Rail Delivery Group

National Rail

RDG Guidance Note: Depot Performance Handbook – A Good Practice Guide

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About this document

Explanatory Note

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Other Guidance Notes or Approved Codes of Practice are available on the Rail Delivery Group (RDG) website.

Executive Summary:

This Guidance Note describes and outlines good practice that organisations should consider when trying to assess the performance of their Depots, Yards, or Sidings; whilst developing Timetables and whilst considering related performance improvement initiatives.

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This document will be reviewed on a regular 3-year cycle, if not updated more frequently.

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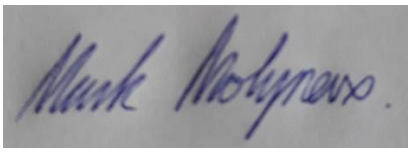

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1 Purpose and Introduction

1.1 Purpose

This Guidance Note describes and outlines good practice that organisations should consider when trying to assess the performance of their Depots, Yards, or Sidings; whilst developing Timetables and whilst considering related performance improvement initiatives.

The industry has previously requested the development of a best practice document that describes the best way to articulate requirements between fleet and planners for robust Timetable development in order to facilitate running a fleet back to Depot for maintenance and repair - and back into service again.

This document has been created based on discussions and presentations at the industry 701A-Owners Group. Where specific examples of good practice have been identified these are presented (Good Practice Examples) to illustrate the point.

Similarly, where specific examples of bad experience or significant learning points have been reported these are also presented (Learning Points) to illustrate the point - to make organisations aware of the potential pitfalls in these areas.

In addition, Appendix C lists freely available industry documents where additional Depot related guidance can be found.

1.2 Introduction

Depot / Fleet Maintenance Facts:

1. The role of a Depot is to maintain a fleet of trains.
2. Fleet maintenance is undertaken to keep a fleet of trains safe and reliable.
3. Good fleet availability is only achieved through achieving good fleet reliability.
4. Train maintenance includes inspection; fault finding and repair; consumables replenishment and cleaning.
5. All of these train maintenance activities take time.
6. The quality of train maintenance undertaken is proportional to the time available, together with the competence of the staff and the quality of the resources available to undertake the activity.
7. In order to undertake train maintenance, the fleet of trains need to return to the Depot.
8. Not all of a fleet of trains return to a Depot every day/night.
9. Train maintenance is a cost to the business.
10. Not all of a fleet of trains are necessarily maintained at one Depot.
11. Not all TOCs are in in charge of their own maintenance. E.g. There are some Depots that are under the control of a third-party i.e. not the TOC.
12. No two Depots are identical in layout; maintenance facilities and staff competencies available.
13. No two Depot maintenance arrangements are identical.
14 No two train maintenance contracts are identical.

Timetable Facts:

1. The Timetable is operated to provide a service to our passengers and customers.
2. The Timetable needs to be robust – so that our passengers and customers can rely on the service provided.
3. The Timetable varies by both time of the year and day of the week.
4. The ‘wear and tear’ experienced by a fleet of trains is directly related to the Timetable operated e.g. miles run and associated operating characteristics - speed / acceleration profiles.
5. The maintenance requirements for a fleet of trains is therefore directly related to the Timetable operated.
6. A fleet of trains is only making money for the business when they are operating a service.
7. A fleet of trains will not return to Depots unless the Timetable facilitates these moves.

It is asserted that historically the focus of the Timetable has been the mainline, but this ignores an important point about the need to return the trains to a Depot so that the Depot is able to repair and

maintain the trains in order to deliver the trains back to the mainline for service.

Conclusion:
Timetable and fleet maintenance requirements are inextricably linked and must be considered in a holistic manner.

Headline Requirements:

1. Timetables need to be developed to ensure the entire needs of the Depots are accommodated – for all days of the week / times of the year.
2. There is a need for defective trains to be returned to the Depots promptly, so the necessary paths should be incorporated in developed Timetables.
   Note: For clarity, this is not considered to be solely directly related to Timetable planning – since it is considered to be also in scope of Control / Train Planner activity on the day.
3. There is a need to ensure effective communication between the Timetable planners and fleet maintenance planners during the Timetable development stage.
4. There is a need for the fleet maintenance planners to articulate their requirements for their Depots. This needs to be in a manner that the Timetable planners can understand.
5. There is a need for the Timetable planners to accommodate the requirements of the fleet maintenance planners in the proposed Timetables.
6. There is a need for an effective relationship to be built to facilitate ongoing dialogue between all affected parties during this process to determine agreed compromises.
7. There is a need to share experiences between planners, maintainers and operators to make sure all parties understand each other's mission.
   Note: People who are operating the Depots and fixing trains are largely of an engineering background and are not necessarily train planners. Sharing experiences helps people to be able to make positive suggestions about the Timetable and capacity by learning the right language to make these suggestions to provide the necessary insight to help with timetabling and capacity. It will provide the participants a common language (and the necessary skills to use it) to say for example, OK, well, this doesn't work for us at the Depot, but if you do this instead, that might work better.

Learning Point:	*One Operator found that a Timetable Change increased the demand for the number of exams to be undertaken at their Depot on their fleet of trains from 52 exams per year to 80. The Depot were already under resourced to deliver their existing commitments and the Timetable change therefore set them up for failure straight away, with more trains needing examinations – without the necessary resource to undertake them.*

Depots, Yards and Sidings (DYS) are therefore crucial to the success of our railway. Despite this, they can be considered to have been the 'Cinderella' of the railway for decades in that they are not at the top of the list in relation to strategic investment.

Learning Point:	*As part of the Trans Pennine Route Upgrade the Electrification requirement at Neville Hill Depot was originally not part of the plan. However, funding was secured for not only more electrification of the Depot, but also the provision of an additional entry and exit road - since it did not make sense to electrify a route and not simultaneously improve the facilities on that route.*

Consequently, Depot culture is 'to try get on with it' and external events effectively mean that things are often 'foisted' on Depots. This was illustrated by the Rail Accident Investigation Branch (RAIB) report into the tragic driver fatality in 2019 that identified that Tyseley Depot was operating at 'over' capacity and added that fleet cascades and new train projects are rarely supported by the money to deliver the new facilities that are often necessary.

Organisations are therefore aware that Depot facilities are not big enough, but despite this TOCs continue to attempt to deliver the daily service. It really should not be like that, but this is the unfortunate reality for many Depot operations.

Depots are also not immune from issues affecting the wider railway and at times of disruption, since the number of Depot related incidents correspondingly rises.

Whilst Depots are good at turning things round if trains arrive late for maintenance the day before,

there are inevitable implications of these compressed timescales e.g. if you've got a 10 hour downtime to undertake maintenance, which is suddenly reduced to 8 hours etc. Historically as an industry we have not been very good at quantifying the adverse impact of such events.

Despite this, there is often an expectation, that a Depot can work miracles and still turn a train around for the morning, even if it's arrived at a Depot two hours late! There is a need to change those expectations so that everyone realises that Depots need sufficient 'touch time' on the trains in order for them to be reliable.

Learning Point:	*Govia Thameslink Railway (GTR) reported that ongoing problems with traincrew availability affected their ability to replace units that became defective in traffic*
Learning Point:	*Avanti West Coast (AWC) reported that Empty Coaching Stock (ECS) moves onto the Depot are the stock moves that are subject to cancellation if there are insufficient traincrew and therefore units are typically out berthed as a result.*
Learning Point:	*AWC noted that Depot acceptance minutes typically increase once the network is disrupted – which can often be exacerbated during the leaf-fall period.*
Learning Point:	*c2c experienced delays because of 'Depot' drivers being 'reallocated' to other duties in support of the service.*
Learning Point:	*Great Western Railway (GWR) reported that St Phillips Marsh Depot had been both struggling with drivers and had been experiencing congestion and capacity problems. The driver problems were related to the age profile and training up new Depot drivers has generated difficulties.*
Learning Point:	*The South Western Railway (SWR) 'Desiro Classic' Class 444/450 units in Autumn experienced lots of trains out of service because of low sand levels – as a result of accepted deficiencies with SWR's sand management processes at the time.*

2 Understanding Depots, Yards and Sidings Performance

2.1 Introduction

There is a well-established link between a good, safe Depot and good performance – since the lower the incident count, the better the performance.

2.2 Pre-requisites for understanding Depots, Yards and Sidings Performance

To really understand what is driving Depots, Yards and Sidings (DYS) performance there are a few pre-requisites that need to be in place, namely:

1. Specific TRUST Responsible Manager Codes for each DYS.
2. Effective processes in place to record arrival and departure times at all DYS.
3. Effective processes in place to record the reasons for any late departures or arrivals at each DYS.
4. Consistent application of the industry agreed guidance in relation to delay attribution. e.g. Delay Attribution Principles and Rules (DAPR) and the RDG Twenty Point Plan (20pp).
5. A nominated owner of 701A performance across the organisation who is empowered to deliver continuous improvement.
6. All planned movements onto and off DYS should be Timetabled – including Empty Coaching Stock (ECS) moves.

In the above statements the word ‘effective’ denotes that the processes are integrated across an organisation’s business i.e. location performance data is readily available to the wider business as opposed to solely at each specific location.

Good Practice Example:	*SWR determined six leading and lagging KPI's to assess their Depot performance, which was linked to work in support of the cross-industry Performance Improvement Management System (PIMS) initiative (which Fleet Challenge Steering Group had initially identified four KPIs), to which SWR had added two additional that resulted in a total of six KPIs as follows:* • *Right time offering to network i.e. delivery of stock for service off Depot* • *Right time offering for maintenance i.e. measuring the delivery of the train back to the Depot for maintenance.* • *Number of Technical incidents* • *Restrictions in traffic* • *Exam beat rate compliance (SWR additional KPI)* • *Monitoring of the work bank against each train class (SWR additional KPI)*
Good Practice Example / Learning Point	*SWR report that some of the KPIs are being properly tracked, whereas in other elements the mechanisms were not yet in place to grab the data in a form that was useful. SWR utilised their continuous improvement teams and also within group as well to explore if processes could be streamlined.*
Good Practice Example	*SWR review the data at daily failure resolution meetings on Depot to ensure there is an effective review of the Depot related incidents e.g. looking to understand repeat failures; no defect founds and especially in human factors where there is an own goal process to support how SWR try and get to the root cause and make sure they don't happen again.*
Good Practice Example	*SWR track incidents weekly using a visualization process, which feeds into fleet board and an Exec visualisation, which is reviewed weekly looking at risk and trends by train class. This also incorporates any issues related to SWR’s train maintainers where a Train Service Agreement (TSA) escalation process incorporates weekly sessions between SWR’s maintainers (Siemens and Alstom) to look at any specific Depot issues – with the aim of informing reliability growth plans.*
Good Practice Example	*SWR’s fleet visualisation process has dashboards with the KPIs presented on the top half with RAG status against target and any associated actions listed and tracked in the bottom half.*
Good Practice	*Should a SWR Depot go Red one week because they've dropped off - as long*

Example	*as there's a plan in place to recover the following week, the meetings will not go into any great detail around the situation. However, if there are successive weeks where a Depot is Red on the RAG status, then an action plan is developed.*
Good Practice Example	*SWR target in-process checks and finished work inspections in relation to any trends highlighted e.g. if there is a particular issue around something like shoe gear, then the Depot is requested to undertake some in-process checks. These are identified as 'opportunities to improve' as opposed to being labelled in a negative manner.*
Good Practice Example	*SWR report that their visualisation process was quite powerful in that:* • *actions that might be stalled can be escalated to SWR's Exec visualisation.* • *this process has been good at facilitating a culture change in production, that has given them more ownership of Depot and fleet performance. Previously Production Managers had only been interested in the train whilst it was 'on Depot' and otherwise it was 'out of sight out of mind.' This visibility has created the ownership of those people on the Depot to assets and has illustrated what the what the fleets do while out in traffic* • *the visualisation has been used as part of toolbox talks / pre-shift briefings as well.*
Good Practice Example	*SWR found that it's not easy to measure late arrivals onto Depot - as a result of incidents being merged back into the root cause of the incidents – e.g. a signal failure or a unit failure etc. As a consequence of this problem, SWR have 'geofenced' their Depot locations and linked this with trust berths records in order to measure Depot lateness. SWR commented that even if an incident is not recorded on TRUST, having that data is useful to the business or Control or even Network Rail to highlight the fact that they need to be delivering these trains on time.*
Good Practice Example	*Northern identified that the link between Leeds Station and Neville Hill Depot was crucial to good performance on the route. Using data to understand how Depot departures clashed with trains on the wider network identified that if trains were 'interposed' 3 minutes before they were due to depart – as opposed to when the train was ready - then the delay across the network was minimised.*

Learning Point:	*Transport for Wales Rail (TfWR) do not think that 'fleet are very effective at disputing minutes related to Depot operations'*
Learning Point:	*There is currently a disconnect between 'on' and 'off' network performance. This can only be addressed by Empty Coaching Stock (ECS) moves being treated with the same rigour as passenger trains.*
Learning Point:	*Within AWC 'Class 5 (non-passenger ECS) delay minutes' are considered of lesser value and this results in it being very difficult to ascertain the root causes of delay.*
Learning Point:	*It has been highlighted that most Depot late starts are allocated to the 'OU' coded pot – 'Uninvestigated' which is created by the Delay Attribution teams every day. It is further estimated that 9 out of 10 of these delays are therefore not investigated any further.*
Learning Point:	*Greater Anglia (GA) discovered that the Ilford Depot Responsible Manager Code was being used as a 'general Depot pot' and had no clarity of who was using it and why. There was a factor of 10 ratio between primary and secondary delay – which was the real 'killer' in terms of impact to the wider GA business.*
Learning Point:	*TfWR reported that TRUST Responsible Manager code MHLG is used for incidents that are ultimately No Fault Found and added that the primary focus is on 701D as opposed to 701A non-technical performance and added that the average delay is only 9 minutes associated with 701A and it can therefore effectively pass 'under the radar' in terms of performance focus.*
Learning Point	*In relation to the number of Restrictions in traffic – SWR have identified a link to low numbers and good Depot performance – both technical and non-technical such as RVAR compliance of disabled toilets.*

2.2 Depot Rules

The delivery of fleet maintenance and servicing is impacted by a wide variety of factors. These factors vary from fleet to fleet, and location to location. To deliver a robust and reliable train service, it is important that such factors are well understood and documented, then considered and reflected in the train plan.

