

Rail Value for Money Study

Asset Management and Supply Chain Management Assessment of GB Rail

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Executive Summary

This study assesses the effectiveness and efficiency of asset management and supply chain management in the GB rail industry. Comparisons with other industry sectors and rail organisations outside the UK, coupled with analysis of accepted 'good practice', show there is much room for improvement, with initial indications suggesting potential annual **savings could be £1.25bn (±£0.57bn) p.a.** after 5 years (nominally 10% savings p.a.). This report summarises these findings, makes clear the need to validate the potential savings and makes recommendations to help realise these benefits.

Potential savings towards the top end of the range will be very challenging to achieve. It will require a clear vision, strong leadership and a willingness to accept some difficult and emotive decisions. It may take up to five years to realise the full savings. However, the opportunity cost of delaying a decision is significant as, by the time the journey reaches fruition and assuming the necessary up-front investment has been made, savings may be accruing at £104m per month.

Remit

On behalf of the Rail Value for Money Study, Atkins has completed a high-level assessment of asset management and supply chain management in the GB rail industry, which is broadly defined as the heavy rail system, explicitly excluding light rail and Transport for London. The work was undertaken by a multi-disciplined and multi-organisation team that included sub-consultants KPMG, Lloyd's Register Rail and Balfour Beatty Rail. The remit was to:

- a. Provide **an independent and impartial assessment** of GB rail's current execution of asset management and supply chain management compared to other similarly complex regulated and non-regulated industries, including appropriate foreign rail administrations.
- b. **Identify the potential for improving** asset management and supply chain management in both management of in-service assets and major enhancement and renewal programmes.
- c. Develop **an assessment of the potential cost savings** achievable by improved arrangements.
- d. **Identify constraints and barriers** to improved whole industry asset management and supply chain management, making informed recommendations on how the industry might move towards best practice.

Later phases of work will consider appropriate industry structure, addressing implementation and its associated cost (all of which are out of scope for this report). This phase of work was specifically to look at potential end states and not how to get there.

Summary approach

Asset management specifically requires a focus on the utilisation of assets to deliver business objectives through the optimal, whole-life management of cost, risk and performance. Our focus has been to track the GB rail objectives through the industry and consider the translation of these through the supply chain in order to determine value for money issues.

We have approached this study on a whole industry, whole-system basis and not mechanistically reviewed the detailed arrangements for each individual organisation.

We have conducted over 60 hours of interviews, talking to over 55 different individuals, and have reviewed more than 80 written submissions, comprising several thousands of pages, within the five week assessment and analysis phase of this study. We have additionally held four workshops with key members of the Value for Money team and industry experts, drawn from different industry sectors within Atkins and our sub-consultants.

We have identified and considered a number of separate supply chain and asset management opportunities where the findings suggest there is potential to increase value for money. Four primary opportunity areas have been defined:

- a. Overall industry aligned objectives.
- b. Whole-system asset management.
- c. World class supply chain.
- d. Whole-system programme management.

Where possible, we have calculated an indicative cost saving estimate based on ranges we have noted through our interviews, our experience in working with other industries and what we believe to be realistic for GB rail to achieve. Where there is evidence from non-GB rail to support conclusions in terms of cash savings and avoided costs, we have sought to identify the range of potential savings by considering the evidence in the context of GB rail.

We have used simple benefits realisation maps to analyse the interdependencies between the areas and to support an estimate of the value of the potential benefits.

Summary findings

The principal findings relating to both asset management and supply chain are set out in Section 3, and can be broadly summarised as follows:

- a. Objectives that provide long-term direction and purpose are not set at an industry level and consequently lower level objectives are poorly aligned.
- b. There is inconsistent application of whole-system good practice.
- c. There is inconsistent application of good practice whole-life programme management techniques.

Overall we have found that Government struggles to set the right level of specification, stick by it and see it appropriately delivered through the industry. Some key asset management decisions are being taken by Government that significantly influence later trade-off decisions throughout the industry. We have been unable to identify evidence of good practice asset management approaches to substantiate the decisions taken by Government, some of which represent billions of pounds of expenditure and have significant influence or impact on performance, cost and risk associated with GB rail. Additionally, no evidence was presented to demonstrate a universally applied test or criteria to assess value for money for GB rail enhancements or that there is a whole rail business case or owner.

It is crucial to good asset management that responsibilities and accountabilities are appropriately aligned with strategic objectives and empowered through the industry organisation so that decisions are influenced by the right people with the correct authority. The importance of good asset information, supported by good whole life, whole system risk models, and of joined-up (whole system) standards management across the industry are noted as key enablers.

We have seen evidence of initiatives that could lead to better practice within the industry, supported by good asset management vision and senior commitment evolving within Network Rail. These initiatives are, however, being carried out within unsupportive industry constraints, including a range of perverse incentives that are clear barriers to improvement.

The industry shows an uneven procurement profile with significant peaks of demand, in new vehicle build for example, resulting in inefficiencies in the industry as suppliers build and lose capability in line with client demands.

The evidence suggests significant “bespoke” specification and rework. It was noted that one manufacturer has provided 23 different variants of train for GB rail, potentially missing standardisation opportunities within the UK and from international practice.

Over prescription is apparent in a number of areas such as constraints on train timetable flexibility for TOCs and specific procurement requirements being introduced by the DfT for new rolling stock. The constraints reduce the scope for innovation in some cases and restrict the ability to drive value in others (for example, reducing maintenance costs by providing alternative transport for first/last services of the day). The evidence suggests decisions are made without necessarily considering a whole-systems cost benefit analysis.

The evidence suggests there is scope for improved procurement planning, better programme profiling and adoption of “partnership” approaches with the supply industry to improve transparency, increase performance and reduce costs.

The analysis has concluded that the Aligned Objectives improvement area is a core enabler to all other opportunities.

Potential Value for Money Improvements

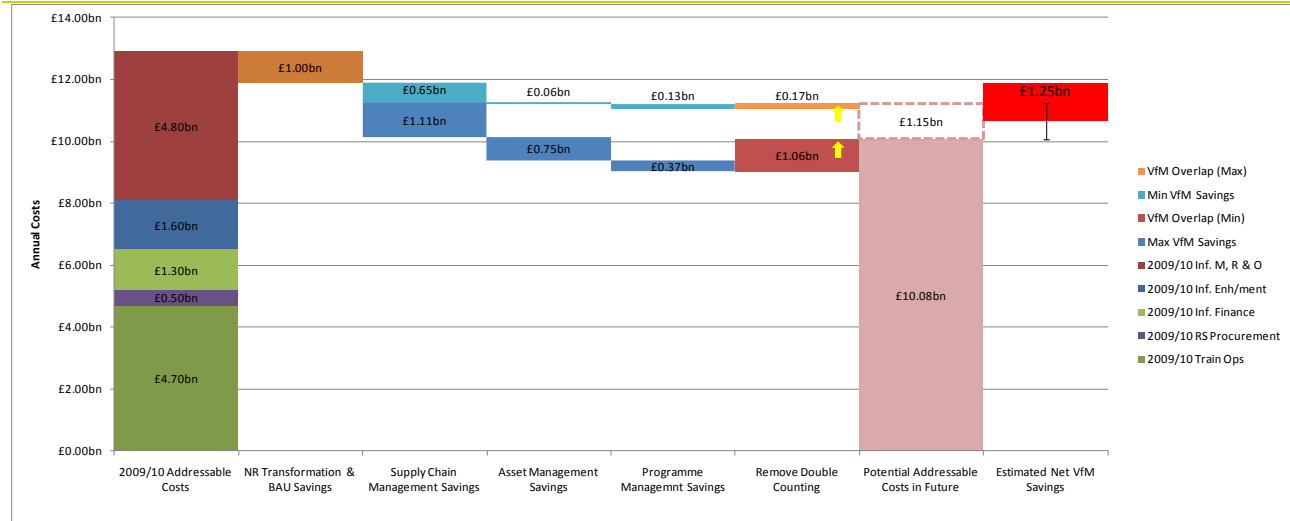
In deriving the potential savings, we have made a number of assumptions, which are all detailed in Section 5. We have estimated the overlap in the savings we have identified with those already set out in Network Rail’s published plans, based on the updated 2010/11 period 7 report provided on 14 December 2010. However, we have not made any assessment of the overlap with savings identified by other Rail Value for Money work streams, which we believe may be significant. Within the timescales of the study we have also been unable to quantify the potential performance or revenue improvements that may be available.

The potential savings after 5 years are based on a limited number of references available from the study and are typical of our broader experience across a range of infrastructure dominant industries. The potential savings, based on the 09/10 level of spend of £12.9bn pa, are estimated to be:

- a. Overall Industry Aligned Objectives – enabler required to achieve the high end of the following ranges
- b. Whole-system Asset Management – potential saving of £0.40bn (±£0.34bn) p.a.
- c. World Class Supply Chain – potential saving of £1.21bn (±£0.55bn) p.a.
- d. Whole-system Programme Management – potential saving of £0.25bn (±£0.12bn) p.a.
- e. The overlap between the three savings areas summarised above is estimated to be between £0.17bn and £1.06bn.

These savings are in addition to an estimated £1bn pa savings that will be delivered in CP 4 by Network Rail as a result of their committed Transformation and BAU plans.

These savings are summarised in the following figure; a full explanation of the waterfall chart is included in Section 5.



Summary Recommendations

A number of recommendations are made in the report (full recommendations are contained in Section 6). The following are summarised key points:

- The industry governance arrangements should be reviewed to facilitate the authority, responsibility and necessary leadership to set coordinated, output-specified objectives for the GB rail industry as a whole and ensure these are delivered. At the top level, the objectives need to be stable and provide long-term direction and purpose for the industry. There is a specific need to design out of the industry a variety of perverse incentive arrangements that are hindering attempts to introduce best practice approaches.
- Clear high-level decision making and optimisation criteria should be established for the industry to enable consistent, delegated decisions.
- The regulatory regime should be reviewed to ensure it aligns with the overall approach to setting objectives for GB rail.
- Improved asset management information arrangements should be established within and between organisations. This should include a national information management framework (or architecture) which will support cross-asset decision making, facilitate collaboration through the sharing of assured information, enable innovation and local processes / systems, facilitate long-term strategic planning and enable control of implementation costs (there is not anticipated to be a single, national IT system).
- Standards should be reviewed to remove over prescription, duplication and conflicting requirements across the industry, taking a whole-system approach.
- 'National' engineering services should be further assessed to identify the most effective and efficient provision going forward, optimising the utilisation and value of associated assets and resources; there is unlikely to be a single 'one size fits all' solution.
- Network Rail should ensure focus and priority is kept on its internal unit cost analysis (where necessary refocusing on a more market-led approach) to provide a consistent view of internal costs to allow 'Make or Buy' decisions versus external prices across maintenance, renewals and enhancements.
- Network Rail and ORR should agree a long-term strategic plan of work for maintenance, renewals and enhancements over a longer term than the current Control Periods to smooth demand.

- i. Government should consider how, for the financing of rolling stock, it can take advantage of its reduced cost of borrowing and should examine how relaxation of franchise conditions would stimulate commercial improvements.
- j. Government should issue a long-term strategic rolling stock plan to achieve a smoother demand on the train manufacturers through strategic procurement, less unnecessary specification and longer and more stable periods for rolling stock production.
- k. All parts of the rail industry should sign up to a long-term plan to achieve greater standardisation of both rolling stock and infrastructure.
- l. A number of pilot projects should be put in place to test/evaluate the practicality of the recommended actions.

Our remit excluded implementation planning and any associated costs, however we have no doubt that it will be necessary to make significant investment in order to implement these recommendations and realise the full potential savings.

We recommend that the findings of this study should be considered against, and validated with, the findings of the wider Value for Money Study and other relevant work. We note that great caution should be exercised in combining these potential savings with those from other work streams, as there is likely to be a large degree of overlap.

1. Introduction

- 1:1 Atkins has undertaken a high-level assessment of asset management and supply chain management in the GB rail industry for the Rail Value for Money Study. Recognising the national importance of this work in seeking out opportunities, influencing and enabling GB rail to deliver greater value for money, we assembled a multi-disciplined and multi-organisation team that offered the best in experience and capability; this team included sub-consultants KPMG, Lloyd's Register Rail and Balfour Beatty Rail. GB rail is broadly defined as the heavy rail system, explicitly excluding light rail and Transport for London.
- 1:2 The support and assistance of all the organisations and individuals who have contributed to this study is acknowledged and greatly appreciated, including the valuable contribution made by those from outside GB rail.
- 1:3 In the time available the study has necessarily had to rely heavily on a number of interviews with senior industry representatives. Accepting that the views expressed can reflect a spectrum from personal opinion to corporate aspirations, statements have been presented at face value as they provide good insight into the current industry, whether the views are consistent or opposing. In many cases it has not been possible to confirm statements with evidence or detailed review, so the approach has sought to coalesce findings at a high-level around the key themes essential to effective asset management and supply chain management. Therefore, while the recommendations are confidently made, it is strongly advised that the analysis is corroborated or tested prior to wholesale implementation.

2. Overview of our Approach

- 2:1 Asset management specifically requires a focus on the utilisation of assets to deliver business objectives through the optimal, whole-life management of cost, risk and performance (recognised as core in frameworks such as BSI PAS55). Our focus has been to track the GB rail objectives through the industry and consider the translation of these through the supply chain in order to determine value for money issues. By considering the relationships between key industry players, we have identified the key value areas for further exploration. We have taken account of existing information and, where practical, liaised with ongoing parallel work streams to avoid duplication. We do, however, recognise that our report will be finalised before the recommendations from these work streams are available.
- 2:2 Our assessment of the supply chain has taken into account the impact of GB rail objectives on the planning, procurement, development and final delivery stages of the supply chain (including contract and supplier relationship management to embed and sustain business objectives). We have considered how these objectives create or diminish value by promoting or preventing the application of supply chain best practice and optimisation seen in other industries and non-GB rail markets.
- 2:3 Recognising the limited time available, we have:
 - a. Provided an **independent and impartial assessment** of GB's current execution of rail asset management and supply chain management compared to other similarly complex regulated and non-regulated industries, including appropriate foreign rail administrations.
 - b. **Identified the potential for improving** asset management and supply chain management in both management of in-service assets and major enhancement and renewal programmes.
 - c. Developed an **assessment of the potential cost savings** achievable by improved arrangements.
 - d. **Identified constraints and barriers** to improved whole industry asset management and supply chain management, making informed recommendations on how the industry might move towards best practice.

- 2:4 In recognising the two distinct work streams of asset management and supply chain management, we have used a common approach to the analysis, comparison and reporting as far as possible and appropriate, whilst exploiting the synergies and complimentary elements.
- 2:5 We have focussed on opportunities that represent the greatest improvement potential and value to GB rail. By focusing on the effectiveness of the relationships that exist across the industry, from the point of view of both asset management and supply chain management, we have identified those relationships that warrant further investigation where there is greatest scope to improve. Our analysis has been informed by our rail industry value map (See figure 3.2 and Appendix A) and we have consciously considered the various enablers and constraints in the context of delivering value.
- 2:6 Informed by analysis, our team’s experience and recognising the compressed timescales, we selected a sample of GB rail organisations in order to maximise the study’s breadth and diversity. We have also taken account of the role and influences of other stakeholders such as the ORR, RSSB and DfT.
- 2:7 We have selected comparator organisations considered to showcase good practice or face similar circumstances to GB rail, recognising the limitations of the programme. This was influenced by our team’s experience and by a number of contextual factors associated with the asset base, organisation and regulatory structure, funding arrangements, etc.
- 2:8 In general, we have approached this study on a whole industry whole-system basis, as depicted in figure 2.1, and not mechanistically reviewed the full arrangements for each individual organisation. Our assessment framework was configured to gain the best insight possible in the limited time available. Further details of typical interview discussion prompts are included in Appendix B.

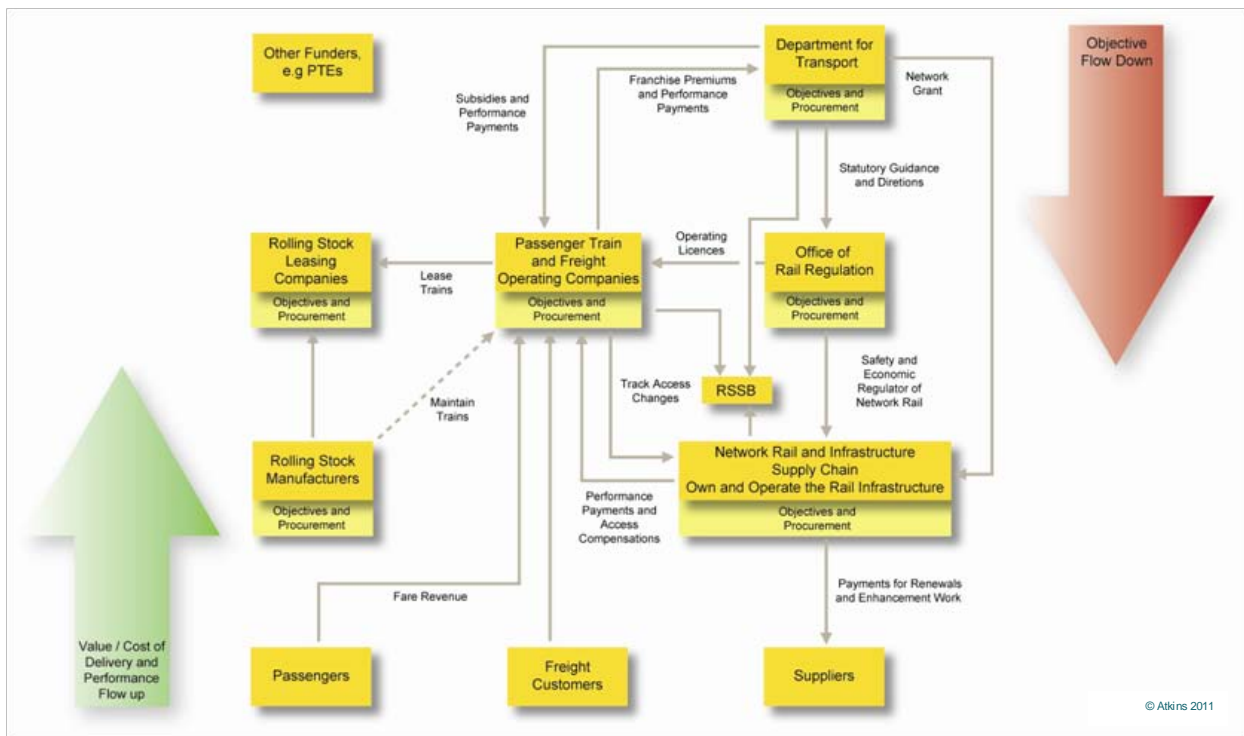


Figure 2.1 Primary Constituents of GB Rail

- 2:9 We recognise that a significant amount of detailed analysis has already – and continues to be – undertaken within companies like Network Rail and some of the proposed comparator organisations. We have taken account of this where it supports review of the key value areas to avoid duplication of effort.
- 2:10 We have conducted over 60 hours of interviews, talking to over 55 different individuals and reviewed over 80 written submissions (comprising several thousands of pages) within the five week assessment and analysis phase of this study. The organisations interviewed for the study include:
 - a. The Department for Transport.

- b. The Office of Rail Regulation.
- c. RSSB.
- d. Network Rail.
- e. Angel Trains.
- f. Bombardier Transportation.
- g. FirstGroup.
- h. ProRail (via correspondence and previous studies), the Dutch Government agency responsible for maintaining and extending the Dutch rail infrastructure.
- i. NS Reizigers, part of the state-owned Dutch passenger railway operating company NS, which owns rolling stock and runs train services.
- j. NedTrain, part of the state-owned Dutch passenger railway operating company NS, which maintains the passenger rolling stock.
- k. Trafikverket, the Swedish Government agency that owns and maintains all state owned road and rail infrastructure.
- l. Ofgem, the UK Office of the Gas and Electricity Markets.
- m. ScottishPower Energy Wholesale.
- n. ScottishPower Energy Networks.
- o. Virgin Trains.
- p. Alstom Transport (West Coast Traincare).
- q. Highways Agency.
- r. Chiltern Railways.
- s. ORR Reporters AMCL and Nichols.

2:11 We also held two workshops with key members of the Value for Money team and our experts, drawn from different industries, disciplines and organisations, which were critical in the process of analysing our findings and developing conclusions and recommendations. Details of some of the early hypotheses are included in Appendix F; these were developed from the early findings and tested with workshop participants, resulting in the selection of the four potential improvement opportunities presented in Section 4. These themes were tested with the Value for Money team stakeholder group, a RIA workshop and an ATOC workshop, before being further developed into conclusions.

2:12 Appendix C details meetings held to inform our study. This included two further industry workshops to consider 'national' engineering services and asset information management in the context of good asset and supply chain management.

2:13 Appendix D details source information considered as part of our research.

2:14 The subsequent analysis sought to establish how the objectives and the resultant decisions flow through representative parts of the industry and how value/costs are realised. Therefore, the following key questions have been considered:

- a. What the key strategic objectives are at each level?
- b. What the trade-offs are at each level?
- c. How often decisions need to be made and when?
- d. Who needs to be involved, who will arbitrate or decide?
- e. Who ensures that by the time the objectives and requirements have flowed through the various organisations, the outcomes are still meeting the stakeholder requirements?

2:15 Inevitably the timescales associated with this study have limited the degree of investigation possible. The experience of all consortium members has also been worked into the outcomes of this study to help to provide a greater insight into the comparative position of GB rail with respect to both asset management and supply chain approaches when compared with other industries both in the UK and overseas.

2.1 Good Practice

2:16 We have summarised a good practice asset management framework as:

- a. Having strong leadership to provide direction.
- b. Having a clear set of aligned objectives (relating to performance, cost and risk) with line of sight through the organisation(s) including planning and delivery.
- c. Having well defined decision making criteria which are consistently applied for optimal outputs.
- d. Enabling alignment between the accountability for results and the responsibility for delivering them.
- e. Enabling appropriate consideration of the wider business risk in its various forms (performance, cost, environmental, reputational, safety, etc.) and the ability to make changes and to trade-off across asset types, optimised against the agreed objectives.
- f. Having long-term and consistent planning horizons with appropriate incentives to promote the right options, e.g. capital investment v operational expenditure.
- g. Enabling the right (competent) people with the correct authority to influence and make decisions.
- h. Having good and well managed asset information providing sufficient asset knowledge to support effective decision making.
- i. Having robust, whole-life optimised asset policies within an arrangement that facilitates continuous improvement based on appropriate measures and review.

2:17 At a high level, an asset management framework can be represented diagrammatically as shown in figure 2.2. This clearly indicates the line of sight concept for objectives through planning and delivery and that this is intended to operate in a realm of continuous improvement.

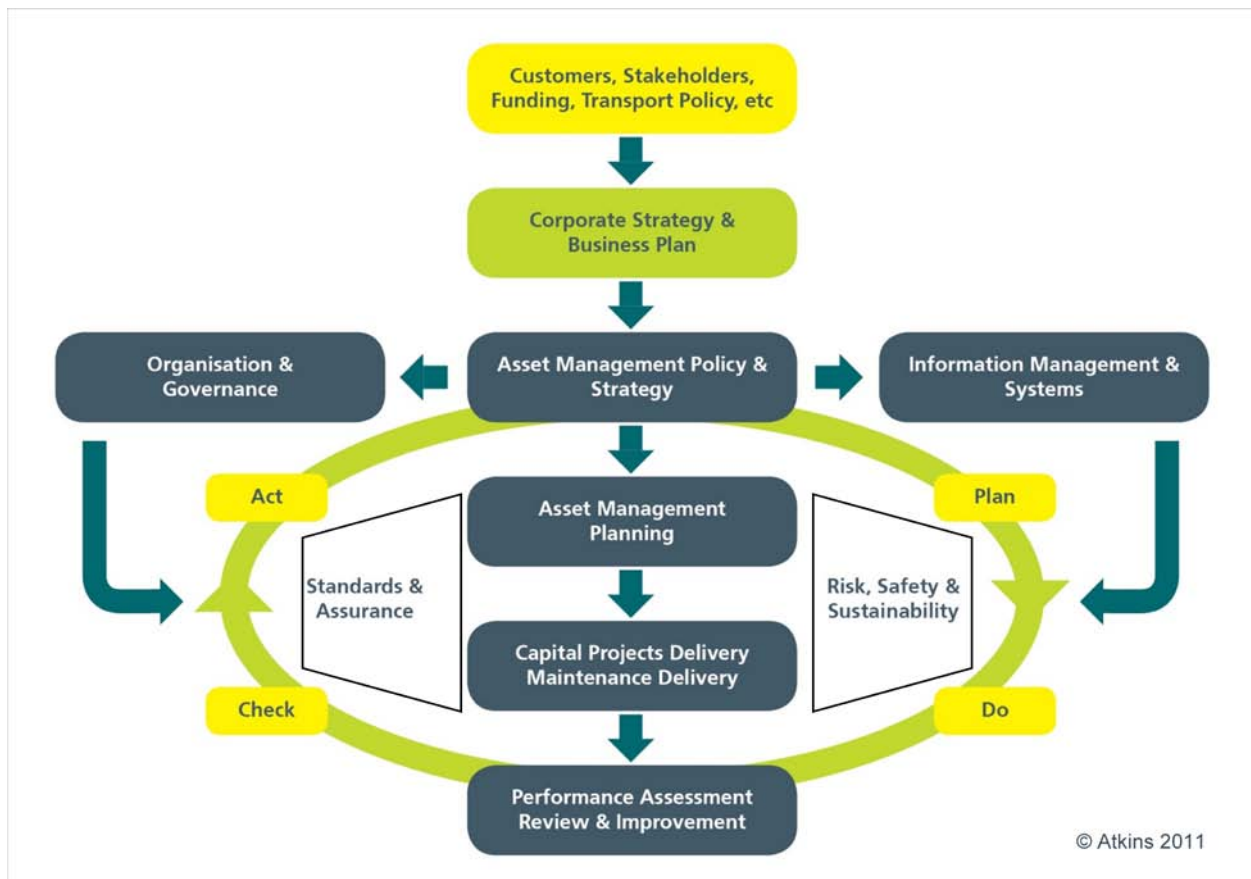


Figure 2.2 Overview of an Asset Management Framework

- 2:18 Any asset management framework will consider policy, strategy, objectives and plans and the activities, processes, systems and organisation necessary for their development, implementation and continual improvement.
- 2:19 Within the asset management framework, consideration is required at all stages of the asset lifecycle, performing trade-off decisions as illustrated in figure 2.3. This can occur at different levels of an organisation or industry. The link back to targets and stakeholder constraints can be seen, setting the parameters of operation.

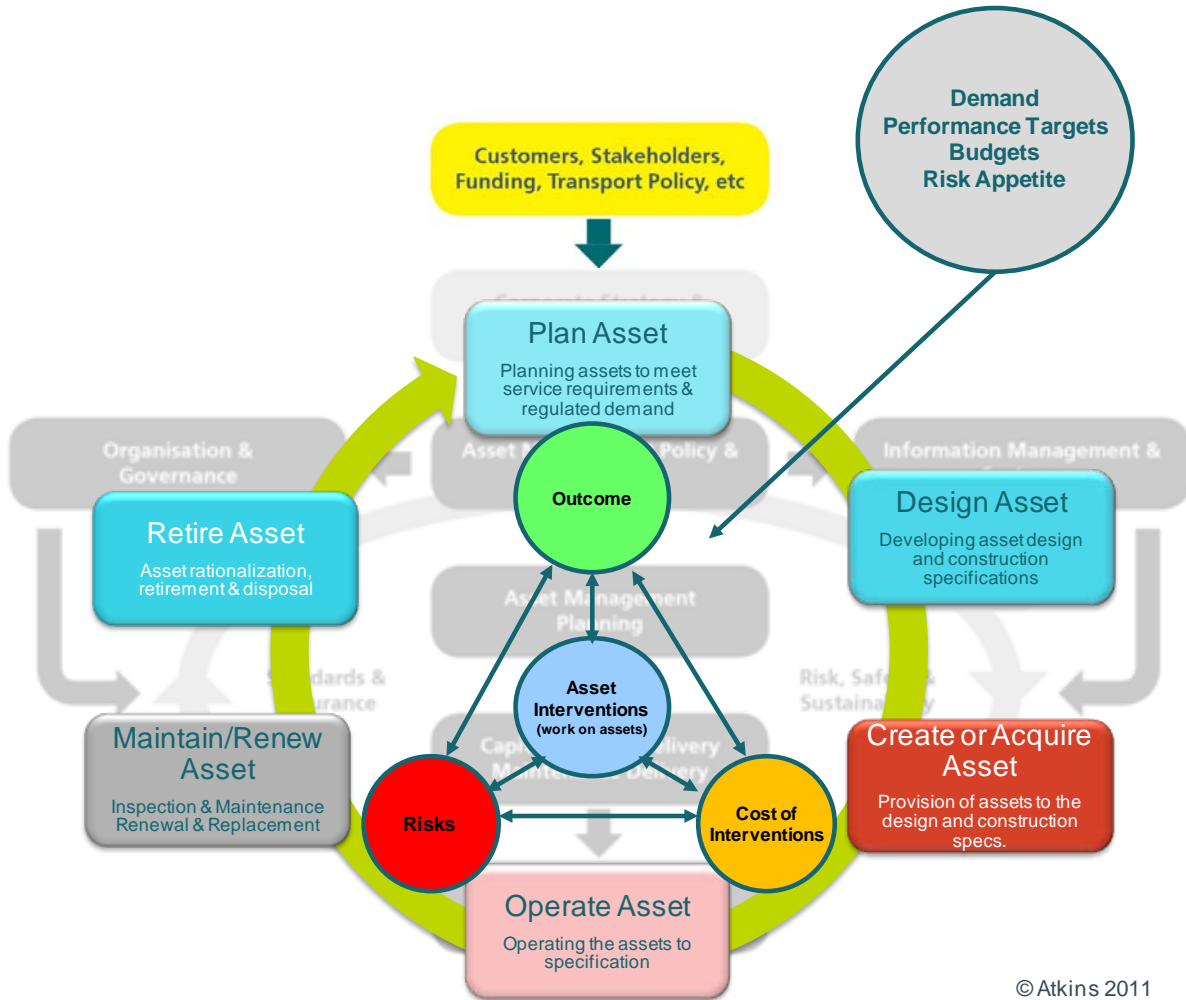


Figure 2.3 Decision Making Within The Asset Lifecycle

- 2:20 Our asset management assessment therefore set out to look for the following across the GB rail industry:
 - a. **Strategic alignment** between organisational objectives and industry objectives (including major projects).
 - b. **Integration** across functional units within an organisation.
 - c. Effectiveness of **whole-system, whole-life planning** in achieving industry objectives.
 - d. The **efficiency of delivery** of those plans.
- 2:21 We have summarised a good practice supply chain management framework as:
 - a. Having a clear and consistent supply chain strategy created in collaboration with key suppliers.
 - b. Using appropriate contracting frameworks including those that demonstrate partnering by sharing benefits and risks for an agreed set of outputs.
 - c. Having standardised planning processes to allow suppliers visibility of demand forecasts.

- d. Understanding the true cost-to-serve for each activity to allow sound make-or-buy decisions.
 - e. Utilising strategic partnerships along the supply chain to ensure alignment of customer requirements with service and infrastructure delivery.
 - f. Providing incentives to stimulate continuous improvement in outputs through long-term strategic alliances.
- 2:22 Our supply chain management assessment has therefore considered the effectiveness of the GB rail arrangements by looking at:
- a. How the **supply chain strategy** is set.
 - b. The quality and collaborative nature of the **planning process**.
 - c. How the **contract frameworks** are specified and set up.
 - d. How the **supply and demand** are balanced.
 - e. How they are **managed through delivery**.
 - f. How they ensure **continuous improvement and innovation**.

3. Assessment Findings

- 3:1 The principal asset management and supply chain findings are presented in the following two sections. In summary, our findings show:
- a. Objectives are not set at an industry level and lower level objectives are poorly aligned.
 - b. There is inconsistent application of good, whole-system asset management and supply chain management practice.
 - c. There is inconsistent application of good practice whole-life programme management techniques.
- 3:2 More comprehensive details are contained in Appendix E and (in Section 3.5) we have also presented a number of expanded non-GB rail case studies illustrating many of the themes in practice.

3.1 Aligned Objectives

- 3:3 Note: This is seen as an enabler to both asset management and supply chain management.

3.1.1 Whole System

- 3:4 Overall we have found that Government struggles to set the right level of specification, stick by it and see it appropriately delivered through the industry. Some key asset management decisions are being taken by Government that significantly influence later trade-off decisions throughout the industry. We have been unable to identify evidence of good practice asset management approaches to substantiate the decisions taken by Government, some of which represent billions of pounds of expenditure and have significant influence or impact on performance, cost and risk associated with GB rail.
- 3:5 There is no evidence of a clear set of aligned objectives for GB rail. As an example there appears to be a lack of a clear purpose to differentiate expectations for the mix of social and commercial rail operations or for considering the railway as a holistic system when making vehicle/infrastructure decisions. It should be emphasised that clarity of objectives is fundamental to allowing appropriate asset management decisions to be made. No evidence was presented to show that clear criteria are in place to allow optimised decision making for GB rail as a whole. Similarly, it is not clear that a robust process or structure is in place to allow such criteria to be applied. We did see evidence of a strong focus on safety but there was a widely held view that the consideration of risk was predominantly safety risk (for which objectives and criteria were more specific) rather than wider business risks such as environmental, reputation, etc.
- 3:6 It is crucial to good asset management that responsibilities and accountabilities are appropriately aligned with strategic objectives through the industry organisation so that decisions are influenced by the right people. There is a need for the industry to organise to ensure that those accountable for asset management decisions have the necessary authority, and that they are empowered to optimise the overall value of the outcomes of those decisions. There is evidence that Network Rail is structuring in this way.
- 3:7 The DfT makes asset management decisions concerning investment allocation and expenditure profile, however we found no evidence of clear accountability within the DfT for doing so. There was evidence of various bodies 'injecting' new requirements, objectives and constraints into the industry in a variety of places without collective accountability for the resulting outcomes, which appears to hamper clear visibility of strategic objectives and clarity of purpose in the industry. One example is the ORR setting efficiency requirements separately from the HLOS requirements placed on Network Rail by the DfT. Additionally there was comment from the RSSB that the safety aspirations in the ORR's Strategy document appeared to differ from safety requirements in HLOS. Another example is the complex and changing standards regime (and local interpretation) providing a confused set of requirements or constraints for project suppliers. Overall these drive waste and inefficiency into the industry. It

is important that the industry has a clear view of actual requirements/objectives and that this is supported by clearly aligned regulatory oversight.

3:8 Figure 3.1 depicts the current arrangement of objectives and how they cascade through the industry. This shows in some cases the detailed injection of requirements (e.g. vehicle specifications from the DfT) but no clear direction, strategy or optimisation criteria that would facilitate the industry in making better value decisions.

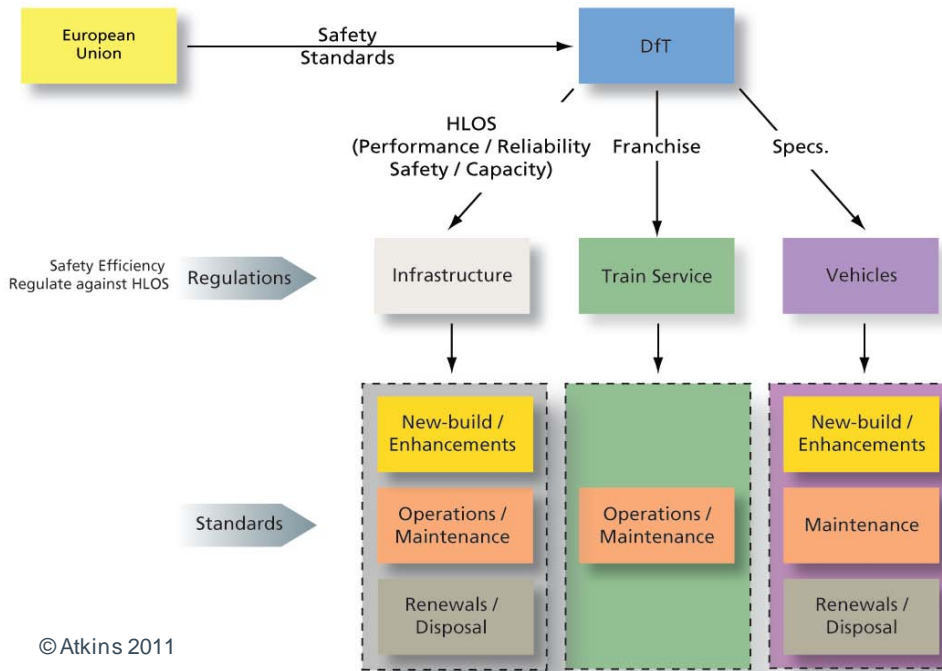


Figure 3.1 – Representation of Current GB Rail Objectives Flow

3:9 There is evidence from several sections of the industry showing that misaligned funding horizons and short-term efficiency pressures make planning for a long system life challenging. Evidence was provided that highlighted that GB rail funding is geared towards minimising initial capital investment cost. Payback periods exacerbate this and do not incentivise the capital investment to be optimised on the basis of whole-life cost, performance and risk.

3:10 There is evidence that the financing periods for infrastructure and train operation, being of relatively short and fixed duration (and rarely starting and ending together), can give rise to behaviours which are not always delivering best industry value. For example the incentive to invest can be affected where payback periods are short or have to be accepted with a risk premium. The ability to provide accurately costed long-term plans for GB rail with any certainty or to reflect a truly whole-life approach may also be difficult, creating further barriers to optimisation. We note that Network Rail states that their asset management plans are not adversely affected by five year funding cycles and are developed on a minimum whole-life whole-system cost basis.

3:11 There is evidence of a good asset management vision within Network Rail and senior commitment to embed this. It is important that this is underpinned by all industry stakeholder involvement. We have found that Network Rail has become positioned as the dominant industry planning entity and that this brings with it responsibility to work with, rather than dictate to, the industry in a very coordinated way in developing future plans. Whilst some examples of effective collaboration have been noted, several respondents have commented on previous attempts to provide this co-ordination that have been slow to evolve and not as successful as expected. These attempts will at best result in slow progress and a sub-optimal outcome without clearly aligned objectives and clear optimisation criteria. Further consideration of collaborative arrangements is given in Appendix E4.

3:12 It is important that the momentum of improvement initiatives is not constrained by the resources needed to drive them or the ability to facilitate change in a timely manner.

- 3:13 We also note that the industry has yet to consistently find the right balance of communication and information share between Network Rail and the other industry stakeholders who, in many cases, are directly interfacing to the two prime customers (Government and rail users). This is often a factor of the industry structure and role allocation. This can impede good industry decision making and practice.
- 3:14 There was evidence that Network Rail has taken on responsibility for bringing together elements of GB rail so that consideration is given to whole-system investment on a route basis. This is demonstrated by the Route Utilisation Strategies (RUS) (underpinned by a licence requirement and therefore delivered on behalf of the industry) and Strategic Route Sections. Nevertheless, the links did not appear to be robust in terms of financial trade-off, particularly when determining franchise specifications. Importantly it was not clear that there is alignment between the accountability for results and the responsibility for delivering them. Several respondents stated that whilst the RUS process achieves significant TOC involvement, this co-operation ceases once planned delivery commences. Respondents indicated their belief that project solutions are not necessarily evaluated at a system-wide level where (once underway) they encounter technical or funding difficulties requiring scope change. Network Rail indicated their approach would be to seek optimum system-wide solutions.
- 3:15 Network Rail has developed Route Utilisation Strategies (RUS) with a 20-25 year horizon and is trialling a 50 year RUS with Merseyrail. Network Rail stated that whole-life consideration was not constrained by the 5 year control period and that asset policies consider the asset life. Whilst Network Rail discussed their approach in terms of moving forward with optimised whole-life and cross asset planning, they also highlighted that at this point in time the challenge of creating trade-offs between asset families has yet to be completed. There is a focus on improving asset knowledge but it was not clear how the improvements being made are supporting effective cross-asset optimisation. Examples can be seen in some of the positive initiatives such as the application of Reliability Centred Maintenance to signalling only (ROSE - Reliability Centred Maintenance of Signalling Equipment) and the development of sectional route based asset management plans for all engineering disciplines (noting these are furthest advanced for track).
- 3:16 Network Rail presented its proposed approach to considering outputs as part of strategic business planning for each route, each of which is stated to be based on delivering the required outputs at minimum whole life cost.
- 3:17 One DfT respondent stated that freight operators have been more innovative as a result of having to think about how to improve the network to develop their services and support their revenue streams.
- 3:18 Several respondents suggested that there is often little co-operation between Network Rail, the TOCs and vehicle manufacturers in planning the introduction of new rolling stock. This sometimes resulted in misaligned requirements, increasing the cost and timescale for new rolling stock introduction. Network Rail has championed the idea of a Train Interface Specification (TIS) for Thameslink to mitigate this situation. However, this currently requires the voluntary co-operation of all parties.

3.1.2 Infrastructure

- 3:19 The evidence indicated that infrastructure objectives and strategies are still very much set internally and by asset family with little trade-off (yet) across asset families and little alignment with high-level GB rail objectives. Network Rail explained that the development of route based asset management philosophies (applied to circa 300 routes) was core to their approach. The ORR's Asset Management Reporter has commented that internal asset management capability has improved between their 2006 and 2009 reviews.

