supervision of a Team Leader or Technician and only within their discipline. When a team is assigned to a job, the whole team will travel to site; the size of the team attending is not typically adjusted according to the complexity of the job.

Where the job requires more than one discipline (for example both Signalling and E&P), more than one team will be in attendance but often working sequentially. Consequently, there can be a high-level of built-in redundancy as team members wait for tasks to be completed by other disciplines before they start.

The safety of its workforce and the travelling public is Network Rail's top priority. The nature of some engineering activities means that work can only be completed safely during times when trains are not operating, most often at night or weekends. This requires managers having the ability to roster staff when the work is required. This planning has to take account of contractual terms, for example, the practice of agreeing rosters up to 52 weeks in advance and the requirement to roster teams together. In an environment where the workload is variable and unpredictable it can prove challenging to flex rosters in response, particularly if more than one team is needed for the work.

Cost position

The Government spent £16bn (up to March 2022) in additional public subsidies to support the rail industry through the pandemic when passenger numbers collapsed.

Given the fiscal environment and the fact that maintenance is Network Rail's largest single expenditure, accounting for 52% of Network Rail's Operating Costs (in 2020/21), there is a need to find significant savings in the running of its maintenance operations. Moreover, the single largest element of maintenance operating costs, at 68% of the annual total, are staff costs. Therefore, staff costs are a major focus for achieving savings.

Changes being considered

In response to the need to reduce expenditure on maintenance, Network Rail's current thinking follows a dual approach:

- Ensuring the 'right maintenance is done at the right time' to keep the railway safe and reliable, and not more than is necessary, for example, moving to more risk-based maintenance.
- Ensuring that the 'right number of staff, with the right skills are deployed at the right time'.

On the first approach, analysis undertaken by Network Rail suggests that routes can safely reduce their existing maintenance scheduled tasks by up to 50% by better use of technology and data to reduce the frequency of inspections by maintenance teams. This would also significantly reduce the safety risk to maintenance staff associated with accessing the railway infrastructure to undertake these inspections. This aligns with the Office of Rail and Road (ORR) expectations for Network Rail to increase technology use in maintenance[4] and with a 2018 report by McKinsey[5] on maintenance for rolling stock that suggested remotely enabled condition-based maintenance can reduce manual inspections by at least 60% and lead to an overall reduction in maintenance costs by over 10%.

On the second approach, effective deployment of maintenance staff comprises the following elements under consideration:

- Having the flexibility to independently roster individual staff based on the size, nature, location and timing of the work. This could further be enabled by a centralised resourcing function that could have oversight of the entire business needs.
- Creating joint multidisciplinary teams rather than separate individual discipline teams.

Network Rail believes that this dual approach and supporting changes would bring substantial safety and cost reduction benefits in addition to improving the effectiveness and efficiency of how maintenance is done.

[4] ORR's review of Network Rail's RF11 delivery plan update for the financial year 2021-22 (31 March 2022)

[5] The rail sectors' changing the maintenance game- McKinsey 2018

5. Practice in comparator organisations

This section sets out how the changes being considered by Network Rail compare with those in use in other, comparable organisations.

Overview of comparator organisations

We held 15 interviews covering 13 different organisations across 5 different sectors. There was considerable diversity in the nature of the assets being maintained, and most organisations had assets that varied greatly in terms of condition, standardisation, criticality or age. Many were responsible for assets that were ageing, at least in part. A small number of assets, however, were very new or not yet operational and this provided a valuable perspective that took advantage of learning from others, harnessed modern technology and applied it to a 'blank sheet of paper'. Notwithstanding this range of different asset conditions in the comparator organisations, clear themes were evident across the interviews. We have set out these themes below, with key findings summarised in lilac boxes.

There were also differences in the maintenance delivery models: some of those we spoke to deliver maintenance through in-house staff, others have outsourced it to a contractor. When outsourcing to contractors, we heard different models of how to do that. Again, all provided meaningful comparison with Network Rail's position. For those delivering maintenance in-house, we heard clear examples of how companies have dealt with the same challenges as Network Rail and had practices that align with the changes being considered by Network Rail. Where the work is outsourced, many of those issues still apply (for example, making sure the workforce is available when needed) and we heard that the contractual arrangements were designed to incentivise the contractor to manage maintenance effectively.