For each DYS, 'Depot Rules' should be developed that define the parameters for each location that need to be complied with for the specific DYS to be able to correctly function i.e. this defines what the train plan needs to deliver.

The purpose of the 'Depot Rules' is to provide an overview of the key information and constraints relating to all fleets and to outline the stabling and servicing capabilities of the locations that provide maintenance and servicing. The procedure includes criteria and requirements for the Train Planning team to follow for future long-term plan (LTP) and short-term plan (STP) Timetable changes. While it is recognised that it may not be possible for all requirements to be met in every Timetable change, early identification of these through the planning process will allow for joint working to identify mitigations.

Amongst other parameters, this will define at a working level:

1. The number of units (or vehicles) that can be accommodated i.e. the Maximum Depot capacity – both for maintenance, servicing and stabling.
2. A set of standard arrivals and departures with correct associated TRUST timings for different train formations.
3. Realistic i.e. achievable headways between arrivals for servicing.
4. Maintenance downtime requirements (quantum, duration) and the 'touch time' needed to carry out the necessary tanking, fuelling, other servicing, or maintenance (planned departure and arrival times need to reflect these requirements) – which also needs to incorporate the timings to shunt vehicles around to get them in the correct position to undertake the required servicing or maintenance.
5. Any third-party Train Supply Agreements e.g. contractual requirements.
6. Any driver resourcing requirements on an hour-by-hour basis – which also needs to incorporate the timings for 'train preparation'.
7. Constraints regarding entry/exit headways.
8. Any notable changes between shifts/days/nights.
9. Associated constraints in terms of number of entry and exit points on the Depot.
10. The provision of several empty roads required to both accept defective trains from service and the continuing need to be able to shunt trains around the Depot.
11. For Depots that do not open 24hrs – Depot opening times need to be documented.

A proposed document structure for the 'Depot Rules' is presented in Appendix A: Suggested 'Depot Rules' Document Structure.

The 'Depot Rules' should form the bedrock of the train plan. It is the intention that they will generate a clear checklist for the train planners – whereby (much like the Network Rail (NR) /Timetable rules) if they cannot comply with any of these rules, there is a need to highlight these non-compliances with the Fleet Engineering Team and apply for a 'concession' to obtain agreement. This will facilitate the relevant discussions to take place to implement changes elsewhere in the plan which will facilitate the concession, or other mitigations to be worked up and/or funded. This also needs to cover Short-Term Planning / Engineering Work amendments.

Learning Point:	*Northern's Neville Hill Depot discovered that whilst their Timetable Planning Rules were set at 3 minutes for train departures, long trains were found to take 4 minutes.*
Learning Point:	*London North Eastern Railway (LNER) identified that berthing stop positions were generating delays – since it was found that in one location the trigger point was half-way down a wash road.*

Good Practice Example	*GA have undertaken a lot of work at Ilford to develop a set of 'Depot Rules' that are based on capacity. At the highest level they:*

	• *Worked with the Depot planners* • *Determined that three running roads are needed to be left empty to shunt trains – otherwise the Depot cannot function.* • *Should this capacity get used no further trains will be accepted into the Depot and Control must find alternative berthing locations.* • *Reported that this has not been an 'easy win' and there is unfortunately no quick fix.* • *Found that they have had to 'stick to their guns' and in the early days trains have been left waiting on the signal – simply to reiterate the message that the Depot was indeed 'full'*
Good Practice Example	*Trans Pennine Express'(TPE) recent fleet transformation threw up many Depot related issues and rewrote their 'Depot Rules Document' for the December 2020 Timetable.*
Good Practice Example	*ScotRail worked with the other TOCs within their Owning Group to develop 'Rules of the Depot' focussing initially on Haymarket Depot in relation to the HST introduction. The Rules of the Depot includes:* • *Turnaround times for tanking and servicing* • *Sufficient time gaps between arrivals and departures* • *Preparation time* *ScotRail are rolling this out to other Depots and commented that the biggest challenge to get everyone aligned (train planners and Depots) but it has been successful in bringing people together and breaking them out of their 'silos'. The December 2021 Timetable came out for review with some changes made concerning the Depots fuel point turnarounds.*
Good Practice Example	*c2c have developed 'Depot Rules' that include:* • *Realistic timings of arrivals/departures of different train formations. This was done to ensure delays aren't picked up on the adjacent network* • *Realistic stabling capacities for the number of units at each location*
Good Practice Example	*c2c have a policy where new drivers spend 6-8 months learning how to drive around the Depot before going on the mainline.*
Good Practice Example	*Northern have generated some comprehensive documents for both engineering and train planning about the rules of the plan for the engineering locations. They have been done with the premise that there will be only 3 main reasons that would change the rules:* • *The infrastructure changes on the Depot* • *The staffing levels change on the Depot* • *The Timetable changes*
Good Practice Example	*GA's Depot Rules list all of their locations that do maintenance and servicing that includes the standard capacity, a disruptions capacity, the number of trains and significant disruption capacities to inform the Control team, train planning and train presentation etc. so that when a train fails and needs to be moved, they know where to take it – as a result of following the rules. – which everyone is signed up to following. They also have in their rules the number of arrivals and departures per hour for each location because of speed restrictions to make sure the trains are placed on suitable roads, preventing them from going to just any Depot, which is for the train planning team to ensure that they get good intervals between arrival and departure times and also in times of disruption.*
Good Practice Example	*The GA Train Planning Manager provides a 'Depot Rules' compliance overview a minimum of 44 weeks before a new LTP (Long Term Plan) Timetable is introduced, or if there are major changes to the STP (Short Term Plan), as part of the approvals process, to allow for non-compliances to be identified and either accepted or mitigated*

It could be the case that dealing with the routine workload is the priority in that there are enough staff available and space to accommodate (and move into position for maintenance) the Timetabled trains. This could be taken further in that it is made clear that nothing additional should be attempted to be moved to Depots between the hours of XX:XX and YY:YY to ensure the routine requirements are met without interruption.

Most Fleet non-technical incidents are because of problems with availability and the Timetable. The

Timetable can only be improved if its development is supported by good 'Depot Rules' – since until Depot requirements are clearly articulated to the Timetable planners the industry will not solve this.

Typically, there are many more staff focussed on addressing technical issues, with much fewer staff focussed on the non-technical issues affecting a fleet of trains.

2.3 Depot Capacities

As an industry, Depot capacities are not known – since this is a complex area.

The typical Depot culture is 'to try get on with it' and external events effectively mean that things are 'foisted' on Depots. Organisations are aware that Depot facilities are not big enough, but despite this TOCs simply must continue to attempt to deliver the daily service.

The demands placed on a Depot are often changing in terms of train types, Timetable and fleet reliability.

In order to determine the stabling capacity of a location, the key variables are typically:

- What are the known planned 'Depot loads' – driven by exam mileage or time
- What are the unplanned 'Depot loads' – driven by fleet unreliability and/or network disruption
- What are the miscellaneous loads – driven by modification / overhaul programmes

These feed into the 'static Depot capacity' model e.g. can the Depot accommodate all the work needed today. This in turn should feed in to a 'future Depot capacity' model that reflects future changed Timetables / mileages / fleet plans / stabling locations etc.

A subgroup of 701A-OG developed a framework methodology for determining the capacity of a Depot – this can be found in Appendix B

Learning Point:	*The RAIB report into the tragic driver fatality at Tyseley in 2019 that identified that the Depot was operating at 'over' capacity and added that fleet cascades and new train projects are rarely supported by the money to deliver the new facilities that are often necessary.*
Learning Point:	*TfWR experienced major capacity issues at their Cardiff Canton Depot because of their new fleets testing and commissioning programmes e.g. Class 769 taking up space. TfWR believe that they do have a set of rules that train planning use, but they are less restricted at Cardiff Canton Depot since there are four routes onto and off the Depot, although only two are of real use. The issues they do experience are typically the positioning of units to form the service.*
Learning Point:	*Following concerns that 'too many trains' were being routed into Neville Hill Depot, a review was undertaken by all affected TOCs. This resulted in temporary CET facilities being added to the reception roads to facilitate throughput.*

A completely full Depot is of no use to anyone and that Depots can be effectively 'full' when 70% of the Sidings are occupied – and depending upon layout that could be much less.

A Depot simply cannot operate at 100% capacity and the 'maximum' that a Depot can operate is not necessarily optimum – since there needs to be a level of contingency factored into things to deal with the 'unexpected' things that inevitably happen whilst running a railway.

Good Practice Example	*Greater Anglia define three levels of Depot capacity as follows:* 1. *Standard Operational Capacity: Total number of Units that can, or are required to be, handed back to the Depot in any 24-hour period (for a maintenance window, layover, 'hot' spares, aligned to the operational plan)* 2. *Disruption Capacity Maximum: Maximum concurrent number of Units that can be accommodated against the plan on daily basis* 3. *Significant Disruption Maximum Capacity: Total additional units that may be accommodated in the Depot concurrently, as set out in the Physical Characteristics Table pertaining to the relevant Depot*

In addition, it's also not only the whole Depot that could be a constraint:

Learning Point:	*At Tyseley Depot the capacity of the fuel point is a known constraint on the overall Depot.*
Learning Point:	*Headways off Tyseley Depot also do not align with the adjacent network junctions and since this is a shared facility West Midlands Trains (WMT) can effectively take up the available Depot capacity – without any additional CrossCountry arrivals.*

Good Practice Example	*Northern has developed a Depot capability plan for Heaton and also found that Neville Hill was overly congested. As a result, Northern do not send as many trains to Neville Hill and they are actively monitoring the number of units returning there to ensure that they can cope.*
Good Practice Example	*GA have got to the point where they now fully understand Depot capacity at Ilford which is important to understand performance.*
Good Practice Example	*AWC are drilling down into the detail in terms of Depot performance and the analysis had revealed a lot of Depot 'acceptance' incidents at Longsight – which is a really busy Depot and does not have the best layout. Conversely their Edge Hill Depot has lots of issues getting trains out of the Depot due to adverse signals on the mainline.*
Good Practice Example	*At c2c Depots, the fouling points are physically identified to prevent trains being left in the wrong place. This has been achieved by working closely with their Operations colleagues.*
Good Practice Example	*GA have constructed a 'digital twin' of Ilford Depot to model future capacity requirements of the Depot.*
Good Practice Example	*Northern have implemented a 'traffic light system' for Depot capacity, with certain numbers to mean different colours to say whether they can manage the numbers or not. Red means that the Depot was literally full – and therefore the last movement into the Depot would have to be the first movement out again.*

Depots are a system of systems which can be simulated in a modelling environment.

Depots can be considered as having two capacities a 'static' capacity and a 'dynamic' capacity and this can be visualised using an analogy of a completely full glass of water.

The completely full glass of water represents the 'static' capacity of a Depot i.e. a completely full Depot.

Once you start to move the glass around some water will spill out and the more quickly you move the glass around the more water will spill – which is analogous to representing the 'dynamic' capacity of the Depot.

The 'dynamic' capacity of the Depot would therefore always be less than the 'static' capacity and the eventual dynamic capacity is related to how 'busy' the Depot is in terms of activity.

Good Practice Example	*Consultancy Frazer-Nash Consultancy (FNC) have developed a bespoke tool that analyses Depot performance. For the model to function the following parameters are required:* *To determine static capacity:* • *Fleet size* • *Maintenance requirements* • *Number of Depot roads* *To determine dynamic capacity:* • *Stock types* • *Stock formations* • *Timetable* • *Depot layout – noting that the orientation of switches and crossings have a strong influence* • *Staffing* *In terms of output, the model will generate:* • *Depot utilisation* • *Timetable adherence – overall input / output adherence to the plan*

	• *Fleet Depot movements analysis* • *Staff utilisation* • *Road / Fleet / Person Activity* • *Dynamic capacity of a Depot* *The system boundary is the Depot connection with the mainline.* *The tool can provide a more realistic view of how a Depot will function, be it a newly proposed Depot, or an existing Depot in relation to a revised Timetable.* *Since the tool can analyse thousands of parameters, to optimise the operation of a Depot it provides a cost-effective analysis of proposed changes to existing Depots.* *The model identifies when the Depot will 'break' if you try to do too much.* *The tool can model different scenarios e.g. the effect on the Depot of proposed changes to the Timetable.*
Good Practice Example	*East Midlands Railway (EMR) have many 'committed obligations' in relation to their latest franchise agreement and found themselves trying to deal with too many 'what-if' scenarios. EMR have employed the FNC tool (described above) that analysed proposed changes to their Etches Park Depot in readiness to the arrival of their new 'Aurora' fleet of trains. It was found that Etches Park could only handle a specific number of 'coupled unit' departures from the Depot.* *It took EMR between March and September to obtain the necessary output, but that was mainly related to the difficulty obtaining the necessary data for the new fleet of trains such as estimating the number of technical defect repairs that was anticipated etc.*

Accurate capacity modelling is key to ensuring Depots can continue to operate e.g. at times of fleet transition (refer to Section 3 New Train Projects / Fleet Cascades (Significant Change Management)).

A theoretical exercise can be undertaken in terms of understanding the maximum capacity of Sidings, accepting that trains still need to be moved around for washing and Controlled Emission Toilet (CET) emptying etc.

The theoretical capacity is to have enough room to expect a failure with a spare road available to accept a failed service train. In addition, a spare run around road is also required.