3.1.3 Operations and Vehicles

- 3:20 There was evidence of unnecessary complexity and over-prescription in setting objectives for TOCs. Several respondents suggested that the DfT focuses too heavily on process (how) rather than clearly stating outputs (what), with little evidence of alignment of objectives between Network Rail, TOCs and vehicle manufacturers.

- 3:21 There was evidence and consensus that the industry struggles to innovate in an environment where timetables, rolling stock allocation and operational requirements are prescribed by the DfT. This leaves operating companies in a situation where they are competitively bidding for rail franchises with little room to drive efficiency and where rolling stock leasing costs are set at levels influenced by a captive market for a particular fleet. In an environment where franchise lengths are short, objectives ill-defined and operation constrained by over-prescription, several parties concurred that there is little incentive for TOC innovation and investment to improve infrastructure, improve revenue streams or optimise assets, with maintenance deferral commonly adopted when there is a high likelihood of not winning a follow-on franchise.
- 3:22 Several respondents suggested that the new train procurement process is unnecessarily lengthy, with specifications prone to ongoing change and typically bespoke from one initiative to the next. It was felt that this lack of standardisation had driven up rolling stock construction and maintenance prices. This appeared to be driven by risk averse behaviour in the DfT, as evidenced by their prescriptive approach to projects, coupled with a desire to transfer risk at the same time. Practice in other industries would not support this as pragmatic, sustainable or effective. This is likely to be reflected in more cost to the DfT at a later date.
- 3:23 There was evidence presented from several sources highlighting shortcomings in the holistic evaluation of risk and objective setting in rolling stock procurement. It was felt that this resulted in the adoption of unnecessary design solutions, leading to additional vehicle cost. The example of train protection was cited, where new vehicles have to meet ever-greater crashworthiness requirements, even though collision risk has been reduced through the application of modern train control solutions, e.g. TPWS.

3.1.4 Non-GB Rail

- 3:24 There was evidence of clear Government set objectives in the Dutch rail industry. Within the industry this allowed a strong focus on delivery of those objectives which were converted into strongly communicated and aligned sub-objectives. The Government objectives provide criteria on which performance will be judged, reflecting the industry structure and governance arrangements, and include the requirement to implement structures and management systems to enable:
- a. Transparency in the relationship of costs, performance, condition, and activities
 - b. An understanding of the interaction between performance of TOC and infrastructure (reflected in access charge factors)
 - c. An understanding of the long-term effects of maintenance
- 3:25 Evidence presented from The Netherlands showed long-term and consistent planning horizons for railway assets organised to allow efficient working using long blockades and effective use of high output machinery. Possessions are planned up to two years in advance, similar to Network Rail. However, ProRail is using a 10 yearly rolling planning cycle and lifecycle cost modelling that fixes budgets and work-plans and explains the expenditure flow between maintenance and renewals. Projections are also made for a 15 year outlook.
- 3:26 There was evidence of 'light touch' governance and significant freedom to adapt the timetable to grow revenue by increasing passenger numbers for Dutch train operator NS.
- 3:27 There was evidence that the Dutch train operator NS looks forward 30 years in planning, collaborating with ProRail the infrastructure manager. NS owns most rolling stock (some new fleets are leased through a subsidiary company) and undertakes strategic fleet planning. NS produces the network timetable and (with limited infrastructure constraints) is able to optimise this so trains generally run everywhere on the network rather than being constrained to particular routes.
- 3:28 The Swedish Government has a small transport ministry (less than 10 staff) and funds most infrastructure costs through annual budgets in response to delivery plans. A new Swedish Transport Administration has been set up from April 2010, external to Government, to better coordinate planning of all national transport infrastructure (road, rail, sea and air). This

organisation owns the road and rail infrastructure and is the Infrastructure Manager with safety, management and financial responsibility.

- 3:29 Within the unregulated section of the power industry (generation) there was evidence of successful delivery to a simple set of clear, high-level goals. Engagement with staff during the transformation process had been thorough, but management clearly drove through its initiatives from the top and have successfully implemented change over a 3 year period. Management considered this timeframe optimum to avoid loss of focus. This change has resulted in a 20% reduction in maintenance and operation costs plus (unquantified) performance improvements. Over the 3 years of their transformation programme they shifted the proportion of preventive maintenance to corrective maintenance from 5% to 70%, allowing better workload scheduling and planning as well as reduced exposure to availability penalties. They also stated a 10% reduction in CapEx simply through applying consistent criteria for optimisation.
- 3:30 Within the regulated section of the power industry (networks) we found evidence of a much more hands-off approach to dictating day to day activity from the regulator. There was evidence of invasive regulatory approaches but they centred on monitoring performance and cost rather than specifying detail. Network Operator licences are not reviewed at regulatory periods or subject to re-bidding. We found evidence of the power industry (networks) considering whole-life issues consistently. These points notwithstanding, the incentive regime in place demonstrated a need to outperform the regulatory settlement if shareholder objectives were to be met and as such this appeared to drive enthusiasm to perform and become more efficient. Whilst there was evidence of cross-industry standards setting, there was also freedom for individual companies to adopt industry standards or set their own requirements to best meet their objectives. The commercial imperative was noted as a strong driver and provided a major incentive to perform.
- 3:31 Within the regulated section of the electricity industry, whilst there was a focus on regulatory control periods, no evidence was found of short-term planning regarding infrastructure investment. Whilst the example relates to electricity infrastructure, there are messages here that could be applied to the franchise side of the rail industry in terms of security of tenure and commercial incentives, noting that the electricity companies are not subject to periodic re-bidding. Where high-levels of near term investment are required, the regulator intervenes to ensure investment is profiled to minimise customer price shocks and monitors the cost of capital to support the investment. Evidence concerning the application of whole-life approaches indicated variability across the industry as maturity of asset management approaches grows.

3.2 Whole-System Asset Management

3.2.1 Whole System

- 3:32 The statutory role of the ORR is focussed on economic and safety regulation of infrastructure. Whilst the ORR has a remit to set track access charges, there is little other scrutiny of the effectiveness of train operators or ROSCOs in terms of cost efficiency. For example, once a franchise is competitively awarded (on lowest cost) the TOC is expected to deliver, despite the absence of an industry role defined to review efficiency of delivery or to ensure that revenues and costs are achieving expectations and continue to represent good value to the taxpayer. These costs account for 50% of the cost of the industry to the taxpayer. Network Rail is responsible under its licence for managing overall punctuality and reliability (monitoring PPM and inputting to a DfT chaired National Task Force) which requires it to take a view of TOC interests as well as the infrastructure. Joint Performance Improvement Plans are understood to be in place for all TOCs and Network Rail routes which, once established, become Reasonable Requirements, enforceable by the ORR. Whilst there was evidence of significant effort expended in the attribution of poor performance, punctuality and reliability across the industry, it wasn't clear whether root causes were actually determined or that the findings were being channelled for the overall industry benefit.
- 3:33 There was little evidence presented of regular effective cross-industry sharing of information to facilitate better asset management decision making. Differences of opinion exist as to the reasons for this but there appears to be adversarial commercial behaviour involved. There is evidence of specific effective collaborations such as between Alstom, Virgin Trains and Network Rail concerning OLE/pantograph failures. Further consideration of collaborative arrangements is given in Appendix E4.
- 3:34 Asset Information is critical to running any asset intensive business effectively and efficiently. The study has shown it is recognised as a key enabler to good asset management, supporting the people processes and systems needed to deliver the agreed strategy, objectives and plans. It is also crucial to an effective supply chain relationship. Fundamentally it is required to enable effective decision making. Arrangements have evolved and adapted to the current industry shape, interfaces and relationships. There are a number of plans yet to be realised and the study has further considered asset information management going forward (Appendix E5). This has indicated the need for a national framework and information architecture (which does not mean a single, national IT system) which will support local decision making. This will need to be resilient to industry change and differing maturity, maintaining the 'line of sight' with industry objectives at all times.
- 3:35 RSSB stated that looking at the industry as a whole there are good processes and tools for optimising safety, reasonable processes for optimising performance (PPM) but virtually no processes and tools for considering cross industry optimisation of wider business risks. Given the industry focus on safety and performance (PPM) from the top this would be expected. No evidence was found of the DfT possessing or using processes and tools to optimise investment and whole-life activities.
- 3:36 A variety of evidence and discussion was provided that showed a number of processes, tools and initiatives to improve optimisation and whole-life cost. Whilst in isolation many of these had merit, it was noted that previous initiatives have failed to deliver to expectations leading to general scepticism that the approaches are suitable for GB rail, with many respondents questioning if current initiatives would successfully deliver. It should be noted that organisations in many industries attempting to improve optimisation techniques often fail to meet expectations in environments where:
- a. Strategic objectives are unclear or inconsistent, resulting in locally optimised solutions pulling in different directions creating waste.
 - b. Decision making criteria are poorly defined or inconsistently applied, resulting in sub-optimal decisions that vary from area to area.
 - c. Asset knowledge is insufficient to support valid decisions.

- 3:37 With regards to GB rail our analysis has found no evidence to refute the statements in items a and b in the previous paragraph. The ORR's Asset Management Reporter has previously highlighted issues with asset knowledge within Network Rail and there is evidence of poor information exchange across the industry (item c in the previous paragraph). Network Rail stated that ORR and their reporter confirmed that the Network Rail met its licence condition with regard to asset information. Therefore any tools and techniques being applied to optimise asset management decision making are, at present, going to operate within a constrained environment.
- 3:38 Evidence was presented of several initiatives to improve knowledge and techniques, mostly operating within single asset families. We noted an example of an initiative looking to address consistency across wheel rail interface decision making and that Network Rail's Transformation programme (see Appendix G) intends to resolve the wider application of knowledge over coming years.
- 3:39 Consideration has been given (Appendix E3) to certain GB rail activities (or the organisation of their provision) that can be considered to be 'national services'. These have significance in terms of cost, performance definition and the effect on the railway (provision (or non-provision) risk). The initial analysis has indicated various ways of approaching this (highly centralised, central specification and local delivery, significantly outsourced, etc) and this preliminary review indicates that the choices are complex and that there is unlikely to be a single 'one size fits all' solution at either end of the central / devolved spectrum. We consider the key is to manage this effectively to make sure that local knowledge and decision making is adequately supported whilst ensuring the utilisation/value of associated assets and resources is maximised. Aligning objectives should assist this.

3.2.2 Infrastructure

- 3:40 There was evidence that Network Rail has implemented an organisational change programme that should align infrastructure responsibilities and authorities with asset management decision making requirements. Stating that asset management aspects form a fundamental building block, Network Rail acknowledged that there is still work to do in embedding an asset management approach in local delivery teams. This was supported by evidence from the ORR's Asset Management Reporter that Network Rail does not yet have the necessary systematic alignment (knowledge, skills and aptitude) in the right place to successfully deliver Route Asset Management Plans. Network Rail strongly believes that they have the capability.

3.2.3 Operations and Vehicles

- 3:41 There was evidence in the form of consistent views from several respondents that TOCs do not take responsibility for asset management as a discipline. Accountability seems to largely lie with Network Rail for stations and ROSCOs for vehicles, although the degree of maintenance responsibility within the lease arrangement tends to dictate greater or lesser TOC interest. There are instances, such as the Alstom/Virgin Pendolino and Bombardier/Virgin Voyager arrangements, where the TOC does take a significant role in asset management issues (with resultant benefits) but this is not consistent across the industry.
- 3:42 Our findings suggested that the ROSCO's asset management accountability is very focussed on managing risk associated with vehicles (including associated enhancement investments), and in seeking to offset that risk financially over the lifecycle of the vehicle. However as the ROSCOs only earn value whilst vehicles are on lease (and typical lease durations are significantly shorter than the life of the asset), the risk cost is inevitably passed on thus increasing the lease costs early in the vehicle's life. Uncertainty of national rolling stock plans as a result of changing Government policy further affects the risk profile. No evidence was presented that this was an optimal way of addressing whole-life considerations for the industry.

3.2.4 Non-GB Rail

- 3:43 Evidence was seen in ProRail and in the non-regulated part of the electricity industry of comprehensive information management systems designed to support the delivery of corporate objectives and provide information to support asset management decision making. As an

example, ScottishPower Energy Wholesale cascades its goals through to 42 risk control measures which are monitored and updated daily, accessible to all via a dashboard and used to inform business planning and asset changes.

- 3:44 There was evidence to suggest that the governance arrangements for the electricity industry in the UK provided opportunity for greater clarity of accountability between those elements of the industry that were revenue focussed and those regulated elements of the industry that managed natural monopolies (infrastructure). Unlike GB rail, no Government subsidy is involved and companies have to make the case for investment on a largely unconstrained commercial basis. The regulated networks were incentivised strongly to provide system availability AND reduce costs by investing wisely and becoming more efficient. The non-regulated, generation part of the industry operates through a market that ensures cost effective electricity pricing. However, no evidence was presented of how the unregulated part of the industry was sustainable or best met long-term UK electricity needs in terms of fuel mix or security of supply.
- 3:45 ScottishPower Energy Wholesale (generation) stated that they adopted a strategy of employing 'best in class' decision support tools in a fully integrated way. The tools included optimisation of investment choices across asset families and a common enterprise risk tool across the company. They were able to show a 20-25% software licensing cost reduction by adopting a common information system platform. They also noted (unquantified) performance improvement from the effective application of asset knowledge and use of appropriate risk based tools and techniques which have contributed to cost reductions.

3.3 World Class Supply Chain

3.3.1 Whole System

3:46 This study aims to identify the specific issues and evidence within the supply chain that, if addressed, may result in improved value for money in the short, medium and long-term. In the diagram below we have identified the major flows of funds in the chain; when considering our findings it may be useful to refer to these in identifying the size of the cash flow where issues are raised.

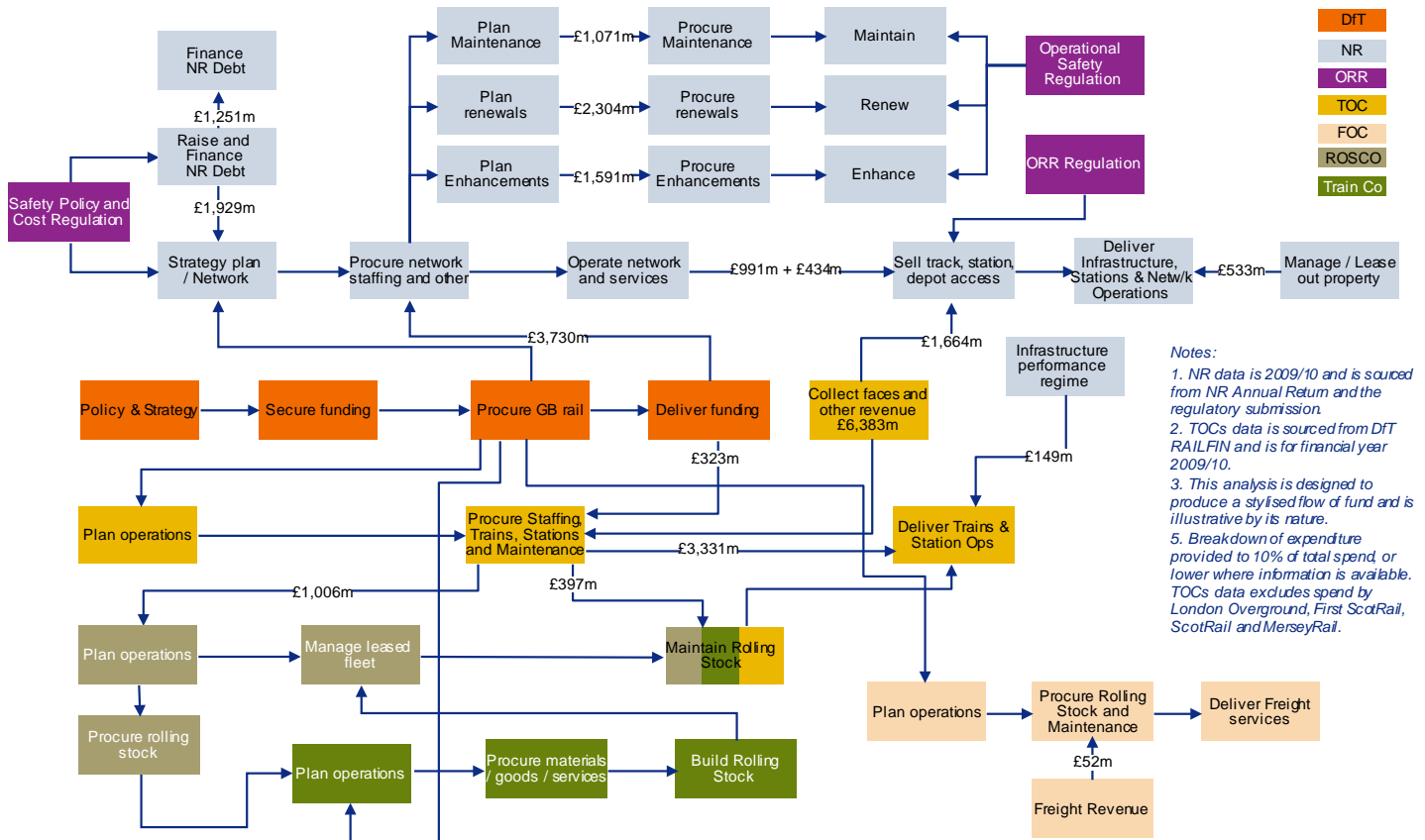


Figure 3.2: GB Rail Supply Chain – Flow of Funds 09/10

3:47 Although there is a strong commitment expressed in the 2010 High Speed 2 Command Paper (DfT, 2010) to improving the supply chain through a new supply chain forum, a high-speed rail industrial strategy, and consideration of procurement approaches that work effectively for industry and Government alike, there is caution, and in some quarters scepticism, that these types of initiatives will be truly effective due to the lack of the necessary agreed trade-off mechanisms, based on the evidence in recent years from IEP.

3:48 The change of decisions around major schemes (e.g. electrification) and lack of updates on rolling stock plans (e.g. IEP) has a significant dampening effect on getting commitments from the supply chain to improve. This results in the larger players in the supply chain identifying that money is wasted in speculation on the outcome, leading to caution when committing to significant cost improvements and employing resources that may lie idle if decisions are not made or postponed.

3:49 The current incentives within GB rail do not lend themselves to an efficient and effective supply chain. At present it is characterised by:

- a. The lack of structure that would facilitate coordinated decisions being made by all players in the supply chain as it passes from planning, to procurement, to delivery and into operation.

- b. Go/no-go decisions, or changes in specifications, can be made in one part of the supply chain that have major implications on other parts, but the whole-system impact and cost is not considered.
- c. An increased cost base as a result of inefficiencies (created by a. and b. above) as suppliers must pass on these costs to remain in business. Where they are unable to survive there is a reduction in competition through the loss of major suppliers. Examples were given of train seat manufacturers and wiring loom providers as well as infrastructure contractors.

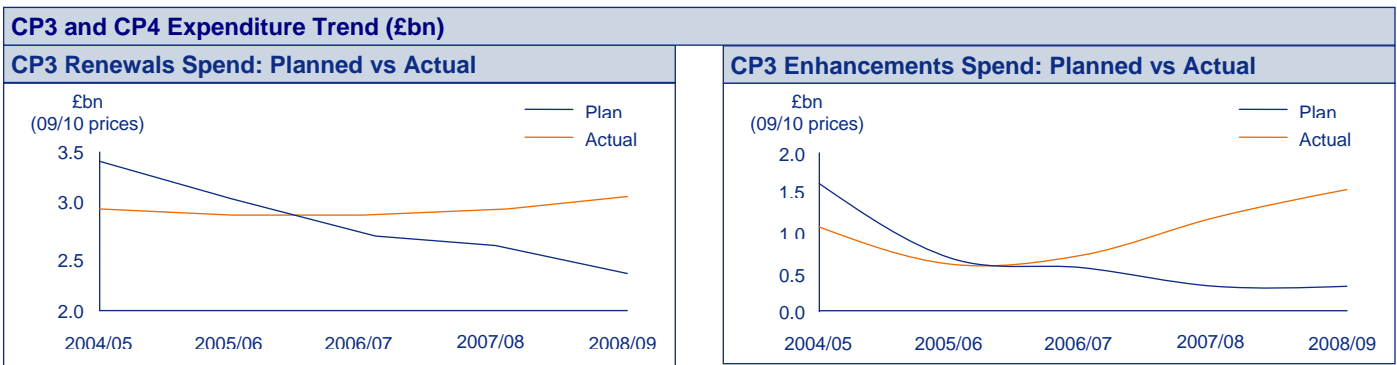
3.3.2 Infrastructure

- 3:50 It has been suggested by contractors that Network Rail's tendering process is overly convoluted and onerous, with a vast amount of information that often lacks cohesion between the technical information provided and the commercial information required, and in some cases, a lack of clarity of the true scope of works. Contractors have stated significant time is spent reviewing and making sense of the information. Further issues cited include the 'intrusive' level of cost detail required during the tender, with the template to collect cost information often containing thousands of line items that change from project to project, resulting in an overly time-consuming process which leaves contractors limited opportunity to provide value-add within the submission and within the tender timescales. A clear direction covering scope, commercials, interfaces with the peripherals and timescales were suggested to help accuracy when bidding for work. This issue has been recognised by Network Rail and is starting to be addressed within their Efficient Infrastructure Delivery programme, as part of the wholesale changes underway within their capital investment procedures. Network Rail has stated they are not only approaching this from a procurement aspect, but also from a post-contract perspective regarding cost management throughout the life of the project.
- 3:51 Network Rail is moving away from "zero value frameworks" across all assets, to using either open competition or frameworks with annually packaged work volumes with the stated aim of helping suppliers better manage their resource efficiency. One respondent stated that savings in the region of 20% - 30% could be achieved through guaranteeing volumes. Network Rail stated that various supplier engagement models are being developed which will be selected based on the dynamics of each project, staff and the market.
- 3:52 Currently there are various approaches taken to the funding of assets in the rail industry supply chain. The majority of infrastructure works are funded by Network Rail who, with the benefit of a Government guarantee, achieve a lower rate than the funders of other assets classes, such as rolling stock or train operations assets (ticket machines, gate lines, CIS etc). The rate spreads are up to 7%. When applied to the balance sheet of the industry, this equates to over £0.5bn per annum¹, to transfer funding responsibility and asset risk management away from Government.
- 3:53 Recent major organisational changes within Network Rail (aimed at standardising the way things are done) show that clearer strategy, planning and development processes are emerging in the enhancements, renewals and maintenance areas; however, the majority of these are still in their infancy, with significant benefits promised (e.g. up to £3.3bn of the £4.1bn gap in CP4) but still to be realised. Network Rail particularly noted that they made £400m efficiency savings and annual savings of £132m during CP3 by in-sourcing maintenance which eliminated contractor risk / corporate overheads, role duplication and increased purchasing power.
- 3:54 In the area of renewals and enhancements, there is uncertainty and variability in whether detailed design contracts will go ahead during the planning horizons. For example, of the 3-6 projects planned by Network Rail for the South Wales Framework for Type A signalling, only the Newport project has been progressed fully to date, with the Cardiff project delayed (only GRIP4 outline design awarded), casting doubt that GRIP stages 5-8 will be awarded prior to the end of the contract period in 2011. Such variability prevents contractors from achieving stable sources of supply in terms of resourcing, parts and materials and sub-contracting

¹ Based on 7% difference between Government (4%) and private sector financing (11%) on a £11bn ROSCO or TOC asset base.

arrangements in response to changes in specifications. Contractors incur significant costs in ramping up/down capacity, or under- or over-capacity in response to ‘feast and famine’ cycles. Typically, these costs are in relation to recruitment (specifically the use of more expensive contract labour to meet the demand), training, redundancy and productivity. Such variability has also resulted in some SMEs going into liquidation in the downturns. Network Rail recognises this to be an issue and a number of work-bank initiatives are underway to try to address the problem.

- 3:55 Poor planning and visibility also encourages suppliers to load upfront costs due to perceived risk arising from poor scoping/technical details and changes in standards. Contractors have stated that it is not uncommon to build in a minimum 10% contingency cost when bidding fixed price for a project. For example, the scope design of one GRIP 4 project was discovered to contain major flaws resulting in redevelopment of the original scope by the contractor. The contract contained a gain-share arrangement, with any variance between the initial fixed price bid by the contractor and the target cost of the project set by Network Rail to be split 50:50. The redesign work led to a 50% variance to the target cost and an overall £80m overspend to be absorbed by both contractor and Network Rail. Considerable work is ongoing in the Efficient Project Governance initiative by Network Rail in regard to locking down remits which improves quality, reduces change, thus enabling differing procurement routes e.g. fixed price lump sums.
- 3:56 Network Rail state that the centralisation of access planning and the work being developed to reduce the access planning horizon down from 2 years to 38 weeks will enable far less access to be booked as the designs will be more robust at this point in time. Based on CP3 trends, there is concern that the switching between maintenance, renewal, and enhancements spends will continue in future Control Periods, with a back loading of renewals towards the end of the CP disrupting planning and award of contracts. A similar trend is beginning to emerge in CP4 in which forecast plans are already the subject of change during the Control Period.



Source: Network Rail annual accounts

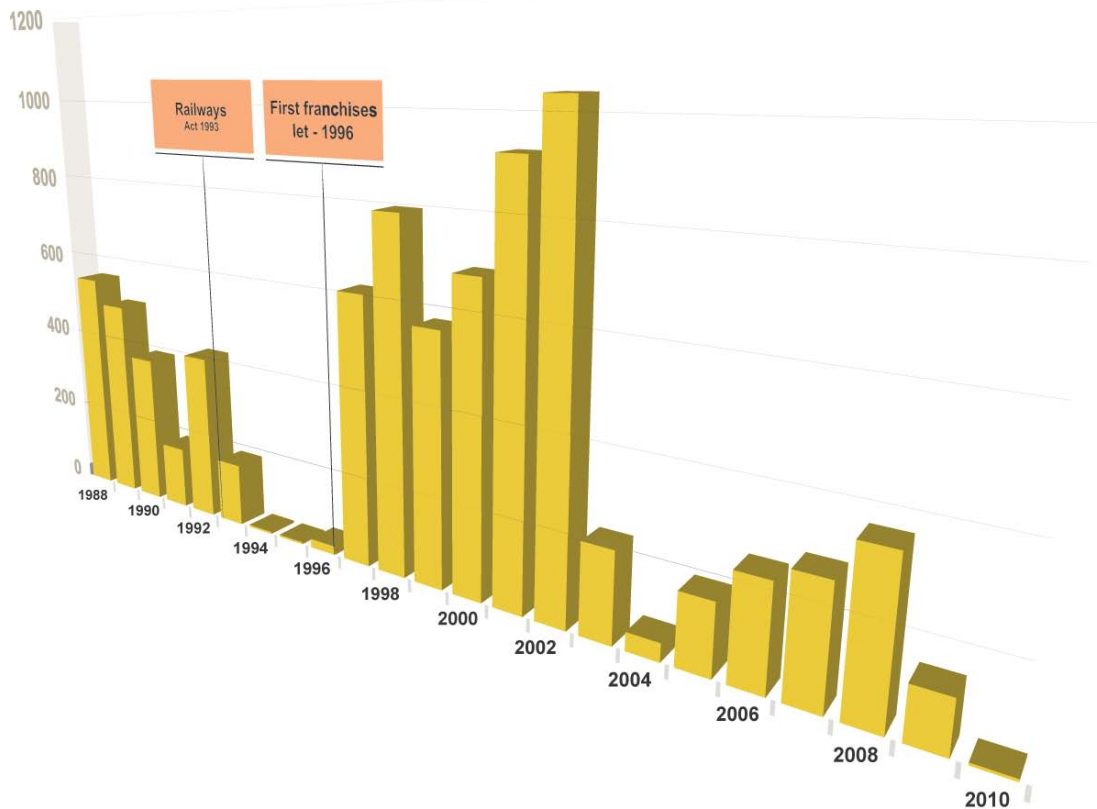
- 3:57 There is evidence that planning is improving within Network Rail e.g. in signalling, the projects have now been agreed for the remainder of CP4, with planning commencing for CP5; and Civils work-bank locked down with work packages awarded for FY11/12. There are, however, some areas that are recognised as still being immature in their planning projections, e.g. enhancements, which consequently prevent the early award of works. Furthermore, suppliers remain cautious about the prospect of work-banks ever becoming stable enough for them to commit to significant longer term cost reductions. Network Rail is seeking to address this issue with an increased line of sight, stating an intention to tender for example, Signalling, Power and Communications and Track works for a 10 year period. Network Rail also believes it will create a more robust and effective end to end project delivery process and standardised product range once the combined effects of the design standardisation (design to cost), value engineering, cost modelling, workbank planning and efficient project governance (Transformation) initiatives are achieved (see Appendix G).
- 3:58 Network Rail has acknowledged that significant investment was undertaken to gain a clear understanding of its maintenance unit costs and cost drivers. Poor coding and poorly coded activity was stated as a barrier to understanding these drivers, and a cause of significant regional variation. Each delivery unit’s maintenance costs are now compared to a theoretical unit cost for each activity based on standardised delivery methods and then benchmarked against each other on an annual basis to drive out poor performance and to drive down unit

costs through knowledge sharing and best practice. Network Rail stated that they apply regression analysis to total Maintenance Delivery Unit (MDU) costs. Individually 65% of the 40 Maintenance Unit Costs (MUC) are measured and monitored by Network Rail; however, it is evident there is still some way to go as significant variations still exist.

- 3:59 Maintenance unit costs for rail replacements are being used as a target price for contractors, although the regional variability suggests that they are not fully built-up costs in all circumstances. It is not clear if other MUCs are being or will be used as a benchmark for contractor target costs, though clearly this would bring benefits in driving down costs. The implication is that Network Rail is not able to say whether it is operating at the most efficient level, be that at a fully built up cost for the in-house provider or that of an outsourced one.
- 3:60 Network Rail has been slow to adopt new innovations, examples include the introduction of Modular Switch concept – although this is expected to be fully implemented by 2013, it will have taken 9 years to implement a process already proven elsewhere. Currently, 25% of the work-bank is modular component, and a tender for modular switches and crossings units is anticipated in September 2010.

3.3.3 Operations and Vehicles

- 3:61 Barriers that have historically existed at various stages of the supply chain interfacing with other parts of the rail industry still remain, preventing the development of a transparent and collaborative relationship with the TOC/FOCs and the rest of the supply industry. These barriers include the restrictive nature of TOC franchise terms, the lack of an agreed mechanism to carry out sound economic trade-offs between infrastructure, rolling stock and operating decisions, cyclical funding and franchise award periods. However, we have found examples of good practice and improvement such as the technical service agreements between Virgin and its train manufacturers Bombardier and Alstom.
- 3:62 Franchised train operators have limited control over their cost categories:
- a. All regulated costs, such as fixed and variable track access charges are determined by the ORR and passed through to Government
 - b. Costs of vehicle leases are generally set at franchise commencement and are fixed for the duration of the franchise term
 - c. Tight specification of the franchise commitments, such as the timetable, limit the ability of the operators to flex their operating costs
- 3:63 The current approach to rail franchising has tended to result in most of the Committed Obligations in the contract, such as the refurbishment of rail vehicles, being programmed to happen early in the franchise, to ensure the required return before the franchise expires. Where multiple franchise contracts are let simultaneously, or in close succession, the front loading of Committed Obligations has caused demand volatility and capacity constraints in the supplier market and also therefore resulted in leaner periods for suppliers when there is less franchising activity.
- 3:64 There are minimum ticket office opening hours in the franchise agreements and the Ticketing and Settlement agreement; effectively imposing restrictions that impose increased costs on the industry. There is inertia to change for political and industrial relations reasons and these restrictions may also limit incentives to introduce new technology, such as smartcard tickets.
- 3:65 There is no coherent objective or strategy articulated to the supply chain for the specification, procurement, funding or management of GB rolling stock. Although an update to the 2008 Rolling Stock Plan was promised to the industry by the DfT in June 2009, it has not been delivered as they wanted the market to come up with their own plans. This has resulted in a very unpredictable situation for vehicle manufacturers and unless resolved is expected to lead to continued inefficiencies in vehicle manufacturing, driving up the cost of procurement.
- 3:66 Historically, demand for new passenger rail vehicles has been volatile, ranging from nominal orders to a peak of 1000+ vehicles in the last decade. Manufacturers, ROSCOs and TOCs have suggested that this increases the capital cost of new vehicles and may also increase the risks associated with the procurement and commission of new vehicles.



EMU/DMU orders for mainline railways by BR/TOCs

3:67 This volatility in demand, cited by manufacturers, causes increased risk and cost to their business to the value of 10-20% increased costs. Reasons given for this increased cost include:

- a. Spare manufacturing capacity to cope with peak demands increases overhead costs.
- b. Labour, redundancy and training costs associated with creating a right sized workforce to meet current demand.
- c. Volatility of supplier prices and loss of scale opportunities further down the supply chain.
- d. Changes in standards and regulations over time increasing development costs and risk.

3:68 The DfT forecasts that there will continue to be volatility in the demand for new passenger vehicles in years to come; the causes of which include:

- a. The life expiry profile of the current fleet.
- b. Known changes to standards, most notably the changes to Persons of Reduced Mobility regulations in 2020.
- c. Major infrastructure programmes, such as Crossrail.

3:69 The DfT estimates that, on average, between 350 and 400 new passenger rail vehicles will be needed every year to replace ageing stock and accommodate forecast increases in passenger demand.

3:70 According to RIA and a rolling stock manufacturer, significant cost is incurred during the procurement process ranging between £500k when bidding for a simple follow-on order to £15m for a complex major project. Costs can increase by as much as 20% where customisation creeps into the process, e.g. the level of product change between projects with similar requirements leading to non-recurring design, procurement and approvals costs (since 1993, 23 different variants of train have been put forward by the (one) manufacturer in response to independently conceived procurement exercises) or an inconsistent approach

deployed for the bidding of manufacture and finance, or abortive costs where projects are delayed or cancelled.

3:71 There is evidence that ramping up production lines accounts for a significant proportion of vehicle costs. Efficiencies with train procurement could be achieved if planning and control is right. For example, orders for Lot 10A Electrostar trains were quoted at £1.1m per vehicle with options for follow on orders as low as £780k per vehicle. The delay in obtaining a decision from the DfT, however, allowed the option price to lapse and the eventual price was £1.25m per vehicle.

3.3.4 Non-GB Rail

3:72 There is a mature relationship between the Dutch Government and ProRail so targets and strategy develop in a constructive and collaborative way; where necessary TOC's are also involved. The Dutch Government articulates its maintenance and renewal expectations of ProRail through four qualitative targets included within ProRail's management contract. ProRail's output principles (reliability, availability, maintainability and safety) are cascaded into the supply chain through quality indicators, maintenance specifications, maintenance activities and contracts, thereby aligning objectives for the railway and lines of responsibility.

3:73 In The Netherlands the planning horizon within ProRail is on a 10 yearly rolling cycle that fixes budgets and work-plans, with projections also made on a 15 year outlook. Long-term planning (up to 20 years) is typically a top-down exercise, however the 10 year plan is completed bottom-up. Were GB rail to take this rolling cycle approach it is expected that the peaks and troughs in work volumes along the supply chain would be smoothed.

3:74 Renewals planning within ProRail is completed on a 3 and 5 year basis. A cost modelling system is used to predict costs for different alternative renewals scenarios using discounted cash flow methods to predict lifecycle costs and is used to explain the flow of expenditure between maintenance and renewals. Renewals are undertaken as discrete projects (i.e. not undertaken as part of maintenance activity), and the average costs for renewals have reduced since they were outsourced. Most efficiency improvements come from bundling activities across asset groups. Keeping the renewals outsourced in discrete projects containing bundles of activities is in contrast to GB rail where many activities are being brought in house and an asset-siloed approach still remains.

3:75 ProRail is the decision maker and contractors deliver all maintenance and renewals services, including logistics and labour, within the Dutch railway system.

3:76 In The Netherlands, ProRail competitively tenders larger renewals activities and uses framework contracts. Maintenance contractors are not guaranteed renewals work but are able to tender for it; they are not given any concessions over other contractors.

3:77 Historically maintenance contracts were based on activity within ProRail, although output contracts (introduced in 2008) are now commonplace and are based on performance and incentives. Contracting periods are typically 6 years.

3:78 A standard set of unit costs are used by ProRail for lifecycle cost calculations. These are based on actual costs and are regularly updated.

3:79 The Swedish Transport Administration, Trafikverket, stated that maintenance and renewal delivery has been progressively outsourced since 2002 and will be fully outsourced by the end of 2010. There are five contractors and the target is to have eight. Contracts are competitively tendered by area (all asset types) covering a number of sections of line and generally of 5 year duration (sometimes extending to 7 years). Renewals and some preventive maintenance is procured outside these contracts. It was stated that base maintenance levels are generally agreed over the period with some variability on renewals and enhancements (which are most likely to be affected by annual budget levels). There are separate, network-wide contracts competitively tendered for certain track activities requiring specialist plant (e.g. ultrasonic monitoring, grinding), traffic information equipment and power supplies. These are generally of 3 years duration extendable to 5 years. Unlike Network Rail, the Administration does not own any rail plant, engineering vehicles, etc and these are provided by the contractors.

- 3:80 Industry feedback has provided examples of a number of tools/techniques which they consider to have taken too long to introduce into GB rail. These include methods routinely used in Switzerland such as Second Life System (approved by Network Rail in August 2004) and the use of dedicated teams to undertake rail stressing using heater-stressing equipment (which is not seen as a separate activity in GB rail). Other examples include making full use of RailVac technology to avoid heavy lifting when renewing ballast, e.g. re-ballasting switches and crossings on non-primary routes at reduced cost. Other suppliers have received encouragement to develop solutions for the GB market which have then not been pursued, such as enclosed barrier systems.
- 3:81 In France, Germany and Japan, long-term framework agreements are used to procure rolling stock, allowing manufacturers to take a long-term view and promote investment in skills, technology and standardisation. It was suggested by RIA and a rolling stock manufacturer that a 10 year framework covering rolling stock supply plus standardised base level service support and financing (taking account of whole-life costs) could be advantageous.
- 3:82 It has also been shown in other industries that framework agreements work for continuous maintenance workloads but significant savings can be made through separately negotiating agreed work packages, even with incumbent suppliers. It is the selection of the appropriate approach that is critical to driving the required cost efficiencies. A recent example from the UK Offshore industry demonstrated a 50% discount saving \$4m over framework rates when a renewal/construction activity was packaged and separately negotiated with the incumbent suppliers.
- 3:83 In the regulated part of the power industry, the clear objective is a commercial drive to outperform the ofgem allowances for infrastructure maintenance and renewal to deliver more value to the shareholders. The constraints on the TOCs through the current detailed franchise specifications mean that they do not have similar degrees of freedom to outperform for their shareholders. With only one shareholder, who is also providing direct funding, there is not the same profit or share-performance driven incentives for a not-for-dividend entity such as Network Rail.
- 3:84 The way the regulation of the power industry is carried out is constantly under review as it too has an impact on the ability of the supply chain to maintain a smooth level of supply and demand due to the way the incentives for efficiency and investment are imposed. In previous control periods, the savings from 'efficiencies' could be kept throughout the current control period, encouraging efficiencies in early years that resulted in a famine across the supply chain. This drove capital investments to be delayed until later in the control period, resulting in excessive and high cost demands on the supply chain.
- 3:85 The water industry works on a 5 year investment period with a 25 year approach/demand plan. Similarly, the utilities industries are also mature in their planning and decision-making, enabling longer-length work-banks to be locked-in. Planning occurs at a network level with delivery planned by geography, and work is contracted regionally enabling local workforces to be deployed, saving additional travel and expenses. In GB rail a high degree of uncertainty dominates resulting in short-term, cross-industry planning horizons. This is believed to be driven by the maintenance and renewals budgeting not being locked into an agreed long-term asset management plan.

3.4 Whole – System Programme Management

- 3:86 We have found that a lack of clarity and stability of whole railway objectives leads to differing expectations of the degree of change within enhancement projects. Industry structure and misaligned planning timescales lead to programmes with complex interfaces or only partial system scope; this often results in solution-focused project requirements, as opposed to output focused requirements. It is important to note that a lack of accurate and comprehensive asset knowledge and cost information will limit the ability to make robust and enduring whole-system, whole-life trade-offs. Route Utilisation Strategies currently investigate broad options to assess value for money. However, following the HLOS and Periodic Review process, GRIP uses different business case criteria to evaluate options.
- 3:87 No evidence was presented to demonstrate a universally applied test or criteria to assess value for money for GB rail enhancements or that there is a whole rail business case or owner. Neither GRIP nor industry processes require projects to review and reconfirm their cost benefit ratio once they are initiated. There is evidence that the different commercial, contractual and regulatory pressures applied to organisations, which share critical technical interfaces, leads them to have their own different project governance arrangements. The complex industry structure means in many cases the benefits of an investment are realised remotely from the necessary investment source which is likely to stifle innovation even with common whole rail benefit to cost ratio assessment criteria.
- 3:88 Evidence of successful application of an Integrated Programme Team approach (Chiltern, Evergreen) was presented where an optimum solution to meet the overall objectives was quickly identified using a dedicated, multi-disciplined team of Chiltern staff and embedded experts. We noted that in later phases, the project has been hampered as key stakeholders have not supported the integrated team approach, eroding the clarity of vision and shared project objectives. This has resulted in delays, increased costs and a more process (as opposed to output) driven approach. Such integrated team concepts are also applicable to railway planning and operational aspects. We believe that integrated teams that are accountable and responsible for the delivery of programme/planning objectives to fruition are a good mechanism. Leaders within such teams should be responsible for managing activities and delivering objectives that are clearly aligned with industry requirements. They should be empowered to make performance/time/cost and risk trade-offs within parameters that are consistent with the criteria set for the industry. Clarity of expected output requirements and standards is vital for all parties.