Our findings below are structured into two main sections: application of efficient asset maintenance practice ('doing the right maintenance') and working practice of maintenance teams ('having the right management practice'). It is evident that the two are closely linked and it was clear that the advantages of more efficiently targeted maintenance practice, such as using technology to enable more responsive maintenance, can only be fully enabled with working practices that allow asset maintainers to capitalise on the benefits.

Doing the right maintenance at the right time

In all interviews, we explored how the maintainer goes about ensuring they do the right maintenance at the right time to ensure safe and reliable condition of their assets. Whilst we found that all asset maintainers had both safety and the continuity of service to users as core priorities, they all also had strategies for how they would focus on doing the right level of maintenance to achieve this, although their approach varied depending on their circumstances. Use of technology and remote sensors were often key elements of their approach but other strategies for the safe maintenance of assets were also used. These included having processes or systems for monitoring and learning about asset performance so that maintenance requirements were regularly updated taking this into account or incentivising contractors to deliver efficiently.

Finding – Overall, Network Rail in its use of technology compares well with other light or heavy rail companies as well as those in the water, aviation, maritime and roads sectors.

All organisations that we spoke to could point to examples of using technology to inform and improve their asset management practises and requirements, take the right preventative action, improve workforce safety and prioritise intervention. For example, one water company we spoke with took a clear risk-based approach to this: they deployed sensors on equipment where failure would be high impact or high cost allowing them to target resources better and avoid service-affecting incidents. The same company also used the data on this equipment to better understand the effectiveness of maintenance that had been carried out. Nearly all companies we spoke to had plans to expand their use of technology and data to better understand asset conditions and performance. This would allow safer, more efficient and targeted maintenance and fault response thereby reducing costs, enhancing reliability and reducing worker safety risk.

Finding – In most comparable organisations constant or regular review of maintenance practice and requirements is commonplace.

How this worked in practice varied: we heard from several rail companies, as well as aviation and maritime asset maintainers, that the expectation was that maintenance practice and requirements would be kept under constant review. One water company told us that it is done quarterly and for other companies in the roads and rail sectors, there was an annual cycle of updating requirements based on safety needs, asset performance and understanding of asset condition. An example we heard from the aviation sector was how they employ risk-based maintenance with every asset given a rating against a range of risk criteria which then informed the maintenance need. Additionally, there was an assessment of condition of an asset every time there was any contact with it (for example, repair, routine maintenance or inspection); this again drove future maintenance requirements allowing them to be adjusted and kept up to date. One highways maintainer told us they had moved to a more risk-based maintenance regime and one overseas rail company had a risk-based approach driven by a detailed model with inputs that were kept under constant review. This provided

a very good understanding of when maintenance is required for individual assets. Across different sectors, we heard that reviews and updates of maintenance regimes would be informed by data from technology being used, as well as by risk assessments, physical inspections, failure rates or camera monitoring. What we heard, clearly though from water, road, aviation, maritime and rail companies in the UK and overseas was that having the right internal processes and systems to take advantage of the incoming information and to update working practice was the key determining factor.

Finding – There are different commercial models when it comes to asset maintenance and where it is outsourced, this provides a helpful comparison in terms of ensuring the right maintenance is undertaken.

With some overseas rail companies we saw examples whereby the client organisation (Network Rail equivalent) sets tolerances within which the asset needed to be maintained (such as track width) and had commercial arrangements to incentivise the contractor to maintain the network to this standard. It was then up to the contractor to adopt a regime that saw them maintain these standards. If the contractor missed the standards, they were penalised financially. The result in these instances was that contractors have very good levels of knowledge of their assets, keep methods under regular review and were skilled at ensuring they deployed that understanding to undertake maintenance in as targeted and efficient a way possible whilst maintaining the assets safely. The downside risk of penalties and potential upside from commercial gains enabled delivery of the right asset condition at the right price. We heard a similar arrangement in UK light rail where, under franchise agreements, the owner sets performance targets and it is the responsibility of the maintainer and operator to determine maintenance requirements that ensure they meet performance targets.

Finding – Asset maintainers are focused on achieving 'right-sized' maintenance to deliver safe and reliable performance, are using different methods to achieve this and are typically using them in combination. Mostly we heard of increasing use of technology to play a key part in this.

Building on the strategy of employing technology to improve asset maintenance performance, we also heard examples of how increased use of technology has enabled efficient and safe practice. A key part of this is how companies use the data that they get from employing remote monitoring of assets. Below we have set out some examples of how companies have used technology and the resultant data to be safer, smarter and more efficient in how they undertake maintenance.