Good Practice Example	*It is c2c policy that both the wash road and CET road left are empty at East Ham Depot.*
Good Practice Example	*Northern Depots use working capacity numbers and send a report out each afternoon to manage their workload and flag up if there are more units at (or planned to be at) a location than the stated working capacity. If the capacity is exceeded a red flag is issued and work arounds are initiated.*
Good Practice Example	*AWC produce a report every Thursday from the Depot planners and internal fleet managers to identify if they are over capacity and flag it to Control to put mitigation in place.*
Good Practice Example	*Chiltern Control send out a sheet every day which calculates the Depot capacities based on the number of expected arrivals and other pieces of information. They do accept that this can never be exact – since the number of spare vehicles at a site can be unpredictable – as you cannot say for definite which vehicles will be repaired and at what time.*
Good Practice Example	*GA have an in-house capability to undertake Depot capacity modelling that can identify any pinch-points.*

Whilst the working capacity of DYS can change because of infrastructure availability, experience has shown that this doesn't change much.

It is important for Depots to regularly communicate to Control and that temporary overcapacity at Depots can be dealt with, but that this is not sustainable in the long-term.

It is very important to plan for maximising the use of the Sidings since 6-cars berthed in 8-car Sidings has an immediate adverse effect on available capacity – which in turn is linked to the train plan.

2.4 Depot Operating Policies

It is very difficult to specify national Depot operating procedures – since all locations have their local geographical differences and peculiarities.

Learning Point:	*GA highlighted the significant differences in operating procedures e.g. at Ilford Depot staff move the points, whereas at Old Oak Common it is down to the Depot drivers to move the points. If not enough time is factored in for the staff to move the points these variables can skew the figures. It is what is going on at the local level that needs to be fully understood.*
Learning Point:	*There is also a real need to better understand movements around a Depot location – since typically this data is currently not available.*
Learning Point:	*Since each Depot has their local constraints a typical ratio for Depot static capacity : dynamic capacity is not possible to be estimated.*
Learning Point:	*AWC's Edge Hill Depot needs the surrounding signals to be non-restrictive to maintain performance. Signal sighting has historically been a problem and the timings of Depot departures have been reviewed. However, there is a need to look at the end-to-end process before any changes are made.*
Learning Point	*GA identified that conflicting movements within the Yard at Ilford were created by the train plan. The root cause was a lack of understanding on behalf of the train planners how the Ilford Depot worked in that they had assumed a train could arrive at the 'low' side of the Yard whilst another was departing from the 'high' side of the Yard – which is simply not practical on the ground.*

Whilst the previous statement is true, there does remain scope to determine headline Depot operating policies.

Good Practice Example	*c2c have evolved their 'Depot Rules' to include details of how the Depots function. These included:* • *Absolutely no propelling moves are allowed.* • *Only one move is permitted at once at a location.* • *Since the Sidings are all manual operated points, trains do not stop over Switches and Crossings (S&C) – and also trains do not 'trail' through S&C.*
Good Practice Example	*Moves around Northern's Neville Hill Depot and EMR's Etches Park Depot were modelled using 'Lego' bricks on a table.*
Good Practice Example	*GA host on site 'Depot Working Groups' with all organisations at the Depot e.g. TOCs; 3rd party maintainers; NR and added that this holistic approach had facilitated a detailed understanding of the constraints which includes having to cross electric main lines in order to access some of the stabling Sidings.*
Good Practice Example	*GA and MTR Elizabeth Line (MTREL) have a weekly meeting to close out any issues. It is the general idea that issues are dealt with there and then – in order to 'nip them in the bud'*
Good Practice Example	*GTR undertook an RM3P assessment at their Hornsey Depot to understand the level of maturity of their depot performance processes.*
Good Practice Example	*GTR implemented a fleet control reorganisation where planners and 'phone a friend' have been split between teams to focus on both. (Previously they all rotated through the desks). It was noticed that fault finding support subsequently improved.*
Good Practice Example	*Historically at TfWR's Canton Depot only had one Operations Team Leader whose responsibilities included controlling shunt moves and managing the team of shunters. It was evident that this was a lot to manage considering that there is a train departure every 6 minutes for three hours at the start of the day. In order to improve the situation, an additional Operations Team Leader was appointed between Sunday and Friday and their responsibilities were split with one conducting the movements with the assistance of the shunters and the 2nd Operations Team leader liaising with the drivers for the afternoon service – essentially ensuring that the drivers are there when needed.*
Good Practice Example	*There is a regular TfWR meeting between 'Fleet' and Operations' – known locally as the FLOPS meeting. The meeting includes Driver Managers, Conductor Managers and Fleet representatives. One of the immediate issues identified from this meeting was that one driver's turn was overloaded in terms of the number of*

	train preparations that they were required to undertake – so a more balanced approach to this was implemented – to share the workload around.
Good Practice Example	*AWC have a good interface between their Fleet and Operations teams as a result of a weekly driver call. A recent issue that has been dealt with has been in relation to the 'parking' position of the windscreen wipers – which was dealt with effectively before it became a 'big issue'*
Good Practice Example	*AWC's Longsight Depot has been found to experience a lot of acceptance delays. This has been addressed by trying to ensure that they arrive 'right time' and they have been liaising with their station teams to focus upon a right time despatch from Manchester Piccadilly station. This has achieved better right time performance at the Depot.*
Good Practice Example	*In order to simplify the operation of Neville Hill, Northern took over as the exclusive Depot Facility Owner and staff from EMR were subject to TUPE.*
Good Practice Example	*Northern have developed and implemented a 'Timetable' for movements within their depot at Neville Hill. Northern report that this has improved the performance of the depot – simply because the plan is clear to everyone concerned.*

3 New Train Projects / Fleet Cascades (Significant Change Management)

3.1 Background

New Train Projects are not just about the trains, since they need to holistically encompass the Depots and supporting maintenance arrangements as well.

All too often, new train projects and fleet cascades have not considered the real implications for the affected Depot in order to effectively manage, service and maintain the new fleets.

3.2 Fleet and Depot Requirements

Even where Depot requirements are effectively addressed, the fact that infrastructure works will typically need to be undertaken at a live maintenance location (in order to keep the existing fleets maintained) can cause significant disruption – since some Depot facilities will be out of use whilst these are being upgraded and therefore will be only able to operate at reduced capacity. This upheaval needs to be effectively planned for.

Nobody wants to be building a Depot while a new fleet is being delivered – but events typically conspire so that this happens all too frequently.

Learning Point:	*GA reported that Norwich Crown Point Depot had been a 'building site' and performance had been poor as a consequence of previous decisions (with good intentions) made by the organisation 18 months prior. It was therefore no surprise to them to see the associated Responsible Manager Code (MBEX) in the top 20 at that time.*

Depots are also placed under their maximum stress in terms of capacity whilst fleet transitions are being undertaken – since the new trains are being introduced the replacement trains need to be stabled and ultimately transferred to their new operator – or scrapped if they are at the end of their useful life.

Learning Point:	*The RAIB report into the tragic driver fatality in 2019 identified that Tyseley Depot was operating at 'over' capacity, but added that fleet cascades and new train projects are rarely supported by the money to deliver the new facilities that are often necessary*
Learning Point:	*A recent New Train project procured the trains without an associated maintenance support agreement. This led to a sub-optimal maintenance arrangements being subsequently agreed and was considered to be less than ideal.*
Learning Point:	*From late 2017, GWR's HST fleet was being replaced by the Super-Express Trains (SET) as part of the Intercity Express Programme (IEP). The SETs were to be serviced at both Laira and Long Rock. However, the Timetable had a 9-car SET being serviced at Long Rock, but the problem was that a 9-Car could not be accommodated at the Depot and therefore the Depot was effectively grid-locked whist the 9-Car sat on the reception road. There were further complications as a result of having to manage third parties in relation to the maintenance arrangements.*
Learning Point:	*Northern found that managing the additional maintenance requirements of the toilets on the new trains had been a massive issue following service introduction – since it has been found that there was simply not enough space to accommodate at that time on their network. They had to look at where tanking could happen and also looked at 3rd party locations and other options involving with NR and other TOCs.*
Learning Point:	*Northern found that their existing fuelling and tanking installations were not*

	compatible with their new trains in relation to the existing lengths of pipes and they were forced to 'selectively fuel and tank'. Trains were running out of water faster than they were of fuel, but for whatever the reason the tanks were not meeting the demand experienced. It is suspected that this might be because people are washing their hands much more often than before the pandemic.
Learning Point:	*For the TfWR Class 175 fleet, Chester was the 'maintainers hub/centre of excellence' and therefore defective trains are often sent to Chester for repair – which creates problems the next day in terms of unit availability elsewhere.*
Learning Point:	*EMR have lots of diverse Depots and from May 2021 took on Kettering stabling point - which is novel to EMR in that it is 25kV ac OLE electrified.*
Learning Point:	*TfWR found that technical and non-technical fleet performance was deteriorating with their Class 175 fleet as the maintenance contract with Alstom came to an end and was replaced by CAF.*
Learning Point:	*The bodyshell cracking issue that emerged during 2021 on the Class 80X fleet impacted LNER's operation at the time. Whilst MkIV sets were reintroduced to cover, this resulted in a compressed ramp up of activities from a new Depot location with new maintenance staff.*
Learning Point	*Northern found that an unanticipated requirement for their new CAF manufactured trains was the need to undertake a periodic 'brake test' every 24 hours. The responsibility to undertake these tests varied (between the driver or fitter) dependent upon the location. When trains were not stabled as per their usual locations (e.g. as a result of Industrial Action) arrangements had not been made to send fitters to these alternative locations - since the driver didn't have the time allocated in their Train Preparation to undertake them – which adversely affected performance.*
Learning Point	*Northern discovered that the water provision for the toilets on their new Class 195 fleet was insufficient on their York and Blackpool routes. There are also issues in vast geographical areas, with Class 195s being managed centrally by the Depot in Manchester, but the trains running to Sheffield, Nottingham, Leeds and Lincoln, and cycling them back necessitated the creation of swaps to deliver for maintenance.*
Learning Point	*Northern found that Class 155s working around Hull, York and Bridlington services didn't have an opportunity to cycle for maintenance at Neville Hill and are the last arrival of the night and nine times out of ten one of the first departures of the day because they work so far from the Depot. As a result, a different work mentality is trying to be adopted to manage overnight workloads at Depots, looking at completing what is on the maintenance diagram before taking another one in so that a quick turnaround needs to be done only once a week.*
Learning Point	*LNER's biggest constraint at Neville Hill is the need to stable electric trains on non-electrified roads due to capacity constraints, but thankfully all LNER trains have Generator Units to be able to haul themselves out, but commented that this is not ideal to have to do this all of the time.*

Good Practice Example:	*Prior to the introduction of their new Class 720 trains (and associated fleet cascade), GA undertook detailed capacity modelling at their Ilford Depot. This identified a number of pinch points months in advance and were able to put in place mitigations, re-run the capacity models and show that the proposed mitigations provided the headroom needed.*
Good Practice Example:	*For their new train fleet, c2c commissioned a study by an external company to simulate arrivals/departures to identify any clashes on their Depots and Sidings. A few were identified and these were fed back to the Timetable planners.*
Good Practice Example:	*EMR spent a great deal of time 'unpicking' the proposed diagrams over the Christmas 2021 period – since they were found to be unworkable. EMR's aim was to free up some Depot capacity to facilitate fleet cascade.*
Good Practice Example:	*GA looked at a capacity model for Ilford and other Depots – since there needed to be contingency plans developed to manage the transition of their fleets whilst their new stock was being delivered.*

New Train contracts are also contributory to generating non-technical fleet related problems. Unless a new Depot is specifically constructed for the new fleet, existing Depots are expected to maintain the new fleet of trains. These Depots were built many decades ago and it has been accepted industry

practice to try to feed more and more trains into existing depot facilities without actually looking at how hamstrung the Depot is in terms of its operation. Once you factor disruption in there, before you know it, you're completely tied in knots in that the Depot can't possibly deliver what's being expected of it. This was one of the factors cited in the unfortunate fatality at Tyseley Depot a couple of years ago was that the Depot simply had too many trains to deal with.

Learning Point:	*The TfWR Class 175 fleet consists of 2-Car and 3-Car units. However, according to their contract it did not differentiate between 2-Car and 3-Car units – so should Alstom make a 2-Car available for a 3-Car diagram then there was no penalty, despite the resulting problems from operating a short-formed train in service.*
Learning Point:	*TfWR performance has been adversely affected by a change of Third-Party Maintainer heralded by the arrival of a new fleet of trains. It has been described as a 'messy divorce' and there is very little 'goodwill' left between the organisations.*
Learning Point:	*Northern found that the additional stock moves were required to manage Controlled Emission Toilets fitted to their new fleets of trains*
Learning Point:	*TfWR reported that the ongoing problems with their Class 769 fleet has created many Depot swap overs*
Learning Point	*Northern suffered from Depot congestion, mainly at Neville Hill, with a lot of the long-term heavy maintenance now being more in-house than externally. Traditionally, the units in heavy maintenance had not been classed on Depot so had not been included in the figures, which has impacted the EMU fleets when there is only capacity for seven EMUs in Neville Hill.*
Learning Point	*The Class 802s have also been suffering with fuel management problems since whilst they are bi-mode trains that are expected to run mostly in electric, diversions have been in place (over non-electrified routes) due to route upgrade works. There have also been struggles with out-stabling and frost instructions on the East Coast as they are instructed to reduce power draw under some circumstances which has increased the running in diesel mode and matching that up with actual fuel management has been tricky.*

3.3 Managing Third-Party Maintainers

TOCs are increasingly reliant on third-party maintainers and contractual Train Service Agreements to provide the trains to operate their services. Often, the third-party maintainers are isolated from the running railway and as a consequence, their Depot teams potentially do not fully appreciate the 'wider picture' in terms of TOC operations and the human factors aspects.

TOCs often grapple with the problem of how to effectively engage with these organisations. This is further compounded by the fact that often the TOC remains the 'Depot Facility Owner' at their sites – and therefore future engagement and any tangible associated benefits are dependent upon the supporting contractual arrangements.

Learning Point: / Good Practice Example	*Neville Hill previously had two Depot Facility Operators, namely Northern and East Midlands Railway shared responsibility. LNER and Hitachi also use the site. Northern have now taken over as the single DFO – which has simplified arrangements at the site.*

The wording of contracts can drive the behaviours of third-party maintainers that only focus on issues affecting headline fleet reliability e.g. MTIN/Mp701D - such that Class 5 (non-passenger ECS) delays do not get any attention.