3.5 Practical Non-GB Rail Case Studies

3.5.1 Scottish Power Energy Wholesale – A case study

3:89 Historically the Station Manager of a power plant was empowered to manage its own destiny within a framework of processes for Health and Safety and Engineering. The historical paradigm had been one of little interference providing the results met expectations. The then owners of ScottishPower were looking to reposition the organisation to improve reputation, performance and maximise shareholder value. The company took the decision to harmonise processes across the fleet of ScottishPower generation assets spanning coal, oil, gas, hydro and renewables in a bid to meet the requirements of its then owners. Over a 3 year period, and with a strong imperative from the top of the organisation, it moved to a situation where the whole company is aligned on a single set of objectives, single investment budget and single set of decision making criteria. Alongside this, a core review of information management arrangements and tools was undertaken.

3:90 During the course of this change, ScottishPower was acquired by Iberdrola Group, the fourth largest energy company in the world – within which they compete for investment funding with other Iberdrola Group member companies.

3:91 Practical benefits achieved

3:92 By applying the new approach the following benefits were achieved:

- a. 20% reduction in Operations and Maintenance costs.
- b. 22% increase in plant availability.
- c. 25% reduction in plant forced outage rates.

3:93 A further benefit has been a 10% reduction in Capital Expenditure through applying consistent optimisation criteria. A 20-25% saving on software licensing costs on an annual basis was reported through the adoption of a common information systems platform and removal of the previous plethora of locally acquired and managed software packages. Maintenance improvement was reported as a result of revised maintenance approaches from a position where only 5% of maintenance was preventive to one where 70% of maintenance activity is preventive. As a result, better staff deployment, less contracting and a better reputation within the Iberdrola Group to attract investment funding (more confidence in capability) were reported.

3:94 Timeline and cost of implementation

3:95 The cost of the programme was £5.2m with most of the expenditure being focussed on the integrated IT and reporting tools. This was supported by a business case which was monitored and the basis of delivery.

3:96 This has taken three years (started precursor activity in 2006). The approach was:

- a. Set clear “Big 6 Goals” across the business, e.g. operate sustainable processes.
- b. All objectives aligned with the Big 6 - company, generating site, department and personal.
- c. Introduce a measurement system that aligns with the key asset management processes in “near real time” (updated daily and visible to all).
- d. Align rewards and incentives with the Big 6.
- e. Provide an integrated information system that supports those objectives and common processes.
- f. Drive the change through empowered management in an aggressive timescale to generate and maintain momentum.

3:97 Factors for consideration and impact on the achieved outcomes

3:98 Key enablers to facilitate cost reduction. Clear investment decision making criteria which were determined using senior management workshops. At an engineering and technical level multi-disciplinary maintenance working groups were established with limited external influences

(including from their own owning company – Iberdrola Group). The company views a fully integrated IT suite as a key enabler that has helped gain internal buy-in to the change process by providing people with what they “need”, not necessarily what they “want”. It was stated that there was a significant effort applied to managing the process of change and winning hearts and minds.

- 3:99 Maintenance optimisation approaches. Each generating site used to operate and maintain their own assets with local processes and procedures. The company has tackled plant, process and people together to have ‘one way’ of doing maintenance. The shift to more preventive maintenance has enabled less unplanned downtime and better workload scheduling. The company has a strategy to become a high reliability organisation.
- 3:100 Degree and use of unit/whole life cost information. Whilst investment proposals come from individual sites, there is a central engineering function that balances whole life cost between the operating stations but also between commercial and procurement priorities. The company uses annual business plans and budgets for capital investment in the assets but is aiming to introduce a 10 year plan from 2011 and introduce more tool-based optimisation across sites and the company. The level of transparency gained from this approach now allows the company to make unit cost calculations on a consistent basis so that the relative operating cost per unit of generated power can be seen across the portfolio. Clearly this varies considerably over a portfolio that includes hydro, coal, oil and gas power generation with a range of asset ages but serves to challenge asset engineers to improve relative to their peers and identifies when assets are approaching the end of their economic life.
- 3:101 Cultural, behavioural and competence requirements. Good asset management is seen as imperative to de-risk the business. The reason for change was defined, presented in a way staff would understand (around process safety management and risk control) and implemented quickly as a series of 19 projects involving the staff. Whilst change was driven from the top there was extensive consultation to bring people along and change the perception to one where it was clear that everyone bought into the message and approach.
- 3:102 The asset information management approach utilised. The company adopted an integrated IT plan and made a conscious decision to adopt common tools with minimum bespoke (100% off the shelf) and adapted their processes to align with this. This required commitment from the leadership to make it happen and a cultural change to break down the “we are different” argument. This was achieved with a quick implementation that gathered and maintained momentum and provided a good information base for decisions. KPIs that directly link to the Big 6 Goals are available to all staff via a web dashboard. Tools included an enterprise risk tool and investment is continuing into an optimisation tool to support capital investment decisions across the company.
- 3:103 The associated management/governance arrangements and impact on decision making. The power generation industry is operating in a competitive, commercial market with significant decision-making discretion. There is limited Government intervention and regulation and no subsidy. The company is not economically regulated (though safety is overseen by HSE and competition regulations apply) and have no minimum generation targets, having to be responsive to the market and to ensure assets are available and then perform reliably at economically advantageous times. They are very clearly market driven but, although these privately owned assets clearly have a degree of national significance, there do not appear to be tensions concerning their use and development (however, there does not seem to be a mechanism for ensuring that national capacity is guaranteed). The governance of asset management was clearly moved to the centre to achieve this change to a consistent approach and has provided the ScottishPower leadership an un-paralleled level of transparency of their asset management performance.
- 3:104 Cost management and commercial influences/controls. A stated key driver is to avoid (financial) loss. The company has a central engineering function that facilitates the balancing of whole life cost criteria between all sites. This central team engages with central procurement to ensure that end decisions are balanced and appropriate. The company has a commercial (market share/customer volume) strategic plan to 2030 which influences the Engineering Managers locally to recommend technology and investments going forward.

There are incentives to invest in renewable energy generation. The company trades 30 minute generation period contracts with customers and also operates within the “balancing market” operated through National Grid contract to help balance the overall supply across the UK. There are penalties if they fail to deliver. The company has to modify the times of operation of its assets to maximise revenue. The need for near real-time information was based on a recognition that the ability to flex to a changing marketplace on an hour by hour basis was essential to survival.

3:105 Collaborations/partnering and supply chain arrangements. The company partnered with a Glasgow based IT company, the Amor group, to assist with the integration of its IT systems.

3:106 What is considered good

3:107 The company has a clear set of aligned objectives through the company (multiple plants and asset types) and consistently applied decision making criteria. They take appropriate consideration of the wider business risk in its various forms (performance, cost, environmental, reputational, safety, etc) and have established the ability to make changes and to trade-off across asset types in the existing asset base. They appear to have aligned accountability for results and responsibility for delivery. They have adopted integrated information arrangements that support their decision making and to achieve consistent performance monitoring across the asset portfolio. Specifically it was clear the information availability was aligned to accountabilities and responsibilities. They have established appropriate tools and techniques supported by good asset knowledge to shift their maintenance regimes towards risk and condition-based preventive maintenance which is better planned.

3:108 What this means in practice

3:109 The Engineering Managers apply a common approach at each site and drive performance and investments based on a good information base for decisions (technical risk register, common tools, dashboard, etc). There is a common sense of direction for all staff linked through to individual objectives. The single common approach around 6 goals, 8 risk control themes and 42 risk control measures is understood. There is visibility of performance to everyone through reporting aligned with the organisational objectives. The change in maintenance approach results in less exposure to availability penalties and improved planning.

3:110 Applicability to GB rail

3:111 The concepts are applicable and transferrable, as are the lessons from the approach to change. These include the single common approach to drive consistency from the centre into the assets to achieve the bigger prize, a common basis for asset information, common engineering performance metrics and common criteria for maintain or replace decisions.

3:112 However this company benefits from a very unconstrained commercial environment which would be difficult to achieve in GB rail within the levels of government intervention and regulation. For UK energy generation there is a common product (not to be confused with a standardised means of provision) so competition is on price and reliability of the assets in delivering the energy so they are driven very much by commercial business prerogative. This is not the case for the various elements of GB rail, even at the highest level of ‘delivering an end to end journey’. The example is also within a company rather than an industry although a significant part of the industry and other players are likely to be doing a similar thing. The study timescales did not permit consideration of the overall governance and coordination of UK energy generation as an industry.

3.5.2 ProRail, The Netherlands – A case study

3:113 The company is the Government's delegated (infrastructure) asset manager, responsible for planning and organising the necessary outputs. They have evolved an integrated 'output steering' approach through four key strategic pre-conditions (objectives) set by Government from which SMART objectives are set, planned and applied across the industry. The four strategic pre-conditions are:

- a. Transparency in the relationships between activities, costs and performance.
- b. Awareness of the interaction between performance by manager and operators.
- c. Awareness of the long term effects of maintenance.
- d. Structures and systems for effectively using the insights gained from these (1 – 3).

3:114 ProRail's strategic objectives require them to facilitate 50% more trains and reduce lifecycle costs by 20%.

3:115 Practical benefits achieved

3:116 An effective and integrated way of working with information transparency across all parts of the industry. Comparison of route types and the effects of changing conditions are understood to inform decisions. There is a good understanding of costs as a basis for ongoing improvement (recent cost trends are understood to show reduced cost levels).

3:117 Timeline for implementation

3:118 The objective setting and whole life cost modelling approach initiative started in 1998 and have evolved with most elements at the current state since 2008 when the latest contracts were established. This period was used to develop both client and supply chain maturity (skills and culture) in a considered way enabling output-based contracting where ProRail, as client, fully understands the input relationships.

3:119 Factors for consideration and impact on the achieved outcomes

3:120 Key enablers to facilitate cost reduction. The company coordinates all infrastructure planning activities and drives the delivery supply chain using six SMART objectives:

- a. Maintenance Management. The relationship between costs, activities and performance is known.
- b. Life Cycle Management. All decisions on new build versus maintenance are taken on the basis of demonstrably lowest lifecycle (whole life) costs.
- c. Quality Assurance. The chain of primary processes including tasks, responsibilities and authorities and internal / external interfaces is described and managed.
- d. Information. Reliable data is available for management, financing systems, dashboards and metrics (KPI's) and is managed at an appropriate level.
- e. Management Instruments. Instruments (including procedures and tools) and systems for supporting asset management, financing and dashboards are implemented and integrated.
- f. Staffing and Organisation. ProRail has embedded professionalism across the organisation.

3:121 Maintenance optimisation approaches. The company has a comprehensive tool kit, cohesive modelling approach, realised cost data and integrated asset information systems which together enable decisions around the optimisation of whole life business costs, performance and risk exposure. As an example, track assets are given an estimated theoretical renewal life to enable a long term (20 year) financial plan that includes volumes and costs and is classified by asset type. Government currently requires a 10 year financial planning horizon. Track infrastructure is reviewed using a 'yardstick' tool as it approaches the theoretical life and engineers determine if it can continue to be maintained, be life extended to optimise the lifecycle or renewed. This changes the section of track from 'Theoretical Life' to 'Technical Life'. A life cycle costing model is used to ascertain if life extension or a complete

renewal is the best financial option, enabling consistent prioritisation for life extension / renewal and budget planning.

- 3:122 Degree and use of unit/whole life cost information. All decisions on new build/renewal versus maintenance are modelled and taken on the basis of demonstrably lowest whole life costs using actual (realised) maintenance / renewal costs and realised lifecycle information. Following extensive analysis the company has a business model to predict expected maintenance costs in relation to changing circumstances (utilisation, day / night, effective working time, quantities) and a cost database with cost norms and cost calculation for maintenance, renewal and new rail infrastructure. Changes to operating conditions and configuration have been found to have the greatest impact on maintenance and renewal costs. They have undertaken significant comparison between routes that have different numbers of trains and tonnages and determined (understood) the effect of changing conditions on maintenance costs (variables used have been trains per year / passenger numbers, track configurations, tonnes per day, failures, punctuality).
- 3:123 Cultural, behavioural and competence requirements. The company has evolved to become professional in asset management, understands the asset base and accepts that others have the competence and are often best placed to undertake activities on the infrastructure. They encourage supply chain innovation to introduce new and better ways of doing things.
- 3:124 The asset information management approach utilised. There are comprehensive and integrated asset information systems / tools supporting the entire asset management operation managed by a small team. For example, inspection train information is maintained up to date by an independent supplier who runs the infrastructure inspection trains / data collection and supplies required management information to both ProRail and contractors throughout the Netherlands. Information is transparent and all use the same. The supply chain procures the plant / IT systems to deliver the information under a ProRail contract.
- 3:125 The associated management/governance arrangements and impact on decision making. The company works under a management contract and has developed a mature relationship with Government to enable strategy and targets to develop in a constructive and open manner. ProRail administers contracts with supply chain contractors to deliver almost all infrastructure services (engineering, maintenance, renewals and construction projects). They audit the process, measure the output and evaluate the results. The company manages train path applications and liaises with train operators over timetables track access and capacity issues. There is clear responsibility for the infrastructure and, in case of disputes concerning the use and development of these 'national assets', train operators can ask the NMa (Netherlands Competition Authority) for a settlement.
- 3:126 Cost management and commercial influences/controls. The renewal life cycle of all assets is estimated and based on an average (theoretical) life time. ProRail have projected a forward plan 2010-2030 (called the long term financial plan) that includes volumes and costs. This covers some 82 separate elements sub divided into key headings (IT/Traffic Control/Communications systems, Transfer (energy transmission), Signalling, Energy Supply, Bridges and Level Crossings, Track). They have depreciated all of their assets. A life cycle cost model is in place and there is confidence with the data and outputs. Modelling of quantities, construction year, utilisation, lifetime and unit costs is performed for long term planning.
- 3:127 Collaborations/partnering and supply chain arrangements. The philosophy is that the company manages the assets leaving the supply chain to manage delivery (an approach aligned with the INNTRACK programme). Outsourcing is seen as a way to improve rather than a goal and it is recognised that there is a need to control costs and performance by knowing the business and applying a mature attitude to contract management. The company has evolved the contracting mechanisms since 1998 and now (since 2008) uses RAMSHE-based (Reliability, Availability, Maintainability, Safety, Health, Environment) performance contracts specifying outputs with incentives through competitive tendering. Depending on risk the performance of maintenance contracts is specified and managed at different levels and sustainability is added as a top down specification. There is one management contract for stations maintenance. Performance of the contract (output) is specified and managed at

related levels through RAMSHE specifications, integrated quality indicators, maintenance specifications and inspection / maintenance activities. Safety and quality measuring/reporting is outsourced and all quality information shared. Supply and logistics of materials is also outsourced.

3:128 What is considered good

3:129 A single set of clear and consistent requirements is in place for the whole infrastructure expressing the outputs required over a 10 year rolling cycle (activated through annual business plans which contain explicit financial and performance targets). Asset lifecycle planning and knowledge are used to project long term financial plans including volumes and costs (20 years for track assets). They have adopted integrated information arrangements that supports decision making and performance monitoring across the industry rather than just within the company.

3:130 What this means in practice

3:131 The company sets six SMART organisational objectives to deliver the strategic pre-conditions (around maintenance management, lifecycle management, quality assurance, information, management instruments, staffing and organisation). Train operators input into performance requirements. The arrangements are robust enough to support largely outsourced delivery with discretion over how it is delivered. The supplier often organises the plant/IT and other services necessary to deliver and is encouraged to innovate. All parties are competent, informed and collaborate towards achieving the objectives.

3:132 Applicability to GB rail

3:133 The functionality of infrastructure asset management and the high level responsibilities are very similar between The Netherlands and GB rail (and equally applicable) but the evolutionary position is considered to be very different. Both are Government funded. The Netherlands has had a consistent asset management focus for many years and aligned the people, processes and tools accordingly. This gives a confidence in making changes efficiently and quickly. There are coherent strategies for, as an example, asset inspection so that data gathered is used to generate meaningful management information and knowledge. The outsourcing culture is established and seen in a positive light with an acceptance that the best people for a task and the method of doing that task does not have to be determined 'in house'. The degree of cross-industry trust and collaboration appears to be a key factor in this as does the balance of experienced engineering staff across the industry in appropriate positions to make or influence decisions.

3:134 The barriers for the GB rail context would appear to be around industry structure, role focus and Governance and the willingness to cede control. As a result applicable competence and knowledge has been distributed or even lost and an attitude of 'old was bad, new knows best' tends to prevail. The current Network Rail Transformation programme is tackling wide ranging topics with good strategies and plans. It is less clear that effective transition plans to invest and embed the necessary arrangements are established which could be a significant barrier to delivering benefits.

3.5.3 NS Reizigers, The Netherlands – A case study

3:135 The company is 100% Government owned but operates commercially as the primary domestic train operator in The Netherlands. They operate 95% of traffic with around 3000 vehicles and hold the Inter City network concession, producing the national timetable and undertaking strategic fleet planning and fleet procurement. They also operate stations with the associated retail opportunities. They have business plans to 2040 with the current plan looking ahead to 2015. Part of the consideration is the accommodation of over 30 other passenger and freight operators, including international, that operate within or through The Netherlands rail network.

3:136 Practical benefits achieved

3:137 The planning appears to be effective at achieving the industry objectives which appear to be aligned around train service provision. The company achieves optimised rolling stock provision and operation. They have reduced fleet km by up to 10% over the last 18 months whilst achieving necessary demand and performance requirements.

3:138 Factors for consideration and impact on the achieved outcomes

3:139 Key enablers to facilitate cost reduction. Output specification, leaving rolling stock detailed technical provision and maintenance to specialist companies. The company is coordinating energy-saving initiatives through train design and traction power provision. They stated that a new aerodynamic design for double-decker train refurbishment has a 2-3 year return on investment. They are also undertaking lifecycle cost analysis for new or modified fleets. The company is collaborating with ProRail (infrastructure manager) on whole-system planning of improved route capacity, radically revising the timetables to increase service frequency with the same number of vehicles (4 trains an hour to 12 (shorter) trains per hour). The aim is to seek an operational solution rather than costly, disruptive and lengthy infrastructure enhancements. All parties have cooperated with live trials with a view to a refined business case for full implementation in the 2012 timetable (and rollout to other routes). There is a major timetable recast every 6 – 7 years.

3:140 Maintenance optimisation approaches. This is understood to be largely in the domain of specialist technical service providers such as NedTrain for fleet. NS stated that they accept that detailed asset fleet knowledge resides with NedTrain (who also write the maintenance manuals). NS have to agree the proposed maintenance and stated that they have sufficient knowledge to do this.

3:141 Degree and use of unit/whole life cost information. NS stated they are at an early stage of applying whole life cost thinking. NS agrees the cost of maintenance with NedTrain who are responsible for efficient technical delivery. For renewals and refurbishment NS specifies services or performance criteria, e.g. onboard wifi provision, leaving NedTrain to specify and source an appropriate technical solution.

3:142 Cultural, behavioural and competence requirements. Staff are stated as receptive to collaboration, for example with rolling stock maintenance subsidiary NedTrain. Operational performance feedback is provided to staff and depots are benchmarked. Managers' contracts are understood to be performance based and directly linked to service objectives.

3:143 The associated management/governance arrangements and impact on decision making. There is no financial regulation, no Government subsidy (though the Government is 100% owner of the company) and passenger numbers are the main business driver. Nedtrain (rolling stock maintenance) and NS Financial Services (fleet leasing) are subsidiary companies each with their own budgets and incentives but sharing a common Board which agrees profit levels for each company. The companies trade commercially. The Government provide a minimum specification for train operations which NS develops into a working timetable with the necessary vehicles, logistics and resources. NS pay ProRail for use of the infrastructure (track access). There were no stated tensions concerning the use and development of these 'national assets' although there are issues with emerging European standards, e.g. around disability provision, which NS are trying to influence.

3:144 Cost management and commercial influences/controls. NS has optimised decision making through improved internal working (less departmental hierarchy between commercial, logistics and rolling stock). Rather than delivering a requested service change without question, solutions are now identified, costed and agreed through a revised planning approach which has enabled 5-10% less fleet km to be run over the last 1.5 years whilst servicing demand and meeting KPIs. NS seeks to use standard products as much as possible and is aiming to consider whole life costs when procuring rolling stock/modifications.

3:145 Collaborations/partnering and supply chain arrangements. The company decides on the fleet options that best meet the objectives, specifies the requirements and manages the procurement project commercially. More recent fleets have been leased via the company's leasing arm.

3:146 What is considered good

3:147 Long term planning and 'whole system' industry objective setting. There appears to be budget transparency and accountability with understanding of performance, cost and risk. The company states that it takes a lifecycle costing approach to rolling stock planning and specification. They appear to have a culture of continuous improvement (recognised by an award in 2008 for the train scheduling approach).

3:148 What this means in practice

3:149 The thinking and delivery appears to be joined up. NS and ProRail have been collaborating on a strategic business planning initiative 'Vision 2020' and other improvement items such as capacity and winter preparedness.

3:150 Applicability to GB rail

3:151 The need and value of long term strategic planning and performance-driven objectives through the industry is equally applicable to GB rail. In The Netherlands, whilst there are a number of provincial concessions, the core operation resides with a single operator (NS) who appears to take a lead with fleet provision and works effectively with ProRail in terms of infrastructure requirements. Accepting that all are Government-owned, there seems to be less Government intervention than occurs in GB rail, less supply chain interfaces and an approach optimised around the national interest. Potential barriers for the GB rail context are that in The Netherlands fleets are much more flexible and operate across the country within common traction power and gauge criteria, generally being timetabled to a range of destinations rather than constrained to particular routes. As such there is no rolling stock cascade. There are only 7 main train types.

3.5.4 Trafikverket, Sweden – A case study

3:152 The Swedish Transport Administration was established in April 2010, external to Government, to better coordinate planning of national transport infrastructure (road, rail, sea and air). This organisation owns the road and rail infrastructure and is the Infrastructure Manager with safety, management and financial responsibility. They have inherited and developed a long running strategy to optimise maintenance and renewal provision on a local basis within a national framework.

3:153 Practical benefits achieved

3:154 In excess of 12% punctuality improvement was reported on one route over 18 months (against a backdrop of increasing traffic levels) as a result of collaborative approaches with the line's two operators who were keen to increase quality. Revised maintenance strategies have generated 15-20% savings over 8 years by moving from time based to condition based maintenance. An approximate 20% saving in maintenance and renewal costs has been achieved between 2002 and 2009 through a progressive move to outsourcing which did not overheat the market. This was initiated on low traffic lines and is about to be completed in the busy urban (slow speed) areas of Stockholm.

3:155 Timeline for the implementation

3:156 The time to achieve this was 8 years. There are indications that a cautious and progressive approach to maintenance strategy revision and outsourcing has been taken, recognising the quality of asset information available to support decision making. This highlights the importance of good information to asset management and of being realistic about the ability to use it effectively.

3:157 Factors for consideration and impact on the achieved outcomes

3:158 Key enablers to facilitate cost reduction. The company stated that there is regular collaborative dialogue between traffic control centres, operators and maintenance contractors (all train operation is outsourced through concessions).

3:159 Maintenance optimisation approaches. The company advised that enhancements (investments) have, since 2008, been subject to a review of maintenance needs to develop maintenance consequence descriptions which are considered a success. It was stated that there has also been a greater awareness of maintenance needs through the development of analysis tools over the last 10 years. This has enabled the use of effective maintenance strategies to increase route capacity and punctuality and to reduce maintenance costs. The company stated that they develop the Government's two high level objectives (relating to accessibility and HSE) through goals (quality, punctuality, traffic information, safety, reliability) for five classes of line, e.g. permitted number of failures per track km. It was stated that these are progressively being linked to maintenance objectives and cascaded to lower goals for specific lines as contacts are re-let. The line classification makes it easier to prioritise in line with the demands of the Government's required socio-economic evaluation.

3:160 Degree and use of unit/whole life cost information. Wheel rail interface interaction was identified as representing 42.5% of total infrastructure maintenance cost and moving to wider use of rail grinding has reduced renewals by up to 50% and produced significant savings. The company stated that whilst standards set out technical life expectations for assets, the application of whole life costing approaches are in their infancy. There is an intention to move towards life cycle costing but this is in its early stages.

3:161 The asset information management approach utilised. Asset information is organised around a central asset register used for consistent output accessed by all parties, contractors, etc. Data input is currently via a number of standalone software tools (modules) all linked to the central tool. Field data is mostly collected and downloaded via handheld devices. It is planned to move to a single Maximo system. An advanced analysis tool (LUPP) is under development as is OPTRAM a tool which makes it possible to plan certain activities such as grinding, tamping and maintenance of catenaries in a much more advanced and effective way. The company recognises the need for good asset information to support decision making and

to compare maintenance activities undertaken. Overall they report having various data quality issues and that asset information suitability is work in progress.

3:162 The associated management/governance arrangements and impact on decision making. The Swedish Government has a small transport ministry (less than 10 staff) and funds most infrastructure costs through annual budgets in response to delivery plans. The Government initiates audits of delivery and expenditure to the plan and the Swedish Transport Agency regulates safety (but not economic) matters. The Government sets two high level objectives (accessibility and HSE) and provides guidelines on specific activities and rules to be applied. The Government requires socio-economic analysis using a defined methodology but the company stated that there remains a lack of knowledge on the effects of activities and some difficulty in measuring these factors.

3:163 Cost management and commercial influences/controls. The company has regular dialogue with contractors to review performance and quality. The relationship with established contractors was stated as generally collaborative rather than contractual. A delivery plan is produced associated with the annual Government agreed budget (currently planning for 2011-2013). The company stated that it uses analysis tools to decide on any reduced outputs following dialogue with contractors and consideration of risks if funding levels are not secured. There is no specific prioritisation tool.

3:164 Collaborations/partnering and supply chain arrangements. The company stated that maintenance and renewal delivery has been progressively outsourced since 2002 and will be fully outsourced by the end of 2010. There are five contractors and the target is to have eight. Contracts are competitively tendered by area (all asset types) covering a number of sections of line and generally of 5 year duration (sometimes extending to 7 years). These include inspection, tamping and associated maintenance plant (renewals and some preventive maintenance is procured outside these contracts). It was stated that base maintenance levels are generally agreed over the period with some variability on renewals and enhancements (which are most likely to be affected by annual budget levels). The contracts include a penalty regime, e.g. for slow failure fix, possession overrun. It was stated that there are separate, network-wide contracts competitively tendered for certain track activities requiring specialist plant (e.g. ultrasonic monitoring, grinding), traffic information equipment and power supplies. These are generally of 3 years duration extendable to 5 years. The company does not own any rail plant, engineering vehicles, etc and these are provided by the contractors.

3:165 **What is considered good**

3:166 An integrated approach to bring a wider-system perspective and expertise to decision making. Empowerment, appropriate competence and devolved responsibility (within a contracted maintenance arrangement). Use of appropriate tools and techniques coupled with asset knowledge to reduce uncertainty.

3:167 **What this means in practice**

3:168 Objectives are flowed down to contractors and there is a greater understanding of the wider risks and consequences in decisions affecting maintenance and renewals. Selecting appropriate maintenance strategies has enabled cost savings.

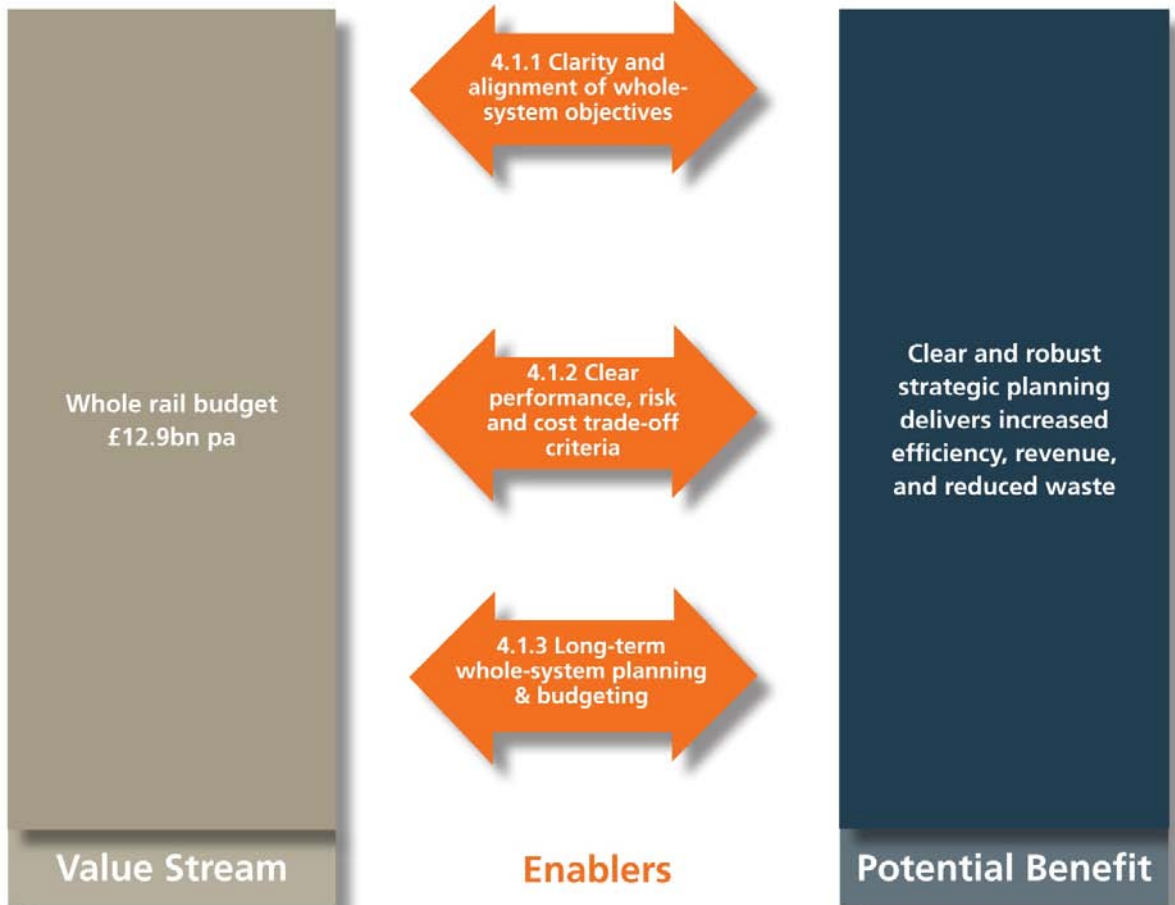
3:169 **Applicability to GB rail**

3:170 The need for appropriate maintenance and renewal strategies to suit the operation of various lines, based on sound asset knowledge is equally applicable to (and recognised within) GB rail. There is a noticeable difference in approach between the two countries (role of Government, overall planning and control arrangements, operator interaction and degree of outsourcing) but both appear to see the need to 'refine' the industry structure, presumably to overcome perceived barriers – the Transport Administration in Sweden being created this year. In both cases funding is coming from Government but the degree of oversight appears different. The Swedish appear to recognise that evolution is appropriate and that results are not instant and require investment.

4. Potential for Improvement

- 4:1 Based on our findings (described in Appendix E and summarised in Section 3), our industry knowledge and experience we generated a range of hypotheses with potential for generating better Value for Money (listed in Appendix F). We reviewed and distilled the hypotheses to identify a number of specific supply chain and asset management opportunities where the findings suggest there is potential to increase Value for Money.
- 4:2 Four primary opportunity areas have been defined:
 - a. Aligned objectives (based on findings articulated particularly in Section 3.1).
 - b. Whole-system asset management (based on findings articulated particularly in Section 3.2).
 - c. World class supply chain (based on findings articulated particularly in Section 3.3).
 - d. Whole-system programme management (based on findings articulated particularly in Section 3.4).
- 4:3 In the following sections we have identified the potential benefits for each opportunity and the key enablers to achieve them.
- 4:4 Where possible, we have calculated an indicative cost saving estimate based on ranges we recorded during our interviews, our experience in working with other industries and what we believe to be realistic for GB rail to achieve. More specific assumptions can be found in Section 5.
- 4:5 We have also identified the key barriers that we believe need to be overcome to ensure success.

4.1 Aligned Objectives



4.1.1 Clarity and Alignment of Whole-system Objectives

4:6 This would require:

- a. A single set of clear and consistent requirements that the GB rail system should deliver. The requirements need to clearly address performance, safety, environmental and cost requirements both today and over reasonable period, perhaps 15-30 years into the future to allow sensible strategic planning to occur.

Note - 'Performance' (above) relates to achieving objectives (which may be expressed in terms of operational, safety, environmental, reputational and financial/revenue considerations).

- b. Government and/or industry leadership to set the agenda and apply it consistently across the industry in its investment and spending decisions.
- c. An aggressive timescale to establish and roll out the objectives enabling momentum to be generated and sustained during the change programme.

4:7 The expected benefits would include:

- a. Commonality of purpose from all sections of the industry (from Government down to front line delivery at a local level and throughout the supply chain) ensuring that the industry is pulling in the same direction.
- b. Understanding that major spend decisions are in the right place to best facilitate delivery of GB rail objectives.
- c. The ability to target expenditure on those areas that will best facilitate delivery of objectives.
- d. The ability to accommodate a range of strategic approaches for different railway types.
- e. Clarity in regulatory regime as there is a single set of objectives understood by all.

Scottish Power Energy Wholesale

Moved over a 3 year period from every generating site operating their own assets with local processes and procedures to a situation where the whole company is aligned on a single set of objectives, single investment budget and single set of decision making criteria.

Reported a 20% reduction in Operations and Maintenance costs over a 3 year period.

4:8 The key barriers are:

- a. The lack of a mechanism to set and agree GB rail objectives.
- b. Inconsistency and poor alignment of the current standards, assurance and regulatory regimes with GB rail objectives.
- c. A perception from many areas of the industry that “we are different and therefore require a different approach”.
- d. DfT’s and industry’s ability to effectively set a long term strategy that is robust in the face of political policy changes.

ProRail, The Netherlands

Evolved towards ‘Output Steering’ through four key strategic pre-conditions (objectives) set by Government which are developed into 6 SMART organisational objectives for the infrastructure, robust enough to support largely outsourced delivery.

4.1.2 Clear Performance, Risk and Cost Trade-off Criteria

4:9 This would require:

- a. Agreement, definition and communication of clear criteria for carrying out performance, cost and risk trade-offs across the industry.

Note - 'Performance' (above) relates to achieving objectives (which may be expressed in terms of operational, safety, environmental, reputational and financial/revenue considerations). 'Risk' relates to uncertainty around achievement of any of the objectives, each requiring tolerability criteria.

- b. Aligning these criteria with the objectives set on the various industry participants.
- c. Provision of accurate and joined up industry information.

ScottishPower Energy Wholesale

Experienced a 10% reduction in CapEx simply through applying consistent criteria for optimisation.

4:10 The expected benefits would include:

- a. Consistency of decision making.
- b. Reduced bureaucracy (everyone agrees on decision making criteria so less debate and simpler approval processes).
- c. Better prioritisation of investments and work.
- d. Greater transparency of decision making and visibility of change impact.

RSSB

Expressed a view of the GB rail industry having:

- Very good systems for making safety related decisions.
- A reasonable system for performance related decisions, e.g. PPM.
- Little or no approach for systematically approaching wider system decisions at an industry level.

4:11 The key barriers are:

- a. A perception in GB rail that risk relates solely to safety and not wider industry risks.
- b. Acceptance and joined-up application of common decision making criteria (breaking down the “we are different” argument).
- c. Ensuring that the regulatory regime is applying the same criteria as other organisations in GB rail.

4.1.3 Long Term, Whole-system Planning and Budgeting

4:12 This would require:

- a. Objective setting on a longer time horizon (using common industry strategic planning arrangements).
- b. Long term costing profiles aligned with asset lifecycles.
- c. A common mechanism for appraising (valuing) investment (and possibly for sharing benefits).
- d. Realistic plan review arrangements.
- e. A single point of accountability at each level to ensure these are delivered.

ProRail, The Netherlands

Track assets are given an estimated theoretical renewal life to enable a long term (20 year) financial plan that includes volumes and costs and is classified by asset type.

Track infrastructure is reviewed using a ‘yardstick’ tool as it approaches the theoretical life and engineers determine if it can continue to be maintained, be life extended to optimise the lifecycle or renewed. This changes the section of track from ‘Theoretical Life’ to ‘Technical Life’. A life cycle costing model is used to ascertain if life extension or a complete renewal is the best financial option, enabling consistent prioritisation for life extension / renewal and budget planning.

4:13 The expected benefits would include:

- a. A budgeting environment that will facilitate and encourage long term risk management.
- b. An environment where whole-life decision making can facilitate better performance, cost and risk trade-off’s over the asset lifecycle.
- c. Greater transparency of the impact of near-term budget decision making on longer term performance, cost and risk.
- d. More effective long term strategic planning based on sound economics to allow proper trade-offs to be measured.

NS, The Netherlands

NS (train operator) is collaborating with ProRail (infrastructure manager) on whole-system planning of improved route capacity, radically revising the timetables to increase service frequency with the same number of vehicles. The aim is to seek an operational solution rather than costly, disruptive and lengthy infrastructure enhancements.

4:14 The key barriers are:

- a. Industry recognition and acceptance that the focus should be less on the regulatory review cycle and more on those long term assumptions that will require change over the life-cycle.
- b. Lack of honesty in budgeting.
- c. Misalignment in contractual and regulatory cycles.
- d. Inertia to change (including procurement alignment with whole-life cost approaches).

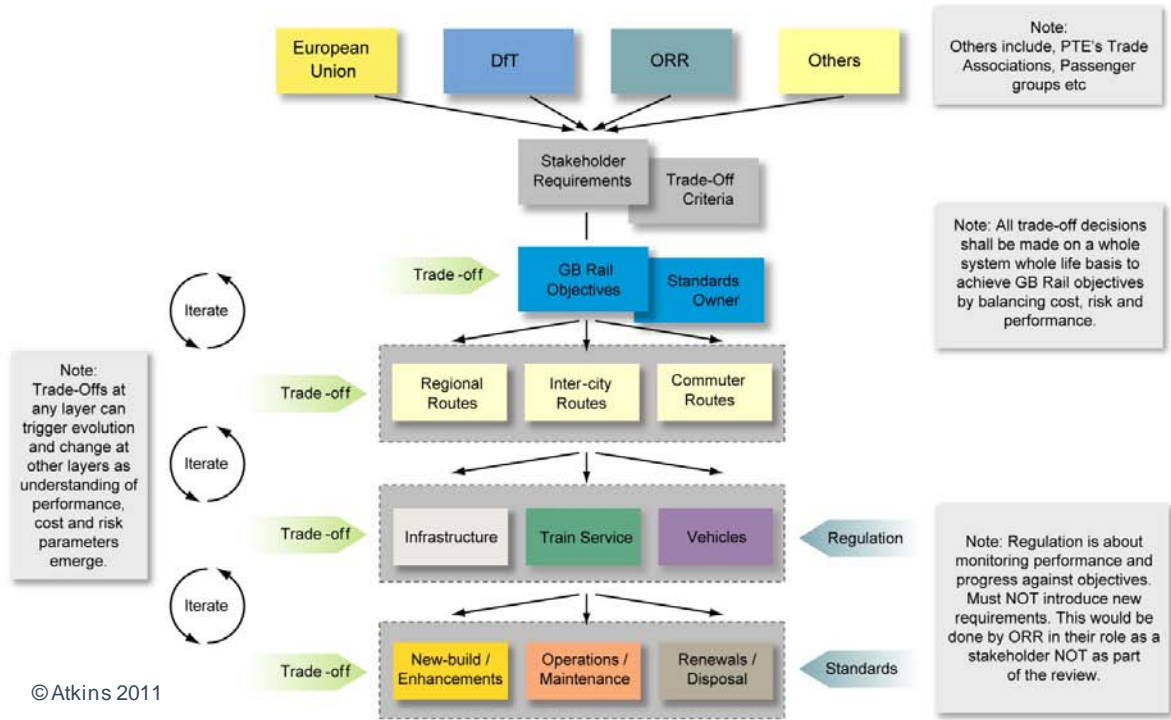


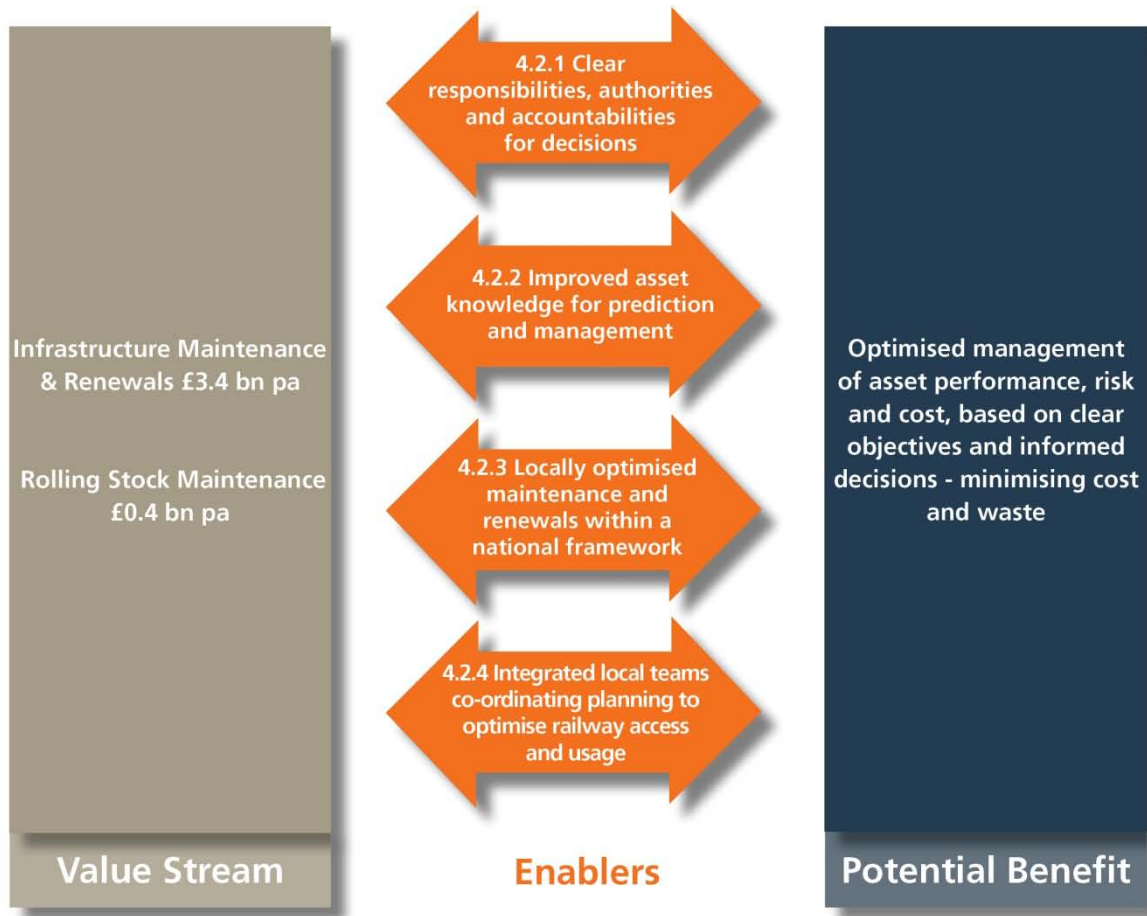
Figure 4.1 Representation of Idealised GB Rail Objectives Flow

Overall value of aligned objectives to benefit realisation

4:15 The asset management enablers identified in section 4.1 above are key to facilitating potential benefits in each of the other identified opportunity areas. In considering the flow of objectives, decision responsibilities and influencing factors through GB rail, we have produced a representation, shown in figure 4.1, to illustrate the extent of impact.