In one water company they had installed condition-monitoring technology in a number of assets which allowed them to see better how they were performing, where issues were arising and therefore the maintenance required. They were able to use the data from condition monitoring to better plan and resource tasks, for example by clustering work schedules together in the same geography so individuals and teams could be deployed efficiently. The same company was also able to use the data, combined into a single data set in a widely used app, to schedule tasks on a more flexible basis, typically weekly and daily. They perhaps

did not have some of the challenges around possession-management of Network Rail, however, it shows how data from monitoring can be used to allow more responsive condition-based maintenance that enables resources to be better deployed. Scheduling interventions driven by the data they got from deployment of condition-monitoring technology allowed this company to increase 'time on tools' by around 15%.

Another water company told us how they were using sensors in their network as pressure fluctuations can cause leaks which can lead to service disruption or pollution. The data coming from the sensors told them about performance and condition and would inform the maintenance need for these assets. Likewise, leakage sensors allow them to be highly effective at accurately pinpointing faults and deploying their workforce efficiently to the right location.

One road maintainer could point to examples of increasing technology use such as sensors to better monitor ground conditions or car mounted cameras to better monitor road surface quality or identify other safety risks that allowed them to maintain the asset safely and take responsive action. They were also increasingly using their data and correlating it to better understand risk to the asset, for examples silt levels in drains that allowed them to be more intelligent and risk-based in their drainage maintenance to enable the right level of maintenance for specific drains. It also allowed them to better predict future risks such as road flooding and take appropriate action as a result. They found such initiatives improved safety, efficiency and quality of maintenance. We heard similar from an overseas rail company with use of digital track monitoring enabling a better understanding of track geometry and maintenance needs that, among other benefits, would improve safety for workers and the overall railway.

Finding – Many asset maintainers had strategies for moving to a position whereby various forms of remote monitoring and data analytics was more commonplace and sufficiently advanced that it would enable them to predict failure before it happened and therefore take preventative action, which is typically safer, cheaper and less disruptive to passenger services.

Having the right management practice

Network Rail is considering a range of working practices that introduce greater flexibility in and availability of their maintenance workforce to enhance efficiency. As set out earlier, these ideas include rostering to enable efficient allocation of staff and joint teams with a broader range of skills.

Finding – Overall, what Network Rail is considering is consistent with working practices in the companies we spoke to, and many had been through similar changes. It was also evident that without these changes to practices, gains from deployment of new technologies set out above would be hard to achieve because as technology enables better understanding of asset condition, it is essential to have a workforce that is flexible and able to respond to what the asset condition information is indicating needs to be prioritised.

Night-time working and rostering arrangements

In terms of when, in a 24-hour period, maintenance is carried out, safety was the key driver. In some industries (for example water, aviation or maritime), maintenance during the day was fine as long as it was safe and didn't interfere with customer operations. In maritime, for example, we heard they used their internal systems to plan maintenance to coincide with when plant and machinery was not operational as this was safer.

Finding – In linear transport assets (i.e. road and rail) night working is the norm, especially when it comes to planned maintenance, reflecting the need for better workforce safety.

Night working is seen as considerably safer, less disruptive and more efficient, particularly in the case of infrastructure assets like track, power systems or roads where hazards at night are materially lower. There was a general acceptance that individuals would be available at night if needed and it was seen as an integral part of their job. If unplanned, reactive maintenance is required during operational hours, the philosophy we heard was to do sufficient to keep the assets operating safely and then repair overnight when it was safer for maintenance and there was an engineering access window planned.

Finding – In companies with regular night-time working, the rostering and management arrangements supported this and was commonplace. Individuals and teams were available to do their work at night and had rostering or shift patterns and practices that enabled this. Generally, each person would be rostered individually rather than on a whole team basis.

In light rail for example we heard that signalling, power and track had fixed rosters that always allowed for the work to be done at night. In another heavy rail maintainer, where maintenance is predominantly done at night, they planned works four weeks ahead and did the same with rosters so that staff with the right competencies were available for the work that was needed. In this example, and in another rail maintainer we spoke to, the rostering was managed centrally by the maintenance planning team which is consistent with Network Rail's thinking. We heard similar in the roads sector, in particular for planned maintenance where around 80-90% was done at night and where they had recently changed shift patterns to align teams better. Given the outsourced nature of maintenance on the strategic road network, the onus was on the contractor to have the right working arrangements in place. The client ensures the worksite is available (closed to traffic) and then there is an incentive on the maintenance contractor to get as much work done within that closure period as possible. This required maintenance teams to be available at night and we heard various examples of rostering arrangements that allowed this. We heard the same approach applied in overseas rail companies where maintenance is also outsourced.