The fact remains that there is a need to collectively find a way to make people accountable for their delays. Whilst the supplier and customer might not be able to agree root cause, it does not change the fact that such delays happened. The operator will still 'take the hit' but as a result of current contractual limitations the operator does not have an effective mechanism to directly influence their supplier.

Learning Point:	*CrossCountry have no contractual mechanism to penalise or incentivise their third-party maintainer (Alstom - formerly Bombardier) in relation to 701A incidents. They therefore have to have a partnership approach in the absence*

	of any 'carrots or sticks'
Learning Point:	*LNER have inherited the Master Availability and Reliability Agreement (MARA) and Train Availability and Reliability Agreement (TARA) which is the source of much frustration since it does not necessarily represent the needs of the TOC and is quite inflexible for planners to diagram against. The ECM entity is also stated as Hitachi rather than the Duty Holder, i.e. LNER.*
Learning Point:	*Trans Pennine Express operate small fleets and since they do not own any Depots they are never a priority for any Depot their fleet accesses.*
Learning Point:	*LNER experience problems obtaining the paper Fitness to Run Certificates from their maintainer (Hitachi) in a timely manner. A digital handover process is under development.*
Learning Point:	*TfWR reported that an Alstom refurbishment that had been undertaken on the Class 175 units in the past 12-18 months which had left TfWR short on trains which had been covered by Class 158 units.*
Learning Point:	*For TfWR a large proportion of 701A incidents were generated as a result of trains not keeping to time as a result of incorrect train formation e.g. Class 150s allocated to cover Class 175 diagram (slower speed unit) or a short formation had been provided e.g. 2-Car on 3-Car service. When one of the 3-Car sets is on the programme this has been typically covered by a 2-Car set (or even a 150 or 153). Alstom maintain the fleet under a Train Service Agreement. Within the Contract there is no performance regime around mis-formation of trains with the exception of trains that start at Chester. TfWR commented that only 7 or 8 trains start from Chester - so the majority of trains are not covered by this regime.*
Learning Point:	*For TfWR Chester is the 'maintainers hub/centre of excellence' and therefore defective trains are often sent to Chester for repair – which creates problems the next day in terms of unit availability elsewhere. Whilst TfWR do have outstation staff, typically units return to the Alstom Depot to repair – since that is what TfWR expect from the contract.*
Learning Point:	*AWC's fleet are maintained at five Depots that are managed by Alstom, but they are not exclusively for the use of AWC i.e. these Depots are shared with other operators*
Learning Point:	*An aspect that affects the ability of TfWR to deal effectively with incidents is the fact that their Cross-Borders Network (north-south Wales) consists of long routes with only one Depot which creates a lot of complexity in returning units back to Depot.*
Learning Point:	*Arriva Rail London reported that a possible reason for an increase in incidents related to Willesden Depot was a lack of engagement with their train service supplier Alstom in terms of driving these incidents down, but that said, there is currently little impact on passenger service of these incidents.*
Learning Point:	*GWR employ a 'Hitachi Management Code' for incidents that GWR and their maintainer Hitachi cannot agree upon the 'root cause'. There is a separate team dealing with this aspect of GWR's contract and as a consequence it is not clear how Delay Attribution is being dealt with in relation to this Fleet to those outside that team at GWR.*
Learning Point	*TPE reported a lot of positive work in relation to preparing for the May Timetable, with some departures and arrivals being split between the North and South ends of the Depot, which helps spread the workload. TPE also reported a desire to change the way they work with their third-party maintainers as there is a complex relationship with some fleets with a lot of different parties involved and have moved to a more risk-based approach to help address Depot issues and non-technical reliability issues.*

Good Practice Example	*CrossCountry has a wealth of experience dealing with third-party maintainers and they have a specific programme to educate their suppliers and maintainers in relation to explaining their business. Furthermore, they encourage people from their third-party Depots to get into XC's driver's cabs to widen their understanding of their role and to simply experience a train at high speed e.g. 125mph. This has been beneficial in terms of improved maintenance practices and additional benefit to this initiative has been to improve collaboration with not only their Ops team, but also the CrossCountry drivers. They were also rolling this process out to include their RosCos and had included a 360º*

	feedback session in relation to their contracts.
Good Practice Example	*AWC concluded that in order to effectively manage Depot performance some good measures are required e.g. timing points reflective of Depot departure; measure of drivers prep timings.*
Good Practice Example	*CrossCountry have a mature relationship with their maintainer and as a result they have reported that the contract has never got in the way of collaborative working with their supplier Alstom (formerly Bombardier).*
Good Practice Example	*GA have an agreement that they will have 45 minutes post maintenance in order to ready the trains for service. It is therefore important that they keep a log of the time of handover following maintenance. This is a key lever they have in order to manage their supplier relationship.*

4 Timetabling

4.1 Background

It is accepted that the purpose of a Depot is to provide safe and reliable trains to operate the published Timetable. However, sometimes not all of the respective Depot requirements e.g. the needs of the fleet maintainers to be able to meet this need are incorporated into the Timetable plan – and therefore effectively the Depot is being set up to fail at the outset.

The Timetable needs to work for all DYS.

Good Practice Example	*The following seven questions need to be answered satisfactorily in order for an organisation to ensure they have effective mitigation in place to incorporate the requirements of their Depots in their Timetable development processes:* 1. *Are your Depot Timetable requirements documented?* 2. *What internal forums do you have to influence Timetable planning?* 3. *Who are the attendees at these forums?* 4. *What frequency do the internal forums occur? e.g., Adhoc, Daily, Weekly, Periodic, Other?* 5. *Are you first likely to recognise if your Timetable requirements are met prior to the released Timetable plan?* 6. *How do you advise of changes in Timetable requirement? E.g., an unforeseen loss of a Depot, Yard or Siding road?* 7. *Is there any other good practice you undertake with Timetable planners to ensure the Timetable works for your Depots?*
Good Practice Example	*In order to improve how their Train Planning and Fleet Planning departments interact across their business, AWC arranged a fleet planning workshop that focussed on a forthcoming significant Timetable change – which was the biggest Timetable change since 2008. AWC commented that 'Prior to this, the approach was virtually "here's your diagrams run with them!"* *AWC took the proposed diagrams for the new Timetable to the Workshop and worked through them to identify any issues and things that didn't work from all points of view of the attendees. This included the Timetable Planners; the AWC Fleet Delivery Manager and the Alstom Fleet Planners. AWC reported that it was a really useful session to identify anything that could be improved from the current working arrangements and then anything that these new diagrams threw up. One of the main benefits was that it started some really useful conversations in relation to scenarios regularly faced, for example:* • *We've got an issue with the A exam, it's starting later and finishing later - what can we do -change the Depot rules or do we move the A exam what does moving the A exam look like?* • *We reviewed some of the out stabling diagrams where they come off and diagrams that we know of going to have been light touch overnight. We don't necessarily want to out stable or arrive later a Depot the next day. What's the work content of those diagrams that out stable and can we make some swaps around that?*
Learning Point	*AWC reported that the output of their Fleet Planning Workshop was not rules, which AWC understand at the headline level e.g. number of trains at a particular location etc. Much of the conversation ended up being related to specific situations e.g. highlighting that it's not ideal a train comes from Polmadie Down Holding Siding rather than the Carriage Maintenance Depot and that's then going to be really late on to Wembley because it is known while it's been on DHS, it's only been cleaned and it's not been touched by maintenance and if it's a really late arrival e.g. 01:30 on to Wembley, it's only going to be really, really light touch, so anything that's wrong on that train, anything that needs doing, that's two nights where that can't happen in a row. So they're not rules because it can be absorbed in the plan. It's just a risk in the plan that and there are risks that AWC were always carrying. So how do we then track things like*

	it's not ideal to have this and this combinations of things because you can't have a rules document that gets really long with nuances like that. So, in a nutshell, that's a problem. Whilst AWC do not currently have a solution, they want to be making sure they are having the conversations to understand those things as best as they can.
Good Practice Example	*AWC's Train Planning Teams now attend more of the Fleet meetings, in order to develop a little more understanding in relation to the fleet planning requirements.*
Learning Point	*An Operator found that they were not receiving sufficient notice of engineering works that caused isolations and possessions of the roads into their Depots. Another Operator reported that their Engineering access managers deal with this since the engineering access planning really have engagement at different levels and numerous meetings that go through these, but accepted that the ones that impact on the Depots do seem to come quite late or are not given as much attention as a block that affects passenger services.*
Learning Point	*An Operator found that the introduction of a new Timetable, which has not been as successful as they hoped. As a result the Operator set up a Timetable task force, which has shown some signs of improvement, and have learned big lessons around creating a Timetable and doing all the checks and balances around the Depot to make sure everything is in place, as it would appear to have been missed on this occasion. The Operator elaborated that the main lesson learnt was on stakeholder engagement, and explained that Timetables are driven by passenger need, the driver, and driver headcount, and then the Timetables are agreed, and engineers tend to make the Timetable work, which has in the past to some extent hidden the issues that have emerged. This time around they could not engineer out the problems, and there is hope that the lessons learned will make the necessary changes to prevent recurrence for future Timetable Changes.*
Learning Point	*As a result of Industrial Action, one Operator reported that ECS movements back to the Depot were not being covered when the 'P' (Planned) cancellation list was published. This resulted in significant problems keeping the fleet maintained as per the specified maintenance plan.*
Good Practice Example	*Northern Train Planning and Fleet representatives sit down and review advance Timetable proposals in September and February in advance of implementation of new Timetables. The aim is that train planning will highlight any issues. E.g if they were to bring a Timetable that would increase the demands on a Depot of 4x A exams and 2x B exams per night currently undertaken then it is the aspiration that there would be one year's notice to be able to implement the changes necessary – and something similar for proposed changes to the number of trains stabled at Depots. The aim is to have two-way communication to avoid either party from being surprised when the Timetable change happens.*

At a fundamental level it is about finding ways to work better with Train Planners and the typical reasons for difficulties being experienced in this area is the fact that the necessary communication channels are not established. The biggest thing to understand is to know who to talk to - since half the time, people don't know who to talk to e.g. do the engineers know who they need to speak to on train planning – and vice versa?

4.2 Link to 'Depot Rules'

As stated in the earlier section (2.2 Depot Rules) the associated 'Depot Rules' should list the requirements needed for the Depot to function - since it is a fact that train planners are very good at adhering to NR's Rules of the Plan and it would be very helpful for all concerned for Depots to develop and share a clear set of Depot Rules for train planners to follow – since Train Planners really like rules. As a consequence, the 'Depot Rules' document should be in a format that they can readily assimilate (i.e. it is in a format that they are comfortable with) and they can use these to effectively plan the train movements on and off the Depots.

It is hypothesized that the absence of such a set of 'Depot Rules' has created the opportunity for train planners to keep pushing the 'boundaries' of acceptability in terms of train diagramming.

It is the intention that the 'Depot Rules' are shared with the Timetable planners to make the Timetable fit for the maintainers' requirements.

Where it is not possible for the Timetable to comply with the Depot Rules, this should be flagged by the Timetable planners to the maintainers in sufficient time for other mitigations to be developed, agreed and implemented prior to Timetable implementation.

Good Practice Example	*Northern's Depot working capacity report is also used by train planning for Timetable Development purposes.*
Good Practice Example	*GTR undertook timing exercises ongoing at Selhurst Depot, where they have learnt that they need extra timing points out of the Depot.*

It is therefore the aspiration that a clear 'Depot Rules' is produced that is on a par with 'Rules of the Plan' and planners should only be able to deviate from the agreed 'Depot Rules' by following a formal dispensation process.

The secret to success in relation to Depot Performance is that the base train plan (if delivered) generates no delay.

Depots that are used by multiple Operators provide an additional complication, since Timetables are typically developed on a 'per Operator basis' and therefore the 'holistic' Depot Timetable needs to be considered to ensure that it works for all:

Learning Point	*In 2024 Holbeck Depot was preparing to become a multi-user TOC location. However when the detail of the proposed Timetable was reviewed it was discovered that there were only two minutes proposed between CrossCountry and Northern arrivals – which was never going to work in practice.*

It is therefore essential that Depot teams establish a 2-way dialogue with train planners, but this is a real challenge facing the industry since the local issues need to be highlighted to the centralised Network Rail Timetable 'hub' in Milton Keynes and there is therefore a need to engage at a national level with Network Rail.

Often it has been found that there have been difficulties in relation to agreeing timescales for Timetable development – and sticking to them. This was particularly the case during the COVID-19 Pandemic when TOCs were subject to many Timetable changes in that the operator was changing their Timetable almost weekly to match capacity with demand - approximately nine Timetables in 6-months.