4:16 We have included some practical, illustrative case studies to indicate how asset management approaches can be used to derive benefits.

4.2 Whole-system Asset Management



4.2.1 Clear Responsibilities, Authorities and Accountabilities for Decisions

4:17 This would require:

- a. Clearly defined and consistently applied objectives and criteria for optimisation of performance, risk and cost.

Note - 'Performance' (above) relates to achieving objectives (which may be expressed in terms of operational, safety, environmental, reputational and financial/revenue considerations). 'Risk' relates to uncertainty around achievement of any of the objectives, each requiring tolerability criteria.

- b. Responsibilities and accountabilities appropriately devolved to facilitate local decision making within a wider framework.
- c. Improved industry collaboration arrangements to make decisions within available budgets, e.g. TOC engagement with route and rolling stock strategies.
- d. Suitably qualified, competent and empowered people across infrastructure/rolling stock/operations.

Network Rail

The infrastructure is now organised around 9 operational routes (Kent, LNE, etc) with associated Route Asset Management Teams holding budget responsibility. This is intended to align technical accountability (output performance / risk) and financial responsibility. The network has been further organised into 305 manageable route sections (typically 100 route km between key junction nodes and with similar traffic types and technical parameters) in order to develop the ability to trade-off asset expenditure across asset families and operate maintenance and renewal budgets at that level. The use of associated Route Utilisation Strategies engages passenger and freight operators to reflect whole-system planning.

NS, The Netherlands

NS has optimised decision making through improved internal working (less departmental hierarchy between commercial, logistics and rolling stock). Rather than delivering a requested service change without question, solutions are now identified, costed and agreed through a revised planning approach which has enabled 5-10% less fleet km to be run over the last 1.5 years whilst servicing demand and meeting KPIs.

- e. Adoption of appropriate tools and techniques supported by good asset knowledge.

4:18 The expected benefits would include:

- a. Quicker and more cost effective delivery through ability to spend on what is required when it is required.
- b. Facilitation of optimised rolling stock and infrastructure maintenance and renewals including revenue implications.
- c. Industry and individuals empowered to resolve problems locally within a national framework.
- d. Ability to flex across infrastructure, operations and rolling stock budgets.

4:19 The key barriers are:

- a. Silo mentality within organisations (need to think about wider route and national priorities rather than signalling or track or train priorities).
- b. Organisational resistance to change, e.g. culture, traditional working practices.

4.2.2 Improved asset knowledge for prediction and management

4:20 This would require:

- a. A commitment (and investment) to develop integrated information arrangements that support asset decision making and measurement of performance (within a national framework).
- b. A significant near term effort to populate and cleanse data to achieve appropriate and consistent levels of asset knowledge.
- c. Agile arrangements for industry / organisation information sharing.
- d. Adoption of appropriate tools and techniques for predicting and managing asset condition and deterioration, e.g. models, remote monitoring.
- e. Suitably qualified, competent and empowered people.

ScottishPower Energy Wholesale

Adopted an integrated IT plan and provided all staff with access to near real-time measures aligned with asset management processes via a web dashboard.

The IT department has assessed that the adoption of a common information systems platform has removed 20-25% of software licensing cost on an annual basis due to the previous plethora of locally acquired and managed software packages.

4:21 The expected benefits would include:

- a. Effective use of tools and systems to support cross-industry asset management that can accurately show cost/revenue impacts of decisions (and more standardisation).
- b. A better understanding of assets and achievement of related objectives.
- c. Alignment of measures with required industry outcomes and with an emphasis on continual improvement (rather than negative attribution).
- d. More certainty of asset availability (and a reduction in reactive activity).
- e. A better understanding of retained asset related risk.
- f. The ability to adopt common approaches to asset information management.
- g. The ability to deliver asset information to more participants to improve performance and engender ownership / pride, e.g. asset performance and condition knowledge.

ProRail, The Netherlands

There are comprehensive and integrated asset information systems / tools supporting the entire asset management operation. Information is maintained up to date and available to all contractors (all use the same).

SBB, Switzerland (from A McNaughton submission)

Efficiency savings (20 – 25% reduction in unit costs) were stated as a result of implementing an integrated asset information management system.

This included an asset register supported by an interlinked structure of asset specific files giving access to as-built drawings, equipment configuration details, track and overhead longitudinal positioning in space and component records. A noted success factor was that asset and project managers were made personally accountable for the absolute accuracy of the drawings and data loaded on to the system progressively over several years. All track maintenance work uses machinery controlled by the system's software files to restore track position.

- h. A reduction in the number of software packages and licenses (and more standardisation of tools).

4:22 The key barriers are:

- a. Silo mentality perpetuates the view that “we are different...” hence drives bespoke information requirements.
- b. Perceptions of a poor track record with major IT projects in the public sector in terms of cost and schedule.
- c. Engineers prefer their own spreadsheets and databases.
- d. Ability to manage the risks of introducing revised information systems.

NedTrain, The Netherlands
 A review and revision of maintenance criteria for 12000 vehicle wheelsets has enabled more accurate triggering of action and better planning as a preventative activity, reducing a 10m Euro annual cost by 4m Euro per year (40% saving).

 Daily train inspections analysed and found to be revealing low fault levels so, following technical review, periodicity extended to every 8 days with a more intensive inspection every 15 days, reducing annual inspection hours by 44%.

4.2.3 Locally Optimised Maintenance and Renewals within a National Framework

4:23 This would require:

- a. Clearly defined and consistently applied objectives and criteria for optimisation.
- b. Integrated planning teams for maintenance and renewals that include train operations and train maintenance expertise to ensure a wider system perspective – and similarly including maintenance and renewals input to rolling stock and train operation decisions.
- c. Responsibilities and accountabilities appropriately devolved to facilitate local decision making within a wider framework (facilitated by an adaptable standards base to suit the railway usage).
- d. Suitably qualified, competent and empowered people.
- e. Provision of appropriate tools and techniques supported by good asset knowledge (so that, for example, the maintenance cost and risk impact of renewal deferral is understood with a high degree of certainty).

ScottishPower Energy Wholesale
 Over the 3 years of their transformation programme the proportion of preventive maintenance to corrective maintenance has shifted from 5% to 70%. This results in less unplanned downtime and thus greater revenue and reduced exposure to availability penalties. Maintainers are better able to schedule workloads and planning.

Trafikverket, Sweden
 An approximate 20% saving in maintenance and renewal costs between 2002 and 2009 through a progressive move to outsourcing. Revised maintenance strategies generating 15-20% savings over 8 years by moving from time based to condition based maintenance.

4:24 The expected benefits would include:

- a. Consistent direction of objectives (all pulling together with commonality of purpose) but achieved by local accountability (ties in local asset knowledge but imposes national priorities).
- b. Improved ratio of preventive to corrective maintenance.
- c. A shift to the most appropriate cost-effective maintenance mix (run to fail, risk based, condition based, reliability based and time based maintenance regimes appropriate to the assets and usage) reflecting improved asset knowledge, e.g. a good understanding of deterioration and impact.
- d. Improved revenue flow (less delayed/cancelled services).

Kassel Regional System, Germany (from A McNaughton submission)
 Regional commuter routes have been segmented and converted operationally and technically as a low cost 'lighter rail' system. As well as enabling cheaper, standard lightweight vehicles, simplified train control systems and less heavily-engineered infrastructure, this facilitated a non-heavy rail approach to maintenance work using a multi-skilled team within a single management team accountable for revenue, operation and asset management. Larger occasional planned mechanised maintenance and renewal activities were contracted out by competitive tender.

 Overarching minimum national standards for this type of route were developed to ensure acceptable safety performance and to ensure sufficient standardisation to support the supply industry developing appropriate innovative products with certainty of sufficient market volume. These standards were worked fresh against affordability understandings rather than being piecemeal derogations from the standard heavy rail suite. Significant cost reductions were reported. This concept is defined, proven and available for wider adoption.

4:25 The key barriers are:

- a. Silo mentality within organisations (need to think about whole-system, e.g. wider route and national priorities rather than signalling or track or train priorities).
- b. The current structure does not allow collaboration and trade-offs at appropriate levels.
- c. Traditional standards base.
- d. Organisational obstruction to innovation, e.g. acceptance complexity, culture, lack of technology strategy, etc.
- e. Lack of asset knowledge and cost information.
- f. Lack of commitment to change and fear of failure leading to risk aversion.

4.2.4 Integrated local teams co-ordinating planning to optimise railway access and usage

4:26 This would require:

- a. Industry organisation to facilitate common objectives and incentivise working towards a common purpose.
- b. Provision of network availability decision support tools as seen in other European networks e.g. Germany (run trains or do work).

4:27 The expected benefits would include:

- a. Responsive and flexible operations and engineering planning (to a national framework).
- b. Better understanding of problems and more efficient utilisation of resources to resolve them effectively.
- c. Better systematic utilisation of infrastructure and rolling stock (increasing revenue opportunities through train operation and maximising use of engineering access).

4:28 The key barriers are:

- a. Industry structure and conflicting objectives / incentives.
- b. Regulatory regime.

ORR Asset Management Reporter, UK
 Network Rail was able to reduce track work volumes by 10% in 09-10 through revised track asset policies. The Reporter has stated (AMCL, 2009) that evidence from other organisations shows application of risk based maintenance can deliver up to 30% reductions in maintenance expenditure with no increase in risk.

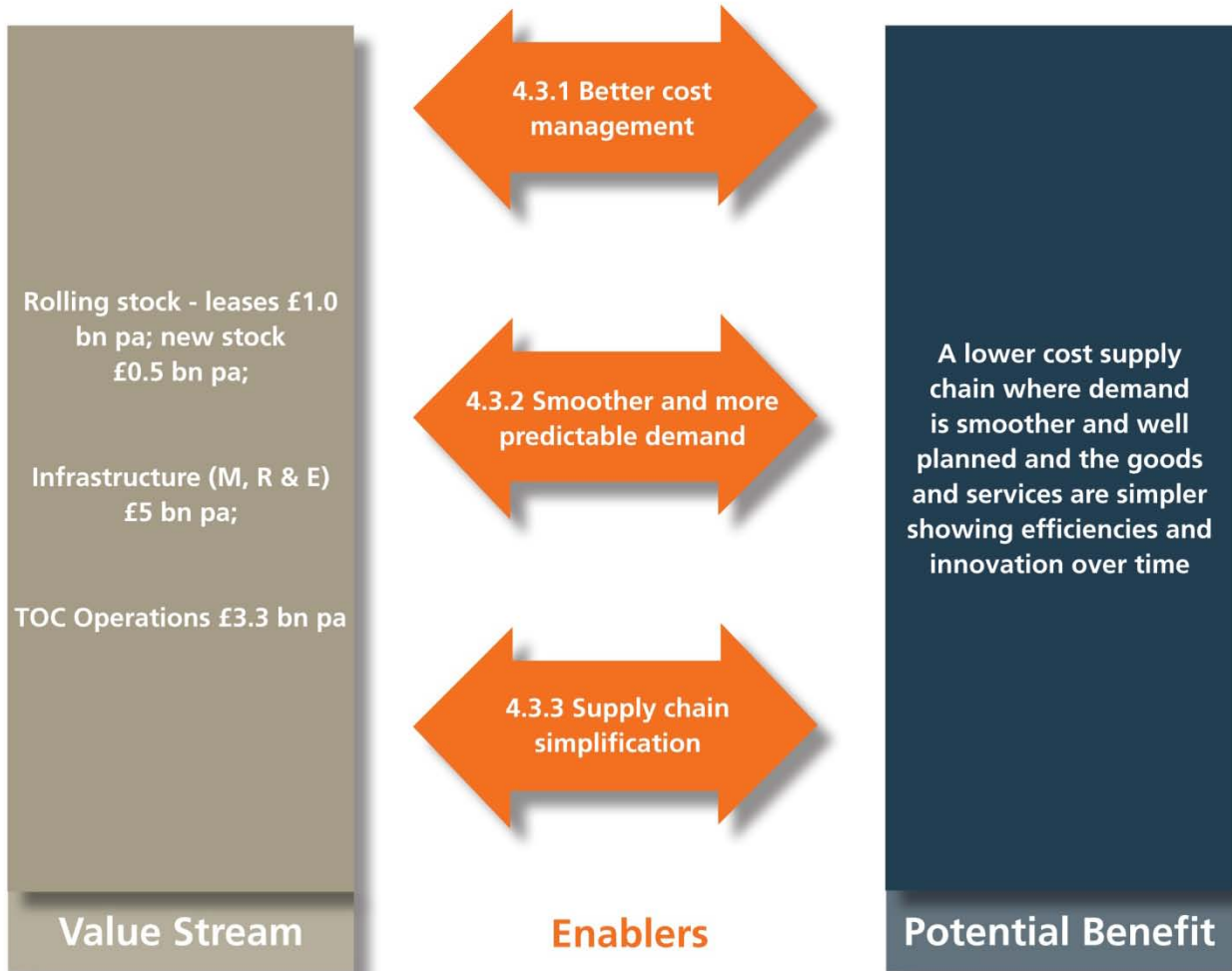
Alstom / Virgin Trains, UK
 15% train maintenance savings (and 15% increased asset use) reported over eight years.

Petroleum Company
 30% savings in terminal and retail outlet maintenance over five years.

Network Rail Planning Initiative
 All engineering planning is currently being centralised and PICOPs working on major possessions are being migrated to the planning team. The National Delivery Service organisation now provide real-time management of engineering access (to agreed Rules of the Route) and key materials delivery via an Infrastructure Group Control which enables a simplified command and control between planners, worksites and operational control.

Alstom / Virgin Trains Collaboration, UK
 Both organisations have partnered to improve train availability and performance. Alstom have made significant investment in the depots and restructured their staff to make both capable of delivering Virgin's needs. Planning horizons have been extended to a 24 month strategically planned work-bank. The 2008 timetable featured the highest train availability of any fleet in Europe and has been introduced with Virgin's fleet now responsible for less than 8% of train delays on the franchise and Alstom's costs lowered despite increased train mileage.
 There is a regular meeting structure and formalised real-time information flow between the two parties via shared system access. Alstom provides technicians to sit in Virgin's Control centre (enabling direct advice to train crew to diagnose and rectify faults). A performance regime was retained but it was simplified and generally issues and compensation are now dealt with at higher level and any settlements due are agreed before a formal claim is made.

4.3 World Class GB Rail Supply Chain



4.3.1 Better Cost Management

4:29 This would require:

- a. *Franchises* – The TOCs would be better able to make revenue versus service trade-offs if they were able to develop their own timetables and vary other elements of service delivery currently specified in detail in the contracts.
- b. *Rolling stock* – Evaluation of alternative, lower cost methodologies for procuring and financing rolling stock whilst remaining clear on who holds the asset risk.
- c. *Infrastructure* – Greater transparency of costs to allow evidence-based commercial challenge to internal and external costs consistently across all asset types can be achieved:
 - i. EITHER through greater detail demanded via the regulator as seen in the electricity or water sectors.
 - ii. OR building on the extensive maintenance and renewals unit cost work (especially in Buildings & Civils) and the cost data requested for major projects and applying one

OFGEM
Require the electricity and gas sectors to produce annual cost breakdowns that reach the level of direct labour, contracts and materials for each size of pipe diameter; ages of all asset types; numbers of failures. Similar cost breakdowns are requested annually by OFWAT.

Upstream Oil and Gas Company
A recent example from the UK Offshore industry demonstrated a 50% discount saving \$4m over framework rates when a renewal/construction activity was packaged and separately negotiated with the incumbent suppliers.

Water Company, UK
6% savings through improved procurement and being a more informed buyer.

Consumer Goods Company
Almost 20% reduction in impactable cost base through internal benchmarking of costs and capex analysis.

common approach to obtain fully built-up market prices for core work activities across all maintenance, renewals and enhancements (as seen in the common Work Breakdown Structure used by the Ministry of Defence and Highways Agency to build up commercial cost capture and estimating knowledge).

4:30 The expected benefits would include:

a. *Franchises* – Working with the TOCs through incentives in the franchises to identify opportunities for reduced operating costs in the order of 5-10% of the current £3.5 bn p.a. non-lease and access charges. This might include optimisation of the timetable, reduced off-peak ticket office opening, reduced train cleaning costs or other reductions in off-peak station staffing.

Highways Agency
As part of the Managed Motorways Project, 5 Contractors signed up to a Programme Framework of 7 joint/common projects to share best practices, improve cross-project buying power and to share risk. The incentive was the 40% of the savings (or loss) versus target cost from each project is pooled and shared amongst the suppliers once all 7 are complete. Contractors were willing to take on the risk of minor project changes under this regime.

b. *Rolling stock* – The benefits of using the Government’s covenant to provide finance for the existing rolling stock fleet held by the ROSCOs would be a reduction in funding costs:

Highways Agency
Example of £60 million saving out of a £300 million project through visibility and challenge of Tier 2 costs.

i. To use rolling stock as an example, in June of this year Porterbrook secured 10 year funding of £250m at Libor+300bp, this is about 295bp ahead of the Government’s cost of capital.

Carillion
Adopting a whole-life, whole-system approach, combined with early contractor involvement, has led to a 25% reduction in cost and programme for Heathrow T5C versus T5B – 15% shorter planning time, 10% shorter construction with risks better managed through learning.

ii. If this rate spread were to be repeated across the whole balance sheet of the three main rolling stock owners (estimated at £8.1bn at end 2008) it equates to reduction of the £1bn p.a. lease costs by 10-15%. (Note: this excludes any RV risk or margin and is solely the benefits from reducing the cost of capital).

c. *Infrastructure* – Reduction in maintenance, renewals and enhancements costs of £5 bn per year by 10 to 30% through:

i. Like-for-like comparison of projects at Initial and Final bid stages as well as Actual costs during delivery.

Swiss / German Railways
High output stressing of rails using specialist contract teams is estimated to save around £10k per item.

ii. Allow competition between in-house and external suppliers at strategic points in the supply chain to promote efficiencies.

Highways Agency
The HA Commercial Division is 35 people looking at a project portfolio of 26 projects worth £4bn with a pipeline of 35 projects worth a further £3.5bn

iii. Ability to negotiate costs with major Tier 2 and 3 suppliers which represent 30 to 60% of the cost base to ensure overall Tier 1 target costs are optimal.

iv. Ability to challenge costs for idle time during possessions and make possession overrun versus revenue decisions.

v. Contracting out repetitive work to specialist teams to get maximum efficiencies.

vi. Extend the types of savings seen in Network Rail buildings and civil work.

Automotive Company
30% savings through improved competition with security system suppliers.

4:31 The key barriers are:

a. *Rolling stock* - Primary legislation may be needed to initiate a refinancing of rolling stock because of the following issues:

i. Ownership of existing assets.

ii. Transfer of residual value risk from the private sector to Government.

iii. Constraints on Government borrowing and the PSBR in the current fiscal environment.

- b. *Infrastructure* – Avoiding the cost management of projects being an industry of its own but a commercial target driven group to achieve savings at a certain multiple of its costs.
- c. Getting the fully built up costs of activities rather than MUCs so that a fair external comparison can be made.

4.3.2 Smoother and More Predictable Demand

4:32 This would require:

- a. *Franchises* - A coordinated programme of one or two franchise replacements per year. A contract and DfT procurement process that encourages the franchisees to spread their investments and initiatives over the period of the franchise as opposed to focusing it in the early years. This approach will smooth demand in the supply chain for items such as rolling stock refurbishment, ticketing equipment and other TOC consumables and investments.

OFGEM
Considering extending their Price Review periods to 7-8 years to stimulate franchisees to meet their investment plans and perhaps attract further investment.

ScottishPower Energy Networks
Consider 8 years too long to be under a restricting price determination, likely to have a major mid-point review so may in effect result in two 4-year Price Review per year.
- b. *Rolling stock* - A long term (10 year+) rolling stock strategic plan with a structured cascade and replacement scheme:
 - i. Developed with cross industry input but led by a single point of accountability for managing rolling stock planning, cascading and replacement decisions.

Bombardier
£500,000 to £15 million per bid per supplier depending on scope.
 - ii. The purchase of a smooth profile of vehicles, possibly around 350-400 per year once the programme started perhaps with long-term framework contracts to procure rolling stock.

Go-Ahead
Lot 10A Electrostars were quoted at £1.1 million per order with options for follow-on orders at £780,000 but delays in initial order and no follow-on resulted in price of £1.25 million a difference of 14 to 60%.
 - iii. Agreements on residual values for existing fleet retired early, or refurbishment costs to extend life, to achieve smoothing.
- c. *Infrastructure* – Change to a series of 5 year programmes on a rolling or extended duration basis would reduce costs associated with feast and famine cycles in demand for contracted renewal projects for infrastructure. This might include:
 - i. A clear, coherent and costed strategic plan for rail maintenance, renewals and enhancements in order that work-plans can be effectively developed to deliver.

Network Rail Buildings & Civils
Developing work-banks for 2011/12 and will have 2012/13 by next April. Have seen savings in the region of 30 – 40% by tendering 30% of an annual spend of £370 million per year previously managed under 5 large frameworks due to strong competition in this market.
 - ii. A more efficient project control framework to prevent gaps between projects due to slow decisions.
 - iii. Revised approach to control period planning and execution that might include extended periods, overlapping to allow pre-investment in following periods.
 - iv. Increased transparency of plans across control periods to the contractor market to allow investment in training, mechanisation and other innovations.
 - v. Setting and locking-in reliable long term rolling work-plans for the next 5 years rather than just to the end of the current/next Control Period, will result in a reduction in the

SBB - Sersa
Sersa is a multinational rail maintenance contractor based in Switzerland. Sersa has developed and implemented a range of new approaches to S&C life extension and renewals. Sersa works in partnership with its clients, the local Infrastructure Manager (such as SBB) to provide 'just in time' service to renew S&C layouts for a fixed price per annum. Sersa's approach is to rigorously plan possession activity and maximise the use of mechanisation and prefabrication. Sersa can replace an S&C unit in between 6-10 hours, for a cost of £100-£275k. Sersa claim this is a saving of between 50% and 75% compared to the UK average for a similar job, which may take between 24 and 72 hours to complete.

number of cancelled or modified bids in the supply chain which would in term mean a reduction in the cost of goods and services.

- vi. Regular spend reviews will support forward planning.
- vii. Ownership, buy-in and accountability/commitment to plans in both rolling stock and infrastructure.
- viii. A cross-industry value / impact assessment to a change in plans, and effective escalation route if plans fundamentally change.
- ix. Recognition of increased financial risk and associated contingency if any significant change to the work-plan.
- x. Improved resource skills and capacity in planning and management of change to execute the work-plan effectively.

4:33 The expected outputs would include:

a. *Franchises*

- i. A smoother profile of franchise renewals would be a key enabler but may in itself only result in minor savings. These might be realised through reduced franchise bid costs, where less consultancy costs are incurred to deliver multiple simultaneous bids, and through smoother demand on the train refurbishment supply chain when new franchisees take over operations.

b. *Rolling Stock*

- i. Reduction in rolling stock manufacturers' overheads through avoidance of major industry spends on bidding for projects that are cancelled.
- ii. Reduced capital costs of replacement and new train units of an average of £0.5bn per year by an assumed 10-15%:
 1. Through avoidance of gearing up/down costs resulting from peaks in demand resulting from replacements of whole classes in one year due to reaching end of useful life or unsuitability to meet mandatory passenger safety or disability requirements.
 2. With a smoothed demand of around 400 units per year, a 15% reduction in capital cost may be possible equating to a saving of about £75 million per year.
 3. Using the current leasing model at a 15% reduced capital cost, the reduced lease costs would be about £8 million in the first year of programme raising to around £40m by year five and a steady state of circa £200m per year after 25 years once the whole fleet had been assumed to be replaced.

- c. *Infrastructure* – Reduction in spend of £5bn p.a. by 1-5% by eliminating mobilisation/demobilisation costs incurred by maintenance, renewals and enhancement contractors in response to sharp changes in demand due to uncertain work-plans.

4:34 The key barriers are:

- a. *Franchises* – Need to adjust contract terms and rolling stock leases to match required changes.

b. *Rolling stock:*

- i. Whether a single body can be created with the skills, capability and authority to develop the industry plan and ensure that it is insulated from external influence.
- ii. The replacement profile is driven by current fleet age and external factors some of which may be fixed (i.e. PRM TSI, RVAR etc).
- iii. Major project requirements, such as Crossrail need to be considered, and whether the required rolling stock could be purchased in advance of the infrastructure enhancement or phased in as capacity is required.

- iv. Current financing and capital costs may make new stock unaffordable and refurbishment may be the only affordable option delaying such a program.
- c. *Infrastructure*:
 - i. Lack of consistent and complete asset management information to allow the confidence that the rates of degradation are correct so that the appropriate maintain, refurbish or renew decisions can be predicted. This may be addressed by the Network Rail Transformation programme where significant effort is going into new route asset management plans.
 - ii. There may also be an issue over who has the skills and authority to develop and execute these plans without interference from interested parties.
 - iii. The current regulatory framework is too rigid to maximise benefits from this approach as it drives short term behaviour in planning how funds can be spent.

4.3.3 Supply Chain Simplification

4:35 This would require:

- a. *Rolling Stock* – Train Operating Companies to be made aware of the cost of the number of variations of GB rolling stock. They should be allowed a choice from a standard suite of options (as per the car industry) which will result in reduced capital and maintenance costs and be consistent with a smooth procurement profile.
- b. *Infrastructure* - Using standard European designs without adding GB complexity for some infrastructure would reduce the costs.

Bombardier

Since privatisation Bombardier has delivered 23 different variants of the same train type in response to independently conceived procurement exercises.

4:36 The expected benefits would include:

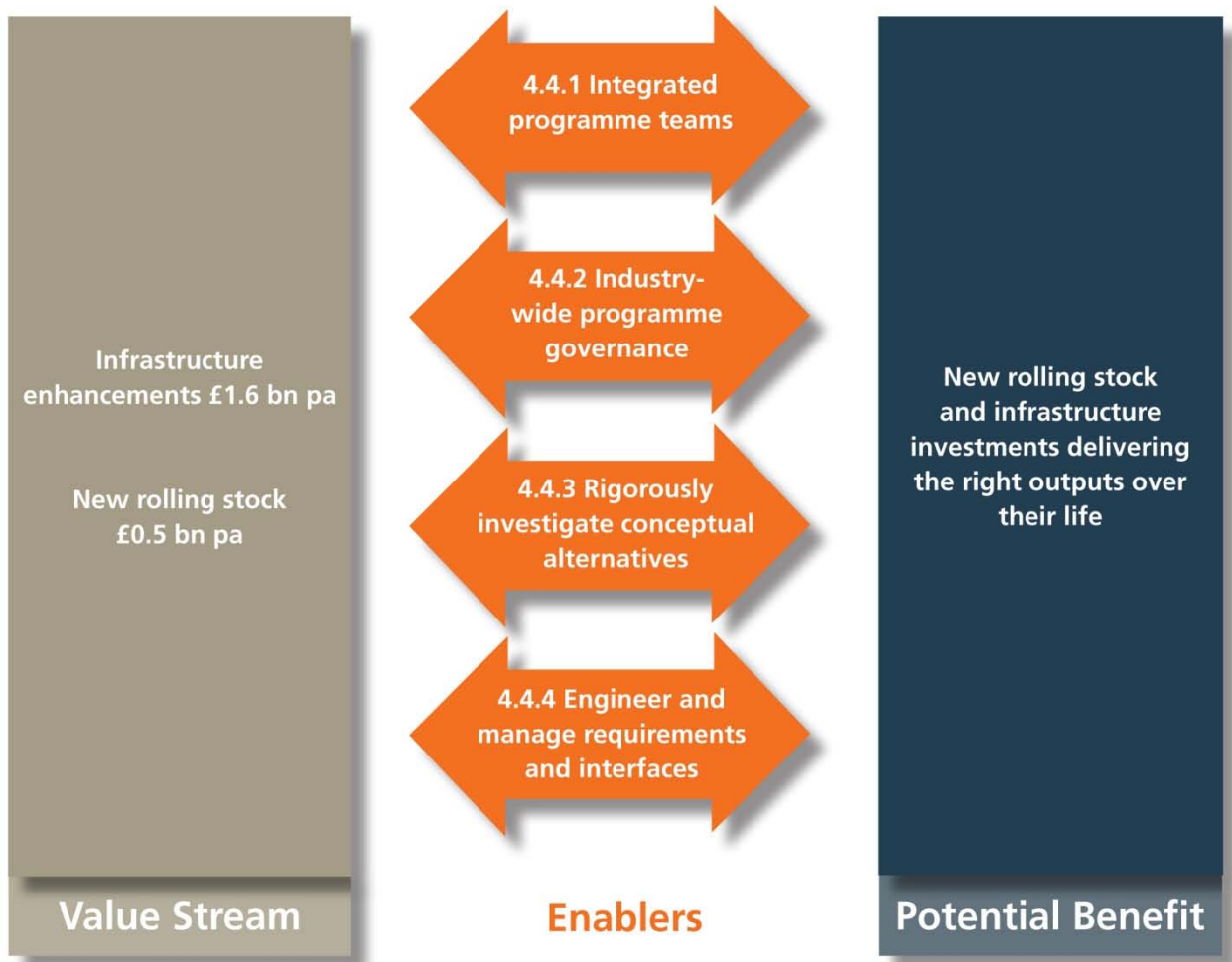
- a. *Rolling stock* - As an illustrative example, the possible scale of the benefits has been cited as around 5%-10% of the capital costs and up to 5% of the operating costs of new trains. (ATOC March 2010). This would reduce the assumed capital cost of £0.5 bn p.a. based on the replacement of around 400 vehicles per year. Likely also to have a similar impact over time on the estimated current train maintenance cost of £0.4bn million per year².
- b. *Infrastructure* - A reduction of 10% over time in the costs of maintaining, renewing and enhancing the infrastructure assets currently costing £5bn p.a.

4:37 The key barriers are:

- a. Where to draw the line between complete standardisation, mass customisation and bespoke design that still meets the restrictions and variations of the GB rail network.
- b. Influencing the grass roots engineering workforce to accept a standard product in place of their 'favourite design' as a result of preferential engineering.
- c. Avoiding designing bespoke high profile new projects requiring specialist trains and infrastructure that are incompatible with another part of the network.

² Assumes a 10% per annum maintenance charge on the £8 billion of current rolling stock

4.4 Whole-system Programme Management



4.4.1 Integrated Programme Teams for Major Investment/Enhancement Programmes

4:38 This would require:

- a. A team that is accountable and responsible for the delivery of the programmes objectives into service. Integrated Programme Team (IPT) Leaders will be responsible for managing projects without day-to-day direction from a management hierarchy and, in consultation with customers, for making performance/time/cost trade-offs within approved parameters.

Chiltern, Evergreen 1
An integrated team delivered substantially the same transportation outputs for £58m, verses an initial estimate of £183m.
- b. Personnel representing all the key specialisms, including operations, maintenance, planning/timetabling, engineering, requirement definition, financial and contracts. IPT members may be drawn from any of the stakeholder organisations. The breadth of expertise and multi-disciplinary nature of IPTs will underline the commitment to a whole-life approach.

House of Commons Business and Enterprise Committee
The committee recognises the importance of integrated team working, in improving value and also creating an environment that encourages innovation. It also notes that success in this area requires underpinning with collaborative (as opposed to adversarial) commercial arrangements.
- c. To ensure continuity, the IPTs will remain in being throughout the life of a project, until the system/equipment enters service and successfully delivers its objectives.

- d. Improved Asset Knowledge – supporting robust whole-life evaluation of options and integration of enhancements, maintenance and renewal planning to deliver optimised whole-life value.

4:39 The expected benefits would include:

- a. Project and programme teams that are focused delivering the required output, leading to innovation and agility in delivery, as opposed to being process driven.
- b. A reduction in capital spending while delivering the same or enhanced outputs, as a result of clarity of objectives, focus on value and authority to make performance/time/cost trade-offs within approved parameters. The ORR Reporter found that, over a small sample of similar projects TOCs, which typically have a more output and value focused project approach, are 73% efficient at capital investment and Network Rail is 58% efficient (Nichols Group, 2010)⁶⁵. In other words, TOCs spend 15% more of every pound they invest on assets on the ground.
- c. A reduction in project cost and time overruns. It has been reported that typically GB rail infrastructure projects overrun by 67%, against initial (GRIP 1) estimates (Halcrow Group Limited, 2010)⁸⁰. This is comparable to the situation reported by Bernard Gray (Gray, 2009)²⁷ where the application of Smart Acquisition, which incorporated whole-system approaches and integration programme teams, led to a reduction in average cost overruns from 53% to 25%.

Chiltern, Evergreen 3
The early phases of this project, which were successful at quickly identifying an optimum solution to meet the overall objectives, were undertaken by a dedicated, multi-disciplined team of Chiltern staff and embedded experts.

OGC MSP
Managing Successful Programmes guidance from OGC and other best practice (such as Oil and Gas firms) successfully employ a small number of hard stage gates.

4:40 Key barriers are:

- a. Lack of clarity and stability of whole railway objectives, leading to expectation of change.
- b. Industry structure and misaligned planning timescales, leading to programmes with complex interfaces or only partial-system scope and resultant solution focused requirements.
- c. Network and Station Change process that adds delays and cost to programmes, by allowing perverse incentives to cost/risk/performance trades.

4.4.2 Industry-wide Programme Governance

4:41 This would require:

- a. An industry-wide pragmatic project governance approach that is based on three strong, universally enforced stage gates.
- b. The Initial Gate to ensure early and full exploration of a wide range of options and trade-offs, with an emphasis on investment in early risk reduction work.
- c. The Main Gate is based on high-level of confidence of being able to deliver the project to narrowly defined performance, cost and time parameters.
- d. The Completion Gate confirms the benefits have been realised.
- e. A robust and agreed set of whole-system criteria against which the value of a railway investment is measured, in order that a consistent assessment of the benefit to cost ratio is applied initially and reapplied at key stages through project life.

Whole Rail Business Case
No organisation owns a whole rail business case, and the differing approaches used to measure value at a whole rail level, although based on NATA, are at a very high or outline level. There is no industry process that requires the cost benefit ratio of investments is re-checked once projects are initiated.

Waterloo Capacity Scheme
While the HLOS clearly specifies a peak passenger capacity increase, the project is described as about accommodating a 10 car trains. The objectives are complicated by the desire to use Waterloo International and the fact that the TOC has bid for additional services. Scheme options have been developed by the RUS, DfT (GRIP 1+) and now by Network Rail to GRIP3. As a result a number of alternatives have been developed and re-developed, including consideration for 12-car, resignalling and track remodelling. However, essential capacity increase can most likely be accommodated with minimal engineering change and using existing capability of platform 20.

4:42 The expected benefits would include:

- a. Providing assurance that limited funds are being invested in the right projects.
- b. Ensuring that projects are stopped where assumptions or circumstances change eroding the benefit to cost ratio to the extent that the solution no longer represents sufficient or the best value.
- c. Devoting appropriate effort to early project phases – International Council for Systems Engineering data shows that effective early investment on clarity of objectives and evaluation of options can lead a reduction in cost of up to 20% and an increase in on-time delivery of 50%.
- d. Increasing visibility and stability of investment demand/volume, leading to efficiencies and savings through the supply chain.

Route Utilisation Strategies
 These investigate broad options to assess value for money. However, following the HLOS and Periodic Review process, GRIP uses different business case criteria to evaluate options.

4:43 Key barriers are:

- a. The different commercial, contractual and regulatory pressures applied to organisations, which share critical technical interfaces, lead them to have their own different project governance arrangements.
- b. The complex industry structure that means in many cases the benefits of an investment are realised remotely from the necessary investment. This will stifle innovation even with common whole rail benefit to cost ratio assessment criteria, as there is no owner of an overall Whole Rail Business Case.

4.4.3 Rigorously Investigate Conceptual Alternatives

4:44 This would require:

- a. Based on clear understanding of required change/output, fully considering whole-system, whole-life trade-offs at the conceptual design stage, with a view to maximising whole-life value for money.
- b. Embedding the practice of documenting the evaluation of alternative conceptual solutions.
- c. Explicit consideration of the value to be reaped from external revenue generation opportunities offered by rail investments.
- d. Consistent assessment of whole-life costs across full range of solution options, which will involve modelling of performance, cost and risk against agreed criteria.
- e. A transparent assessment of the whole-life costs and benefits of a standardised versus a bespoke approach, valuing the investment and maintenance implications against project risk and performance, using agreed and standard criteria.
- f. A streamlined product and system approval process – lowering the barriers to alternative technology/products, enabling innovation and competition.

HLOS
 Specified the outputs for Thameslink to be 12 car trains at 24 tph in the central section; an input rather than a transport output.

GRIP 1-3
 Project expenditure on major enhancements up to the end of GRIP 3 was 4-5% of the total, which is recognised by Network Rail as being below recognised industry benchmarks of around 10%. This is being addressed.

IEP
 Andrew Foster's review of IEP notes that while the programme still passes the BCR value test, its BCR has been reducing and it is likely that credible alternatives (which were not worked up and tested) would offer greater value for money.

4:45 The expected benefits would include:

- a. Ensuring all alternatives (operational, rolling stock, infrastructure) to deliver the outputs have been robustly explored at the conceptual level, maximising value for money.
- b. A reduction in initial capital spend, due to a strong focus on the outputs required.

London Underground
 The Victoria Line Tube Map to Success used modelling, analysis and an assurance process to provide a quantified route map, demonstrating how many different project elements combined to deliver performance, operability and safety outputs at defined configuration controlled project stages. As the programme progressed the actual results were used to adjust the expected tolerance – and take appropriate action.

- c. Minimising the whole-life cost of new assets, delivering a long term reduction in the cost of the railway.

4:46 Key barriers are:

- a. Long project durations and contractual segmentation can lead to changes in personnel/consultants, which is often associated with changes in project direction and rework.
- b. Current practice of solution justification rather than selecting the most efficient/effective solution.
- c. The lack of accurate and comprehensive asset knowledge will limit the ability to make robust and enduring whole-system, whole-life trade-offs.

Thameslink

Has a multi-discipline, multi-stakeholder Integration team responsible for ensuring the system reliably delivers the required outputs. However, it was established a year ago, well after the requirements for the major rolling stock and infrastructure elements were fixed, so it has limited influence. The Thameslink programme has been running for 19yrs, and yet the primary role of the Integration Team is to model and communicate to stakeholders how the specified systems will interoperate in order to identify and engineer out or mitigate problems.

4.4.4 Engineer and Manage Requirements and Interfaces

4:47 This would require:

- a. Engineering the requirements and interfaces, enabling the concept to be specified to a sufficient and necessary level of detail.
- b. Partitioning of the conceptual solution and allocating requirements to the partitioned elements.
- c. Documentation of the environment within which the solution must work and the assumptions therein.
- d. A transparent assessment (including a whole-life costs vs. benefits) of the standards that are applicable, resulting in a conscious selection of the applicable, necessary and sufficient standards.
- e. Close coordination with the commercial framework for procuring the solution, to ensure appropriate allocation of risk and with careful consideration of the test acceptance process and criteria.
- f. A common approach to reporting and tracking the status of projects, which demonstrates progressive assurance against the requirements and links this to confidence in the delivery of the overall benefits.