Finding – Another example of flexible working practices was in the ability of teams to work across geographic boundaries.

This is different to Network Rail's current working practice (for example, a team in one geographic area doesn't assist one in a neighbouring area even if it has capacity to do so as they are assigned to different geographies). Whilst the companies we spoke to had geographical boundaries within which staff were allocated, many gave examples of where they had formal or informal systems by which staff could work in another geographical area in order to assist on reactive maintenance tasks to enable swift resolution, particularly where there was close proximity. One overseas company we spoke to told us that there were provisions in their geographically based contracts that required neighbouring contractors to help in case of need and if they could. One road maintainer set out how it was relatively commonplace as it allowed them to take maximum advantage of road closures. This is a good example of how taking a flexible approach to management of maintenance tasks can lead to a better outcome for service users. We heard less ability to work across boundaries in the case of outsourced contracts for obvious reasons.

One of the changes that Network Rail is considering is to its operative role, making that role more multi-skilled and widely available to different teams.

Finding – This approach would be consistent with practice we found elsewhere where we observed two main trends:

- An expectation that entry-level staff would undertake a range of mixed tasks
- Reduced need for lower skilled operatives

In road maintenance, for example, the entry level maintenance practitioner would be expected to be able to cover a range of tasks from drainage clearance to setting up traffic management to filling potholes. This was described as 'industry standard' and the view was that it would not be economical for contractors to do anything else. Likewise in the water industry the junior roles and teams were expected to be versatile and cover a range of different tasks at different sites that supported the more specialised technicians.

Elsewhere in the UK rail sector, both heavy and light with more recently constructed assets, there was limited or even no deployment of discipline-based operatives. As above, this means that their most junior skills levels would need to be able to undertake a range of tasks and the view was that the overall skill level would be higher ("everyone is professional"). One overseas rail maintainer told us that they did not have an operative equivalent in maintenance, all staff have technical qualifications. We heard one company make a virtue of this sort of approach: by reducing repetitive and lower value work and by focusing on where individuals can make a difference, they aimed to make work more rewarding.

Finding – There are multiple examples of organisations moving to both multi-functional teams and to more skilled technicians having a wider skills base.

This contrasts to current Network Rail practice but is aligned to the changes being considered. The concept of multi-skilled teams who can cover most maintenance needs with multi-disciplinary specialists dealing with complex or specific tasks was commonplace. We heard examples of moves to multi-disciplinary teams having taken place over recent years in roads and aviation and heard that they were much more efficient to run (one company quoted that it could cover the work with a team less than half the size when it moved to multi-disciplinary teams). Another example is that, for reactive maintenance in light rail, small teams of two were expected to deal with approximately 80% of all faults so had the broad-based training and equipment to meet this expectation. This aligns with the maritime and aviation companies we spoke with. Maintenance teams were expected to be able to deal with approximately 80% of jobs even though they dealt with a broad range of different assets. Another rail company set out how they were deploying multi-disciplinary teams for maintenance tasks. Their approach was that they would know what competencies were needed for a task and they would deploy a single multi-disciplinary team comprising of individuals with specific competencies required for the task. This is consistent with what we heard in another rail company who planned small, highly skilled teams with the capability to undertake all but the most specialist tasks and with an overseas rail company who had multi-disciplinary teams that could undertake the range of tasks for a given piece of work. In these instances it was clear that they do not roster disciplines separately, thereby allowing multi-disciplined teams to be deployed together when needed, predominantly at night.

Finding – In UK and overseas rail companies we spoke with there is an expectation that technicians would have a combination of skills. They would have a core competency in one discipline, and have complementary skills in other disciplines.

For example, a technician would have a core competency in, say signalling, but given commonality with electrical works, they would also have skills in this area that would allow them to undertake some simpler tasks without a separate team. Or another example we heard from an overseas rail company that technicians in one discipline (for example, track) would have competency to undertake basic or routine tasks outside their core areas. This allows the overall maintenance regime to be more efficient through having fewer, more versatile technicians and reduces the number of people required on a task. It also enables the sort of competency-based approach to structuring teams for tasks set out above.

6. Conclusions

We have summarised how, overall, Network Rail compares to practices in other industries in the areas where it is considering changes. We have also summarised, in the bold text, whether Network Rail's consideration of changes should bridge gaps with what we have heard elsewhere.