Learning Point:	*LNER found that a Timetable had resulted in a maintenance 'touch time' for their third-party maintainer, Hitachi at Neville Hill Depot of only three hours. This had been further exacerbated by the fact that there was nowhere vacant on the Depot to stable a 9-Car IEP without returning to the reception road – thereby limiting access for long trains onto the Depot.*
Learning Point:	*GWR's HST fleet had been replaced by the Super-Express Trains (SET) as part of the Intercity Express Programme (IEP). The SETs were to be serviced at both Laira and Long Rock. However, the Timetable had a 9-car SET being serviced at Long Rock, but the problem was that a 9-Car could not be accommodated at the Depot and therefore the Depot is grid-locked whilst the 9-Car sat on the reception road. There were further complications as a result of having to manage third parties in relation to the maintenance arrangements.*
Learning Point:	*TfWR have been subject to a lot of vehicle cascades and the Class 769 introduced a lot of problems – in the main technical, but some were operational. TfWR have had a new Timetable that introduced new diagrams that required an additional fuelling installation at Rhymney since the Class 769 range is not sufficient.*
Learning Point:	*In 2018, ScotRail took on some of the cascaded HST fleet, but the timetabling process had not considered the supporting Depot or crewing requirements and it was found that they could not operate the published Timetable.*
Learning Point:	*LNER attempted to berth three units at Neville Hill between 2130-2200 and it was found that there was insufficient time to achieve this.*
Learning Point:	*AWC discovered that a recent Timetable change had made set swaps more difficult.*

Learning Point:	*TfWR identified that some of their unit diagrams were an arduous 18/19-hour duration with very few returning to the maintenance Depot which led to diesel engine reliability issues.*
Learning Point:	*Northern reported that sometimes the diagrams did not facilitate the requirements of the Depots to be met in terms of units returning to Depot for maintenance and that a lot of time and effort had to be expended investigating the reason for set swaps and added that only 20-30% of the Northern fleet returns to the Depot each day.*
Learning Point:	*ScotRail's 'MHA' codes reflect the 'Control' of the fleets nominally based at Corkerhill (MHAC) and Inverness (MHAI) which due to the geography of the ScotRail operation typically need lots of set swaps to return these trains to the home Depot. The Haymarket maintained trains are covered by MHAH.*
Learning Point:	*TfWR experienced numerous late notices of units required for maintenance and toilets in need of tanking/emptying. This required lots of stock changes to facilitate this. The fundamental reason for this is that the train was simply not really designed for the diagrams currently being operated.*
Learning Point:	*Southeastern have identified that getting stock back to Ramsgate Depot is more difficult on their bigger fleets. Class 375 units are interchangeable, but Class 376 units need specific diagrams.*
Learning Point	*Timetabling documentation is also a perennial problem in that unless there are adequate controls in place it can become rapidly out of date – since things change and people can end up referring to different versions etc. so documentation and governance are very important to get right.*
Learning Point	*It is appreciated that there are nuances in relation to Depots e.g. how many trains can fit and how many they can deliver. Often Depots are different and there are so many little intricacies that such timetabling documents can become really long and detailed and is therefore a challenge to keep updated.*
Learning Point	*Timetable development is further complicated by the needs of Engineering Works because it is known that ECS trains cannot run at certain times onto certain Depots because the Depot access roads are not available. This does however present an opportunity at that Depot to be able to strip the needs back and consider what is best.*
Learning Point	*AWC commented that the reason there is often a mismatch between the needs of the Depot and the needs of the Timetable is that things have evolved in this way because the constraints are given to two different teams by each other. AWC therefore identified the need for Timetable and Depot Planners to work together in this space.*
Learning Point	*AWC 'Romeo' headcodes are the peak services in the morning are important Class '1' and Class '9' trains with an 'R' head code. So AWC refer to them the Romeos for R and it was raised at their Fleet Planning Workshop that they are not allowed to make swaps of those trains in London Euston, but no-one at Alstom appreciated the importance of these services to AWC until this was highlighted.*

Good Practice Example	*For their new train fleet, c2c commissioned a study by an external company to simulate arrivals/departures to identify any clashes on their Depots and Sidings. A few were identified and these were fed back to the Timetable planners.*
Good Practice Example	*Chiltern recalculated Depot capacities and this has been added to their 'Compendium of Train Operations'. It was identified that there were too many arrivals at Banbury Depot for the Depot driver to effectively deal with so the train plan has been amended and stock is out berthed to free up Depot capacity. Chiltern commented that whilst COVID undoubtedly helped in reducing the train plan it also helped in improving relationships with train planning. Fleet /Train Planning who now have a weekly meeting which has really helped to smooth out the relationships.*
Good Practice Example	*Northern's Heaton Depot has four different TOCs accessing the site and that they are managing only three minutes between departures and arrivals with only one Depot access/egress road. These Depot constraints are fed back to the planners and the implications of compressed headways.*
Good Practice Example	*Many TOC delays are as a result of difficulties getting stock back to the Depot. In order to address this a number of TOCs have shunt moves booked into their Timetables*

Good Practice Example	*GA have ceased undertaking 'VSTP' stock movements back to their Depots and have migrated to using 'Q-paths'. In addition, they have implemented a 'unit return tracker' process that identified trains required to be returned to maintenance locations. This list includes only units that the maintenance locations could repair in the next 24 hours e.g. spares and resources were available. Importantly, trains that failed in service were moved to the nearest stabling point – as opposed to being automatically returned to the Depots. This freed up capacity in the Depots to be able to focus on trains that they are able to fix – as opposed to the Depots becoming 'train parks.'*
Good Practice Example	*Northern reported that it has historically been difficult to influence the Timetable, but better maintenance slots are being delivered by working with the train planners e.g. there were originally no maintenance slots available back at Neville Hill around 8pm, but slots are now available.*
Good Practice Example	*TfWR analysed train departures at Canton Depot in terms of the 'biggest hitters' in relation to delay. Since there are two exits from Canton Depot they sent these services the 'other way'. This has allowed them to introduce 'fire breaks' of 20/30 minutes during the departures so that subsequent trains will not be affected by any earlier delay.*
Good Practice Example	*AWC convene tripartite fleet planning review meetings which is very much focussed on train planning and fleet projects looking at making sure AWC can deliver what is planned in relation to making sure arrangements are line with Depot capability and then additionally looking ahead at plans for Engineering Works. The meeting also involves Alstom (AWC's 3rd Party Maintainer) that looks ahead for the Long Term Plan (LTP) and Short Term Plan (STP) highlights changing availability requirements, Depot capacities to try to make sure that everybody is aware and everyone knows what they need to deliver - including Alstom. Charters and special workings are also discussed because that means taking more trains from the Depot at different times than normal. In addition, Engineering Works and isolations are covered. e.g. for Engineering Works they will discuss arrangements for diesel Voyager replacements for services on diversion around Birmingham.*
Good Practice Example	*AWC have a document called guidance for issuing diagrams to the Train Service Providers (TSP). This document has the agreed timescales e.g. It defines the number of weeks' notice of the Timetable requirements. It also defines the Depot numbers and capacity and specifies arrival times for the respective maintenance to be undertaken at the locations e.g. one arrival before 2130 for an exam and one arrival before 2200 for a clean.*
Good Practice Example	*Another document that is published by the AWC Train Planning team which is a specification when there are Timetable changes for STP purposes. It includes the details of engineering possessions (that have often driven Timetable changes, particularly ECS moves). In addition, special events are covered and it summarises the train plan and it includes a section that highlights the number of units to be outstabled and where those trains are rail replacement buses and then after that a full list of all the amended trains and new diagrams.*
Good Practice Example	*AWC recognised that good Timetable documentation is crucial – especially when things change. As a result, all Timetable 'rules' documentation has nominated owners and review dates. AWC therefore know that documentation is then going to be up to date.*
Good Practice Example	*AWC have an aspiration to ensure that the Timetable specification documentation is useful to all parties that are in receipt. In order to achieve this the documentation readily identifies what has changed in relation to out stabling requirements; highlights possessions and other aspects in detail what has changed. This is followed up by the AWC Fleet Team reviewing, communicating and making sure that their Third-Party Maintenance Provider Alstom are aware of what has changed by a detailed discussion in relation to those changes and highlighting areas that concern them. This aspiration has been met when there is a 'RAG' status associated with the specification, e.g:* • *Green level would be out stabling as per the long-term plan e.g. one at Preston, two at Euston on a Saturday night.* • *Amber level agreed with our fleet team e.g. that identifies and makes sure everyone is aware that there is one extra at this location – additional cleaning is necessary* • *Red would be this is a real risk and something that needs dealing with.*

	AWC report that this is a good way to highlight where more trains are coming off a Depot than is usually able to manage and Depot arrival times. The trains for exams, for maintenance, for refurbishment are highlighted and there is a very clear illustration. Effectively when there is an amended train plan, anything that is not normal and acceptable is flagged i.e. NOT green. *AWC reported that what has tended to happen is that whilst train plans are developed many weeks before, just before implementation somebody notices a major problem. If the specification is shared with associated 'RAGs' this should smooth that process and mean less rework for train planning and also provides better information into what needs to be managed in terms of the fleet.*
Good Practice Example	*AWC have been asking questions of their Third-Party Maintainer, Alstom in relation to what should the exam cycles look like? Whilst they are reviewed by the Train Service Provider (TSP) this has historically been done very much isolation to the Timetable or using the Timetable as it stands right now to plan where exams are and how long is given to each of those exams. As a result, as soon as AWC change the Timetable that might not work – so you end up with suboptimal solutions. So what would the ideal exam cycle look like and then this raises further questions:* • *What is achieved in each exam currently?* • *How long does it take?* • *Where does it take place?*
Good Practice Example	*AWC found that cleaning was undertaken at their Edge Hill Depot because it was in the Timetable and AWC have always historically used to do it there. However, as a result of a revised Timetable the arrival times no longer worked and this led to a more fundamental question being asked in relation to is the cleaning at Edge Hill actually the optimum arrangement for the business.*
Good Practice Example	*As part of a review of performance, AWC discovered that trains can sometimes arrive early to Longsight Depot on the day, and that's because they are despatched early from Manchester Piccadilly to the Depot. The stations team do what they need to do e.g. check that the trains are empty; everybody's got off; catering is sorted etc. All the staff are at the end of their shift, so they want an end to their day, so they want to drop the train off at the Depot and the station team want the train out of the station – it's human nature.* *However, at the Depot, the trains were not arriving in the booked order or at the time that they're expecting them which was causing problems. AWC therefore started a trial to enforce trains to be dispatched on time at the right time from the station to the Depot and performance consequently improved.*
Good Practice Example	*GA have generated a train planning compliance checklist for use on the December 2023 Timetable Change which is shared with their train planning team for Norwich and Ilford Depots, their two main maintenance locations. It includes compliances, such as arrivals have to be at Depot no later than a certain time, the downtime, and the departure time. The aim of this is to ensure there are no surprises with the new set of diagrams that are implemented as a result of Timetable change. There is also a column for the Timetable planners to identify if they have fully complied, partially complied or not complied, and another column for comments. GA fleet representatives subsequently meet with the train planning manager to discuss any non-compliances to find out why and if it is something that can be fixed. Compliance with 'Q paths' (that are beneficial to enable moving trains to and from Depots is also covered. This also prohibits the stabling certain trains at certain locations because of a lack of servicing equipment.*
Learning Point	*GA reported that their 'Timetable Compliance Checklist' demonstrated that it is good for permanent Timetable changes, but there are questions about more significant changes such as an STP change or overnight engineering work that prevents train movements to certain locations. Whilst the rules should still be relevant for those types of situations there will be times where the railway may be blocked that could also cause issues. Despite this they do give a better understanding of delays that may help with identifying fundamental Timetable issues that can be changed easily, or if it is the fact that there are too many trains in one location in a short space of time, so by spacing them out it gives the Depot team more chance of putting the train on the most suitable road and completing maintenance on time.*

Learning Point	*GA's Yard Manager at Cambridge noticed that there are simple basics that have been taken for granted in each Yard - as looking into other Yards, people are surprised at the different practices being undertaken, and added that their Depot Rules document is really good for everyone to understand for different situations - such as only being able to have a headway of 6 minute departures, or by the time a 12 car moves at 5mph and gets out to the mainline and gets up to speed that time needs to be accounted for. The Manager cited an incident where there was a call from an NR signaller at Cambridge who enquired about a train coming in that looked like it had stopped, but was actually moving at 5mph and the document helps with explaining the realities of incidents like that.*

4.3 Link With Control

Irrespective of the published Timetable, the realities of running our railway dictate that whatever is in the plan in relation to the times for trains to arrive on Depots for a particular exams and maintenance regimes, what happens on the day can be very different – typically as a result of disruption, but otherwise as a result of the 'good intentions' of trains being despatched early – as highlighted in the 'Longsight Depot' example highlighted above.

Operators have found that it is important to have Control in the mix, since sometimes Control know more about the 'art of the possible on the day' and are subsequently irritated that Train Planners have planned in a certain way onto Depot e.g. whilst the number of 11 cars fits on paper, there are other constraints that dictate this is not possible. There is therefore a need to ensure that whatever is planned, whatever is documented also works for Control as well.

Learning Point	*One Operator reported that their Control has taken up a lot of responsibility and have done well despite the difficult conditions they have had to face, but once things settle down they will need to work to understand how to decide to work for not just on-the-day, but also the following days. This is because from a fleet perspective they might have decided to do something very different on the day in terms of where the train has ended up to ensure they had a resilient plan.*
Good Practice Example	*TPE have put an additional resource into their control (albeit temporarily) to keep an eye on the maintenance plan in the light of developing plans the night before making a lot of alterations (which has been funded by the DfT). The reason for this is that they can't see further than 48 hours on the actual service of the day and the following day, but the maintenance cycle plan, is over four days – so there is an evident disconnect.*
Learning Point	*One Operator opined that when getting trains in, Control only seem to consider the 'now' and not the 'tomorrow'. So if they lose the ECS as a result of a Control decision to operate the unit as a shuttle train as a consequence of wider disruption, with the best intention of trying to do the best for our passengers, there are other alternatives to operate that train, but there's no alternative for the one that needs to come into the Depot and be fixed.*
Learning Point	*One Operator cited an example where trains are being run until midnight instead of the train returning to the Depot for maintenance at 5pm which dictates that they lose a unit for the next day as a result of the train not being brought back early enough to maintain and it has therefore run out of miles.*
Good Practice Example	*GTR identified the need for a fleet 'go-between' to focus on the interface between their Depots and Control. The position was added to the organisation when GTR reorganised fleet Control.*
Good Practice Example	*When AWC stable Units at alternative locations to those that were planned, they have a process that the Controllers follow in order to contact the cleaners that would be required to attend the train at the different location.*

4.4 The Importance of 'Q-Paths

It might seem an obvious statement, but defective trains can only be returned to Depots for repair unless there has been provision made in the Timetable for 'Q-Paths' and this is a key requirement for fleet management that is often overlooked during Timetable development.

Learning Point	*One Operator experienced a Class 158 limping with an engine reverting to idle. The defective train remained in service for a number of days – racking up several incidents*

	and avoidable delays. It was only until it was pointed out that the train needed to be returned to the Depot for this to be resolved i.e. If you give us the train then we can do something about it! The problem with that was there were no paths, so they could not readily return the defective train to a maintenance location. This problem is made even worse with TOCs that cover a large geographical area such as TfWR, Northern and ScotRail.
Learning Point	*GA cited an example where some great Q paths that enabled GA to move trains around were taken away as a result of 'someone stating' that they had not been used for six months and NR replaced them with a freight train.*

Not all Depots can undertake all repair tasks that might arise on a fleet.