Progressive Assurance, Carillion

Using requirements management tools to manage requirements and interfaces on major rail infrastructure projects, Carillion have demonstrated up to 5% savings in cost, in addition to valuable time savings.

4:48 The expected benefits would include:

- a. Assure projects and contracts deliver the required outputs, based on tracking progress against clearly engineered requirements and interfaces.
- b. Mature management of risk, where organisations take responsibility for managing risks based on their ability to affect them.

Kassel Regional System (from A McNaughton submission)

In Kassel, Germany, a comprehensive and pragmatic approach was taken to develop a minimal set of standards for the tram-train system, which balanced safety and the need for standardisation to support the supply chain. This has resulted in a sustainable rural/regional railway that has achieved significant cost savings.

4:49 Key barriers are:

- a. Complex technical, commercial and organisation interfaces that are not aligned.
- b. Media fuelled risk aversion to the use of engineering judgement because of the fear of personal persecution.
- c. A lack of trust in the supply chain results in risks being inefficiently and inappropriately allocated.

5. Conclusions

- 5:1 The previous section detailed a number of potential areas of improvement that have been identified. In each case the potential benefits were detailed.
- 5:2 This section describes how simple benefits realisation maps³ have been used to analyse the interdependencies between the areas and support an estimate of the cash value of the potential benefits. It should be noted that for simplicity, only key barriers have been translated into requirements and included in the mapping. These initial maps have been developed to inform the conclusions presented in this report and are included in Appendix H. They may be used to aid the development of implementation plans.
- 5:3 The analysis has concluded that the **Aligned Objectives** improvement area (described in Section 4.1) is a core enabler to all other opportunities, as illustrated in figure 5.1 and 5.2.
- 5:4 Benefits will be revealed as performance benefits, cash savings, avoided costs or increased revenue (as depicted in figure 5.1). In Appendix H each of the enablers has been modelled to show linkages to potential benefits.

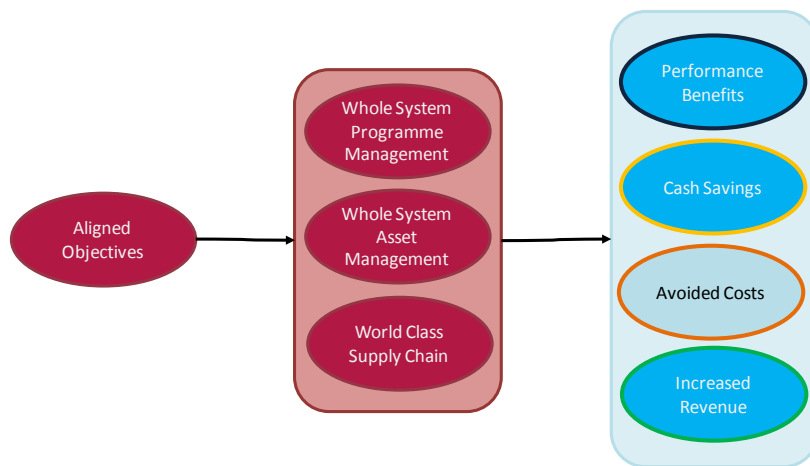


Figure 5.1: Overall Structure of Improvement Areas and Benefits

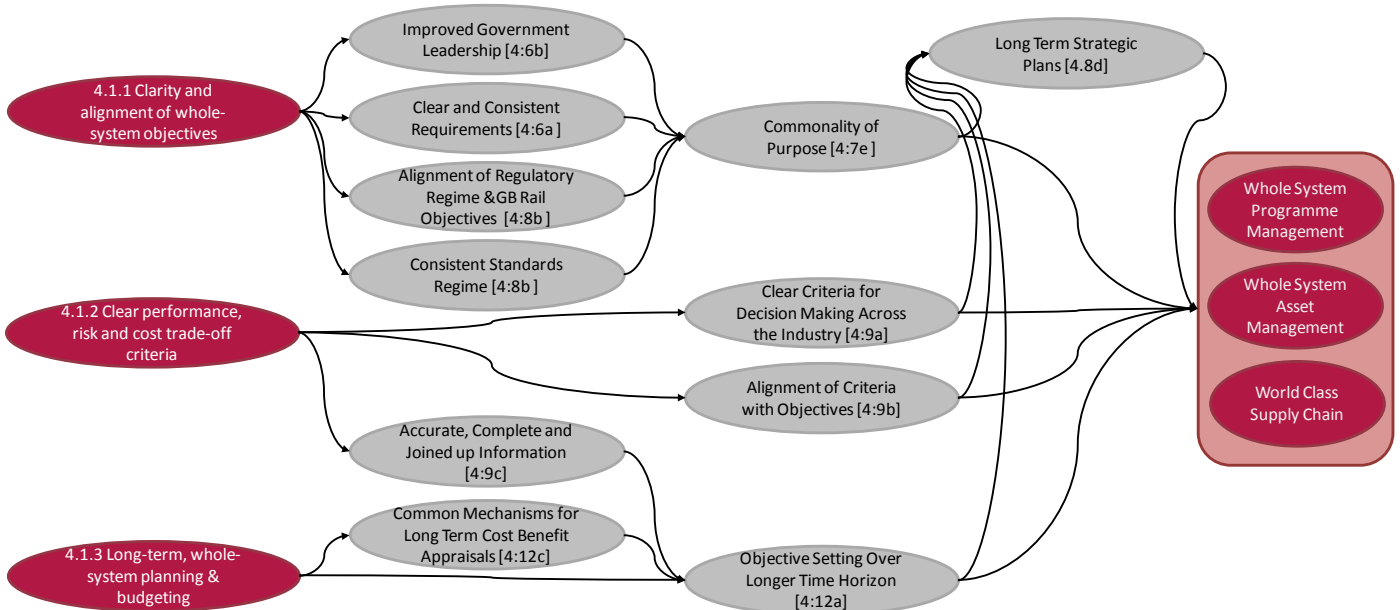


Figure 5.2: Aligned Objectives Benefits Map

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³ Benefit Realisation Maps are specified as best practice in the Office of Government Commerce (OGC) guidance for Managing Successful Programmes.

- 5:5 Where there is evidence to support conclusions in terms of cash savings and avoided costs, we have sought to identify the range of potential savings, by considering the evidence in the context of GB rail.
- 5:6 Within the timescales of the study, we have been unable to quantify the potential performance or revenue improvements that are identified on some of the benefits maps.
- 5:7 In deriving the potential savings summarised below, we have made the following assumptions:
 - a. The basis of the savings assessment is the total cost of GB rail in 09/10 at £12.9bn which includes both capital investment and operating expenditure across GB rail, as detailed in figures 5.3 and 5.4.
 - b. It should be noted that these costs and projections exclude the capital investment costs of Crossrail and High Speed Two.
 - c. It should be noted that figure includes the capital cost of new rolling stock of £0.5bn per year which has been assumed to be required based on a smooth procurement profile to meet projected replacement requirements.
 - d. A number of improvement opportunities are considered as enablers and do not in their own right have savings associated.
 - e. We have made no estimate of the cost to implement this in 5 years, but believe that a greater focus on these few initiatives over many other smaller ones will yield the benefits desired in that timeframe. Investment in targeted external support may be required.
 - f. The benefits of these initiatives will increase over time. Some will not be able to start in year 1, where significant legal, policy or terms of employment changes are required. This may result in delays of up to 2 years before “on the ground” action to realise the benefits can start.
 - g. The savings across the following tables are not additive as significant improvements in asset management will flow into reduced costs in the supply chain, and conversely the higher levels of savings in the supply chain are not realisable without better asset management practices and information.
 - h. In deciding on the ranges detailed in the following tables, the study team has drawn from the evidence found (and summarised in Section 4) and also applied professional commercial/technical judgement and experience.
 - i. In assessing the timescales in which benefits can start to be realised, we have used the following key:
 - i. Short-term – within the current Financial Year (10/11).
 - ii. Medium-term – within 2 years.
 - iii. Long-term – within 5 years (noting that, in this context, many of the benefits will be realised over a much longer timescale).

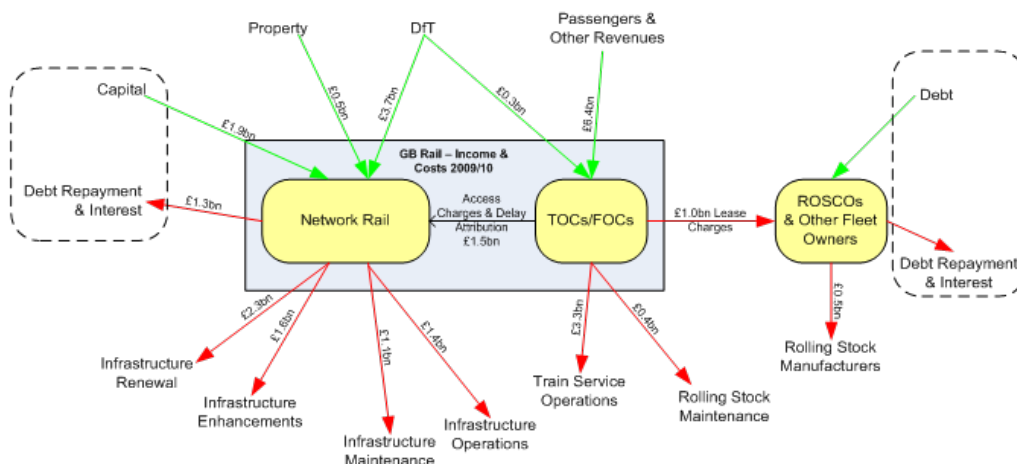


Figure 5.3: Simplified View of GB Rail 09/10 Income and Costs

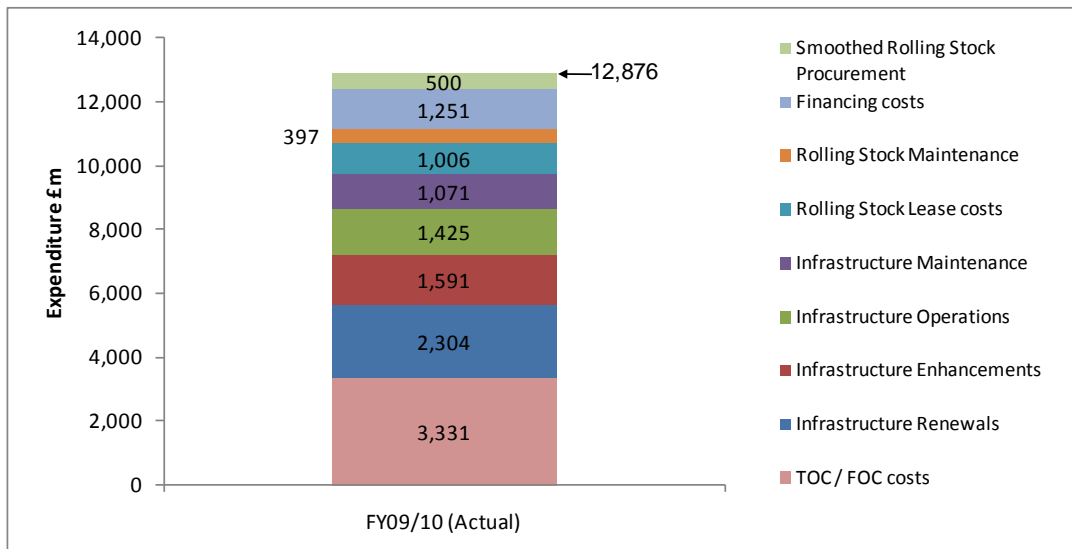


Figure 5.4: GB Rail 09/10 Costs

5:8 Whole-system Asset Management:

Enabler	Description	Addressable Cost (p.a.)	Savings range	Potential Savings	Time to benefit
Improved asset knowledge for prediction and management					
Rationalised systems	A reduction in the number of software packages and licenses (and more standardisation of tools)	£0.07bn	15-25%	10 - £16m	Medium
Locally optimised maintenance and renewals within a national framework					
Consistent direction	Consistent direction of objectives (all pulling together with commonality of purpose) but achieved by local accountability (ties in local asset knowledge but imposes national priorities).	£3.8bn	12- 30%	£0.46 - £1.14bn	Long
Preventive vs corrective	Improved ratio of preventive to corrective maintenance				
Maintenance mix	A shift to an appropriate maintenance mix (run to fail, risk based, condition based, reliability based and time based maintenance regimes appropriate to the assets and usage) reflecting improved asset knowledge, e.g. a good understanding of deterioration				

5:9 Specific assumptions for Whole-system Asset Management Savings:

- Rationalised systems (whole industry) is based on a achieving a one-off reduction of up to 15 to 25% in the £65m addressable costs (which comprises 50% of Network Rail IM costs of £89m p.a. and 50% TOC IM costs of £42m pa).
- Optimised maintenance and renewals (whole industry) is based on achieving reductions of up to 6% per annum (up to a maximum of 30% over five years) of £3.8bn addressable costs (which comprises £2.3bn infrastructure renewals, £1.1bn infrastructure maintenance and £0.4bn rolling stock maintenance).

5:10 World Class Supply Chain:

Enabler	Description	Addressable Cost (p.a.)	Savings range	Potential Savings	Time to benefit
Cost Management					
Transparency / control	Development of better understanding the fully built up costs to provide an activity (such rail replacement) in GB rail infrastructure; tighter control of suppliers costs, internal and external competition; and tighter demand management	£5.0bn	10%-30%	£500m - £1.5bn	Short/ Medium
Refinancing	Using the Government cost of capital to fund railway assets, including rolling stock, to significantly reduce financing costs	£1.0bn	10%-15%	£100m - £150m	Short / Medium
Commercial freedom	Releasing the constraint on passenger train operators to act with a more commercial focus, thus better matching the operational cost base to passenger demand	£3.3bn	5% - 10%	£175m - £330m	Short /Medium
Smoother Demand					
Plan stability	A clear, coherent and costed strategic plan for rail infrastructure maintenance, renewals and enhancements to allow work-plans to be effectively developed and fixed, offering suppliers confidence by locking-in long-term rolling work-banks	£5.0bn	1%-5%	£50m - £250m	Medium
Smooth demand for rolling stock	A long-term (10 year+) rolling stock strategic plan developed with cross industry input but led by a single point of accountability to smooth the profile of vehicle replacement	£0.5bn	15% - 30%	£80m - £150m	Medium
Simplification					
Reduced overheads	Simplified development and design of rail assets and systems through the introduction of uniform and stable standards	£1.96bn	10%	£200m	Long
Simplified underlying demand	Simplified railway operations, infrastructure and train maintenance and supply chain through the homogenisation of product types and specifications	£1.6bn	10%	£160m	Long

5:11 Specific assumptions for World Class Supply Chain Management Savings:

- a. Transparency and control is based on achieving a 10 to 30% reduction in the £5.0bn of addressable costs (from £2.3bn infrastructure renewals, £1.1bn infrastructure maintenance and £1.6bn infrastructure enhancements) through being a more informed buyer and better control of internal costs.
- b. Refinancing is based on the £1.0bn of rolling stock lease costs and smoothing the rolling stock plan is based on the £0.5bn the industry need to invest annually on average to meet the long-term replacement requirements of the fleet.
- c. Commercial freedom applies to the addressable cost of £3.3bn which is what the TOC/FOCs spend on operations and variable access charges.
- d. Plan stability is based on achieving a 1 to 5% reduction in the £5.0bn of addressable costs (from £2.3bn infrastructure renewals, £1.1bn infrastructure maintenance and £1.6bn infrastructure enhancements) by avoiding gearing up/down costs.

- e. Reduced overheads is based on a 10% reduction in the 40% of 'not in the ground spend' of the £2.3bn infrastructure renewals and £1.6bn infrastructure enhancements spend, plus £0.4bn of train maintenance.
- f. Simplifying underlying demand is based on a 10% reduction in the addressable spend of £1.6bn made up of new trains (£0.5bn) plus the materials portion (30%) of in the ground spend (60%) of the £2.3bn infrastructure renewals and £1.6bn infrastructure enhancements spend, plus £0.4bn of train maintenance.

5:12 Whole-system Programme Management:

Enabler	Description	Addressable Cost (p.a.)	Savings range	Potential Savings	Time to benefit
Integrated Programme Teams					
Increased Efficiency	Focusing on the output, rather than the process leads to reduced programme overheads.	£0.64bn	10-25%	£60 - £160m	Medium
Reduced Overspend	Reduced project overspend and overruns.	£1.26bn	25-50%	£350 - £630m	Long
Industry-wide Programme Governance					
Increase early effort	Devoting appropriate effort early in project phases, while increasing initial costs, results in reduced overall costs through clarity of objectives, risk reduction and better option selection.	£2.1bn	10-20%	£210 - £420m	Long

5:13 Specific assumptions for Whole-system Programme Management Savings:

- a. Renewals is excluded, as much of the benefits from integrated programme teams and early option evaluation will come from delivering outputs in different ways to what might be thought of initially. This is not necessarily applicable to renewals, although many of the efficiencies resulting from output focus and streamlined processes would also deliver benefits to renewals.
- b. Increased Efficiency is based on achieving a 10 to 25% reduction in the £0.64bn addressable cost (from 40% of 'not in the ground spend' of the £1.6bn infrastructure enhancements spend).
- c. Reduced Overspends is based on reducing overspends by between 25 and 50% (the addressable cost, being the typical 60% overspend of the £1.6bn infrastructure enhancements and £0.5bn smoothed spending on new rolling stock. Note: this is shown in red as it is an avoided cost, as opposed to a saving. and it is not considered in the later analysis.
- d. Increased Early Effort is based on achieving a 10 to 20% reduction in the £2.1bn addressable cost (from £0.5bn smoothed spending on new rolling stock and £1.6bn infrastructure enhancements) through clarity of objectives, risk reduction and better option selection.

5.1 Summary of Savings

5:14 The savings presented in the preceding tables are not additive. In the following waterfall charts, overlaps between the enablers presented herein are identified and removed.

5:15 The savings identified also to some extent duplicate plans that are already in place within Network Rail as part of their Transformation programme (see Appendix G) and declared business plans (business as usual (BAU)). The pertinent elements of Network Rail savings overlaps are shown on the waterfall charts; duplication with published Network Rail plans has been estimated and explicitly removed (based on Network Rail's latest EID and Asset Management forecast savings for 2013/14 taken from the 2010/11 period 7 update supplied on 14 December 2010).

- 5:16 The analysis has concluded that the Aligned Objectives improvement area is a core enabler to all other benefit opportunities and will have to be delivered in order to achieve the upper levels of these potential savings.
- 5:17 Based on these savings ranges, we have projected the potential annual GB rail costs, 5 years after implementation is started and using the spending in 09/10 as the baseline; the projections are shown in the figures below.
- 5:18 Firstly, each of the three potential savings areas are presented, indicating the savings range that might be possible if this area were to be pursued in isolation. Figures 5.8 and 5.9 present potential savings if all three areas were to be pursued together.
- 5:19 In each case the light blue bars represents the cascade of minimum savings, and the dark blue bars the maximum savings. These bars (light and dark blue) build to indicate the maximum and minimum savings that could be realised – assuming no double counting.
- 5:20 Each waterfall includes a column towards the right that details the maximum and minimum overlaps which are plotted to remove the double counting.
- 5:21 The pink bar shows the extrapolated potential addressable future costs, with the dashed-bar at the top showing the possible range.
- 5:22 The red bar on the right hand side represents the mid-point of possible savings, net of existing planned savings and double counting. The error bar shows the possible range of savings.

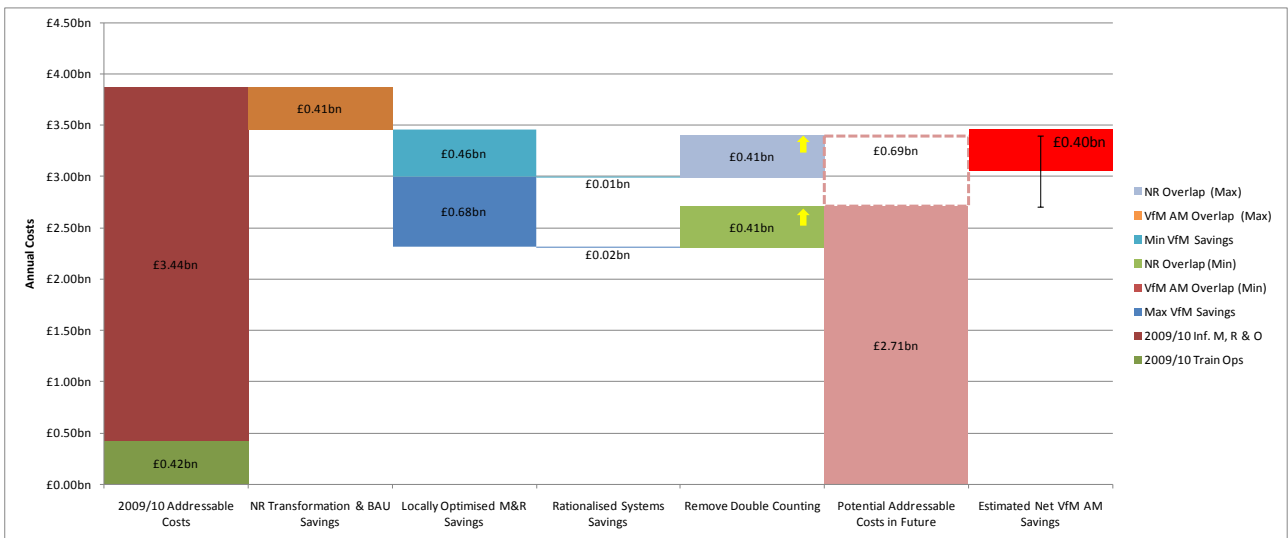


Figure 5.5 Whole-system Asset Management Potential Impact on GB Rail costs after 5 years

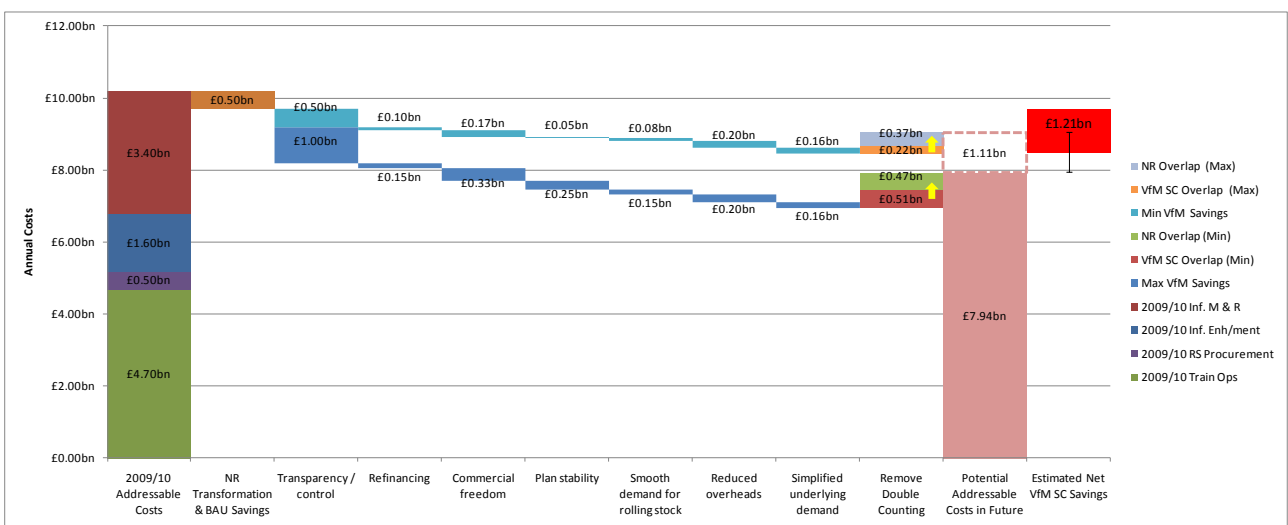


Figure 5.6 World Class Supply Chain Management Potential Impact on GB Rail costs after 5 years

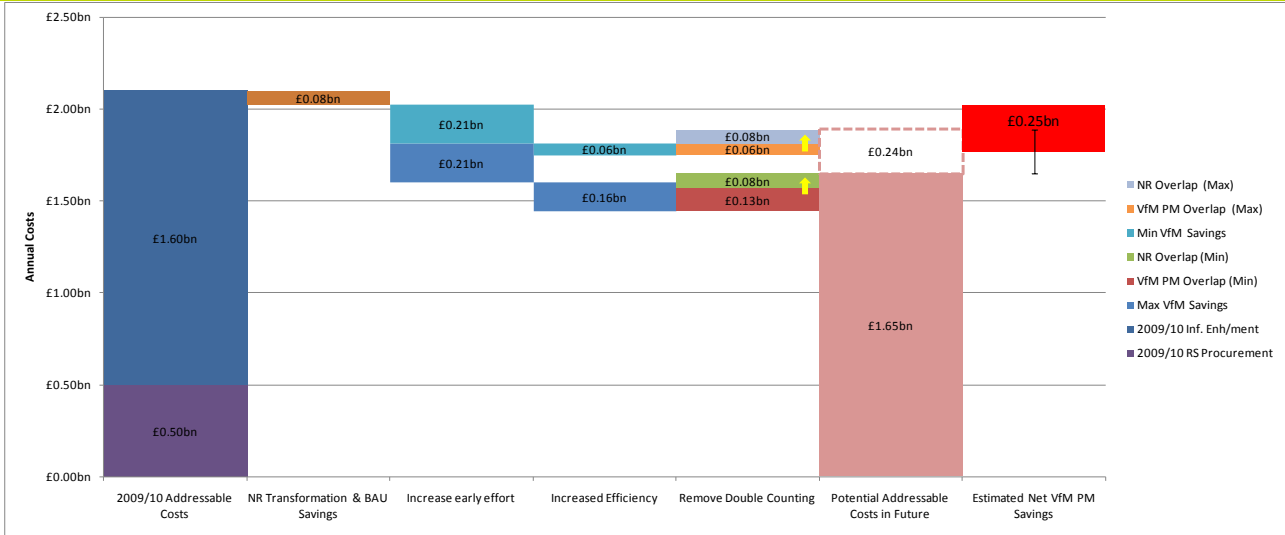


Figure 5.7 Whole-system Programme Management Potential Impact on GB Rail costs in 2015/16

- 5:23 The potential savings, based on the 09/10 level of spend of £12.9bn p.a., are estimated to be:
 - a. Whole-system Asset Management – potential saving of £0.40bn (±£0.34bn) p.a.
 - b. World Class Supply Chain – potential saving of £1.21bn (±£0.55bn) p.a.
 - c. Whole-system Programme Management – potential saving of £0.25bn (±£0.12bn) p.a.
 - d. The overlap between the three savings areas summarised above is estimated to be between £0.17bn and £1.06bn.
- 5:24 These savings are in addition to an estimated £1bn pa savings that will be delivered in CP 4 by Network Rail as a result of their committed Transformation and BAU plans.
- 5:25 When taken together, the overall potential impact on GB rail costs after 5 years can be summarised as shown in figure 5.8. 5.9 and 5.10. It should be noted that all the overlaps with existing industry plans are accounted for and removed in the previous waterfalls.
- 5:26 The potential savings presented here take no account of potential savings developed by other Rail Value for Money work streams. The potential benefits identified here must be analysed to identify and remove overlaps with benefits identified by other Rail Value for Money work streams.

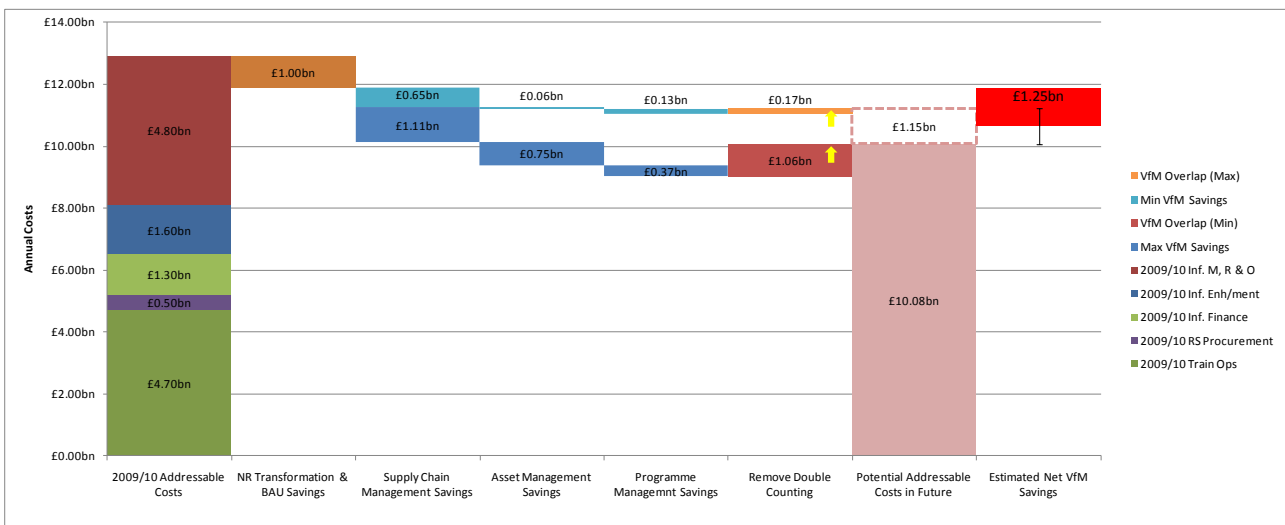


Figure 5.8: Overall Potential Impact on GB Rail costs after 5 years

- 5:27 Therefore, initial indications suggest potential savings from successfully achieving aligned industry objectives, whole-system asset management, world class supply chain management

and whole-system programme management are **estimated to be £1.25bn (±£0.57bn) p.a.** after 5 years (nominally 10% savings p.a.).

5:28 Potential savings towards the top end of the range will be very challenging to achieve and, although our remit excluded implementation planning and any associated costs, we have no doubt that it will be necessary to make significant investment in order to implement these recommendations and realise the full potential savings.

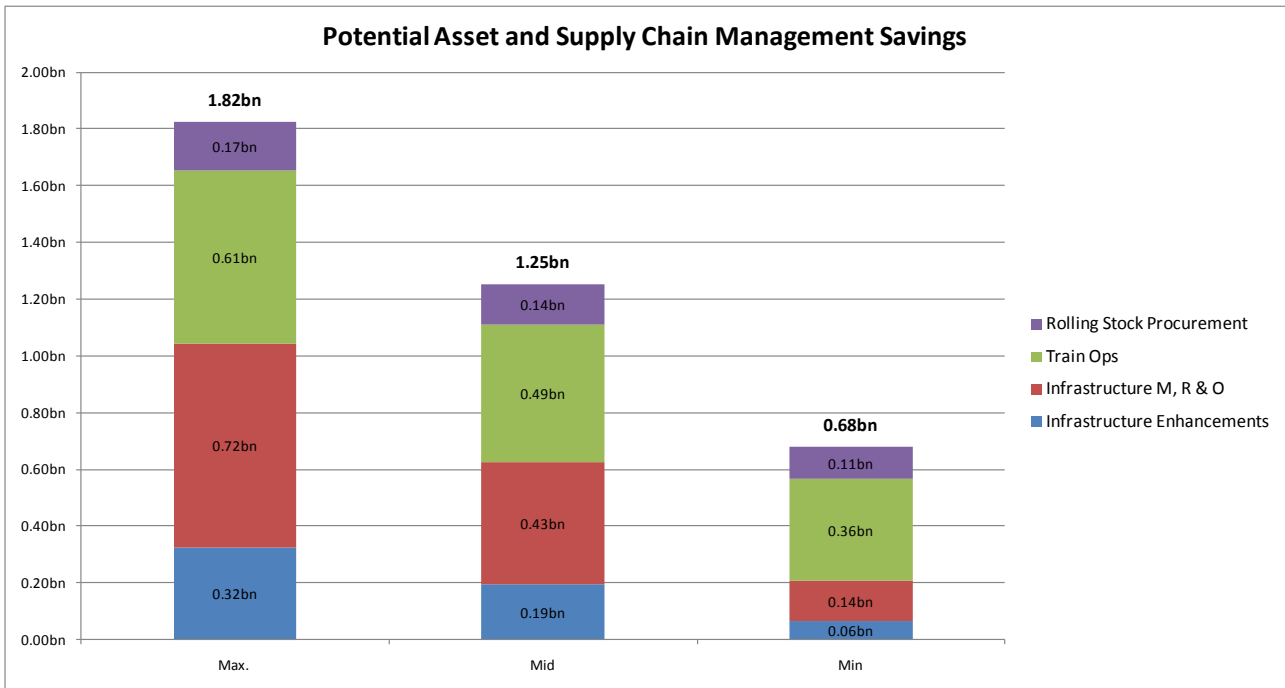


Figure 5.9: Distribution of Potential Savings

	Total Addressable	Min Saving	% of Total Addressable	Max Saving	% of Total Addressable	Mid Point Savings	% of Total Addressable
Infrastructure Enhancements	1.60bn	0.06bn	4.0%	0.32bn	20.3%	0.19bn	12.1%
Infrastructure Renewals	2.30bn	0.09bn	4.0%	0.47bn	20.3%	0.28bn	12.1%
Infrastructure Maintenance	1.10bn	0.04bn	3.9%	0.24bn	22.1%	0.14bn	13.0%
Infrastructure Operations	1.40bn	0.01bn	0.5%	0.01bn	0.8%	0.01bn	0.6%
Train Service Operations	3.30bn	0.17bn	5.1%	0.34bn	10.2%	0.25bn	7.6%
Rolling Stock Maintenance	0.40bn	0.09bn	23.6%	0.12bn	31.0%	0.11bn	27.3%
Rolling Stock Leasing	1.00bn	0.10bn	10.0%	0.15bn	15.0%	0.13bn	12.5%
Rolling Stock Procurement	0.50bn	0.11bn	22.0%	0.17bn	34.0%	0.14bn	28.0%
	11.60bn	0.68bn		1.82bn		1.25bn	

Table 5.10: Distribution of Potential Savings

6. Recommendations

- 6:1 Based on the findings from this study the following recommendations have been developed for consideration by the Rail Value for Money team. These recommended actions are necessary to fully realise the cost savings and other benefits identified in Section 5.
- 6:2 The findings from this study and these recommendations should be corroborated with findings and recommendations from the parallel Rail Value for Money work streams. The potential benefits identified in this report should be analysed to identify and remove overlaps with benefits identified by other Rail Value for Money work streams.
- 6:3 The industry governance arrangements should be reviewed to facilitate the authority, responsibility and necessary leadership to set coordinated output-specified objectives for the GB rail industry as a whole and to ensure these are delivered. At the top level, the objectives need to be stable and provide long-term direction and purpose for the industry. It may be appropriate for these arrangements to draw on existing elements of the industry but some realignment of roles and responsibilities may be required. The revised governance arrangements must meet the following fundamental requirements:
- a. To enable the setting of high-level, whole industry “corporate objectives” to ensure the delivery of effective and sustainable GB rail services.
 - b. To enable these output specified objectives to address all aspects including safety, performance, cost and risk.
 - c. To ensure these objectives are set within a progressive and challenging timeframe to ensure momentum is maintained.
 - d. To ensure these objectives promote and facilitate long-term strategic planning that is necessary and sufficient to allow more effective asset management decision making and supply chain optimisation.
 - e. To ensure that the objectives are realistic, allow flexibility to promote innovation and are clearly allocated unambiguously across the industry members.
 - f. To design out of the industry a variety of perverse incentive arrangements that are hindering attempts to introduce best practice approaches.
- 6:4 Clear high-level decision making and optimisation criteria should be established for the industry to ensure a consistent approach to the development of solutions aligned to the achievement of the overall objectives set for GB rail. The criteria should:
- a. Allow individual companies to properly address their diverse business drivers.
 - b. Ensure that there is a common basis for asset management decision making across GB rail.
- 6:5 The industry regulatory regime should be reviewed to ensure it aligns with the overall approach to setting objectives for GB rail. The review should ensure that:
- a. The regulatory body has the remit and authority to examine the value for money in all areas of the GB rail business, recognising business environment changes, in addition to safety and performance aspects.
 - b. The nature of on-going regulatory reviews should be such that asset management arrangements consider whole-system, whole-life criteria, rather than being constrained by the franchise or control period cycle.
- 6:6 The standards management arrangements should be reviewed to ensure that industry standards are consistent, avoiding over prescription, duplication and conflict, while providing the necessary key inputs on behalf of GB rail in respect of international standards and directives. It is suggested that this could be rapidly enabled with the creation of a whole-system industry standards framework, which forces standards to be graded by criticality and aligned with the delivery of GB rail objectives.

- 6:7 Improved and coordinated asset management information arrangements should be established, facilitating the controlled sharing of asset information and knowledge around the industry. The arrangements should:
- Include a national information management framework (or architecture) which will support local decision making and enable control of implementation costs (there is not anticipated to be a single, national IT system).
 - Include system protocols designed such that information relevant to cross asset decision making is available not just within organisations but between them.
 - Allow innovation within organisations, whilst ensuring a common approach at key information interfaces.
 - Ensure that the information captured meets the requirements of long-term strategic planning, research and development, and standards development in addition to meeting the tactical and operational needs of organisations.
- 6:8 In line with emerging industry objectives and criteria:
- Asset maintenance standards and approaches should be reviewed on a risk and criticality basis, leading to a refinement of asset policies, maintenance standards and resource requirements based on real needs.
 - Industry arrangements for investment appraisal and delivery of major enhancements (including new rolling stock) should be reviewed to formulate a single methodology.
- 6:9 Good practice guidelines should be issued to embody the features we highlight in Sections 4 and 2.1 of this report. The industry should promote greater use of decision support tools for asset investment planning and portfolio management.
- 6:10 All parts of the rail industry should sign up to a long-term plan to achieve greater standardisation of both rolling stock and infrastructure, using current commonly available stock and components. Furthermore, all groups involved in procurement should be incentivised to comply with these new rules.
- 6:11 This study has considered 'national' engineering services and has found that the choices are complex and that there is unlikely to be a single 'one size fits all' solution. In considering the future industry structure there should be further consideration of such services in order to assess those best suited to central or devolved provision (and whether best in or out sourced). This should be informed by the need to offer services efficiently and to optimise the utilisation/value of associated assets and resources. It will be important to ensure this can reflect local knowledge and adaptability whilst aligning with national objectives and providing the benefits of standard, best practice approaches.
- 6:12 This study has found evidence that strongly supports the initiatives currently underway by Network Rail under the 'Transformation' banner (see Appendix G). These initiatives are necessary and should be aggressively pursued and their implementation expedited.
- 6:13 Network Rail should accelerate its consideration of how to better utilise the cost data it holds from project tenders and execution to challenge the supplier costs in its enhancements and renewals work.
- 6:14 Network Rail should ensure focus and priority is kept on its internal unit cost analysis (where necessary refocusing on a more market-led approach) to provide a consistent view of internal costs to allow 'Make or Buy' decisions across maintenance, renewals and enhancements, and benchmark these against external prices. This could include opening up selective services to open competition with internal divisions competing against external providers.
- 6:15 Network Rail should agree with ORR a strategic plan of work for maintenance, renewals and enhancements over a longer term than the current Control Periods and lock-in a significant proportion of this work.
- 6:16 The Government should consider options for the refinancing of rolling stock to take advantage of its reduced cost of borrowing.

6:17 The DfT should examine the terms of all existing franchises and enter into negotiation with the incumbent on relaxation of conditions that would stimulate commercial improvements and cost savings to both parties. Government should issue a long-term strategic rolling stock plan to achieve a smoother demand on the train manufacturers through strategic procurement, less unnecessary specification and longer and more stable periods for rolling stock production.

6.1 Pilot Studies

6:18 Given the limited research that was possible within this ten week intensive study, it is strongly suggested that the findings and identified potential benefits should be corroborated and tested/piloted prior to wholesale implementation. This should include undertaking further work to quantify the potential performance improvement and revenue generating benefits.

6:19 The following pilot projects should be initiated soon to confirm the approach and benefits and to inform a more detailed rollout plan across the industry:

- a. A pilot implementation of **Whole-system Asset Management** (see Section 4.2) on a strategic route – supporting and accelerating the work already underway by Network Rail but aligned with wider GB rail objectives.
- b. A pilot of the costs management (transparency and control) element of **World Class Supply Chain** (see Section 4.3.1) applying this to a selection of renewals and enhancements projects that are at an appropriate stage and demonstrating that it can produce real savings and a transferrable set of market prices by activity.
- c. A pilot of the costs management (commercial freedom) element of **World Class Supply Chain** (see Section 4.3.1) with one or two TOCs by negotiating what could be achieved on their cost base by relaxing some franchise conditions.
- d. A pilot of the integrated programme team element of **Whole-system Programme Management** (see Section 4.4.1) with authority and accountability to deliver an enhancement project, building on the experience of Chiltern and demonstrating that this approach can be successful in other situations.
- e. A pilot of the industry-wide programme governance element of **Whole-system Programme Management** (see Section 4.4.2) to review the top 10 or 20 programmes (by budget) to test the stage gate criteria and ensure all the major programmes have all the fundamentals in place to assure whole-life, whole-system optimised delivery.