Use of technology – Network Rail has made significant advances in its use of technology and understands its importance in providing the ability to make informed decisions about maintenance. Overall, in its use of technology, we found that Network Rail compares well against the sectors we spoke to.

To take full advantage of technology deployment, Network Rail needs to have the flexible and responsive working practices we heard others are using.

Regular review of maintenance practices – Network Rail review their standards every five years or when there is an event that prompts a change. Network Rail also encourages suppliers and stakeholders to challenge standards and propose changes. Despite the volume and complexity of Network Rail's standards catalogue other companies we heard from tend to review their standards more pro-actively and frequently.

Moving to more condition and/or risk-based maintenance is consistent with what we heard elsewhere.

Independent rostering – Current Network Rail practices appear more restrictive and less flexible than the majority of companies we spoke to who roster staff individually, have a shorter roster cycle that is managed centrally and did not report issues with deploying staff when needed.

Adoption of ideas that allow flexibility to deploy staff when needed aligns with common practice we heard elsewhere.

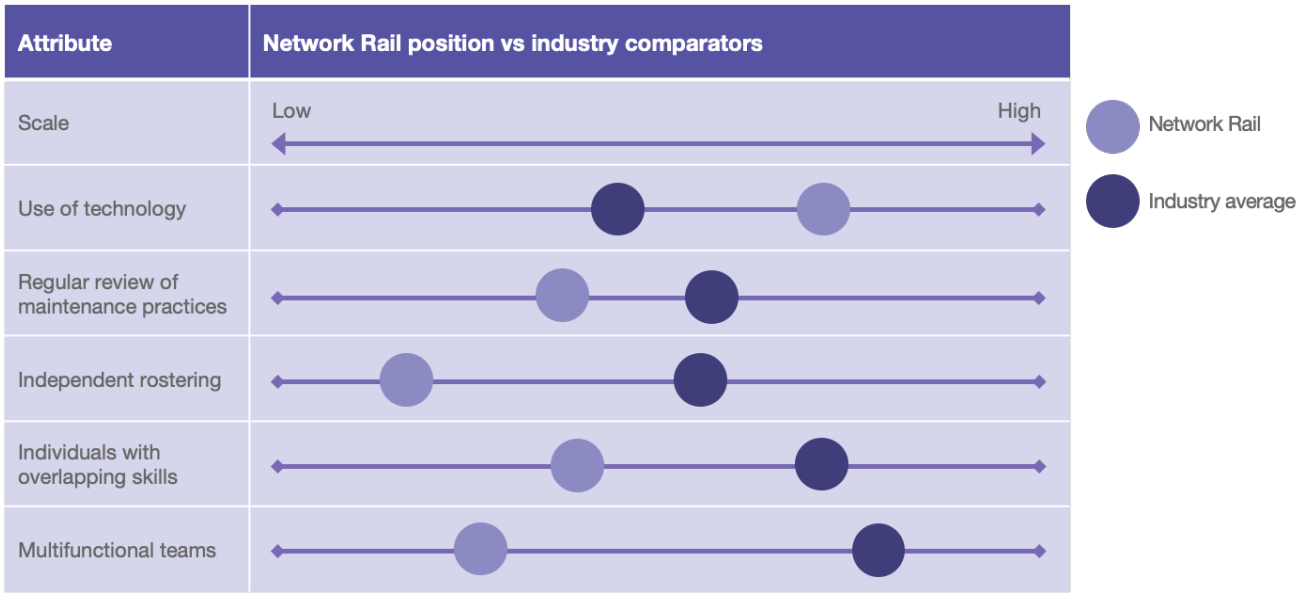
Individuals with broader skills – Frontline operatives in Network Rail are managed in single discipline-based teams and operate independently of each other. This contrasts to elsewhere in the UK where, in particular, entry-level maintenance practitioners were expected to cover a wide range of tasks requiring skills that overlapped different disciplines.

Adoption of overlapping skills at operative level would bring Network Rail in line with this. However, we heard companies had overlapping skills at a more technical level also.

Multifunctional teams – Network Rail practice is to have single discipline teams. In contrast we heard that multifunctional teams who can cover the great majority of maintenance needs, leaving highly skilled specialists dealing with complex tasks, was a very common model that appears to be more efficient.

Multifunctional teams are regularly deployed in other sectors which report their potential to be more efficient.

These overall conclusions are summarised in the following graphic which provides an illustrative summary of Network Rail's position compared to other industries on these areas:



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