Learning Point	***Often the view from the outside is that you could also do other repairs in other places, for example you could change HVAC at a fuel point – which is simply not practical for obvious reasons related to roof access!***

4.5 The Importance of Defect Management

It is a truism that good fleet Availability can only be achieved through good fleet reliability. Technical defects that arise in service therefore need to be effectively managed i.e. contained (in the first instance) and rectified as soon as possible.

This also equally applies to defects found on routine examinations.

Good Practice Example	***GA had a specific drive on addressing 'critical' defects off examination – since they found that their maintainer Alstom were not clearing all of the critical defects on the trains during routine examination. This not only improved fleet reliability, it also improved 701A (fleet, non-technical) performance.***

4.6 Relationships and Collaboration

In order to develop a Timetable that works for all, everyone involved in the process to develop and finalise a Timetable needs to have an appreciation of the requirements of all participants. This can only be achieved through useful dialogue between the parties.

Learning Point	*One Operator stressed the importance of sharing skills between planners, maintainers and operators to make sure all parties understand each other's mission, because people who are operating the Depots and fixing trains are largely of an engineering background and are not necessarily train planners, so helping upskilling people to be able to make positive suggestions about the Timetable and capacity and learning the right language and skills to make suggestions to provide the necessary insight to help with timetabling and capacity by giving them the right words and language and skills to use to say, OK, well, this doesn't work for us at the Depot, but if you do this instead, that might work better.*
Good Practice Example	*GTR run a four-weekly meeting with representatives from train planning and representatives from the Depots, which is helping to build relationships and a mutual understanding of each party's specific problems – since train planning have just as many problems as fleet do. GTR commented that the biggest challenge is getting the outside world to understand that when a train goes into a Depot, there are still numerous rules about how it moves and that Depots are not a "bottomless pit", especially if there is a big incident to deal with on Southern, whilst they will initially attempt it, they can't put all the trains into a Depot as they do have capacity limits, which is something they have dealt with from Network Rail, asking GTR why they can't take trains in quicker, when they can only do 5-10 mph in the Depot.*
Good Practice Example	*GTR have better relationships that started at a train planning executive meeting, and now feeder meetings have been set up. The Southern and Gatwick Express Depots talk to train planning which includes people from engineering Depots, and train presentation Depots, and have short term and long-term train planning, as well as strategic planning to be looking ahead by two years, and as part of this are planning*

	face to face meetings and visits at other Depots to help build wider understanding.
Learning Point	*GA reported that whilst the Rules of the Plan might state nine minutes between arrivals at Ilford or Cambridge, but the fleet planners need four or five minutes. Discussions like this in relation to where compromises might be possible were simply not happening beforehand.*

5 Delay Attribution

5.1 Background

There is currently no consistent approach to measuring the performance of a Depot and this also reflected in the associated Delay Attribution. One of the key aspects to understand is the context around the use of the MU code – e.g. is it being used incorrectly for maintenance induced failures? In addition, there is a 7-day critical window to undertake incident investigation – which for a number of reasons is unfortunately not always done. There are only 8 days available for the immediate delay attribution (DA)

Learning Point:	*LNER have been working with the secretary of the Delay Attribution Board since they identified that that there is no consistency in relation to when a train is considered 'on' or 'off' of the network (termed as 'replacement') – since it can be defined either when the front wheel (or the rear wheel) of the train has passed the associated signal. This is of importance in relation to train length since on average it is used to determine performance at the timing points. There are performance data accuracy codes related to 'front wheel replacement on the network' and 'rear wheel replacement off the network'*
Learning Point:	*AWC only track Class 1 and Class 9 trains in Bugle in the default view i.e. Class 5 (non-passenger ECS) trains are not shown without amending settings.*
Learning Point:	*SWR had an issue at Clapham where buried power cables caught fire and caused circa 250 cancellations from trains being trapped. The TOC was held responsible even though NR were ultimately responsible and as a result the Depot lease arrangements are being reviewed by SWR for off-network incidents since the current Delay Attribution arrangements hold the TOC responsible even if NR is ultimately responsible. This incident caused an increase in 701A MU, despite NR's responsibility.*
Learning Point:	*TfWR found that whilst units being damaged as a result of striking objects on the track was the responsibility NR, they created protracted delays due to the need to undertake long-distance stock moves in order to repair.*
Learning Point:	*AWC struggle to reattribute incidents to NR where signals are slow to clear.*
Learning Point:	*AWC report that late on and late off Depots are a significant issue and it is acknowledged that there are performance improvements that can be made for Class 5 (non-passenger ECS) trains.*
Learning Point:	*CrossCountry report that it can be often difficult to find out the original reason for an incorrect train formation – since the reason could be several days preceding –as their trains operate between Aberdeen and Penzance.*
Learning Point:	*Many TOCs do not correct the initial attribution data in TRUST and therefore the national data is not 100% correct - as a result of the extra work this would entail. From the TOCs and Network Rail's perspective, the current data in TRUST is accurate at an organisational level, but in order to inform wider industry performance decisions it is desirable that this more granular data is also made as correct as it can be.*
Learning Point:	*Northern reported that the industry TRUST data did not match their own data for minutes and cancellations and was significantly larger in RDG's data. This is related to the fact that the data includes ALL minutes – i.e. not just TOC-on-self, but also TOC-on-TOC minutes.*
Learning Point:	*Many TOCs do not apportion 701A codes against the fleet type, making performance comparisons difficult.*
Learning Point:	*Chiltern's Light Maintenance Depot at Wembley has historically struggled with timings of trains for maintenance, but Aylesbury Depot has Class 1 departures and therefore does not suffer to the same extent.*
Learning Point:	*During the period when the Hitachi Class 80X bolster welds were found to be cracking, LNER utilised the 701A 'MS' Code for Hitachi stock non-provision. It was not immediately clear how 'non-availability of trains' could generate so many minutes, but LNER subsequently explained that the delay minutes are so high as a result of the remaining trains in service having to fill Timetable gaps with special stop orders etc. These trains were often 5-Cars operating 9-*

	Car diagrams and LNER had covered the Class 80X diagrams with InterCity 225 rolling stock that do not have the same performance as a Class 80X.
Learning Point:	*A feature of the Class 700 PIS that GTR attribute non-technical delays is related to the fact that the Passenger Information System cannot be configured for services that 'skip stations'. As a result there is a 'get me home' code that is used in these instances – since there is not a technical fault with the train – it has just not been designed to be able to cope with an operational scenario that arises from time to time, but any associated delays remain with fleet. It was suggested that such delays should be apportioned to the reason for the 'skip station' in the first place.*
Learning Point:	*AWC use a centrally managed code in relation to fleet performance. They acknowledge that there might be a benefit to split out individual Depots from this centrally managed code – in order to highlight the differences to the operation.*
Learning Point:	*Northern highlighted an issue where trains that were late off Depot were being attributed to MU even though they were delayed by events external to the Depot. The latest issue that had been experienced were driver shortages creating congestion in the Leeds area. If the trains were presented on time at the departure signal, then these delays should have been disputed (in accordance with PGD8 Guide)*
Learning Point:	*SWR's predecessor organisation were in an alliance with NR a few years ago and it is reported that there are still elements of this culture remaining.*
Learning Point:	*During the 2021 'leaf-fall' period, SWR saw an increase in the number of 'MS' incidents as a result of replenishing sanders, together with a lack of enforcement of 'PGD16' with the Wessex Route.*

Whilst each TOC understands what it is doing then there is no problem at the organisational level. However, at a national level this makes comparison between TOCs of little value due to the differences in TOC application. This is further compounded by the fact that this not only relates to the TOCs, since it is reported that the NR Routes are also inconsistent in their application.

It has been suggested that late arrivals at Depot cannot be mitigated by the fleet engineering teams and a national 'late arrival at Depot' code would be very helpful – since it is believed that this is only tracked by some TOCs at a local level. Subsequent discussion has revealed however that trains arriving 'out of course' at the depot should be attributed to the original cause – which is clearly explained in the Delay Attribution Principles and Rules document.

There is a belief in a number of TOCs that there is no way of complying with PGD16 – Stock Swaps Scenarios Attribution. There is a challenge to get NR to do what they should. When a stock change goes wrong the focus is on why it came out of service instead of why it went wrong (plan failure). (More detail can be found in 5.2).

As highlighted earlier GTR have instigated an approach in terms of stock moves that tracks 'plan failures' within 4 hours of request – since it is sometimes difficult to reattribute on the basis of what transpired the previous day.

Good Practice Example	*SWR have identified the following six key contributing factors to ensuring effective delay attribution:* *1. Culture* • *Is there a shared view across the operation?* • *Is it target driven – or simply to improve performance?* • *Being target driven does not always create the right behaviours. Someone needs to own the problem and fix it otherwise it will never improve.* • *Does deep alliance with NR support or hinder things - as even through it is the right premise to reduce tension it may not always help improvement or data quality.* • *Does the DA process support the culture?* *2. Process* • *Does the process align with Delay Attribution Principles and Rules?*

	• *Does the process help support the Responsible Managers with clear expectations?* • *Is there a specific focus on timescales compliance within 8 days?* • *Is there a consequence for non-compliance within timescales?* • *A 4-day rule is enforced in BUGLE with forced acceptance if not dealt with. This provides 2 days to dispute any incidents with NR.* • *This process ensures a shared urgency in collecting critical evidence in the first couple of days.* • *Is arbitration part of the normal process or is it explicitly a last resort?* • *Does your process reference Delay Attribution Board (DAB) documents and Access Dispute Process (ADP) decisions?* 3. *<u>Timescales</u>* • *Is there an ultimate goal to close incidents out within TRUST by day 8, or are Day 8 breaches accepted as normal process with subsequent code matching?* • *Continued management of incidents beyond Day 8 exposes data quality risks for any internal reporting or visualisation.* • *If the code doesn't match there is a defined process with NR to align TRUST and Bugle.* • *Day 1 (level 1) investigations become more important for Day 8 compliance.* • *Internal referrals should be carried out within the first 4 days of the incident.* • *Disputes to NR need to be compliant with the contractual relationship and/or local agreements.* 4. *<u>Resource</u>* • *Insufficient resource hampers compliance with the process.* • *Is the operation suitably focussed and resourced at both the Level 1 and Level 2? This could affect Day 1 accuracy of DA or longer-term management within the timescales available.* • *Are the functions suitably focussed and resourced as Responsible Managers to deal with the incidents effectively and robustly?* • *Additional contractual relationships with third party train maintainers (e.g. Siemens) need to be factored in.* 5. *<u>Collaboration</u>* • *In order to succeed a good culture and process needs to be in place. There needs to be a joint vision on improvement instead of keeping within business targets. Good collaboration with NR is also key to interface issues and associated investigations. With the disbanding of the NR Rail Vehicle Interface Engineers there needs to be new relationships set up.* • *Do rolling stock engineers have a direct link to their counterparts in NR infrastructure and fixed assets?* 6. *<u>Data Quality</u>* • *Daily/weekly reporting is adversely affected and less accurate, but period-based reporting is best.* • *Quality of investigations should meet the levels expected within PGD17.* • *Another issue could be with automated Mp701D reporting through TRUST if multiple incidents are still being managed within the process after period end.* • *There is no mechanism to correct TRUST and BUGLE mismatch due to day 8 breaches (may need 'Edit Set').*
Good Practice Example	*Southeastern's Delay Attribution Team sits within Engineering and as a consequence 'Fleet' numbers are much lower – as a result of having a bit more control over things e.g. in terms of traincrew.*
Good Practice	*The same team at AWC manage both the 701A and 701D codes and AWC's*

Example	*Performance Attribution Manager aligns the data contained in TRUST with that in Bugle – up to the 7-day window.*
Good Practice Example	*Section 2 of the 'Twenty Point Plan' has been updated in 2024 by RDG which now includes industry guidance for TOCs that define the criteria for the use of TRUST 701A and 701D codes.* *Note: This is fully aligned with the industry Delay Attribution Principles and Rules document issued by the Delay Attribution Board.*
Good Practice Example	*In relation to 'set swaps' to get the trains on the 'right' diagrams there can be significant disruption as a result of such set swaps and TOCs focussing on the primary reason for the set swap has been very useful – especially in relation to incidents related to Class 5 (non-passenger ECS) trains. In terms of reattribution, if the reason for the set swap is found to be not a fleet responsibility it should be reattributed to the correct part of the business (MS is a code that should only be used for incidents that are the responsibility of fleet)*
Good Practice Example	*SWR do have a process in place that code-matches Bugle and TRUST data. It is important that the 7-day deadline for reattribution is met as far as practicable. In addition, part of their Delay Attribution Team's responsibilities and also is to align codes in Bugle and TRUST at 'day 42'*
Good Practice Example	*GTR / Southern have an 8-day focus with an 'Edit Set' code 'mop up' code match process that ensures full traceability for attribution between TRUST and Bugle data. This is illustrated by the following example:* • *There was a fault on a Class 700 operating on 25kV AC OLE that caused the pantograph to drop. The driver stated that it was a fault with the train and another member of traincrew in the rear cab reported that there was no damage to the overhead lines. The lines were checked, and the incident was split between GTR and the NR signaller.* • *Each train affected by the incident is put in the spreadsheet as well as who is responsible for each.* • *It is a long-winded process that is done for larger incidents with more disputes.* • *The report is then sent back to NR for them to amend TRUST.*
Good Practice Example	*SWR use the MU code for Depot operations and that they use MS in accordance with the guidance contained in PGD16: Stock Swap Scenarios Attribution – issued by the Delay Attribution Board. PGD16 is about generating a plan that works – which in turn is about developing relationships and teams working together e.g. dealing with previous days stock displacement.*
Good Practice Example	*In terms of the use of the 'MU' code, AWC are improving the data quality and how it is used by focussing on everything that is late 'on' and late 'off' their Depots.*
Good Practice Example	*SWR's Incident Management Vision is to undertake a robust local review at the Depot on 'Day 2' to decide where the incidents fit e.g. was this an 'own goal' or a known technical problem in order to satisfy themselves that effective mitigation for the problem is in place.*
Good Practice Example	*Northern have granted access to their 3rd party maintainers to BUGLE in order to support their reattribution process.*

The number of incidents is not necessarily a fair reflection of location performance – especially for multi-user sites. Taking Neville Hill Depot in Leeds as an example:

- If a Northern Train causes a delay to a subsequent LNER train departure from the Depot – two incidents are created i.e. one for Northern and one for LNER.
- If a Northern Train causes a delay to a subsequent Northern departure from the Depot then only one incident is created

Each operator therefore takes their own delays off Depot – since Delay Attribution stops at the edge of NR managed Infrastructure.