7. Document Control

Notice

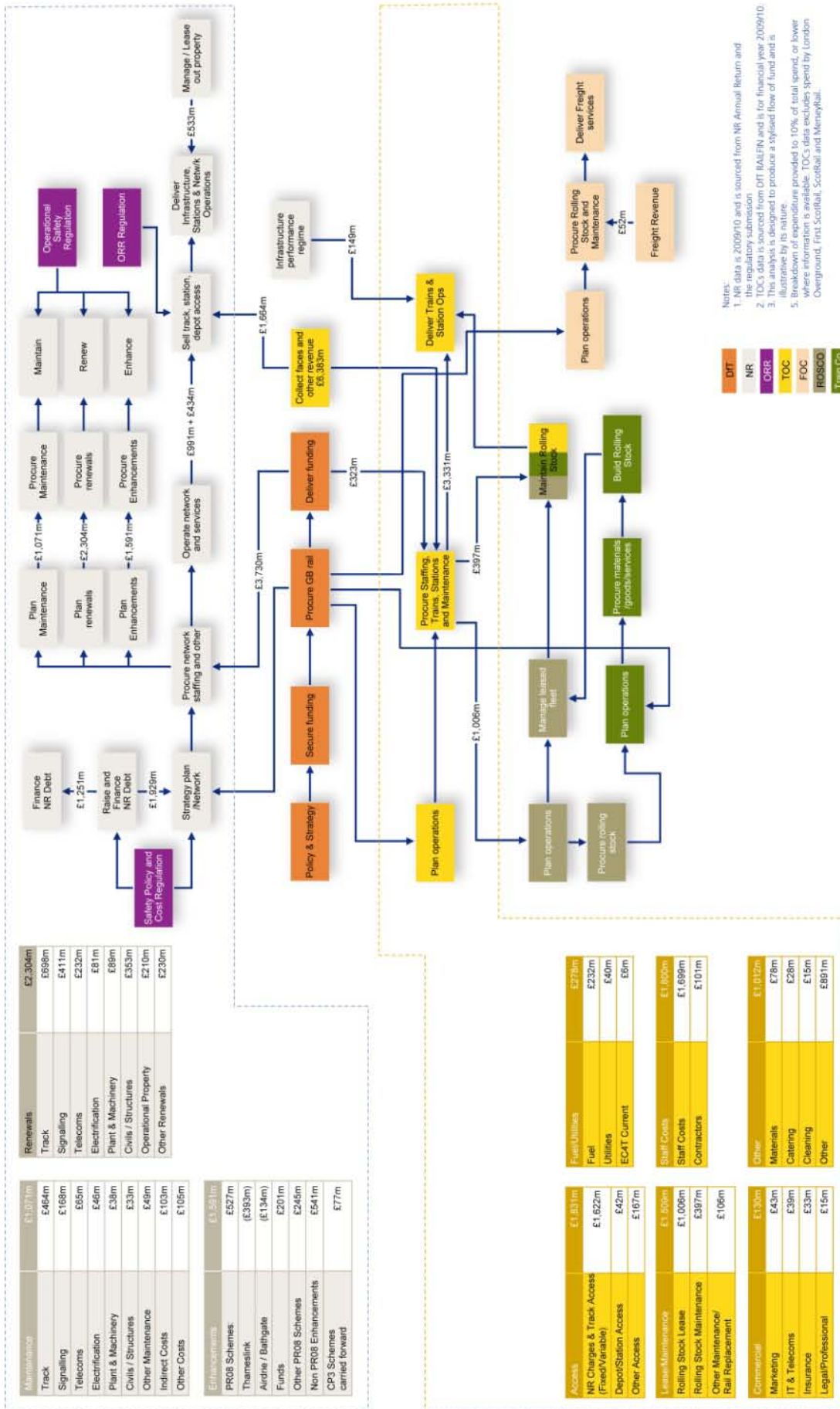
- 7:1 This document has been produced by Atkins for the Rail Value for Money Study Team, the Department for Transport and the Office of Rail Regulation (the Client) solely for the purpose of the supplying a report to the Rail Value for Money Team in respect of the Benchmarking of Asset Management and Supply Chain Management in the GB Rail Industry (DfT Contract Number: PPCA10036).
- 7:2 This Report is for the benefit only of the Client and the other parties that we have agreed in writing to treat as addressees of the Report (together the Beneficiaries).
- 7:3 Nothing in this Report constitutes a valuation or legal advice. We have not verified the reliability or accuracy of any information obtained in the course of our work, other than in the limited circumstances set out in the Report.
- 7:4 Any review activity, including this study, is based upon the use of sampling techniques and, as such, there is the possibility that issues will remain unidentified during an assessment.
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- 7:6 Atkins gratefully acknowledges the significant contribution made by a number of organisations (listed in Appendix C) who shared their time, wisdom and information in support of this work.

Document History

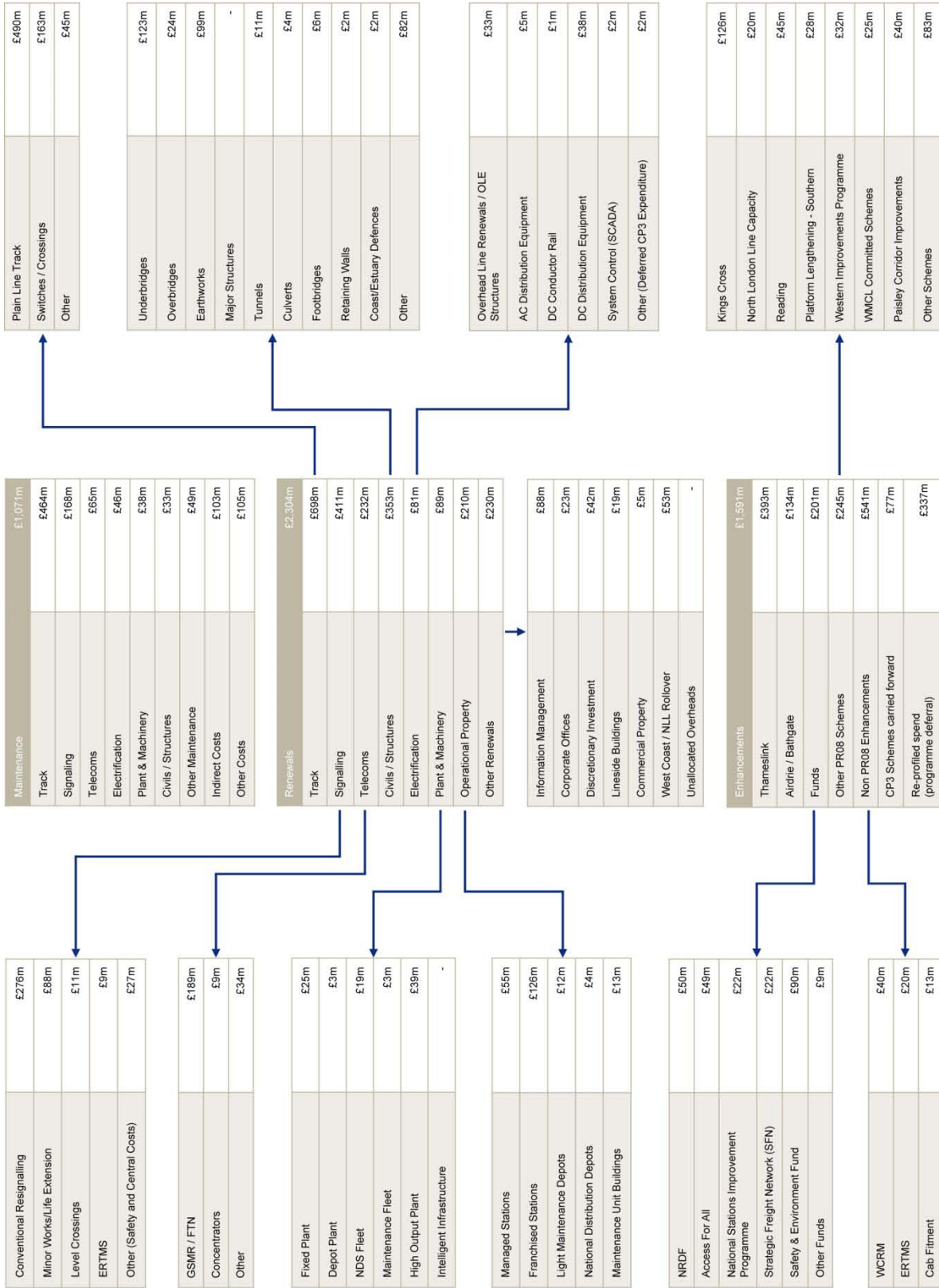
JOB NUMBER: 5094940			5094940-VfM_AM-SC_Final_Rpt		
Rev	Purpose	Originated	Reviewed	Authorised	Date
1A	Final Draft Issue	JE/GS/KC/R D/LB	NS/CK/TW	DMcC	16-Sept-2010
1B	Preliminary Draft following further consultation – In progress	JE/GS/ KC/RD			15-Dec-2010
1C	Final Draft Issue following further consultation	JE/GS/ KC/RD			24-Dec-2010
1D	Final Draft Issue incorporating stakeholder comments	GS	JE	DMcC	26-Jan-2011
1.1	Final Issue	GS	JE	NS	25 th May 2011

Appendix A – Supply Chain Map

Supply Chain Map: Flow of Funds



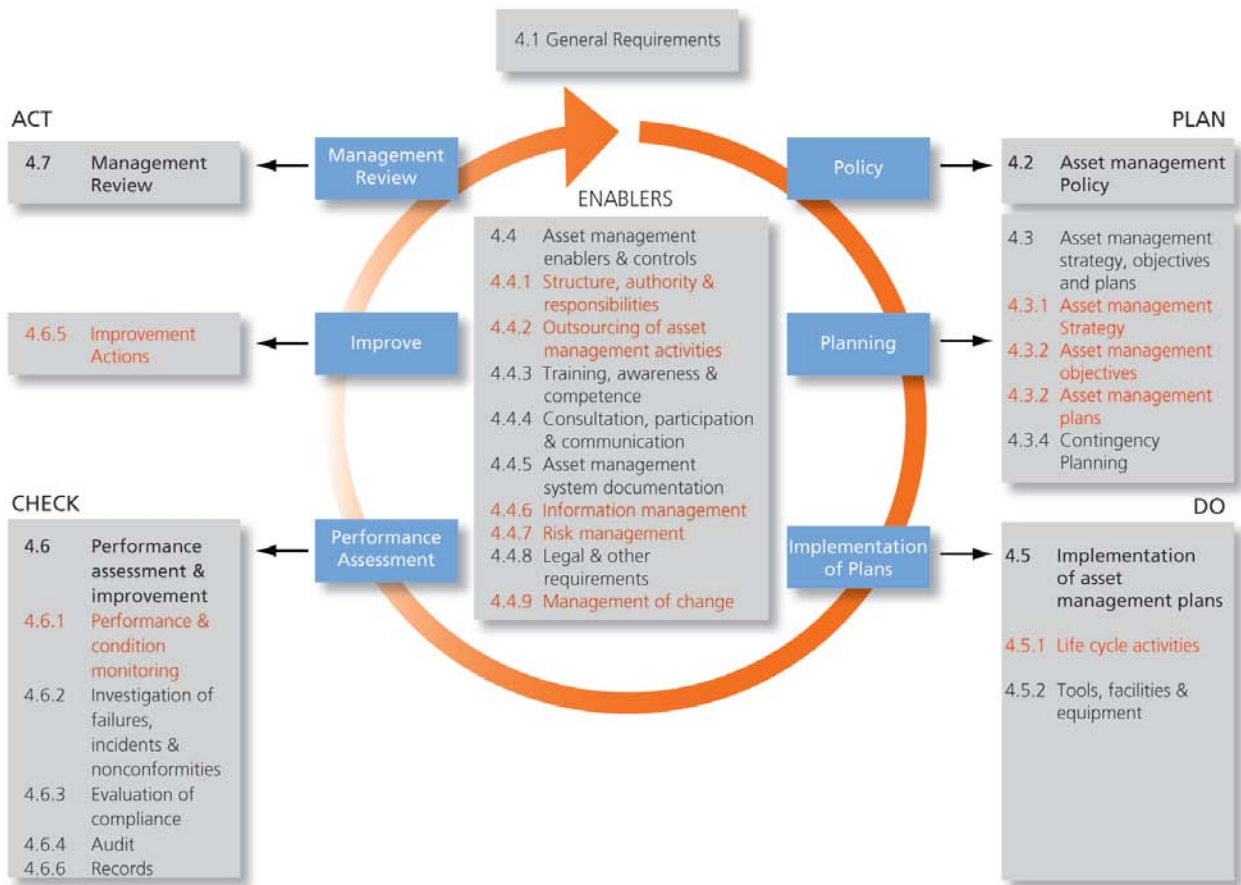
Breakdown of Expenditure



Notes:
 1. NR data is 2009/10 and is sourced from PR08 forecasts in NR regulatory submission
 2. Breakdown of expenditure provided to 10% of total spend, or lower where information is available.

Appendix B – Assessment Briefing

For asset management we have considered the elements of BSI PAS55: 2008 as illustrated in the framework diagram below:



We have used this to create a number of discussion prompts as a common basis for our meetings across the industry and other sectors. These can be summarised in the guidance note shown overleaf:

Assessment Briefing

This document provides a brief overview of the proposed discussion themes and some sample prompts to enable preparation. Themes 1 to 4 are intended for discussions with senior management. Separate discussions are intended to be held with representatives responsible for themes 3 to 8 as appropriate.

Assessment theme	Asset Management Discussion Prompts	Supply Chain Management Discussion Prompts
1. Objectives	<p>Defining whole industry and organisational objectives</p> <p>What are the organisation’s objectives (relating to performance, cost and risk) and how often do they change?</p> <p>What are your customers’ objectives and do they effectively cascade the objectives of GB Rail to your organisation?</p> <p>How is stakeholder buy-in achieved?</p>	
2. Strategy	<p>Strategy for delivering the objectives</p> <p>What is your high level strategy/approach for delivering the organisational objectives?</p> <p>Who are the key entities in setting and agreeing the asset management strategy – is it in place and agreed?</p> <p>Does the asset management strategy reflect the business strategy?</p> <p>How are the benefits of new build / enhancement capital project expected to deliver expressed and aligned with objectives?</p>	<p>Do the objectives set by Government for GB Rail enable a clear strategy to be formed effectively by the appropriate bodies and organisations?</p> <p>Who are the key entities in setting and agreeing the supply chain strategy – is it in place and agreed?</p> <p>Are there opportunities to increase collaboration with those influencing and setting strategy to enable the benefits of longer-term strategies to be achieved?</p>
3. Planning	<p>Planning to apply the strategy and achieve objectives by balancing risk, cost and performance</p> <p>How are cost-performance-risk trade-offs made to ensure optimum approach and value?</p> <p>How can incentives be aligned to promote the right options, e.g optimum capital investment v operational spend?</p> <p>What alternative approaches have been investigated to deliver the required benefits of new build / enhancement capital projects – technical, operational and/or commercial?</p>	<p>How does the current process and time horizons affect the effectiveness and efficiency of planning and who is responsible for long term plans (10+ years)?</p> <p>To what extent do customers engage with you in discussions about long term planning and what benefits does/could this realise.</p> <p>To what extent do you engage with suppliers in discussions about long term planning and what benefits does/could this realise.</p>
4. Organisation	<p>Roles and accountabilities for managing safety/standards/risk and balancing risk-cost-performance decisions</p> <p>Who is accountable for asset management decisions (and does this include financial and safety/risk accountability)?</p> <p>How are objectives communicated to delivery units?</p> <p>Who is responsible for capital projects from concept to disposal and who has the authority to make whole-life trade-off decisions?</p>	<p>What mechanism is in place to approve extra work orders and variations, and who has the authority for this? How could the current process be improved to reduce these additional orders and variations?</p>
5. Delivery	<p>Implementing the plans efficiently: Delivering new-build/enhancement, renewals and maintenance works</p> <p>How does the organisation assure itself that the objectives are realised?</p> <p>What is currently done that is perceived not to contribute to delivery of objectives (and why)?</p>	<p>How are changes to strategy and standards assessed – value assessment/commercial aspects? Are these viewed from a short-term cash position or whole system cost? What is the basis for making the decision to change and who has</p>

Assessment theme	Asset Management Discussion Prompts	Supply Chain Management Discussion Prompts
	<p>How could better asset management enable new opportunities, better utilisation, etc - what are the opportunities for improvement?</p> <p>What is stopping you doing this as you would want – what are the barriers or constraints?</p>	<p>the authority to approve this (including cancellation or postponement of jobs)?</p> <p>How efficient and effective is the procurement process in sourcing the required goods/services?</p> <p>How/when are suppliers involved in design considerations? Do existing process/methods encourage involvement? What considerations are taken to future proof designs?</p>
	<p><u>New build / enhancement capital projects</u> How do you measure the benefits the project/asset is to deliver?</p> <p>How is assurance provided that (contract) requirements are consistent with objectives?</p>	<p><u>New build / enhancement capital projects</u> What is the process for developing capital projects and what stage-gates are used in the process?</p> <p>Is the approach for introducing new equipment, rolling stock or operating practices efficient? What changes could be made to further improve this?</p>
	<p><u>Renewals</u> What lifecycle renewals strategies/plans do you have for your principal asset types – how are these optimised with maintenance plans?</p> <p>How do you balance renewals against enhancements and life extension options?</p>	<p><u>Competition of supply</u> How do you ensure that there is competition of supply for maintenance and renewals (and rolling stock, spares, and consumables for TOCs and FOCs)?</p> <p>Do internal delivery functions (e.g. maintenance) compete with the external contracting market for jobs?</p> <p>What strategic alliances have been formed where competition cannot be ensured?</p>
	<p><u>Maintenance</u> What is your experience of moving over from traditional maintenance regimes to new regimes – how well have you done this?</p> <p>Are maintenance regimes based on time, duty, condition or risk?</p>	<p><u>Central v regional procurement</u> What is the balance between centralised and regional contracting?</p> <p>Are there any possible procurement synergies at a central or network level (e.g. Smartcard Ticketing systems, freight only improvement in infrastructure)?</p>
6. Risk Management	Management of safety, service loss and business risks across the enterprise.	
	<p>How are safety, service loss and business risks identified and managed across the organisation and at all levels?</p> <p>What processes and organisational arrangements are in place to manage major business changes arising from the introduction of new assets, change in strategy, organisational, supply-chain, technology, operating environment, etc</p>	<p>What is your approach to risk management?</p> <p>What examples are there where you have taken risk away from a contractor in exchange for a price reduction and vice versa.</p>
7. Information Management	Adequacy and appropriateness of knowledge and information to support planning and decision-making	
	How do you decide what information to capture?	How do you decide what information to capture?
8. Continual Improvement	Monitoring the delivery of the plans and achievement of objectives through assurance and review	
	<p>How do you determine what to measure and monitor?</p> <p>How do you ascertain that the asset management processes and plans are effective and contributing to the delivery of organisational objectives?</p>	<p>How do you determine what to measure and monitor?</p> <p>How do you ascertain that the supply chain management processes and plans are effective and contributing to the delivery of organisational objectives?</p>

Appendix C – Assessment Record

List of Interviews and respondents.

17/06/2010 Kings Place, London	INTERVIEW to discuss Network Rail asset management benchmarking activity	Andrew Newby (NR) Andrew Kirwan (NR)
23/06/2010 71 Fenchurch Street, London	INTERVIEW with ORR Reporter AMCL	Richard Edwards (AMCL)
28/06/2010 Great Minster House, London	INTERVIEW to discuss industry supply chain	Simon Lydiard (DfT) Simon Baskerville (DfT)
28/06/2010 Melton Street, London	INTERVIEW to discuss Network Rail reliability centred maintenance activity	Deanne Haseltine (NR) Barry Daley (NR) Dan Boyde (NR)
30/06/2010 London	INTERVIEW to discuss Network Rail asset information activity	Brian Halliday (NR) Andrew Newby (NR)
06/07/2010 East Anglia House, London	INTERVIEW to discuss Network Rail: Enhancements – regional example.	Simon Maple (NR Programme Sponsor Waterloo capacity scheme).
09/07/2010 Kings Place, London	INTERVIEW to discuss Network Planning with Network Rail	Richard Eccles (NR)
09/07/2010 Kings Place, London	INTERVIEW to discuss Network Rail delivery	Simon Kirby (NR) Roger Dickinson (NR)
09/07/2010 Kings Place, London	INTERVIEW to discuss Network Development with Network Rail	Stephen Prendergast (NR)
12/07/2010 1 Kemble Street, London	INTERVIEW with ORR Head of Infrastructure and Asset Management	Jim Bostock (ORR)
12/07/2010 Great Minster House, London	INTERVIEW with DfT Director General National Networks	Mike Mitchell (DfT)
13/07/2010 Great Minster House, London	INTERVIEW with DfT to discuss Rolling Stock Age and Replacement Profile	Brian Freemantle (DfT)
13/07/2010 Melton Street, London	INTERVIEW with Network Rail to discuss maintenance / renewals trade-off	James Dean (NR) Andrew Newby (NR)
13/07/2010 1 Kemble Street, London	INTERVIEW with ORR Director Planning and Performance	Michael Lee (ORR)
14/07/2010 15 Canada Square, Canary Wharf, London, E14 5GL	WORKSHOP to review and challenge findings and hypotheses.	Value for Money team and industry experts, drawn from members of the cross-industry Atkins' team.
16/07/2010 Kings Place, London	INTERVIEW with Network Rail to discuss asset management improvement plans	Andrew Newby (NR) Jerry England (NR)
16/07/2010 40 Melton Street, London	INTERVIEW with Network Rail to discuss the Supply Chain	Peter Williams (NR)

23/07/2010 Floor 28 - South Wing, Euston Tower, London	INTERVIEW on supply chain management	Neil Porter (Atkins)
23/07/2010 Great Minster House, London	INTERVIEW with DfT Director Franchises and Strategy	Bob Linnard (DfT)
26/07/2010 Bombardier's offices, Euston, London	INTERVIEW with Bombardier	Neil Walker, Allan Morgan, Paul Roberts, Jon Seddon, Mike Burgess (Bombardier)
27/07/2010 Kings Place, London	INTERVIEW with Network Rail	Andy Doherty (NR), deputising for Steve Yianni (NR)
27/07/2010 Macmillan House, London	INTERVIEW with FirstGroup	Ian Grindlay, Dave Gausby, Hugh Clancy, Alan Cockerham (FirstGroup)
28/07/2010 Network Rail's offices, Milton Keynes	INTERVIEW with Network Rail to discuss NDS Procurement	Ken Blackley (NR)
29/07/2010 40 Melton Street, London	INTERVIEW with Network Rail	Danny Mair, Brian Neve, and Neil Carruthers (NR)
30/07/2010 9 Millbank, London	INTERVIEW with ofgem	Chris Watts, Paul Branston (ofgem)
30/07/2010 Portland House, London	INTERVIEW with Angel Trains	Tim Dugher, Steve Lamey (Angel Trains)
30/07/2010 40 Melton Street, London	INTERVIEW with Network Rail	Steve Featherstone (NR)
30/07/2010 40 Melton Street, London	INTERVIEW with Network Rail	Andrew Newby, Jerry England (NR)
02/08/2010 40 Melton Street, London	INTERVIEW with Network Rail	Mick Martin, Andrew Newby (NR)
04/08/2010 RSSB's offices	INTERVIEW with RSSB	Len Porter, Anson Jack and Andrew Sharpe (RSSB)
05/08/2010 55 Victoria Street, London	INTERVIEW with Chiltern Railways	Vic Michel
05/08/2010 55 Victoria Street, London	INTERVIEW with ORR Enhancements Reporter Nichols	Peter Hansford & Rod Croucher
06/08/2010 Cathcart Business Park, Glasgow	INTERVIEW with Scottish Power Wholesale	Martin Sedgwick (ScottishPower Energy Wholesale)
06/08/2010 New Alderston House, Bellshill, Scotland	INTERVIEW with Scottish Power Networks	Jeff Hunt (ScottishPower Energy Networks)
9/08/2010 Railway Industry Association, 22 Headfort Place, London, SW1X 7RY, England	WORKSHOP to review and challenge potential areas for improvements and conclusions.	Value for Money team and industry experts, drawn from members of the cross-industry Atkins' team.

10/08/2010 HA office, The Cube, Birmingham, B1 1RN	INTERVIEW with Highways Agency	Mark Gripton (HA)
02/09/2010 Utrecht, The Neatherlands	INTERVIEW with NedTrain	Theo Walbeek (NedTrain)
02/09/2010 Utrecht, The Neatherlands	INTERVIEW with NS Reizigers	Irene Doosje (NS Reizigers)
06/09/2010 Videoconference	INTERVIEW with Trafikverket	Vivianne Karlsson, Per Norrbin, Per Hurtig, Ulla Ericson, Dan Eriksson, Per-Olof Kraik- Larsson
10/12/2010 40 Melton Street, London	WORKSHOP to consider asset information management principles	Andrew Newby (NR), Patrick Bossert (NR), David Wilkes (NR), Jon Seddon (Bombardier), Jim Bostock (ORR), David McLeish (AMCL)
16/12/2010 40 Melton Street, London	WORKSHOP to consider national engineering services	Andrew Newby (NR), Martin Elwood (NR), Richard Spoors (ind), David Wyn (NR), Francis How (RIA)

Appendix D – Research

1. Accenture. (2003, 07 11). Review of Network Rail's Supply Chain.
2. AMCL. (2009, 11 07). 2009 Best Practice Review Update.
3. AMCL. (2010, 05 04). Asset Management Improvement Roadmap.
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Appendix E – Detailed Findings

E.1 ASSET MANAGEMENT FINDINGS

E:1 Our findings are summarised for GB rail and comparative organisations under four headings:

- a. Objectives and strategy.
- b. Organisation.
- c. Planning for delivery.
- d. Processes and tools.

E.1.1 Objectives and Strategy

E.1.1.1 GB rail as a whole-system

E:2 We have found that:

E:3 There appears to be no strategic ownership and formal dialogue to ensure objectives (currently reflected through HLOS/SoFA, Strategic Business Plans, Delivery Plans, Franchise Agreements, Route Strategies/Plans, Rolling Stock Asset Management Plans and subservient or influencing documents) are joined up across GB rail to represent the industry's best interest. Whilst the Route Utilisation Strategies reflect longer term planning horizons there is an industry focus around Control Periods/Franchise Periods. This presents a risk of organisations planning and delivering to reflect the approved funding period or regulatory cycle. This can result in working to local assumptions rather than a clearly owned industry direction.

E:4 The process of an industry strategy feeding onto RUS/forward plans, feeding into HLOS/SoFA and Periodic Reviews and any alignment with Franchise agreements is very drawn out, in some cases tenuous and its effectiveness unclear. Non-infrastructure organisations have stated that they can and want to be more involved in industry level dialogue than they are and to be better consulted over RUS, HLOS, etc. The current weave of responsibility and intended competitive innovation and entrepreneurialism does not appear to fit well around this. Network Rail has stated that they are now more mature and proactive about recognising what Government may want and considering what is right for the industry, with each periodic review getting more strategic and taking a better look ahead (including the Planning Oversight Group's future vision). Network Rail stated that a joint planning group was previously in place between Network Rail and the DfT to discuss implications, costs and alternatives (but has not met since the election). Without industry dialogue and clear objective direction we find it difficult to see how any organisations can do anything other than second guess and set their own agenda.

E:5 The DfT White Paper (DfT, 2007)¹⁹ set out a 30 year strategy with the objectives of increasing passenger numbers, revenue and freight use, managing costs downwards, increasing local involvement and enabling the railway to pay a larger role in economic and social regeneration. A key objective was for the industry to deliver continual improvement. The White Paper did not believe that radical or rapid change was necessary to secure these objectives, anticipating that established fares policies would continue, competition would be used to secure the best prices for operating passenger services, infrastructure costs would be rigorously controlled and capital investment would be incremental and targeted at need. The White Paper did not, for example, mention asset management.

E:6 The industry is currently funded, and therefore influenced, by a number of organisations and authorities with their own planning and financial approaches. There is currently a lot of Government involvement in the industry. The DfT has stated that it is difficult for Government to be 'hands off' and not want to change things over a five year period (or not to want more details and to be involved in decisions on what to buy) whilst they are taking the risk and providing significant funding. Government does not like holding all the risk.

E:7 The industry has indicated Government involvement can be too detailed, for instance around rail franchising and rolling stock procurement, injecting complexity, delay and cost. HLOS, conversely, is very high-level and leaves industry to define requirements without clarity of overall long-term strategy. This is compounded by a regulatory regime that injects additional

requirements above those set out in HLOS, such as those for efficiency separate from requirements placed on Network Rail by the DfT, which may conflict. Additionally there was comment from the RSSB that the safety aspirations in the ORR's Strategy document appeared to differ from safety requirements in HLOS. Whilst it may be correct that these represent aspirations, it is important that the industry has a clear view of actual requirements/objectives and that this is supported by clearly aligned regulatory oversight. Requirements and objectives need to be clear and consistent throughout the industry; moreover, they need to then be challenged by regulatory regimes against the original requirement set and not some other set of criteria determined by others.

- E:8 The ORR have stated there is a lack of will to work together to solve the bigger problems. This is potentially influenced by commercial behaviours and trust. RSSB stated that the will is there but the structure in many case restricts or prevents change.
- E:9 Whilst some elements of the overall standards regime (Railway Group Standards for example) have recently been confirmed as working well by the ORR review of RSSB (ORR, 2010)⁶⁷, the industry have indicated that there is still conflict between other standards approaches such as company standards and the incoming EU directives. The assessment concluded that there are multiple sources of standards that form confusing constraints on asset management decision making which can only result in sub-optimal decision outcomes. We noted:
- a. The DfT has stated that there is often no link between industry output requirements and standards (unspecified) that support them and that the industry should challenge them. The ORR has stated that there are many duplicated or conflicting standards and processes leaving scope for interpretation and requiring management effort, increasingly so for European standards. RSSB stated that there is a clear process for challenging Railway Group Standards and seeking derogation which is used by many projects (which implies the standards are regularly not considered suitable). Industry finds it difficult to challenge standards, particularly at the tendering stage when required to offer compliant bids in a limited timescale through commercial relationships.
 - b. Network Rail raised the issue of the cost of poor and conflicting standards (unspecified) in relation to the Waterloo Capacity enhancement project. There is low supplier confidence that this will be resolved to support route based approaches.
 - c. The relationship between responsibility for standards specification and accountability for their cost/performance impact is not always clear. Similarly those with authority to accept completed work (to those specified standards) have different accountabilities.
 - d. A previous report by Network Rail into the impact of standards changes on a project (Network Rail, 2004)⁵² found that there were over 700 standards changes in a three year period and some 300 applications for non compliance. However, the report concluded these had minimal effect on project costs and timescale and that the major impact was from technical instructions / engineering policies issued outside the standards process, scope changes, organisational changes and increased risk averse behaviour affecting design, implementation and compliance activities as a result of concern over personal prosecution.
- E:10 A number of examples were stated of the impact of unclear or frequently changing standards and requirements (or lack of consistent guidance on their use within the industry) affecting enhancements and major renewals projects which ultimately affect costs. Examples of the impact on signalling projects noted include:
- a. Each project effectively has a different set of standards and requirements to the last with the need for considerable assumption, technical query and risk management overhead.
 - b. Restricted ability to apply standardised approaches such as equipment case layout design due to differences of interpretation, local preferential engineering and a non-pragmatic 'compliance culture' within design acceptance arrangements.
 - c. Constrained innovation investment in tools to automate data and control table production as every project is different and cost saving potential is negated by the need for re-configuration.

- E:11 Bombardier (on behalf of all train builders supplying the GB rail market) stated that the standards applicable to vehicles were not a particular issue but variance in interpretation and a need for significant compliance demonstration for GB rail (with integration risk being placed on the supplier) is a cost factor. Whilst accepting that GB rail standards are different to the rest of Europe (particularly around gauging, axle load and electrical specification), Bombardier suggested that GB rail should be aiming to use EU standards (or GB rail standards better aligned with EU standards) wherever possible. This would enable designs less unique to GB rail and less costly. However, Bombardier stated that the Disability Discrimination Act imposes requirements such as platform gaps that have become extremely difficult to comply with and that there should be a more fundamental industry look at the cost/risk of compliance.
- E:12 We note comments and examples in an independent submission to the VfM Study (McNaughton, 2010)³⁸ that route or service type segmentation enabling different operational practice, systems and standards is well proven in Europe and can facilitate materially different cost bases and organisational approaches to asset management involving local accountability and incentivised delivery innovation. The submission noted little ownership to drive such initiatives in GB rail with a perception that challenging the underlying safety standards would not be acceptable, even when effective safe strategies and methods already demonstrably exist in other European railways. Whilst we can see some parallels in Network Rail's current route-based asset management approach this is largely working within the fundamental GB rail standards and operational heavy rail structure without challenge.
- E:13 There is a potential disjoint between major GB rail project objectives/purpose and the ultimate customers and their objectives, leading to organisations delivering to reflect an assumed position with resultant rework costs or inappropriate solutions. Projects tend to focus on deliverables/solutions (how) rather than industry outputs (what) and it is unclear if cost-benefit re-appraisal occurs to ensure continued alignment with needs. An example is the Wessex capacity improvement project to deliver 10 car capability where the RUS set out various infrastructure aspirations which did not align with the TOC's bid and commitment.
- E:14 The DfT states that it is responsible for carrying out the trade-off between rolling stock and infrastructure investment and that the ORR determines how infrastructure investment should be made after consideration of Network Rail submissions. No evidence was presented to demonstrate how these trade-offs were carried out and optimised against the end objectives of the industry. Knowledge to support such decisions resides with a number of organisations who may have different views or interests. The outcomes may affect complexity, ongoing reliability, maintenance, wider fleet usage, etc. each bringing an associated cost. Network Rail stated that they often know more about rolling stock than the TOCs. Examples of such trade-off might include:
- a. Crashworthiness requirements compared with train protection features such as TPWS or ATP.
 - b. Train weight and bogie requirements compared with track quality level.
 - c. Train door systems compared with platform extension.
- E:15 Good asset management practice would require evidence of the use of asset knowledge in the strategic decision making processes. Several parties indicated that key asset management decisions (particularly at Government level influencing or constraining rolling stock procurement processes and ongoing life cycle cost, performance and risk) are being made without use of well founded asset knowledge from other places in the industry. Examples include:
- a. FirstGroup stated that they want to understand vehicle asset management issues and provide informed input to pre-tender development activity and how available monies for HLOS delivery can be used as they plan to have a long-term involvement. FirstGroup have worked with the DfT on the technical specification and commercial principles for Thameslink from day one. They consider themselves to bring valuable insight, operating knowledge and delivery focus, yet have little involvement in strategic planning.
 - b. FirstGroup stated that dialogue with Network Rail is improving through the planning activities but still lacks a partnership approach, visibility of costs in the non-station

environment and a total system focus (to avoid an infrastructure change bias over TOC plans). They noted that Network Rail keeps control over writing the final future planning and RUS documents and discussions with the ORR.

- E:16 The assessment was seeking evidence of how investment in one part of the industry was influenced by or traded off against investment in other parts of the industry. No evidence was presented by the DfT in this area (see above). Another area where evidence of this trade-off could have been found was in the role of the ORR in driving infrastructure efficiency and setting track access charges. The ORR monitors outputs, such as renewals volumes, and uses assumptions about efficiency to determine charges. The ORR sets, and can vary, the calculation of the Variable Track Access Charge although the degree of adjustment is limited by knowledge of the infrastructure and vehicle impact factors. The ORR has limited oversight of TOCs and therefore it was unclear how franchise strategies to encourage and make effective use of track friendly trains and mileage related payments are applied. The assessment concluded that no effective asset management decision making could be seen within the DfT, within the ORR or between the two roles that could be described as delivering an optimal investment solution in furthering the delivery of GB rail objectives.
- E:17 Industry perception and measurement of value is not consistently defined, understood or applied, ownership of an overall rail business case is unclear and it is uncertain if there is a uniform approach to considering costs and benefits. This may discourage support for initiatives, incentives to improve or prevent an understanding of how successful they are.
- E:18 The assessment was seeking evidence of the appropriate consideration of the wider business risk in its various forms (performance, cost, environmental, reputational, safety, etc) and subsequent allocation and responsibilities for management. This, rather than a blinkered view that results in safety risk being the dominant driver, underpins good asset management. Relevant factors noted included:
- a. Decisions on new rolling stock are seen ultimately as a DfT choice as residual life (and residual value risk) will extend beyond the Franchise Agreement length. Bombardier (on behalf of all train builders supplying the GB rail market) stated that clients often seek an unreasonable risk transfer, such as that arising from infrastructure over which Bombardier had no control, which ultimately is reflected in rolling stock prices. Bombardier advocated a more fundamental and holistic risk trade when introducing new or modified equipment. The example of train protection was cited, where new vehicles have to meet ever-greater crashworthiness requirements, even though collision risk has been reduced through the application of modern train control solutions, e.g. TPWS. Bombardier would consider taking responsibility for total integration of rolling stock and infrastructure systems and look at risk on a case by case basis. Bombardier consider they are currently being asked to take too much risk for product performance and cost as a result of inefficient procurement processes and a lack of joined up thinking on capex / opex trade-off.
 - b. The ORR's method for monitoring economic and safety performance is driven by tolerance to risk. Public tolerance of safety risk is low, so the ORR's assessment of safety performance is prescriptive, i.e. confirming railway safety risk ALARP. By contrast, the ORR believes that the tolerance to poor economic performance is higher, thus they take a less prescriptive approach than is acceptable for safety. This tends to be judgement-based, e.g. have Network Rail achieved a 30% reduction in train delays. However, the ORR stated that they do evaluate whether proposed economic efficiency measures will impact on safety risk and that safety regulation is driven by the legislation (primarily the Health and Safety at Work Act (HASAWA)) which addresses the management of safety rather than the outcome (numbers of injuries, etc), itself probably reflecting public tolerance of safety risk (not an internal ORR matter).

E.1.1.2 GB rail infrastructure

E:19 We have found that:

E:20 Network Rail stated that they have unlocked the approach to better managing the railway by thinking of the network as route sections small enough to link operating strategy with asset policy and an evaluation of the acceptability of unit cost against the volume of maintenance, renewal and enhancement activity.

- E:21 Network Rail stated that the Route Utilisation Strategies (RUSs) are a good mechanism for drawing together HLOS, national and local policy, Network Rail's demand forecasts and stakeholder views. The stated approach is to define the baseline (present) and future demand (initially 10 years ahead), identify gaps of over or under capacity and to include value for money, whole industry options (not definitive solutions) to close the gaps (or, where none identified, to flag the gap). Network Rail test value for money using the appropriate Government Benefit Cost Ratio (BCR) formulae (England, Wales, Scotland) however there is no formal re-check of the business case (VfM assessment) during GRIP. The BCR is rerun only if the investment board think it should be. Network Rail noted the case of a project stopped at GRIP3 as it failed the BCR. Network Rail stated that a second generation of RUSs is being developed to address a longer planning horizon, better aligned with the HLOS process and with the aim of taking less time to produce and consult. Network Rail stated that the RUS process targets operational solutions before infrastructure options are considered. No specific examples have been provided and we have not been able to validate this in the time available
- E:22 Network Rail stated that they involve ATOC, the TOCs and the freight companies in the development of the RUSs and the long-term planning framework. In this sense, they say, elements of trade-off are possible between Network Rail and the operators during optioneering for change. However, it is recognised that this process is not carried through to HLOS and beyond. Network Rail gave two examples of how their interface with stakeholders is changing:
- In previous control periods Network Rail has told the DfT whether a particular vehicle gauging aspiration is possible. Now Network Rail provides the DfT with the technical and financial implications of implementing a chosen gauge. The rolling stock RUS considers the impact of EU standards on gauging.
 - At present Network Rail takes the lead in accepting new rolling stock onto their infrastructure. However, EU Directives may be changing this, with the TOC taking the lead. Network Rail is keen to agree with the TOC community what the most cost effective solution will be for creating EU-compliant rolling stock.
- E:23 Network Rail stated that it has introduced a new Network Development Group to sponsor enhancements and liaise with the DfT. This group will consider why Network Rail spends 4% - 5% of project budget on GRIP 1-3 for major enhancements, which is recognised from benchmarking as below accepted best practice (around 10%) and leads to large discontinuities in project forecasts (cost and time) between GRIP 3 and 4. It is noted that this level of up front investment is not necessary or appropriate for straightforward renewals. International Council for Systems Engineering data shows that effective early investment on clarity of objectives and evaluation of options can lead a reduction in cost of up to 20% and an increase in on-time delivery of 50%.
- E:24 Network Rail has stated that it has a key objective to implement changes to the maintenance and renewal work-banks and to reduce whole life costs.
- E:25 Network Rail has stated that their asset management strategy is based on the effective management of risk, explicitly addressing broader risk issues (not just safety).
- E:26 An independent report has concluded that there is no compelling strategic vision for stations asset management, inconsistent standards and poor clarity for stations maintenance and renewals responsibility (Nichols Group, 2010)⁵⁸.
- E:27 Network Rail stated that the ORR's Asset Management Reporter had recently shown all assessed capabilities as either competent, effective or (in some cases) excellent and that Network Rail generally accepts the Reporter's improvement roadmap proposals. Network Rail has established a 2010 asset management improvement programme overseen by Peter Henderson at Board level (asset management is one of seven core (PR13) initiatives for Network Rail). Network Rail has stated an aspiration to be a leading UK asset management organisation by 2014 and one of the acknowledged world leaders by 2019. They stated that the asset management work streams are reviewed internally at each period and have detailed delivery plans under senior managers to the end of 2010. They stated that the ORR has endorsed the approach proposed.

E:28 Each work stream is to be written up as a chapter of the Strategic Business Plan. Network Rail stated that this is intended to inform the Initial Strategic Business Plan (ISBP) but is embedded as 'part of the day job' and intended to blend into business as usual in future. Network Rail noted that the programme includes review of AM competencies around 20-30 roles key to the ISBP and a number of benchmarking initiatives to understand the 'true position', drive CP4 delivery and inform CP5 plans. Network Rail stated that they are currently benchmarking the UK civil engineering market with Germany, Holland and France with the assistance of Birse, Faithful and Gould, Vinci and Bam. This study is not able to confirm the status of this 2010 programme (which has just been launched to build on previous work and is still to deliver) but the coverage described appears to be appropriate.

E.1.1.3 GB rail vehicles

E:29 We have found that:

E:30 Rail franchises can have 15 year durations under EU rules (extendable to 22.5 years (or more with EU agreement) where significant investment is proposed) but rarely do so. The DfT has (July 2010) started industry consultation on future franchising which proposes to include a 'looser' base specification but a clearer idea of funding with a declared subsidy line. Some criteria like overcrowding limits will be stated.

E:31 FirstGroup considered that bidding for franchises is genuinely competitive but is not strategic enough to permit real investment and savings as the payback time is too short. FirstGroup stated that the major cost drivers are the level of service and mileage operated, noting that in recent franchises costs have been broadly fixed at the bid stage for the duration of a franchise as the service (and effectively therefore mileage, fuel and maintenance) is heavily prescribed by the DfT specification, most track access charge is fixed and the ROSCO charge is set (very often with no choice over fleet). FirstGroup noted the limited opportunity to apply in-house operating expertise to optimise or create an efficient operating model for the railway and consider the DfT is unwilling to discuss workable mechanisms to recoup TOC investment plan costs (perhaps around fare levels) which would provide certainty on residual value at franchise end. FirstGroup stated that if costs were clearer and some control/veto was possible more risk would be taken on investment.

E:32 FirstGroup stated that the ROSCOs have little incentive to negotiate over existing rolling stock as they are aware of the demand on the vehicles and the general lack of suitable spare stock as an alternative. The franchisee has to sign up to a ROSCO contract for the full franchise period on day one, generally for the rolling stock already associated with the franchise. The DfT stated that the existing rolling stock is not subject to effective market forces at a change of franchise. FirstGroup noted that the Competition Commission had recently removed the obligation on ROSCOs to provide the same pricing and conditions to all potential franchise bidders. FirstGroup stated that they would like to have a choice over signing up for whole franchise periods and build in break points in rolling stock contracts (and for non-aligned train maintenance contracts) so they could be incentivised to change fleet, invest in new trains or choose to move to full in-house maintenance for cost and quality control purposes later in a franchise. They feel this would help make ROSCO pricing more competitive by reducing leasing certainty.

E:33 FirstGroup stated that most franchisees prefer not to procure new rolling stock as part of the franchise deal as the new vehicles do not appear until part way through the franchise period, there is delivery risk to manage, there is no certainty on end franchise residual value and it is likely that leasing of two fleets of trains has to be in place for a period of time. However, FirstGroup stated that the most competitive part of the ROSCO market is the provision of new trains as if there is a new train on the planning horizon, the incumbent ROSCO will reduce its existing fleet price in response to the 'credible threat' to persuade the franchisee to continue with the existing rolling stock.

E:34 Misaligned incentives result in additional risk cost. Angel Trains stated that they have to offer a range of maintenance options with a lease. The ROSCO takes the risk on heavy maintenance and Angel Trains stated that they spend £100m/yr on maintaining or refurbishing their existing fleets, taking the risk on energy and steel prices which is smoothed for the TOCs along the duration of the franchise. Whilst Angel Trains consider maintenance is best done by the

manufacturer from a whole-life rolling stock point of view, the TOCs want the control as they are incentivised to get the train back into service and cannot budget for major rolling stock refurbishments especially if unseen. Angel Trains stated that if the TOCs do maintenance the ROSCOs may only get limited sight of the vehicles to assess condition and seek corrective action before the end of the franchise.

- E:35 Bombardier (on behalf of all train builders supplying the GB rail market) stated that current franchising periods caused behaviours where TOCs can take a short-term outlook and hide the true cost of vehicle maintenance by seeking to extend it beyond the end of the franchise, to be picked-up by the next franchisee. This point was reinforced by Angel Trains. Bombardier noted this is characterised by the significant number of requests for changes to maintenance periodicities and are mindful this could cause added cost in the future if such actions led to endemic fleet problems. We note that such problems would be avoided by proper consideration of cost, performance and retained risk (fundamental to an optimised solution). FirstGroup and Angel Trains stated that TOCs like the manufacturer to maintain their fleet during the first years of introduction as this enables fleet reliability to be developed with greater certainty and establishes a good information base for the TOC to make a reasoned decision as to whether it should take on future maintenance.
- E:36 FirstGroup & Bombardier (on behalf of all train builders supplying the GB rail market) noted that the DfT, for the first time, are taking a whole-life cost approach with Thameslink rolling stock procurement enabling a higher first cost to be offset by lower operating cost factors. This has enabled the TOC to take more responsibility for delivery risk. Bombardier suggested that whole-life cost modelling enables capex and opex to be assessed holistically and the right trade-offs to be made. This is considered to be an effective approach.
- E:37 One ORR representative considered that there are arguably two conflicting goals at play in the desire to achieve effective asset management; standardisation and optimisation. The former is epitomised by the suite of interoperability legislation which seeks to create uniformity throughout Europe. Yet, much of the aim to fulfil the potential of the railway as a system centres around optimisation. We noted that:
- a. Bombardier (on behalf of all train builders supplying the GB rail market) stated that they would like to standardise their product range but clients seek a bespoke solution with each new initiative, e.g. Thameslink, Crossrail, and try and specify how it should be provided rather than providing a good specification of the outputs required. Bombardier noted that variances in core specification make it hard to produce vehicles efficiently and TOCs have specified different vehicle lengths, door configurations, etc. (possibly due to a lack of clarity in franchise specifications) and often speculatively (before the specification is visible) which all cost money to respond to. Bombardier noted that there are now 20+ Electrostar variants having to be maintained across GB rail. They had encountered similar problems in other countries, but they considered that the problem was exacerbated in GB rail by the state of change in the industry which has resulted in a stream of new enquiries from TOCs for new vehicles, major upgrades and overhauls, most of which are asking for bespoke solutions and in many cases are unlikely to proceed beyond enquiry stage. Bombardier noted that in Germany they work with DB to specify a standardised set of vehicle designs within a long-term delivery framework and stick with this when they secure an operating concession.
 - b. FirstGroup stated that they too want rolling stock standardisation and believe it to be achievable through migration to European standards (it not being in the TOC's interest to bespoke), wanting to specify outputs and leave it to the manufacturer to deliver. Whilst recognising the variability of GB rail infrastructure, FirstGroup want cheap, plentiful and reliable vehicles and do not consider there are too many variants currently in GB rail. FirstGroup stated that major technological shifts in rolling stock technology and sustainability should be led by Government as they consider that one TOC on its own cannot persuade the manufacturers to change direction.

E.1.1.4 Non-GB rail

E:38 We have found that:

E:39 Ofgem stated that they regulate end customer price controls, set quality of service objectives and set an acceptable rate of return. They stated that the approach is to ensure visibility of

spending but to stay hands-off, just asking why certain spending is required and/or why now. Ofgem currently has five year price control periods but are moving towards eight years so as not to distort investment incentives (recognising the need for renewables investment and the need for some certainty). Ofgem stated that the energy companies (14 licensed distribution and 8 gas providers) determine enhancements and provide all funding (no subsidy to manage) through a transparent consultation process where incentives to improve overall network are discussed and good rationale sought. Licences are not subject to renewal and companies own and operate assets in geographical regions. Ofgem stated they are moving to be more output focussed with companies justifying delivery forecasts. Within the price control period ofgem seek annual cost reporting from each company against a submission template and use mainly in house auditing rather than independent advisors to check accuracy and progress. They stated that there is now a greater emphasis on asset health and condition and the relationship to the investment plans. They stated that there are common standards for planning, safety, tolerances, etc. but lots of variability in design standards.

E:40 ScottishPower (Energy Networks) is a regulated geographical energy distribution and transmission organisation and stated:

- a. They have just started the fifth price control period.
- b. The review and settlement takes around 18 months to agree from presentation of a 10 year business plan (featuring opex and capex and modelled to 25 year horizon) based on stakeholder objectives, asset knowledge and modelling to negotiating a determination.
- c. Asset decision trade-offs and solution risk is revealed in technical option papers.
- d. There is reasonable certainty of investment as the 'franchise' is ongoing allowing a lower cost of capital and lower investor risk (although no formal regulator acceptance beyond control period).
- e. The regulator judges the cost to deliver, builds in efficiency assumptions and sets cost of capital, profiling revenues to avoid customer shocks.
- f. There is significant internal incentive to outperform settlement - some savings can be retained.
- g. The regulation is considered intrusive and still monitors how (inputs) as well as what (outputs).
- h. The annual regulatory reporting pack provides a rolling update of business plan achievement and the rigour of preparation benefits the business (although too detailed in places and still regulates competitive items).
- i. The percentage of capex under-spend is measured and can trigger a new pricing review.
- j. A five year period is about right to cope with poor settlement (eight years will involve a midpoint review).
- k. R&D was affected by pricing controls so there is now a cross industry collaborative scheme (IFI) to incentivise technology investment focussed on business delivery.

E:41 ScottishPower Energy Wholesale is an unregulated energy generator and retail organisation. They stated that they transformed locally owned and managed plants to a single common approach 'one way' through a three year operational transformation programme fully embedded in the organisation:

- a. Six big goals were set as clearly understood objectives, linked to monthly reporting and individual's objectives.
- b. Staff were involved through 7 workgroups and 19 sub projects with the whole thing planned and resourced as a project.
- c. Elements were described in terms of 'Process Safety' as more understood than 'asset management'.
- d. 42 risk control measures monitored and updated near real time and accessible to all via dashboard.

- e. Multi-discipline maintenance working group reviewing measures, targets and ongoing improvement.
- f. Measures used to inform annual business plan and changes to existing assets.
- g. Final trial stage of optimisation of investment decisions from each site to common criteria.
- h. Competing for investment across worldwide Iberdrola Group and using leading practice as differentiator.

E:42 The Government is the asset owner of The Netherlands rail infrastructure and has delegated parts of this task to ProRail as asset managers. Decisions about targets, strategy and funding are made by the Government and preliminary work is generally done by ProRail. For maintenance & renewal the Government formally set the objectives by signing a management contract prepared by ProRail within the Government constraints. There is a mature relationship between Government and ProRail enabling targets and strategy to be developed in a constructive and open way, where necessary involving TOCs. We note:

- a. ProRail have evolved towards 'Output Steering' through four key strategic pre-conditions (objectives) set by Government:
 - i. Transparency in the relationships between activities, costs and performance.
 - ii. Awareness of the interaction between performance by manager and operators.
 - iii. Awareness of the long-term effects of maintenance.
 - iv. Structures and systems for effectively using the insights in objectives i to iii.
- b. TOC's input into performance requirements.
- c. ProRail set 6 SMART objectives:
 - i. Maintenance Management - The relationship between costs, activities and performance is known.
 - ii. Life Cycle Management - All decisions on new build versus maintenance are taken on the basis of demonstrably lowest life cycle costs.
 - iii. Quality Assurance - The chain of primary processes including tasks, responsibilities and authorities and internal / external interfaces is described and managed.
 - iv. Information - The data for management, financing systems and dashboards (KPI's) are available reliable and managed at a sufficient level.
 - v. Management Instruments - Instruments (including procedures) and systems for supporting asset management, financing system and dashboard are implemented.
 - vi. Staffing and Organisation - ProRail has embedded professionalism across the organisation.
- d. TOC access charges in The Netherlands are based on superstructure costs (gross tonkm), traffic control and signalling (trainkm), catenaries & transport costs (kWh), stations costs (amount of stops at stations) and marshalling & storage yards (trainkm) (utilisation of a route is seen as a main cost driver).
- e. ProRail has undertaken significant comparison between routes that have different numbers of trains and tonnages and determined the varying maintenance costs (variables used have been trains per year / passenger numbers, track configurations, tonnes per day, failures, punctuality). Costs, conditions and performance are managed in relation to each other by using Life Cycle management based on actual realisable costs.

E:43 It was stated that in The Netherlands the Government do not financially regulate the business but do set minimum objectives around pricing (fixed fare levels), punctuality, service quality, etc. in Concession agreements. NS has significant flexibility to determine the details including the timetable and can decide on extra (or less) services. NS advised that the main driver is passenger numbers. NS is also able to trade-off with ProRail (the Government run infrastructure manager) over possessions v train running adjustment, speed restrictions, etc. NS managers have performance contracts linked to specific cascaded objectives. There is

comprehensive performance feedback to staff, depots, etc with benchmarking and punctuality comparison.

- E:44 Dutch operator NS stated that it funds all activities on an annual budget basis and is a commercial organisation, owning stations, running associated retail activity and collecting the farebox. There is no Government subsidy but the Government does have a safety inspection role.
- E:45 The infrastructure manager for the French rail network, RFF, in renegotiating their contract with operator SNCF, is putting in place mechanisms that will ensure that SNCF's contractual obligations are aligned more closely to RFF's objectives (including quality of service, indicative levels of renewals/activities and development of unit costs). The French ORR was set up in Spring 2010 and efficiency is now more of a priority than when RFF was set up.
- E:46 The Swedish Government sets two high-level objectives (accessibility and HSE) and provides guidelines on specific activities and rules to be applied. The Transport Administration stated that they develop these through goals (quality, punctuality, traffic information, safety, reliability) for five classes of line, e.g. permitted number of failures per track km. It was stated that these are progressively being linked to maintenance objectives and cascaded to lower goals for specific lines as contracts are re-let.

E.1.2 Organisation

E.1.2.1 GB rail as a whole-system

E:47 We have found that:

- E:48 It is crucial to good asset management that responsibilities and accountabilities are appropriately aligned with strategic objectives and empowered through the industry organisation so that decisions are influenced by the right people with the correct authority.
- E:49 In order to provide a single responsible body for the operational railway, Network Rail has a remit to lead on industry planning (RUS process and Planning Ahead group) and safety. Network Rail is also responsible under its licence for managing overall punctuality and reliability (monitoring PPM and inputting to a DfT chaired National Task Force) although not able to control a number of influencing factors. This needs it to take a view of TOC interests as well as the infrastructure. The relationships drive behaviours which, if not industry-focussed, can impact decisions and costs. Joint Performance Improvement Plans are understood to be in place for all TOCs and Network Rail routes which, once established, become Reasonable Requirements, enforceable by the ORR. Whilst there was evidence of significant effort expended in the attribution of poor performance, punctuality and reliability across the industry, it wasn't clear whether root causes were actually determined or that the findings were being channelled for the overall industry benefit.
- E:50 Integrated teams representing rolling stock, operations and infrastructure can provide more assurance that systems will integrate in order to deliver the overall objectives. For example, the Thameslink enhancement project is utilising an integrated project team. It is not clear that this is occurring as part of day to day asset management outside of major projects.
- E:51 The ORR is heavily oriented towards infrastructure economic regulation (scrutiny of Network Rail) and has little involvement with vehicles other than via track access charges (safety regulation applies to both). The ORR's stated role is not to dictate how Network Rail runs its business but is concerned that some changes are being made without enablers in place which could affect performance and the ability to deliver. Improvements can be suggested but only imposed via objectives in the next Periodic Review. There is a risk that each change of control period causes a rethink of expenditure profiles which could affect the supply chain.

E.1.2.2 GB rail infrastructure

E:52 We have found that:

- E:53 From an asset management point of view, Network Rail has stated that it has organised the railway into 305 manageable route sections (typically 100 route km between key junction nodes and with similar traffic types) in order to develop the ability to trade-off asset expenditure across asset families and operate maintenance and renewal budgets at that level. Network

Rail stated that the initiative has been led by the track discipline and the track policies are in place with other asset types being integrated by 2011. The implication is that this will align technical accountability (output performance / risk) and financial responsibility though Network Rail stated that technical disciplines currently still hold their own budgets. Network Rail has stated that it has the organisation in place to deliver Route Asset Management Plans and to consider maintenance, renewals and enhancements in a coordinated way. Whilst this study is not able to substantiate how developed this structure is below the senior team, the approach described appears to be well thought out and to represent good asset management practice. We note:

- a. The railway infrastructure is currently organised around 9 operational routes (Kent, LNE, etc) with associated Route Asset Management Teams (9) and Maintenance Delivery Units (40). It is important that the 16 (+ network) RUSs, the stated 26 Strategic Routes and 17 Strategic Route Plans, 305 Route Sections with their Route Asset Management Plans, 7 Asset Group Policies, etc are fully linked, understood and embedded within the organisation (and clear to other stakeholders) so that the asset management planning, delivery and logistical support is aligned and effective.
- b. Network Rail stated that development is still required to embed good asset management practice at the coal face of the business with the various local delivery teams, correcting local work practices/workarounds as a result of unclear output requirements, addressing cultural issues and enabling trade-offs between asset types.
- c. Network Rail stated that it has recognised that maintaining momentum is a challenge in any major change programme and that developing people competencies is a key enabler.

E:54 The ORR's Asset Management Reporter considers that Network Rail may not yet have the systematic alignment (knowledge, skills and aptitude) in the right place to deliver the Route Asset Management Plans and is reluctant to outsource analysis and modelling. The ORR has concerns over the ability to robustly model deterioration with variable data and the time taken to achieve outputs if using an internal capability. Network Rail strongly believes they have the capability and denies a reluctance to outsource but confirms this is a core area that needs to be developed further. The study is not able to verify the Reporter's statements in this respect but notes that they have reviewed Network Rail's documents in significant depth over a period of years.

E.1.2.3 GB rail vehicles

E:55 We have found that:

E:56 The view amongst several respondents was that TOCs, being thinly capitalised and possessing short duration franchises, do not take responsibility for asset management as a discipline. Accountability seems to largely lie with Network Rail for stations and with ROSCOs for vehicles, although the degree of maintenance responsibility within the lease arrangement tends to dictate greater or lesser TOC interest. There are instances, such as the Alstom/Virgin Pendolino and Bombardier/Virgin Voyager arrangements, where the TOC does take a significant role in asset management issues (with resultant benefits) but this is not consistent across the industry.

E:57 There is evidence that ROSCOs take responsibility and are accountable for asset management on vehicles. Our findings suggested that their focus is on managing risk associated with vehicles, and associated enhancement investment, and seeking to offset that risk financially over the lifecycle of the vehicle. However as the ROSCOs only earn value whilst vehicles are on lease (and typical lease durations are significantly shorter than the life of the asset), the risk cost is inevitably passed on thus increasing the lease costs early in the vehicle's life. Uncertainty of national rolling stock plans as a result of changing Government policy further affect the risk profile. No evidence was presented that this was an optimal way of addressing whole-life considerations for the industry.

E.1.2.4 Non-GB rail

E:58 We have found that:

- E:59 There was evidence to suggest that the governance arrangements for the electricity industry in the UK provided opportunity for greater clarity of accountability between those elements of the industry that were revenue focussed and those regulated elements of the industry that managed natural monopolies (infrastructure). Unlike GB rail, no Government subsidy is involved and companies have to make the case for investment on a largely unconstrained commercial basis. The regulated networks were incentivised strongly to provide system availability AND reduce costs by investing wisely and becoming more efficient. The non-regulated generation part of the industry operates through a market that ensures cost effective electricity pricing. However, no evidence was presented of how the unregulated part of the industry was sustainable or best met long-term UK electricity needs in terms of fuel mix or security of supply.
- E:60 The Swedish Government has a small transport ministry (less than 10 staff) and funds most infrastructure costs through annual budgets in response to delivery plans. It was stated that budgets have to be set on an annual basis under Swedish law. The Government initiates audits of delivery and expenditure to the plan and the Swedish Transport Agency regulates safety (but not economic) matters.
- E:61 A new Swedish Transport Administration has been set up from April 2010, external to Government, to better coordinate planning of national transport infrastructure (road, rail, sea and air). This organisation owns the road and rail infrastructure and is the Infrastructure Manager with safety, management and financial responsibility. It was stated that they have to deliver according to the granted budget and cannot borrow money other than for some specific enhancement projects (improvements) following Government agreement.
- E:62 ProRail are the infrastructure Asset Managers in the Netherlands. We note:
- a. ProRail have outsourced all executive activities (engineering / maintenance / renewal and construction projects), supply and materials logistics and quality measurement/reporting. ProRail regard outsourcing as a way to improve rather than a goal and that this requires mature contract management attitudes, good information and an understanding of how to control costs and performance.
 - b. ProRail specify the input, audit the process, measure the output and evaluate the results of the work. Specifications for Reliability, Availability, Maintainability, Safety, Health and Environment (RAMSHE) are used to manage contracts.
 - c. Contractors plan, execute and inspect the work, measure the output, evaluate and improve the process and report. Maintenance contractors are keen to innovate and introduce better methods where they can see a benefit.

E.1.3 Planning for Delivery

E.1.3.1 GB rail as a whole-system

E:63 We have found that:

E:64 The industry can find a thirty year, whole-life view difficult because of misaligned funding horizons and short-term efficiency pressures. Network Rail stated that the latest versions of Route Utilisation Strategies (RUSs) have been able to take a 20-25 year horizon and provide a list of options (to help formulate industry plans and HLOS development). Network Rail is undertaking a trial of a 50 year RUS with Merseyrail. Network Rail stated that RUSs are required by the licence but are what Network Rail would do anyway.

E:65 Evidence was provided that highlighted that GB rail funding is geared towards minimising initial capital investment cost. Payback periods exacerbate this and do not incentivise the capital investment for the optimisation of whole-life cost, performance and risk. A recent independent report found that Network Rail has no standardised approach to estimating whole-life costs or for formally driving and confirming this through final design solutions (Halcrow Group Limited, 2009)³⁰.

E.1.3.2 GB rail infrastructure

E:66 We have found that:

- E:67 Network Rail stated that their Asset Policies are at the core of the asset management planning approach, being risk based, aimed at minimising whole-life cost and identifying the inspection, maintenance and renewal regimes under which assets are managed over their life. Network Rail specifically stated that development of optimised policies is not constrained by periodic review funding cycles or impacted by short-term efficiency pressures. Network Rail stated that it did re-examine the policies in response to the CP4 efficiency challenge and, as a result of the route section segmentation, was able to make considerable permanent (sustainable not deferred) reductions to work scopes.
- E:68 We note that the ORR's Asset Management Reporter expressed concerns in the 2009 Best Practice Review Update (AMCL, 2009)² that Network Rail's Asset Policies had not been developed from 2006 to the extent envisaged, resulting in them not being sufficiently enduring to develop affordable delivery plans for the early part of CP4 (despite forming the basis of the CP4 Strategic Business Plan). The ORR's Asset Management Reporter also briefed the VfM Study Team in June 2010 (after Network Rail had modified the Asset Policies) and stated that they found good rationale for the changes but had concerns that policy development and justification had not developed as expected since the 2009 review, had been limited to some specific short-term CP4 objectives and therefore remained a priority area for attention. The study is not able to validate the Reporter's statements in this respect but notes that they have reviewed Network Rail's processes and documents in significant depth over a period of years. We note the importance of robust, whole-life optimised asset policies in underpinning good asset management.
- E:69 Network Rail's 17 Strategic Route Section Plans and 305 Route Asset Management Plans are based on defined route parameters, particular train types, etc. with a view to optimising regimes around use and condition. Network Rail advised that a Route Asset Management Plan will be produced for each route section stating how the outputs defined in the RUSs/Strategic Business Plan can be delivered by the delivery units and, when added together, would provide the Initial Strategic Business Plan (ISBP) costs. Network Rail stated that the plans include an evaluation of whether expenditure on the network can be reduced whilst maintaining railway reliability at acceptable levels. We note:
- a. Network Rail stated that the Route Asset Management Plans were evolving with three layers:
 - i. map and route descriptor.
 - ii. summary of work activities, cost and expenditure.
 - iii. detail of inspections – what/when.
 - b. Network Rail stated that the challenge of creating trade-offs between different asset groups has not yet been fully addressed and that merging all engineering disciplines to the current track content by route section is yet to be done (managed by the Track Engineers) 'over the next 3 months' with the next step of feeding this into business planning cycle (stated as necessary to achieve CP4 targets as well as informing the next ISBP).
 - c. Network Rail stated that there will also be further improvements to the 7 Asset Group Policies (stated as in hand and to be published by December 2010) which will be used to inform what Network Rail wants to buy and activity volumes for the CP5 Initial Strategic Business Plan (ISBP) in June 2011. They stated that the improvements will provide more evidence to support intervention choices and an improved alignment of the analysis methodology across all asset groups.
 - d. Network Rail stated that they were still deciding how to communicate Route Asset Management Plans, noting that the TOCs are aware of them and want to see them. Network Rail stated that they would rather talk to TOCs around the 17 Strategic Route Plans but that Level 2 of the Route Asset Management Plans (see above) presently under production would probably be shared with the TOCs.
- E:70 The ORR wants Network Rail to determine the right work or product rather than merely cutting cost. The ORR has expressed frustration that Network Rail delivery plans often appear to be mechanisms for reducing work volumes rather than improving efficiency in real terms. Network Rail has stated that where the reduction in scope can be demonstrated to be sustainable (i.e.

not simply a deferral) then it is a legitimate efficiency saving. Network Rail stated that they reviewed the scope of work to be carried out in CP4 (by reviewing the asset management policies) and the cost of delivering the work resulting from the application of these policies, agreeing the approach and demonstrating, as far as possible, the robustness of the activity reductions to the ORR.

- E:71 Network Rail has to start the formal planning cycle for the next Control Period almost four years in advance, but has described an intention to take a more dynamic and substantiated approach for CP5, starting with an Initial Strategic Business Plan (ISBP) in June 2011 (intended to proactively contribute to the next HLOS and funding decisions). This is a pre-cursor to the Strategic Business Plan and request for funds – responding to the new objectives - and Delivery Plans stating what will be done, when and the cost – in response to the ORR’s determination of obligations, network grant and access charge levels. Network Rail has stated that the necessary enablers such as information are in place to support this process for CP5 and expect this to be work-bank led to improve accuracy (currently CP5 track activity planning is understood to be largely by modelling and extrapolation with some limited workbank comparison as validation). Whilst unable to substantiate this intended future approach the process described appears to be well thought out and to represent good asset management practice. Network Rail originally stated that the next ISBP will define a range of robustly costed strategic options, together with what they would achieve based on exploration of the following scenarios (although Network Rail has latterly advised (December 2010) that there may not be a range of costed options as this not yet decided and the following scenarios are a one-off approach):
- a. Enhancing performance (based on RUS options).
 - b. Keeping performance and expenditure as is (on whole-life cost basis) – considered as the ‘mid’ option.
 - c. Keeping performance as is but defer expenditure (with some life extension and sensible lowest cost).
 - d. Reducing expenditure by reducing outputs in some areas where above ‘average reliability’.
- E:72 The DfT is using the RUS / Planning Ahead process to help inform enhancements and franchise objectives, noting that the RUS has moved away from purely capacity issues and perhaps sets over-optimistic expectations. The DfT to date sees these documents as a wish list, not budget-constrained and largely divorced from cost and trade-off details.
- E:73 Where Network Rail is unable or unwilling to engage with suppliers at the early planning stages of enhancements and major renewals in order to collaborate and understand construction and commissioning efficiency possibilities there is evidence that it can result in poor assumptions and unrealistic disruptive possession arrangements. This can be compounded by protracted scheme development resulting in reduced design time and the need for parallel design and build.
- E:74 Network Rail stated that all engineering planning is being centralised at Milton Keynes by 2012 (currently rationalised to 11 sites from 18) and from December 2010 all PICOPs working on major possessions will migrate to the planning team. Network Rail stated that they already provide real-time management of engineering access (to agreed Rules of the Route fixed around a year in advance) and key materials delivery via an Infrastructure Group Control which enables a simplified command and control between planners, worksites and operational control. There is a significant lead time and Network Rail stated that they currently collect work aspirations from Route Asset Managers two years out and aim to plan and efficiently package works to be most economic under Schedule 4 (minimum disruptive access). Schedule 4 is also reviewed at each Control Period and Network Rail stated this provides incentive but as payments are based on changes to timetable it is difficult to apportion to particular works. The process includes TOC consultation but Network Rail stated the (well established) overall process takes too long.
- E:75 Network Rail stated that there is no decision-making support tool or rules to assist possession v network availability decisions (and there are penalties for late changes and also penalties under Schedule 8 – managed by a different Network Rail organisation - if works overrun).

They apply a ‘customer comes first’ mentality which means that trains would be run (and possessions delayed or some work cancelled to accommodate late running) with further emphasis on handing back on time. The overrun reluctance in particular influences behaviours and is subject to measurement (whilst there is no KPI to measure effective use of possessions – work-banks are checked for delivered activities).

E.1.3.3 GB rail vehicles

E:76 We have found that:

E:77 The DfT has stated that freight operators have been innovative as they are obliged to think more about how to improve the network and have to pay for it (though some grant support is available). The passenger franchises are now tightly specified and there is little scope for variable revenue as a TOC incentive to innovate or invest. The payback period is also a prime factor. The DfT acknowledges that TOCs are generally not incentivised to vary infrastructure (the Chiltern Line being a specific case where this has been agreed) but offers of station improvements, car parks, etc. can be enshrined into Franchise Agreements.

E:78 Bombardier (on behalf of all train builders supplying the GB rail market) stated that visibility and consistency of demand is a problem due to a lack of long-term forward planning. Consequently, Bombardier is not able to plan its resources, retain skills or undertake longer term development. Bombardier stated this situation had not improved with the DfT leading specification and procurement. This particularly affects the GB rail supply chain and especially SMEs.

E:79 Angel Trains stated there was poor clarity and planning over rolling stock strategy, despite attempts at dialogue with the DfT, and a belief that this is not happening or shared in case it stifles competition. Rather than a long-term investment and cascade plan Angel Trains stated that the result is a rush at each new franchise with duplication of effort and costs to the supply chain in answering bids for rolling stock that may never be bought. Angel Trains noted that following the Competition Commission ruling and need for transparency and annual ORR scrutiny, a simple ‘indicative price’ request needs a more elaborate process and takes longer.

E:80 Angel Trains stated increasing difficulty in sourcing a skilled supply base for components where there is no investment flow. An example given was GB rail vehicle seating which has particular crashworthiness and fire retardation requirements. Angel Trains stated the difficulty in taking a longer term view (without wider industry engagement) to plan an opportunity to modify vehicles for a future (unknown) operator in order to comply with future legislation (such as mandatory disability requirements) or more track-friendly capability which could otherwise restrict the use of the asset. Angel Trains stated that major maintenance intervals may present a good opportunity but the Franchise Agreement needs to allow time out of service as TOCs are not incentivised. Two examples given were GSM-R fitment progress and disabled toilet fitment which reduces seats.

E.1.3.4 Non-GB rail

E:81 We have found that:

E:82 ScottishPower (Energy Networks), as a regulated geographical energy distribution and transmission organisation, stated:

- a. Annual delivery plans and prioritised projects, though listed with a mixture of direct labour (where day to day resilience and particular technical knowledge required) and contracted work, still encounters supply peaks and troughs.
- b. Current bespoke planning systems are being migrated to a central system.

E:83 ScottishPower Energy Wholesale, as an unregulated energy generator and retail organisation, stated that they have:

- a. A strong commercial driver for availability and responsive plant to generate power reliably at high value times.
- b. New assets and enhancements to provide a balanced portfolio matching the required market share to a 20 year strategy, modelled and able to demonstrate whole-life cost.

- E:84 RFF, the French rail infrastructure manager, plan the main line renewal programme 15 years ahead at a macro level based on an optimised lifecycle costing model. More detailed management is based on actual deterioration and quality of service. Renewal is generally enhanced modernisation rather than like for like. There are 22 Regions in France that have their own budgets separate from Government and if these wish to improve transport in their area (better service or quality) or ensure network longevity they can fund renewals.
- E:85 The Swedish Transport Administration stated that it is responsible for asset management and stated that it produces:
- a. An annual Network Statement which describes the committed train plan, track works and infrastructure improvements.
 - b. A long-term plan including operation and maintenance strategy (currently a 12 year look ahead for Government agreement).
 - c. A delivery plan (currently planning for 2011-2013) associated with an annual Government agreed budget. The Administration uses analysis tools to decide on any reduced outputs following dialogue with contractors and consideration of risks if funding levels are not secured. There is no specific prioritisation tool.
 - d. A national timetable covering an 18 month period (including engineering possessions).
- E:86 Dutch operator NS stated that it has a business plan to 2015 with further look-ahead to 2020 and 2040. NS interacts with ProRail (the infrastructure manager) to do this and there is a specific 'vision 2020' initiative to plan ahead collaboratively. NS produces the network timetable through consultation with ProRail. Every 6-7 years there is a major timetable review and change. NS stated that there are limited infrastructure constraints on rolling stock and trains generally run everywhere on the network (rather than constrained to particular routes). Some routes have particular loading demands for which higher density, higher accelerating trains are used (a new Sprinter fleet of 700 vehicles has been introduced).
- E:87 NS stated that in the Netherlands most rolling stock is owned by them although recent fleets have been dry-leased through NS Financial Services (another subsidiary company), passing off the end life risk. NS stated that they undertake strategic fleet planning, business cases (mostly for refurbishment), decide the best option for obtaining new rolling stock (buy or lease), specify the trains functionally, do life cycle plans and undertake all the commercial dialogue. NS stated it currently has an agreement to use NedTrain for fleet maintenance (within a trading contract). As the fleets generally have a 'go anywhere' network capability there is no cascading as such and vehicles are maintained until they are refurbished or replaced. NS run the procurement project where buying a fleet. Whilst NS stated that it aims for as much 'off the shelf' standard rolling stock as possible they noted that things change over time and policies evolve so in effect each procurement has a different specification. NS stated they are in the early stages of applying whole-life costing when considering options and are influenced by lessons and experiences from previous fleets.
- E:88 ProRail are the infrastructure Asset Managers in the Netherlands. We note:
- a. The Long-term Financial Plan is a fundamental for the long-term financial planning of the Government. It is used as a baseline. All changes in plans and funding are related to the base line. In The Netherlands they don't have a similar control period as in GB rail. ProRail has a yearly actuated management/business plan. It is the contract with the Government with explicit financial and performance targets.
 - b. ProRail estimate the renewal life cycle of all assets and use this theoretical life [see 'yardstick' case study] to project a long-term financial plan (1995-2030) for Government that includes volumes and costs and is classified by asset type. Modelling has been used for long-term planning using the information on quantities / construction year, utilisation, life time and unit costs. ProRail is using a 10 yearly rolling planning cycle and lifecycle cost modelling that fixes budgets and work-plans and explains the expenditure flow between maintenance and renewals. Projections are also made for a 15 year outlook.

- c. The planning timescale for fixed track access periods for engineering work is approximately two years. This centres around the use of high output equipment for track and engineers try and batch work into longer blockades for more efficient delivery.

Case Study: Track Life ‘Yardstick’ System

From ProRail (Office of Rail Regulation, 2007)⁶⁶

ORR’s published Visit Report to Netherlands in 2007. Pages 12 – 14 describe each item having a theoretical renewal life and the “Yardstick” tool used to independently verify the actual renewal date closer to the time.

Long-term planning (from 5 years to 20 years ahead) is a three step process which is very much top down:

- 1) Each object has a theoretical renewal time which is recorded in the asset register (first level of planning).
- 2) After $\frac{3}{4}$ of the theoretical lifetime the assets are inspected to determine the expected residual lifetime (second level of planning).
- 3) When it becomes time for renewing the assets, the actual network needs, and other opportunities (such as bundling) are examined (third level of planning).

‘Yardstick’ is a numerate method of assessing a section of track by marking the various components against a marking system approved by ProRail. The ProRail ‘Yardstick’ is a “picture book” that has been introduced to ensure a more objective assessment of the condition of the assets. The book contains photographic and descriptive examples of asset defects and enables the inspectors to consistently assess asset condition out in the field. It is based on UIC principles. The aim is to review a piece of track infrastructure that is ‘Theoretically’ (according to the long-term plan) at the end of its life. The Engineers then determine if it can 1. Continue to be maintained, 2. Be life extended for a period so that its life cycle can be optimised, or 3 needs renewing. This then changes the section of track from ‘Theoretical’ life to ‘Technical Life’. A life cycle costing model is used to ascertain if life extension or a complete renewal is the best financial option. This enables consistent prioritisation for life extension / renewal. A prioritisation tool is used to rank and select suitable renewal activities for budget and plan allocation at a two year horizon.

E.1.4 Processes and Tools

E.1.4.1 GB rail as a whole-system

E:89 We have found that:

E:90 There was little evidence presented of regular effective cross-industry sharing of information to facilitate better asset management decision making. Differences of opinion exist as to the reasons for this but there appears to be adversarial commercial behaviour involved. There is evidence of specific effective collaborations such as between Alstom, Virgin Trains and Network Rail concerning OLE/pantograph failures.

E:91 RSSB stated that looking at the industry as a whole there are good processes and tools for optimising safety, reasonable processes for optimising performance (PPM) but virtually no processes and tools for considering cross industry optimisation of wider business risks. Given the industry focus on safety and performance (PPM) from the top this would be expected. No evidence was found of the DfT possessing or using processes and tools to optimise investment and whole-life activities.

E.1.4.2 GB rail infrastructure

E:92 We have found that:

E:93 The ORR has stated that current efficiency measures are appropriate but not necessarily aligned to objectives or serviceability factors. The ORR state what Network Rail are to report and the ORR Reporters assure what Network Rail reports is correct.

E:94 The ORR wants to move towards annual assurance reporting of Network Rail’s asset management.

E:95 There is an increasing use of benchmarking to underpin performance assessment and improvement, however clear baselines and criteria are necessary for this to be applied constructively across the industry. We note the following example. The ORR stated that benchmarking is a key input to objectives and they use it to ensure credible efficiency targets

for Network Rail. The ORR benchmarking of costs with other European railways (pre-CP4 determination) showed an apparent 30-40% difference in economic efficiency to Network Rail. Network Rail disagreed with this and stated that the source data or process used in this analysis was not sufficiently robust to justify such a sweeping (and potentially misleading) statement. Network Rail stated that the ORR commissioned a further study to review the analysis which suggested areas where it could and should be improved. Network Rail stated that it has repeatedly challenged the analysis throughout the 2008 Periodic Review (PR08) process (and since), raising concerns around:

- a. The quality of data used in the analysis and differences in classification of costs and overheads.
- b. Historical investment and the assumption that the benchmark countries are carrying out the level of activity required to maintain their networks in a steady state (sustainable) manner.
- c. The omission of key cost drivers such as outputs from the models.
- d. The uncertainty as to whether benchmarking exercises have been based upon currency exchange rates or whether a comparative price level index has been applied which considers the relative purchasing powers of the respective countries being compared. For example, Network Rail note that the Transport Research Laboratory Report dated December 2009 comparing the Highways Agency with its Dutch counterpart identified a 32% difference between the UK and Netherlands using comparative methods but a 41% difference utilising exchange rates. Furthermore an additional 13% was identified for technical/cultural reasons resulting in a net 19% disparity.

E:96 Network Rail stated that maintenance delivery units are regularly reviewed and compared with each other against a number of measures. Network Rail stated that they are using Maintenance Improvement Teams to promote good practice, regularly seek improvement ideas locally and provide specific assistance where a particular unit is struggling. Network Rail stated there was better engagement between maintenance and operations at a route level and a weekly dashboard report is made available to TOCs. In the time available it has not been possible for the study to verify the extent of implementation and reaction to the initiatives described which we consider to be appropriate.

E:97 Network Rail stated that ATOC had complained that TOCs were not consulted sufficiently about infrastructure change but that Network Rail standards already require all projects to consult TOCs over any material changes prior to obtaining project acceptance. Network Rail stated, as an example, that GSM-R has to be done but also has to be negotiated individually with every TOC and FOC which adds to industry cost. Some are supportive where they see operational benefit but others regard it as a revenue opportunity. It has been stated that the cost of managing the Network / Station Change process can be more than the cost of actually providing the proposed change.