Train Preparation is also a particularly thorny issue. This is because when trains are the subject of train preparation associated delays are allocated by who is undertaking the preparation. This is again illustrated by the following example:

- Where Engineering Staff are undertaking the train preparation and problems are experienced before the train is allocated to a service this would be allocated to MU – 701A.
- However, if Operations staff are undertaking the train preparation prior to entering service on a train that has been allocated to a diagram - then this would be allocated to 701D.

It has therefore been suggested that a new national code for 'train preparation' would be very helpful.

5.2 Management of Stock Changes / PGD16

Irrespective of the plans in place, it is a railway truism that things change that affect the train plan. Fleet Planners are looking at more than a week ahead in terms of diagramming since the Depots are set up for a controlled throughput of work. The reason a specific train needs to be changed over might not be the responsibility of fleet. e.g. a fleet planner initially puts a unit due for maintenance on a diagram that finishes at the maintenance location, but due to subsequent network disruption the unit ends up on a different diagram – thereby needing a stock change to put the unit on a revised diagram that ends up at a maintenance location.

Learning Point:	*Northern report that, as currently organised, fleet is held responsible for all stock change related delays. However, there are projects under development to improve the planning of units back to Depot on Northern.*

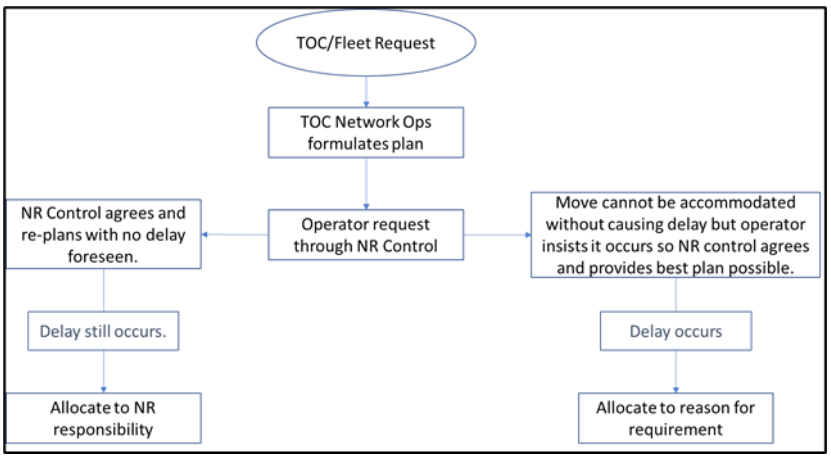
Therefore, not all requests for unplanned stock changes have 'fleet' as their root cause and it is important to understand (and describe) the root cause of the stock change. Irrespective of this, there are tensions between the Operator and Network Rail at the local level.

The Delay Attribution Board has published guidance Process and Guidance Document 16 (PDG16) STOCK SWAP SCENARIOS ATTRIBUTION that aims to provide greater clarity and assistance in the understanding of the attribution of delays related to Stock Swaps.

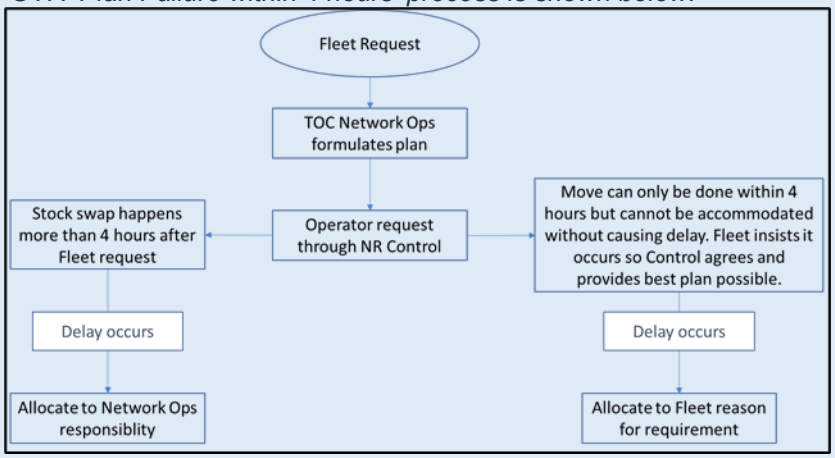
The document was recently updated to clarify the fact that not all stock changes are the responsibility of 'Fleet'.

Learning Point:	*The bolster weld cracking issue that emerged during April 2022 on the Class 80X fleet impacted LNER's operation at the time. Replacement rolling stock in the form of MkIV sets had increased the number of set swaps required since there were currently insufficient trained drivers, but a subsequent training programme addressed this shortfall.*

The 'PGD16' process is shown below:



Good Practice Example	*SWR believe that if PGD16 is properly implemented it is good for highlighting the reasons the plan failed back on the 'owners'*
Good Practice Example	*GTR have enhanced PGD16 to agree at a local level a 4-hour window for the stock swap to happen – and if the 4-hour window was exceeded then any associated delay goes to GTR Network Operations, known as the 'Plan Failure within 4 hours process' which is linked to PGD-16, but enhances the*

	arrangements in support of the discussion between the Train Planners and the technical teams. *The GTR 'Plan Failure within 4 hours' process is shown below:*  *Since the implementation of the 'Plan Failure within 4 hours process' GTR report that:* • *There is an agreed stock change plan that whilst there are still some discussions that take place, most stock swaps now happen without problem.* • *There will always need to be some stock swaps undertaken and this method of working recognises this reality and actually enhances the processes employed.*
Good Practice Example	*GTR utilise RTS, which is a communication system that is used Fleet Planners and Train Service Managers that is used to convey 'keep to diagram' instructions etc.*
Good Practice Example	*Chiltern have an agreement with Control that lower speed stock changes are associated with a 24-hour request and higher speed stock changes are associated with a 4- hour request. In order to assist with fleet planning the fleet major exam has been moved from mileage to day based.*
Good Practice Example	*Northern have a 3-day plan ahead for units to return to the Depot, but acknowledge that there is always a bit of 'backwards and forwards' to get units back to Depot.*
Good Practice Example	*SWR reported have Fleet Control Planners that manage disruption through stock control*
Good Practice Example	*GA have a return to Depot unit tracker.*
Good Practice Example	*In order to reduce the number of 'set-swaps' AWC worked with their Control teams to improve the data in this area and in addition they have also implemented an improved maintenance planning tool which is designed to generate an automated optimal maintenance plan for their fleets.*
Good Practice Example	*TfWR worked with their Train Planning to address balancing diagrams in the north and south end – focusing on 3-car diagrams.*
Good Practice Example	*In order to reduce the number of units having to return to the Depot, TfWR appointed additional Outstations technicians, part funded by their third-party maintainer Alstom.*

6 Depots, Yards and Sidings Performance KPIs

6.1 Overview

There is currently no agreed method of assessing DYS performance and facilitating benchmarking – since all locations have their local differences and peculiarities. Whatever measure is ultimately chosen it should be proportionate and it is accepted that irrespective of the KPI used, it will always be perceived to be 'unfair' on someone.

6.2 Developing DYS KPIs

In order to manage DYS performance, Key Performance Indicators need to be identified and accurately recorded i.e. the generation of 'good data'. This provides the necessary insight in order to identify problems, make correct decisions and to subsequently take the necessary management action. The objective here is to obtain 'data driven insights' that allow sufficient delving into the causes of delays to Depot departures (and arrivals). Granular data facilitates the analysis of the events leading up to the problems to be identified in order to work out what is going wrong.

As with most things, it is absolutely essential to gain the buy-in from all affected staff and where this has been successfully implemented it is reported that it really is basic management - people simply need to be made accountable. A collaborative approach is essential in that whilst the issues might be cross-industry they are also cross-functional. Everyone affected should be involved since there are many perspectives of what the root cause of the perceived problem is, but a key part of the activity needs to be absolutely data driven and 'myth bust' wherever required. Using the data in this way allows the capabilities of the system to become known to generate an understanding of the actual capability of the DYS and to use the data to improve performance. Analysis of the data allows the Depot teams to develop action plans to address the reasons for trains being late off Depot.

Learning Point:	*AWC concluded that in order to effectively manage Depot performance some good measures are required e.g. timing points reflective of Depot departure; measure of drivers prep timings.*
Learning Point:	*GA wanted to improve the performance of their Depot at Ilford – illustrated by the following saying "If Ilford sneezes, Greater Anglia catches a cold!" The only way to understand what was going on was to start to dig into the data and found that the level of granularity required was not initially available. It was discovered that effectively the TRUST Responsible Manager Code for Ilford Depot was being used by the wider business as a 'dustbin' – since the code was not being effectively managed. The initiative resulted in a performance improvement from around 600 minutes per period to below 100 in a year.*
Learning Point:	*It was reported that Northern's fleet planning tools are currently not clever enough to track trains that are at risk of running out of fuel.*
Learning Point:	*LNER found that that berthing stop positions were also generating delays – since it was found that in one location the trigger point was half-way down a wash road.*

Other successful approaches have relied on the need to change the mindset of people's approach to problems – since if you keep doing the same things nothing will improve. Practitioners report that if you are open and honest about your problems, people will help and also reciprocate in terms of providing insight of their problems.

This mindset can be summarised by the following:

- Keep the problem precious – don't rush to solutions
- Act only on facts – facts are important to move forward
- Do what needs to be done, not what can be done – 'needs' identify what to do, whereas 'can' is based on 'judgement, authority and often volume'

Good Practice Example	*GA started to undertake 'root cause' analysis of Ilford Depot performance as part of an 'A3' which contained the following details in relation to areas of delay*

	e.g.: • *Depot Management* • *Late off Maintenance* • *Depot Availability* *The root cause analysis was supported by a 'fishbone' analysis that covered Production, Technical and Operations and weekly workshops were undertaken to allow the key players to discuss what needed to be done to address the problems identified.*
Good Practice Example	*GA decided to convert all Depot incidents to an equivalent 'monetary' value and this made things become much easier – since it became a tool that was 'self-managing' since no-one wanted to be 'top of the tree' in terms of business impact and made people stand up and take notice.*
Good Practice Example	*At GA's Ilford Depot, the Yard Movements Controller (YMC) has a comprehensive weekly log that is a live document. The log is used to track:* • *Hand back time* • *Driver on time* • *Train Ready to Start time* • *Path out time* *This log is also used when incidents need to be attributed and anything that is worthy of note, or out of course is also recorded in the log.*
Good Practice Example	*GA undertake the following meetings for their Depots:* • *04:00 Stock Maintenance and Planning Meeting: List of Units required back for maintenance is discussed that also considers the amount of space available.* • *09:00 A full list of units returning (and at what times) is produced*
Good Practice Example	*For GA's Ilford Depot, their improved processes are reported to have led to impressive improvement - in that a year-on-year reduction from around 3000 minutes to approximately 600 minutes was witnessed. These processes now also prevent logistical errors and the Depot having too many trains to deal with e.g. being overcapacity. It was stressed that whilst these processes have had a significant impact – they are relatively simple.*
Good Practice Example	*GA hold a monthly meeting to discuss Ilford Yard operations that includes Network Rail (NR), Arriva Rail London (ARL), MTR Elizabeth Line (MTREL), Deutsche Bahn (DB) and Rail Operations Group (ROG). One of the issues being addressed is timings allocated for trains to clear the Yard – since from NR's Signallers point of view they see the Depot as a 'black hole' and have no appreciation of what goes on and therefore why it takes so long to clear a track circuit. As a result of this a 'timing exercise' was undertaken to track train movements.*
Good Practice Example	*As part of a project to improve the performance of Neville Hill Depot, Northern used the Amey 'Quartz' IT system that was used by station staff to report reasons for train delays. This was achieved by adding Neville Hill as a location in Quartz so that reasons for trains leaving the Depot late could be identified.*
Good Practice Example	*Northern discovered that one of the key reasons for late departures being flagged at Neville Hill Depot was the discovery that the 'offsets' were wrong in the train plan for trains departing the Depot.*
Good Practice Example	*TfWR are also undertaking 'technical preparations' on the most problematic departures prior to the drivers train preparation prior to departure – since it was found that drivers were 'under prepping' their own trains and not necessarily giving sufficient time for e.g. air pressure to build up and also finding and reporting 'silly faults' immediately prior to booked departure times. Typically this is undertaken an hour before departure and this has shown some performance improvement.*
Good Practice Example	*GTR are aware of issues at Selhurst Depot in relation to timings and there is a project looking at the amount of delays experienced by arrivals. There are lots of trains that are being sent to the Depot early – which is subsequently causing a problem. The project has involved obtaining accurate timings for train movements and options for new timing points around Selhurst are being investigated. However, whilst this work is currently ongoing, there will be no use of the output until the December 2024 Timetable at the earliest.*

Learning Point:	*LNER discovered that 'berth offset' issues are adversely affecting their performance since despite trains being presented on time from their Depots they have been racking up delays on TRUST. There is therefore a need to 'observe' timings on site, but this is problematic due to restricted access to the departure signals.*
Learning Point:	*SWR have been undertaking a trial as part of the industry Performance Improvement Management System and it has identified that SWR do not have clarity or visibility of late starts and late acceptance on Depots. Key to this is having a better flow of information which can be achieved by finding a way to get shunters to directly interface with TRUST to allow immediate reporting so that the reasons are clear. Whilst SWR accepted that there are Depot complexities and site-specific issues, but without better visibility of late starts and late acceptances it is impossible to understand what is going on at a location and how things could be improved.*
Learning Point:	*SWR currently have a plan led approach where stock controllers are in charge. This is related to a previous reorganisation where SWR lost expertise, but efforts are being made to migrate back to train service delivery being the focus, but at the moment creating the plan is the focus.*
Learning Point:	*For the Southeastern fleets they have a 'Metro' fleet that is managed by the 'Metro' planners but that the fleet is maintained by their 'Mainline' team. It is noticeable that the Metro fleet has very few 'MS' incidents, whereas the Mainline fleet has significantly more 'MS' incidents which is probably as a result of having three Depots that are geographically spread.*

Irrespective of all the good intentions, understanding Depot performance is further complicated by the train type being serviced and maintained at that Depot. Instinctively, it does not seem right to expect comparable performance at Depots that only have to deal with the same fixed formation of trains e.g. 11-Car Pendolinos – as opposed to DMU Depots where trains have to be split and joined to form up the trains for service.

Good Practice Example	*Ilford Depot has 3 TOCs using the facility with 4 different lengths of train being berthed there and complexities around the use of different Sidings. GA have started to use 701A incidents per 100,000 miles in order to measure and compare the performance of their Depots.*
Good Practice Example	*AWC look at Depot performance in terms of defined targets and NR are also present on the calls. This has enabled 'themes' for each Depot to be identified*

The industry has therefore (so far) yet to solve the rather 'knotty' problem of finding a common method of measuring and comparing Depot performance. It has been suggested that there are two measures that 'make sense' that could be standardised, namely the number of late departures and the number of late arrivals, but it is accepted that this data is not necessarily available. Other metrics that could be used include:

- Right time off Depot – normalised by the number of departures/diagrams leaving a location
- Right time arrival at Depot – normalised by the number of arrivals/diagrams arriving at a location
- MU coded passenger delay minutes / mile
- Number of train movements within the Depot.

Good Practice Example	*SWR are liaising with NR in relation to developing Fleet 'Lead Indicators' which includes tracking late arrivals and departures from Depots.* *The six indicators SWRs are currently using are as follows:* • *Right time offering to network i.e. delivery of stock for service off Depot* • *Right time offering for maintenance i.e. measuring the delivery of the train back to the Depot for maintenance – and noted that SWR have still to obtain this consistently for all locations* • *Number of Technical (701D) incidents* • *Restrictions in traffic – there is a link to low numbers and good Depot performance – both technical and non-technical such as RVAR compliance of disabled toilets.* • *Exam beat rate compliance* • *Monitoring of the work bank against each train class*
Good Practice	*AWC are developing some 'Power BI' dashboards to track right time on/off*

Example	*Depots in order to identify which headcodes are the worst performers.*
Good Practice Example	*Chiltern have introduced a 'late off log' which is an excel spreadsheet for late departures. This is reported to be a simple thing to get the shunters involved.*

Whatever KPI measure is ultimately agreed upon needs to be fed by data that is readily available without excessive effort required to generate.

7 Depot Infrastructure

7.1 Background

The Depot infrastructure is equally important (although often overlooked) to performance as the rolling stock and the maintenance teams.

An example of this is illustrated in the photograph below at Northern's Neville Hill Depot. Each and every train that enters of exits the depot form maintenance has to traverse the set of points shown – as a result of the depot layout. In the event that these points fail, this effectively closes the depot.

Learning Point:	*Three major incidents had been experienced at GTR's Selhurst Depot which had contributed to MET0 being in the top three codes nationally. A points blade had failed on the Depot departure road at 15:00 which was subsequently compounded by a signal failure. It was reported that the points had not been repaired for three weeks*
Learning Point:	*c2c's problems in their DYS at the moment are related to failing 'life expired' infrastructure i.e. the interface boxes to 'clear' the signalling system for trains at the Sidings together with problems with the points in Sidings as well and that all the problems being experienced have been raised with Senior Management. Whilst this is part of the signalling infrastructure it is contained within the depot boundary and therefore when it fails it is allocated to the TOC – despite this being NR equipment – which the say they will ultimately repair, but have so far failed to do so.*

Good Practice Example:	*GTR historically suffered a lot of infrastructure problems at Selhurst Depot. These are age related failures and like many depots it's difficult to shut things down so that such faults can be repaired without there being significant performance impact – since overnight GTR have 50 unit arrivals and 25 departures from/to the depot. Despite this, Selhurst Depot closed between Christmas and the New Year to try to address some of the known trackwork problems in addition to other work undertaken during weekend possessions – so it can be done.*
Good Practice Example	*SWR have accepted that even where NR are the third-party maintainer for the TOC in relation to the infrastructure – any incidents that result remain allocated to the TOC – since the issue is within depot limits. SWR have therefore had an initiative where they have reviewed such infrastructure failures and are assessing how their performance could be improved.*

Appendix A: Suggested 'Depot Rules' Document Structure

1. Responsibilities
   Aspects that should be documented:
   a. Whose responsibility is it to consult on, update and maintain the Depot Rules document.

2. Depot Rules Amendment Process
   Aspects that should be documented:
   a. The routine periodicity for review of the Depot Rules
   b. The process for changing the 'Depot Rules' should be explained e.g. what would instigate a change.

3. Fleet Summary
   Aspects that should be documented by fleet type:
   a. Fleet type
   b. Number of each fleet type
   c. Formation length by number of vehicles and length in metres
   d. Maintenance arrangements
   e. Servicing arrangements
   f. Maintenance location(s)

4. Depot / Yard / Siding Diagram
   Aspects that should be documented by location:
   a. A diagram of the Depot / Siding facility should be included

5. Timetable Change Arrangements
   Aspects that should be documented:
   a. What are the arrangements in place to routinely communicate the Depot Rules with the Timetable Planners.
      i. Whom? What? When? How?
   b. What are the arrangements in place to ensure any proposed Timetable is compatible with the Depot Rules?
      i. Whom? What? When? How?

6. Depot / Yard or Siding (DYS) Operation
   Aspects that should be documented by location:
   a. What is the time needed between trains arriving at the DYS?
      i. At each end of the location if there is more than one entry point
      ii. By train length – if there are differences e.g. additional need to split arriving train formations
   b. What is the time needed between trains departing from the DYS?
      i. At each end of the location if there is more than one exit point
      ii. By train length – if there are differences e.g. additional need to join train formations
   c. What are the times the DYS is operational e.g. members of staff are available to 'accept' and 'despatch' trains?
   d. What are the times that no arrivals or departures should be scheduled in order to facilitate DYS shunting and formation of train service? – e.g. provision of shunt windows
   e. What is the maximum axle weight that the facility can deal with?
   f. What is the maximum train length that the facility can deal with?
   g. Are there any current operational restrictions applying to the DYS?
   h. What are the operational requirements for 'other TOC's' rolling stock?
   i. What are the operational requirements for 'third party' maintainers?

7. DYS Capacity
   Aspects that should be documented by location:
   a. Maximum number of trains to be stabled at a Depot location – including Sidings
      i. Whilst continuing to allow the Depot to operate effectively e.g. leaving CET or wash roads free
      ii. How many roads need to remain empty to shunt trains around the Depot?

iii. How many roads need to remain empty as contingency to accept a defective train from service?

b. All trains (irrespective of TOC) need to be captured.
c. Capacity of each specific road at a DYS.
d. Specific activities typically undertaken at each specific road.
e. Facilities available at each specific Depot road.

8. Maintenance / Servicing Facilities

Aspects that should be documented by location:

a. Description of Facility
b. Planned frequency of use

9. Fleet Maintenance Requirements

Aspects that should be documented by fleet type:

a. What are the specified 'maintenance windows'?
   i. by day of the week / daytime / night-time
b. Number of trains required for maintenance in the Depot facility
   i. by day of the week / daytime / night-time
c. Minimum maintenance 'touch time' – defined as the time between the train arrival (factoring in shunting requirements to position the train for maintenance) and the planned departure time (factoring in subsequent shunting requirements for train formation and train preparation etc.)
d. Exceptional maintenance requirements. What is the theoretical maximum? e.g. as a result the need to accommodate engineering works / possessions etc.
e. Diagrams should be provided to 'cycle' the units through maintenance e.g. a range of mileages to prevent maintenance exam 'bunching'
f. ECS diagrams should be provided to facilitate tyre turning and returning defective units to the Depot for repair.

10. Fleet Servicing Requirements

Aspects that should be documented by fleet type:

a. What are the requirements for 'servicing' in terms of maximum capacities for:
   i. Internal Cleaning
   ii. Tanking
   iii. Controlled Emission Toilet (CET)
   iv. External Washing – including vehicle ends
   v. Fuelling
   vi. Sander replenishment

11. Fleet Availability Requirements

Aspects that should be documented by fleet type:

a. How many trains are required to operate the planned Timetable - by day of the week – if there are differences

12. Fleet Reliability Requirements

Aspects that should be documented by fleet type:

a. How many 'non-splitting diagrams' are required in order to contain 'degraded' units until the Depot is able to repair. Ideally these diagrams should return to the Depot.

13. Fleet Operational Requirements

Aspects that should be documented by fleet type:

a. What are the arrangements for Train Preparation prior to Units entering service?
   i. Whom? What? When? How?
b. What are the associated timings for Train Preparation activities following trains being released for maintenance?

14. Requirements for the Location of 'Strategic Spare' Units:

Aspects that should be documented by fleet type:

a. Locations where 'Strategic Spares' should be positioned – should they be available

15. Guidance for the Management of Long Term Stopped Units

Aspects that should be documented by fleet type:

a. Specific requirements to be implemented e.g. vehicle movement (to prevent wheel bearing damage); periodic diesel engine start up; etc.

Appendix B: Framework methodology for determining the capacity of a Depot

1	Create Summary of Depot/Siding/Platform Stabling Roads/Lengths	Stabling Capacity
2	Identify Roads where Stabling is Prohibited - TOC Control	
3	Identify Roads where Stabling is Discretionary - TOC Control	
4	Identify Roads where Stabling is Discretionary - 3rd Party Control (such as Network Rail Platforms)	
5	Identify Operational Stabling Limitations for each Road (such as Fouling Points)	
6	Identify Stabling Limitations for each Road (such as Network Rail Isolations/Infrastructure Works)	
7	**Calculate Maximum/Minimum Stabling Capacity (metres)**	
8	Identify Rolling Stock Types/Lengths	
9	Identify Maximum qty of each Rolling Stock type that can Stable on each Road	
10	**Calculate Maximum/Minimum Stabling Capacity (Units)**	
11	Identify Annual Mileage by Fleet	Planned Load Miles/Time Driven
12	Identify Exam/Servicing Schedule (including Seasonal Variances)	
13	Identify Exam/Servicing Schedule tolerance +/- Days/Miles	
14	Identify Exam/Servicing Durations	
15	Identify Planned Seasonal Preparedness Maintenance/Servicing	
16	Identify Servicing/Maintenance Locations by Road	
17	Identify Servicing/Maintenance Limitations (Rules of the Depot)	
18	Identify Stabling Load (In addition to Servicing/Maintenance)	
19	**Calculate Planned Servicing/Maintenance/Stabling Load over 24Hr Period**	
20	Identify Annual Mileage by Fleet	Unplanned Load Reliability Driven
21	Identify Reliability by Fleet (Taking Account of Seasonal Impact)	
22	Forecast Qty Defects per Fleet	
23	Forecast % of Defects Requiring Return to Depot	
24	Forecast Defect Resolution Timescale	
25	**Forecast Unplanned Defect Rectification Load over 24Hr Period**	
26	Forecast Fleet Check Load	Unplanned Load Misc
27	Forecast Mod Programme Load	
28	Forecast Graffiti Load	
29	Forecast Fatalities Load	
30	Forecast Seasonal Loads - Leaks/Wheel Re-Profiling/HVAC	
31	**Forecast Unplanned Misc Load over 24Hr Period**	
32	Identify Planned Arrival/Departure Timings	Capacity Modelling (Static)
33	Identify Train Movement Restrictions	
34	Identify Current Depot Driver Resource	
35	Identify Units Requiring Maintenance/Servicing	
36	Identify Maintenance/Servicing Timings	
37	Identify Shunt/Protection Timings	
38	Undertake Beat Rate/Day in the Life (DILO) for Planned & Unplanned Loads	
39	Update Train Planning Rules - Maximum qty Planned Units Depot can Accept	
40	Update Fleet Control Rules - Maximum qty Unplanned Units Depot can Accept	
41	Identify future temporary/permanent Capacity Changes (Infrastructure Works)	Capacity Modelling (Forecast)
42	Forecast future Timetable Changes	
43	Forecast future Fleet Mileage Changes	
44	Forecast future Fleet Changes (Cascades)	
45	Forecast Pessimistic/Realistic/Optimistic Reliability Growth Curves by Fleet	
46	Forecast Pessimistic/Realistic/Optimistic Unplanned Loads	
47	Forecast Pessimistic/Realistic/Optimistic Misc Unplanned Loads	
48	Create Stabling Model	

Appendix C: Other Related Guidance Available

Document	Title	Link
RDG-ENG-GN-008: Issue 2.2	RDG Guidance Note: New Trains – A Good Practice Guide	https://www.raildeliverygroup.com/about-us/publications/12913-rdg-eng-gn-008-new-trains-a-good-practice-guide-2-2-draft-clean/file.html
20pp: Issue 15	The Twenty Point Plan – Fleet Management Good Practice Guide – Chapter 7: The Depot	https://www.raildeliverygroup.com/files/Publications/engportal/TheTwentyPointPlan/7TheDepot.pdf
GIGN7621: Issue 1	Guidance for the Development and Design Considerations of Passenger Rolling Stock Depots	https://www.rssb.co.uk/en/standards-catalogue/CatalogueItem/GIGN7621-Iss-1
RP-GN07	Train Depot Good Practice - October 2022	Note: Document is not freely available on the Rail Partners website. Available to Rail Partners member organisations.

Rail Delivery Group

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