E:98 We consider that a mature asset management organisation would define and communicate clear criteria for decision making consistent with strategic objectives. In terms of acceptance arrangements we have noted a lack of clear understanding of the decision making criteria. There is room for Government to provide better direction of decision making criteria and tolerability to risk (wider business risk) however we find that the underlying issue seems to be that different bits of the industry apply different tolerability criteria and hence debate over what is acceptable. We noted:

- a. FirstGroup stated that the GRIP process was too cumbersome for smaller projects (depots, car parks, small track work schemes), being over-prescriptive and taking too long to achieve. FirstGroup stated that Network Rail has a risk aversion which drives a one size fits all approach to change. They stated that asset protection requirements make tactical work access difficult.
- b. The ORR Enhancements Reporter, considering stations asset management (Nichols Group, 2010)⁵⁸, recommended a review into the potential for consolidating all project approvals into a single clear transparent third party process.
- c. Network Rail had amended the product acceptance process for the North London Line project to ensure that new product introductions provide long-term benefits, that the product

- aligns with business strategy and that the product is promoted internally (Halcrow Group Limited, 2010)³⁰.
- d. The ORR has stated a view that a lack of industry confidence has driven risk averse behaviour which slows delivery, asset management progress and probably affects costs. This may impact use of new products and adoption of different working practices. Network Rail stated that the ORR audit the acceptance process, typically annually, and are keen to see that Network Rail is compliant but have stated that Network Rail are not doing enough, based on some particular project issues. Network Rail state that they are exceeding ROGS requirements. The study is unable to verify the extent of resourcing in place to support this process or its effectiveness.
 - e. Network Rail stated that they have a duty of care under section 4 of the Health and Safety at Work Act (HASAWA) and have adopted a conservative verification process that allow them to discharge this responsibility. If projects were accepted that were subsequently shown to have safety shortcomings, Network Rail could be prosecuted therefore the acceptance process and asset management process need to be independent so the acceptance outcome was not dictated by financial requirements. Network Rail suggested that societal views of railway safety play a big part in this issue with the public placing a greater expectation on railways upholding safety than found on, for example, highways.
 - f. Network Rail stated that the biggest blocker to acceptance of new projects and products was the complexity and onerous nature of the regulations applicable to railways and their appropriate interpretation. New guidance notes on interpretation of ROGS are awaited and there have been a number of re-issues changing the level of prescription over the last few years. The respondent also noted that new and forthcoming European legislation, including common safety methods, were more onerous and took no commercial viewpoint on safety.
 - g. Network Rail stated that the Network Rail Acceptance Panel (NRAP) sets out the policy for the criteria that must be applied to demonstrate acceptance which varies according to risk, e.g. Level 1 like for like replacement, minimal impact of change (60% of projects are Level 1 and self-managed under Network Rail's Health & Safety Management System), Level 2 material change requiring appropriate scrutiny using panels, ISAs, etc. Network Rail stated that they hold an Engineering Technical Meeting with the professional heads of each discipline to brief the verification needs, agree new policy and determine R&D/innovation areas. This ensures the acceptability of any given project or product takes into account the policies and standards owned by the professional heads who attend the Safety Review Panels. Network Rail stated that they also have technology teams talking to the asset teams to understand issues and needs.
 - h. Network Rail stated that approvals should be linked with innovation. Through the Vehicle-Track System Interface Committee (VTSIC) Network Rail Engineering are looking at ways to improve the system interface to achieve an economic benefit, e.g. less weight creates less damage and lower VTAC to the TOC, thereby providing suitable incentive to reduce weight further. Network Rail stated that it has committed a permanent project team to this. Network Rail stated the example of work with Siemens on the Desiros for South West Trains where the manufacturer is improving the management of wheel impact and Network Rail have agreed that this will result in a reduced Variable Track Access Charge (VTAC) as infrastructure repair costs will be lower. There is evidence that this has taken at least 18 months to agree and that industry investment has been committed to tool up for wider application, e.g. Virgin Trains for West Coast. However, it is reported that Network Rail have not followed through with the lower VTAC commitment and that South West Trains have expressed concern over agreements for lower track access charges being supported into future costing/franchise periods. This is perceived to have diminished the collaborative initiative.
 - i. Network Rail stated that investment was being made in new equipment such as mechanised tree cutting, mobile welders (on order for Spring 2011 delivery) and video inspection technology (plain line defect recognition capability anticipated in 2011). Network Rail stated that, in their view, there were no particular issues with acceptance and

implementation, giving an example of rail unclipping machines introduced in six weeks. Wider industry views differ and a number of examples are noted in section E2.5.2.

E:99 Network Rail's Reliability Centred Maintenance of Signalling Assets (ROSE) programme is stated as delivering benefits in terms of reduced time on tools. It was stated that Network Rail had difficulty in distinguishing reliability improvements between this and other initiatives and no comparative base data on failures preventable through maintenance is available. Network Rail stated that the initiative is not yet (at the time of researching this report) fully written into Route Asset Management Plans and the rollout programme is being adapted in light of available resources and reorganisation. Network Rail's stated intention is to tie in with a committed investment in remote monitoring systems to enable a regime based on performance and risk though it is not clear how the two initiatives are currently joined up.

E:100 Good and well managed asset information is a crucial enabler to effective asset management. We consider this to be a major dependency for successful achievement of stated improvement plans and initiatives. The study is unable to verify any specifics around this key issue but notes the following conflicting views as indicative of the industry:

- a. Network Rail has a large number of discrete asset information systems. The ORR has concerns over the effectiveness of arrangements which still use a lot of paper based job sheets and descriptions of work completed, requiring manual collation and input to asset recording systems. The ORR noted some good use of Computerised Maintenance Management Systems such as signalling assets in Ellipse but stated that, in their view, asset information and data quality issues are hampering asset management progress. The ORR stated that reporting on Network Rail's asset knowledge has highlighted significant differences between asset families in terms of data quality, processes and field technology to support data gathering. Over time, the ORR Asset Management Reporter has noted better accessibility and use of asset information.
- b. Network Rail has stated that the quality, coverage and accessibility of asset information is on a par with good practice in UK utility companies and European railway administrations and the current provision of asset information provides adequate support to existing asset management processes.
- c. Network Rail acknowledges that further development of information and systems is required to help facilitate optimal decisions on maintaining, renewing and enhancing the infrastructure. They stated that this is a key part of the 2010 improvement programme with an initial aim to support the Route Asset Management Plan development and provide data to support the CP5 review process followed by consideration of longer term asset information requirements. Network Rail stated that wherever possible they will seek to use off-the-shelf configurable systems rather than bespoke designs and will be looking to exploit the strengths of existing well established systems such as Ellipse. Network Rail stated that they do not believe there is a robust business case to support the widespread use of handheld computer equipment at present.
- d. The ORR Enhancements Reporter, considering stations asset management (Nichols Group, 2010)⁵⁸, recommends improving core asset knowledge to inform decisions.
- e. Network Rail stated that there are currently a number of engineering planning systems in use including a National Resources Ordering system (NROL), Possession Planning System (PPS) and various manual systems. Network Rail has a stated programme to reduce and integrate support systems into a single Engineering Access & Resources System (EARS) by 2012 for which feasibility funding has now been received. A common ordering system for materials is due to operate from August 2010.

E:101 We note the example in an independent submission to the VfM Study (McNaughton, 2010)³⁸ regarding SBB implementation of an asset information system which included a relatively unsophisticated asset register supported by an interlinked structure of asset specific files giving access to as-built drawings, equipment configuration details, track and overhead longitudinal positioning in space and component records. The submission stated that asset and project managers were made personally (and compulsorily) accountable for the absolute accuracy of the drawings and data loaded on to the system progressively over several years. This has led to a reliable information base for planning and executing works without the need

for further survey, where work is controlled and coordinated using the system in an integrated way and managed in a resource-efficient manner.

E:102 Network Rail highlighted the work of the Vehicle / Track Systems Interface Committee in establishing tools and models that allowed the whole-life cost of new trains to be evaluated in the context of energy use and track/vehicle wear. The Vehicle Track Interaction Strategic Model (VTISM) has been applied on the Thameslink project. Network Rail also noted that New Measurement Train data is being applied via a TrackX decision support tool and used by Track Engineers to inform interventions.

E:103 Network Rail stated that a rationalisation of the materials and spares inventory is underway and various supply arrangements are used to manage stock levels and to source materials including an inventory, warehousing and haulage arrangement with DHL. Network Rail stated that the high cost of failure (to have materials like aggregate when required) has led to contingency 'buffer' stocks at distribution points and a move away from weekend Just In Time delivery. Network Rail described investment in various track materials recycling centres which will enable more re-use or re-sale of materials. Westbury opened in April 2010 and a National Track Materials Recycling Centre at Whitemoor is scheduled for April 2011. The study is unable to verify the current extent of recycling and cascading but we note (based on industry insight and good practice through various industry benchmarking) that this is at an early stage compared to comparative organisations. It will be essential to embed a fully cohesive management system and integrated plan across the organisation (not just the National Delivery Service) and to revise the culture to ensure serviceable assets that could be reused are identified, recovered and reprocessed routinely.

E.1.4.3 GB rail vehicles

E:104 We have found that:

E:105 Network Rail stated that TOCs, ROSCOs and manufacturers often do not consult early enough about new vehicles and that working with Network Rail from project inception was key to a successful acceptance to run on the infrastructure. Examples were provided over understanding track loading categorisation to ensure weight issues were understood to avoid delivery delay and the more recent use of Train Interface Specifications (TIS) for Thameslink. The TIS was developed with the DfT to ensure a TIS-compliant train would be granted Network Rail approval to operate. Network Rail stated they would like to work proactively with TOCs to ensure that a TIS is produced for each new fleet with the opportunity to trade-off between infrastructure change and vehicle design and plan ahead. Network Rail stated that they have now embedded the TIS process in the Rolling Stock RUS. The (well established) control process is ultimately a compatibility statement in the Sectional Appendix showing routes approved for certain vehicles and any restrictions.

E:106 Bombardier considered that costs for product acceptance were too high and that products with acceptance in other railways were often treated as if they possessed no relevant approvals. Bombardier stated they have spent in the region of £100m developing ETCS systems to meet EU regulations but that further development was anticipated before use in the GB rail market was possible. Bombardier stated that the need to start acceptance afresh with Network Rail on depots, train acceptance, etc for each project presented significant risk to financiers who are aware that successful conclusion requires Network Rail approval.

E.1.4.4 Non-GB rail

E:107 We have found that:

E:108 Within the unregulated section of the power industry (generation) there was evidence of successful delivery to a simple set of clear, high-level goals. Engagement with staff during the transformation process had been thorough, but management clearly drove through its initiatives from the top and have successfully implemented change over a 3 year period. Management considered this timeframe optimum to avoid loss of focus. This change has resulted in a 20% reduction in maintenance and operation costs plus (unquantified) performance improvements. Over the 3 years of their transformation programme they shifted the proportion of preventive maintenance to corrective maintenance from 5% to 70%, allowing better workload scheduling and planning as well as reduced exposure to availability penalties.

They also stated a 10% reduction in CapEx simply through applying consistent criteria for optimisation.

- E:109 Within the regulated section of the power industry (networks) we found evidence of a much more 'hands-off' approach to dictating day to day activity from the regulator. There was evidence of invasive regulatory approaches but they centred on monitoring performance and cost rather than specifying detail. Network Operator licences are not reviewed at regulatory periods or subject to re-bidding. We found evidence of the power industry (networks) considering whole-life issues consistently. These points notwithstanding, the incentive regime in place demonstrated a need to outperform the regulatory settlement if shareholder objectives were to be met and as such this appeared to drive enthusiasm to perform and become more efficient. Whilst there was evidence of cross-industry standards setting, there was also freedom for individual companies to adopt industry standards or set their own requirements to best meet their objectives. The commercial imperative was noted as a strong driver and provided a major incentive to perform.
- E:110 Within the regulated section of the electricity industry, whilst there was a focus on regulatory control periods, no evidence was found of short-term planning regarding infrastructure investment. Whilst the example relates to electricity infrastructure, there are messages here that could be applied to the franchise side of the rail industry in terms of security of tenure and commercial incentives, noting that the electricity companies are not subject to periodic re-bidding. Where high-levels of near term investment are required, the regulator intervenes to ensure investment is profiled to minimise customer price shocks and monitors the cost of capital to support the investment. Evidence concerning the application of whole-life approaches indicated variability across the industry as maturity of asset management approaches grows.
- E:111 ScottishPower (Energy Networks), as a regulated geographical energy distribution and transmission organisation, stated:
- a. Maintenance is largely time-based tailored by asset type, service history and location (control and information is not considered sufficient for condition based maintenance).
 - b. Asset life is uncertain and tools are used to reforecast based on measured rate of change of condition (which regulator challenges).
 - c. There is no cross team performance monitoring or comparison but external benchmarking is undertaken.
 - d. There is no difficulty in specifying, reviewing and approving new equipment using in house approvals and support from an Energy Networks Association where required.
- E:112 ScottishPower Energy Wholesale, as an unregulated energy generator and retail organisation, stated that they have established:
- a. An integrated IT plan with common tools and off the shelf solutions supporting sustainable processes.
 - b. A good information base for decisions and corrected understanding of assets.
- E:113 ScottishPower Energy Wholesale (generation) stated that they adopted a strategy of employing 'best in class' decision support tools in a fully integrated way. The tools included optimisation of investment choices across asset families and a common enterprise risk tool across the company. They were able to show a 20-25% software licensing cost reduction by adopting a common information systems platform. They also noted (unquantified) performance improvement from the effective application of asset knowledge and use of appropriate risk based tools and techniques which have contributed to cost reductions.
- E:114 The Swedish Transport Administration, Trafikverket, advised that enhancements (investments) have, since 2008, been subject to a review of maintenance needs to develop maintenance consequence descriptions which are considered a success. It was stated that there has also been a greater awareness of maintenance needs through the development of analysis tools over the last 10 years. This has enabled the use of maintenance to increase route capacity and punctuality.

- E:115 Trafikverket stated that there is regular collaborative dialogue between traffic control centres, operators and maintenance contractors (all train operation is outsourced through concessions). In excess of 12% punctuality improvement was reported on one route over 18 months (against a backdrop of increasing traffic levels) as a result of collaborative approaches with the line's two operators who were keen to increase quality.
- E:116 Trafikverket stated that asset information is organised around a central asset register used for consistent output accessed by all parties, contractors, etc. Data input is currently via a number of standalone software tools (modules) all linked to the central register. Field data is mostly collected and downloaded via handheld devices. It is planned to move to a single Maximo system and an advanced analysis tool is under development.
- E:117 The Dutch rolling stock maintainer NedTrain has much of the asset knowledge and the relationship with the operator NS was described as mature with dialogue focussing on performance rather than the technical issues behind it. Examples of good cooperation stated include recent winter issues where resilience modifications were discussed and options traded-off between risk, cost and performance. NedTrain proposed solutions and NS agreed and invested. No particular decision support tools are used for this but it was stated that NS have access to the NedTrain information systems and data.
- E:118 NS stated that they 'know enough' about their assets to make decisions but accept much of the rolling stock asset knowledge resides with NedTrain. For example, NedTrain will write maintenance manuals but NS will agree them. Similarly the leasing company carries limited technical knowledge and consults over rolling stock issues. NS stated that engineering judgement and dialogue is used for cost/performance/risk trade-offs, though the specific format for business cases ensures things like contribution to organisation goals, impact on other companies, etc. are considered. NS maintains a 'knowledge centre' which shares information between NedTrain, ProRail, etc. Overall NS stated that it is seen as 'one company' and there is regular collaboration for the common good despite potential conflicting business incentives.
- E:119 ProRail are the infrastructure Asset Managers in the Netherlands. We note:
- a. ProRail have comprehensive and integrated asset information systems / tools supporting the operation managed by a small team. Information is maintained up to date.
 - b. An independent supplier runs the infrastructure inspection trains / data collection and supplies required management information to both ProRail and contractors in the Netherlands. Information is transparent and all use the same. The supply chain procures the plant / IT systems to deliver the information under a ProRail contract.
 - c. ProRail use a 'Yardstick' system for undertaking, analysing and prioritising track renewals, managed by engineers located in the supply chain [see 'yardstick' case study above].
 - d. Good information systems support decision certainty. ProRail apply virtual inspection coherently nationally to OLE, Switch & Crossings (which is differentiated per end for different inspection frequencies) and plain line track using trainborne video systems. ProRail do not consider automatic recognition of track is essential and operate inspection trains less frequently than Network Rail. Foot inspections are minimal and restricted to special inspections. This is all facilitated by standards and financed by private sector investment.
 - e. Remote condition monitoring is widely fitted including approximately 1000 critical point ends. There is also other equipment to detect tonnage flows and wheel problems.
- E:120 Dutch train operator NS stated that it strives for continuous improvement with a number of project initiatives then incorporated as business as usual activities. Examples given included:
- a. Optimised decision making through improved internal working which, rather than delivering a commercially requested service change without question, now identifies, costs and agrees solutions through a revised planning approach which has enabled 5-10% less fleet km to be run over the last 1.5 years whilst servicing demand and meeting KPIs.
 - b. An electricity cost saving initiative where NS, collaboratively on behalf of the 36 operators in the Netherlands, buys electricity direct from the energy provider on a long-term contract which avoids price fluctuation. NS monitors usage and has a tool to control resale to the

- other companies. Significant (unspecified) savings have been achieved over the last two years. NS stated that energy costs are not part of the track access charge.
- c. 20% operating power saving for the new Sprinter fleet compared with the previous fleet through specification.
 - d. Training drivers to drive more efficiently resulting in 6% saving in electricity usage from a pilot scheme.

E.2 SUPPLY CHAIN MANAGEMENT FINDINGS

E:121 In our assessment to date of GB rail we have reviewed a number of existing studies and interviews with key GB rail representatives, our findings relating to the supply chain are:

E:122 We have related the effectiveness of the industry supply chain by considering:

- a. How the supply chain strategy is set.
- b. The quality and collaborative nature of the planning process.
- c. How the contract framework are specified and set up.
- d. How the supply and demand are balanced.
- e. How they are managed through delivery.
- f. How they ensure continuous improvement and innovation.

E:123 This study aims to identify the specific issues and evidence within the supply chain that if addressed may result in improved value for money in the short, medium and long-term.

E:124 In the diagram in Appendix A we have identified the major flows of funds in the chain and when considering our findings it may be useful to refer to these in identifying the size of the cash flow where issues are raised.

E.2.1 Objectives and Strategy

E.2.1.1 GB rail as a whole-system

E:125 There are strong organisational/functional silos within facets of the rail supply chain with independently aligned operations, and an adversarial culture in many places indicating a low level of maturity within the supply chain. Barriers that have historically existed at various stages of the supply chain interfacing with other parts of the rail industry still remain, preventing the development of a transparent and collaborative relationship with the TOC/FOCs and the rest of the supply industry. However we have found examples of good practice and improvement such as the Train Supply and Service Agreement (TSSA) between Alstom and Virgin Trains.

E:126 There is a strong commitment expressed in the 2010 High Speed 2 Command Paper (Department for Transport, 2010)¹⁷ to improving the supply chain through: a new supply chain forum; a high-speed rail industrial strategy; and consideration of procurement approaches that work effectively for industry and Government alike, however there is caution that these types of initiatives will be truly effective, based on the evidence in recent years.

E:127 The change of decisions around major schemes (e.g. electrification) and lack of updates on rolling stock plans (e.g. IEP) has a significant dampening effect on getting commitments from the supply chain to improve. This results in the larger players in the supply chain identifying that money is wasted in speculation on the outcome, leading to caution when committing to significant cost improvements and employing resources that may lie idle if decisions are not made or postponed.

E:128 Currently there are various approaches taken to the funding of assets in the rail industry supply chain. The majority of infrastructure works are funded by Network Rail, who with the benefit of a Government guarantee, achieve a lower rate than the funders of other assets classes, such as rolling stock or train operations assets (ticket machines, gate lines, CIS etc). The rate spreads are up to 7%. When applied to the balance sheet of the industry, this equates to over £0.5bn of increased cost of financing per annum, to transfer funding responsibility away from Government.

E.2.1.2 GB rail infrastructure

E:129 Recent major organisational changes within Network Rail (aimed at standardising the way things are done) show that a clearer strategy, planning and development process is emerging in the enhancements, renewals and maintenance areas, however the majority of these are still in their infancy with significant benefits promised (e.g. up to £3.3bn in CP4) but still to be

realised. Network Rail particularly noted that they made £400m efficiency savings and annual savings of £132m during CP3 by in-sourcing maintenance which eliminated contractor risk / corporate overheads, role duplication and increased purchasing power.

- E:130 The deployment of a category management approach to procurement has improved the level of strategic planning undertaken across Network Rail at category level with plans for each category of spend reviewed on an annual basis by procurement and commercial boards.
- E:131 Significant consolidation and rationalisation programmes are underway across suppliers, products and materials, plant, logistics and depots, to streamline operations, leverage volumes and drive down costs, however the focus in some areas is on quick wins in terms of ease of implementation rather than returning the most value which may realise greater benefits.
- E:132 There is an increased focus on recycling parts and materials across the network which can realise significant unit cost benefits (e.g. a target of 80,000 concrete sleepers to be reused per annum at a saving of £23 per sleeper resulting in potential savings of c.£1.8m; and re-welding rails saving c.66% against new). The scope of recycling however is likely to remain small (e.g. 80,000 sleepers out of an annual demand for 800,000 to 1 million).
- E:133 The on-sale of scrap materials (e.g. steel and ballast) provides an income revenue stream for Network Rail. The sale of c.110k tonnes of scrap rail alone returned nett revenues of £22m which it is stated was returned to budget. It is not clear however how this money is or was reinvested.
- E:134 A 'Best Value Country Sourcing' pilot study has been commissioned by Network Rail to identify alternative global sources of supply and the associated risks and benefits of a global supply chain. Network Rail estimates that c.£80m of spend could be channelled through lower-cost country sourcing, however potential benefits are yet to be determined.

E.2.1.3 GB rail vehicles

- E:135 There is no coherent objective or strategy articulated to the supply chain for the specification, procurement, funding or management of GB rolling stock. Although a Rolling Stock Plan was promised to the industry by the DfT in June 2009, it has failed to materialise.
- E:136 The DfT has published a technical strategy for rail vehicles, however there is uncertainty in the manufacturing and operator community over the standing of this strategy, and in particular the process by which this strategy will be enacted.

E.2.1.4 Passenger and freight train operations

- E:137 The RUSs are developed in isolation of the overall rail budget, and may not be aligned to the budgets for train services. The DfT may consider RUSs and Network Rail's business plans when it develops either a new or varies an existing franchise specification. This process can be convoluted, and may for example take a minimum of several years between the initial White Paper and introduction of change to the operation of train services.
- E:138 Franchised train operators can also act unilaterally within the constraints of their franchise agreements to design and implement strategic change, e.g. South West Trains new timetable in 2004, however this has generally only happened on a limited basis.
- E:139 Franchised train operators have limited control over their cost categories:
- All regulated costs such as fixed and variable track access charges are determined by the ORR and passed through to Government.
 - Costs of vehicle leases are generally set at franchise commencement and are fixed for the duration of the franchise term.
 - Tight specification of the franchise commitments, such as the timetable, limit the ability of the operators to flex their operating costs.
- E:140 Franchised train operators are incentivised to manage their controllable cost base over the duration of a franchise period; for some railway assets e.g. station buildings, this may be shorter than the life of the asset and may create incentives to focus on shorter term solutions.

- E:141 The companies and groups that own passenger rail franchises generally have mature approaches to the procurement of consumable and commodity products. For more complex product categories e.g. ticket machines, a range of approaches have been taken, including partnering and benefit sharing, although the inherent transient nature of franchises has sometimes limited the ability to enter into such arrangements.
- E:142 The freight industry operates as a free market. However, the pricing of track access for freight vehicles was perceived by some in the industry as being deliberately set by Government to be below the full cost of infrastructure to provide support to the freight industry; Government does provide some direct capital grants.

E.2.1.5 Non-GB rail

- E:143 There is a mature relationship between the Dutch Government and ProRail so targets and strategy develop in a constructive and collaborative way; where necessary TOC's are also involved. The Dutch Government articulates its maintenance and renewal expectations of ProRail providing criteria on which its performance will be judged, reflecting the industry structure and governance arrangements. Four qualitative targets are included within ProRail's management contract:
- To increase the transparency in the relationship of costs, performance, condition, and activities.
 - To understand the interaction between performance of TOC and infrastructure.
 - To understand the long-term effects of maintenance.
 - To implement structures and management systems to support a to c.
- E:144 ProRail's output principles (reliability, availability, maintainability and safety) is cascaded into the supply chain through quality indicators, maintenance specifications, maintenance activities and contracts, thereby aligning objectives for the railway and lines of responsibility.
- E:145 The Government is 100% share holder of the overall Dutch Railways organisation of which NedTrain is a subsidiary company responsible for rolling stock maintenance. Whilst sharing a common board, the relationship with NS Reizigers (NS) (who own/lease and operate most of the rolling stock) is contractual with cost of maintenance agreed and NS specifying what they want from refurbishment (performance requirements, e.g. on-board internet provision) and NedTrain responsible for defining a technical solution (technical specification). NedTrain deals with around 3000 vehicles of five main types and seven sub-types from a range of manufacturers.
- E:146 In The Netherlands the main intercity network Concession covers 95% of domestic traffic and is reviewed 10 yearly with annual KPIs. NS stated that there are no bonus incentives for exceeding targets but fines are charged for missing targets. The next review is at the end of 2014 but Government (which has changed) is yet to decide if this is to be commercially re-let. This uncertainty is on the radar but not really influencing NS future planning at this stage. There are also some local concessions around 12 provinces let by Local Government lasting 6 – 7 years some of which have been bid and won by NS.
- E:147 The Swedish Transport Administration stated that it receives fares revenue (fare levels are set by Government) and administers track charges (fixed by Government). The Government is proposing to double track charges from 2013 to reduce levels of Government funding.
- E:148 In the non-regulated parts of the power industry the clearly defined objective, like in Rail, is to ensure that the supply chain is able to deliver the safest and highest availability of the infrastructure. However this is more like the TOC part of the supply chain where there are large revenue incentives to meet day-to-day market commitments and the large disincentives if they fail. Although these compare with the Schedule 4 and 8 payments in Rail the impact is immediate resulting in increases or decreases in revenue that is visible to the shareholders. In Rail the incentive/disincentive regime felt by the infrastructure provider i.e. Network Rail is balanced across the period and therefore its cost of failure is less apparent than that for the TOCs where a cancelled train means immediate revenue loss.

- E:149 In the regulated part of the power industry the clear objective is the commercial drive to outperform the ofgem allowances for infrastructure maintenance and renewal to deliver more value to the shareholders. The constraints on the TOCs through the current detailed franchise specifications mean that they do not have similar degrees of freedom to outperform for their shareholders. This also clearly contrasts with the lack of commercial incentive for a not-for-dividend entity such as Network Rail.
- E:150 The way the regulation of the power industry is carried out is constantly under review as it too has an impact on the ability of the supply chain to maintain a smooth level of supply and demand due to the way the incentives for efficiency and investment are imposed. In previous control periods, the savings from 'efficiencies' could be kept throughout the current control period, encouraging efficiencies in early years that resulted in a famine across the supply chain. This drove capital investments to be delayed until later in the control period, resulting in excess and high cost demands on the supply chain.
- E:151 The strategy for in-house capacity versus contracted within the power industry is based on only having direct labour where they have a technical requirement (e.g. cable jointing) to maintain a standard and avoid points of failure as opposed to cable laying which would be contracted-out. The other area is where having an external supplier might add risk in a particular area (e.g. provision of 24hr breakdown cover).
- E:152 In the oil and gas industry the safety and availability of any infrastructure is also paramount and similar day-to-day revenue impacts are felt if the infrastructure fails. The freedom to make commercial decisions on how to run the supply chain to achieve this drives the way the alliances, frameworks and contract management is set-up. However in recent years the contractors in the upstream part of the industry have felt that they have been asked to take on more availability risk in their contracts alongside a downward pressure on rates.
- E:153 In the aerospace industry the supply chain is made up of many highly specialised providers and therefore the strategy for in-house capability is driven around proprietary knowledge and competitive advantage but in some areas the in-house provider can compete with external suppliers if capacity exists and it is competitive.
- E:154 Where sole source providers exist in aerospace the tendency is to develop alliances to get visibility and some control over the cost base. A similar approach is applied in Network Rail with Corus for plain rails but is not seen within the rolling stock industry despite the bespoke nature of the new train builds.

E.2.2 Organisation

E.2.2.1 GB rail as a whole-system

- E:155 The current incentives within GB rail do not lend themselves to an efficient and effective supply chain. At present it is characterised by:
- a. The lack of structure that would facilitate coordinated decision being made by all players in the supply chain as it passes from planning, to procurement, to delivery and into operation.
 - b. Go/no-go decisions, or changes in specifications, can be made in one part of the supply chain that have major implications on other parts, but the whole-system impact and cost is not considered.
 - c. An increased cost base as a result of inefficiencies (created by a. and b. above) as suppliers must pass on these costs to remain in business. Where they are unable to survive there is a reduction in competition through the loss of major suppliers. Examples were given of train seat manufacturers and wiring loom providers as well as infrastructure contractors.
- E:156 Various organisational structures have been set up within GB rail to drive a more commercial supply chain, however the lack of clear strategy and over specification of the way to deliver outputs stifles innovation and commerciality along the chain.

E.2.2.2 GB rail infrastructure

- E:157 Network Rail has undergone a substantial period of change in the last 18-24 months, with renewed focus on its procurement and supply chain practices, and significant investment made

in strategic sourcing, systems (Requisition to Pay), and supplier relationship management. Feedback from a 360 degree supplier review undertaken in May 2010 however, has revealed that suppliers still believe there is:

- a. A lack of confidence in Network Rail decision-making to award contracts.
- b. No interest in innovation.
- c. A lack of prioritisation of key opportunities.
- d. Talk of greater collaboration with suppliers but which is not seen in practice.

E:158 Maintenance activities within Network Rail are completed in-house, with renewals and enhancements works outsourced to contractors (with exception to minor renewals that are typically undertaken in-house).

E:159 The National Delivery Service manages 9 of the 30 spend categories within Network Rail, relating to the supply chain of direct infrastructure materials. It has also extended its remit to include Schedule 4 Engineering Access Planning (including the management of the payment mechanism) and possessions management of the network. The organisation has grown five-fold in c.2 years, with the number of employees now at c.900.

E.2.2.3 GB rail vehicles

E:160 Since privatisation there have been different approaches taken to the procurement of new rolling stock. The lead role in the specification and procurement of trains has been undertaken variously by the ROSCOs, TOCs and Government. Generally opinions were expressed by respondents that TOCs and ROSCOs had been more successful at undertaking this activity.

E:161 The market for the supply of spare-parts is limited and there are some monopoly suppliers.

E:162 The current arrangement for the funding of rolling stock relies mainly on private sector finance via a leasing arrangement. Questions were raised by several of the respondents about the ability and / or cost effectiveness of the private sector providing funding and carrying residual value risk. This was felt to be a particular issue for the largest rolling stock procurement projects or when the train operators faced limited choice in the market. This market has recently been subject to a review by the Competition Commission which instructed some limited remedies. These remedies have not yet been subject to market testing.

E.2.2.4 Passenger and freight train operations

E:163 The DfT is currently consulting on the process for the specification, procurement and management of the franchise agreements with train operators. As part of the consultation the DfT is also considering the length of the contract, the approach to risk sharing, investment and the split of responsibility for certain tasks such as the repair of station buildings.

E:164 The current approach to rail franchising has tended to result in most of the 'Committed Obligations' in the contract, such as the refurbishment of rail vehicles being programmed to happen early in the franchise term. Where multiple franchise contracts are let simultaneously, or in close succession, the front loading of 'Committed Obligations' has caused demand volatility and capacity constraints in the supplier market and also therefore resulted in leaner periods for suppliers when there is less franchising activity.

E.2.2.5 Non-GB rail

E:165 During privatisation of the Dutch railway system, ProRail was restructured from a traditional regional structure to a matrix structure. Regional managers historically managed their regions however a new focus was on the management of policies, introduction of better planning processes, provision of support and information systems, and co-ordination of operations. ProRail found this resulted in improved process flow between the regions.

E:166 In the regulated part of the power industry the commercial network operators are incentivised to innovate and improve on the way their supply chain delivers the outputs. However it is felt the level of public scrutiny by the regulator does have a dampening effect.

E:167 It was also mentioned on several occasions that the need to tender under OJEU rules precludes significant alliances between the companies and their suppliers resulting in the inability to invest in many supplier innovations.

E.2.3 Planning

E.2.3.1 GB rail as a whole-system

E:168 Publicly available information on up-and-coming projects within Network Rail is variable, dependent largely upon the type of work activity. The Network Rail website is one of the primary vehicles for publishing pipeline activity, however the level of information provided is fragmented and not as easily accessible as it could be. At the time of writing this report: the civils area was under development, there were a number of outdated lists (Network Rail)⁵⁵ for signalling, power and communications, and for buildings there were projects shown on the 'main' list to which another list must also be referred on the buildings page (Network Rail, 2010)⁴⁵. Network Rail has since stated that all work banks have been uploaded online in September 2010, though the report time scales have not permitted this to be checked or confirmed.

E:169 In the area of renewals and enhancements, there is uncertainty and variability in whether detailed design contracts will go ahead during the planning horizons; for example, of the 3-6 projects planned by Network Rail for the South Wales Framework for Type A signalling, only the Newport project has been progressed fully to date, with the Cardiff project delayed (only GRIP4 outline design awarded), casting doubt that GRIP stages 5-8 will be awarded prior to the end of the contract period in 2011. Such variability prevents contractors from achieving stable sources of supply in terms of resourcing, parts and materials and sub-contracting arrangements in response to rush orders or changes in specifications. Contractors incur significant costs in ramping up/down capacity, or under- or over-capacity in response to 'feast and famine' cycles; typically, these costs are in relation to recruitment (specifically the use of more expensive contract labour to meet the demand), training, redundancy and productivity. Such variability has also resulted in some SMEs going into liquidation in the downturns. Network Rail recognises this to be an issue and a number of work-bank initiatives are underway to try to address the problem.

E:170 Further issues affecting the planning process include the lack of a central decision maker within Network Rail to agree the standards to be used at both network and local level. As a result preferential engineering often occurs, resulting ultimately in increased costs as economies of scale cannot be leveraged by contractors through the utilisation of standard approaches.

E:171 Poor planning and visibility also encourages suppliers to load upfront costs due to perceived risk arising from poor scoping/technical details and changes in standards. Contractors have stated that it is not uncommon to build in a minimum 10% contingency cost when bidding fixed price for a project. For example, the scope design of one GRIP 4 project was discovered to contain major flaws resulting in redevelopment of the original scope by the contractor. The contract contained a gain-share arrangement, with any variance between the initial fixed price bid by the contractor and the target cost of the project set by Network Rail to be split 50:50. The redesign work led to a 50% variance to the target cost and an overall £80m overspend to be absorbed by both contractor and Network Rail. Considerable work is ongoing in the Efficient Project Governance initiative by Network Rail in regard to locking down remits which improves quality, reduces change, thus enabling differing procurement routes e.g. fixed price lump sums.

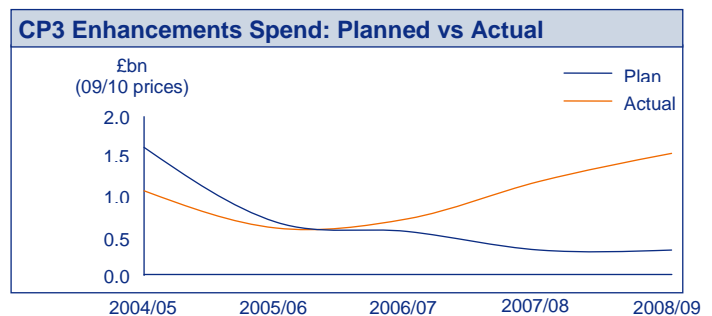
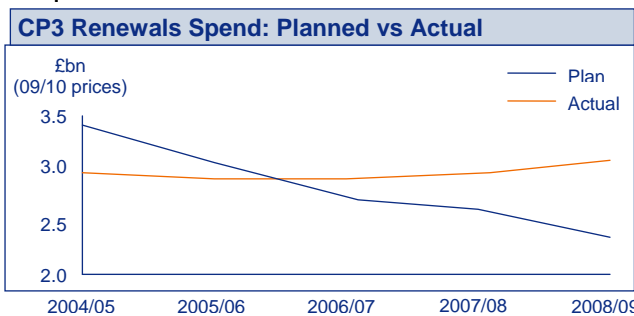
E:172 Changes in standards are commonplace within the industry, with Network Rail issuing changes every 3 months impacting the supply chain. Contractors have stated that each project will typically have a different set of standards that must be adhered to, leading to a range of issues e.g. tool reconfiguration, occupational safety risks for engineers, bureaucracy and form filling. Engineers have stated that the risk profile increases each time standards change resulting in increased costs; locking in standards for a given period however will help to reduce inconsistency and the burden of change.

E:173 A lack of industry involvement at the early stages in planning and procurement can lead to insufficient skilled labour available and higher costs. Early and more open involvement can result in reduced timescales, improved design or ways of working, and the avoidance of abortive costs. In one example, the early involvement of a contractor working on a tunnel gauge improvement project 8 months prior to the start of the planned possession reduced 2 separate planned tunnel closures over a Christmas period, to just 10 days and a small number of 52 hour overall possessions. Previous improvement projects of similar nature had resulted in 3 month total closure to tunnels. The contractor further stated that much abortive design work could also have been achieved had they been involved earlier in the process.

E:174 Unpredictability has also deterred industry from attempting demand planning leading to skills gaps and reluctance to invest in training and development. Of the demand planning that is undertaken within the supply chain, failure to communicate effectively increases risk, and erodes the effectiveness of demand planning impacting PPM.

E.2.3.2 GB rail infrastructure

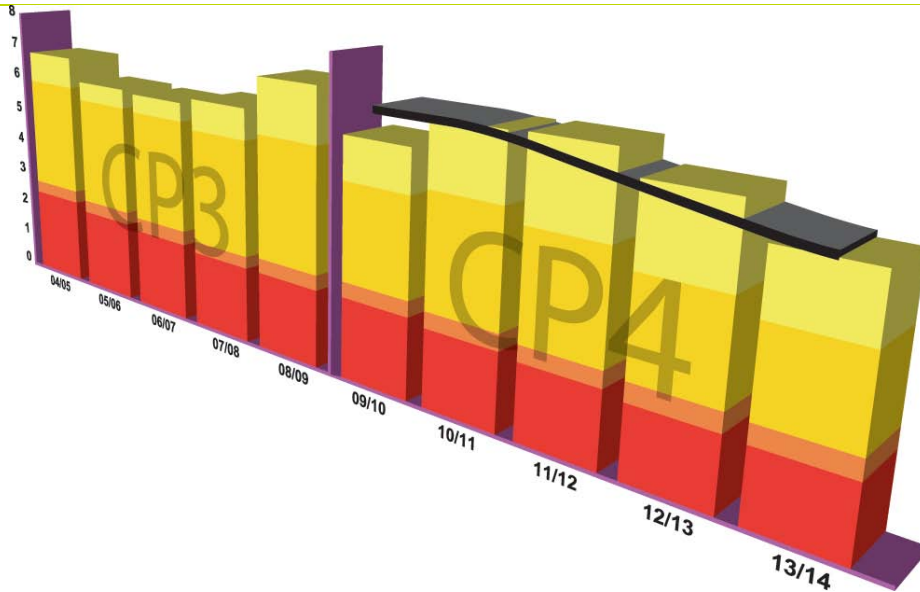
E:175 Historically, Network Rail has been unable to deliver the renewals and enhancements projects that were planned across the last Control Period, CP3. The tables below evidence the volatility in planned vs actual spend reflecting changes to the forecast plans. This is further supported by the ORR’s Monitor Capital Spend profiles which indicate variance in renewals spend by as much as 18% of actual vs planned spend during CP3. In order to make sound investment and supply chain decisions, the supply chain requires a greater certainty in the future demand.



Source: Network Rail annual accounts

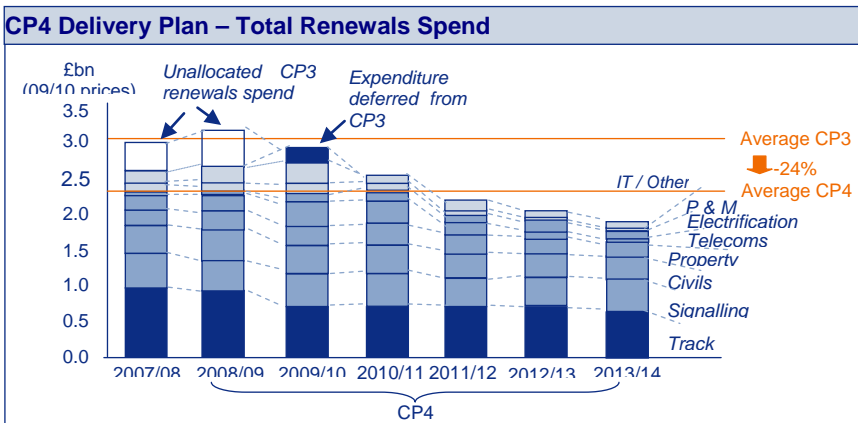
E:176 Based on CP3 trends, there is concern that the switching between maintenance, renewal, and enhancements spends will continue in future Control Periods, with a backloading of renewals towards the end of the period disrupting planning and award of contracts. A similar trend is beginning to emerge in CP4 in which forecast plans are already the subject of change during the Control Period.

CP3 and CP4 Expenditure Trend (£bn)

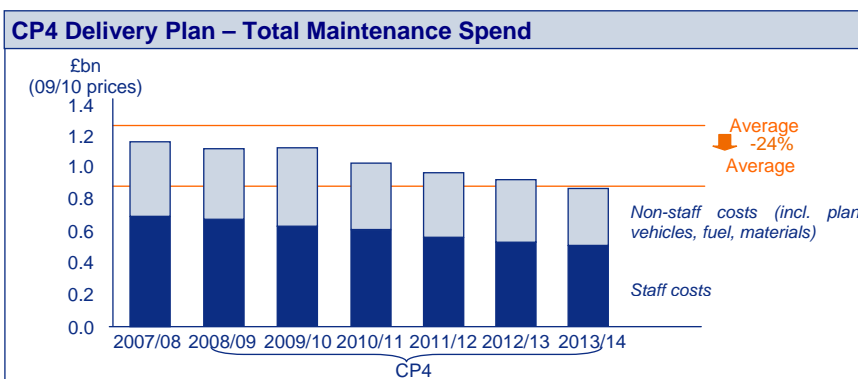


Source: CP4 Delivery Plan Update 2010, Network Rail

E:177 CP4 forecast spend plans for renewals, maintenance and enhancements are depicted in the following tables:

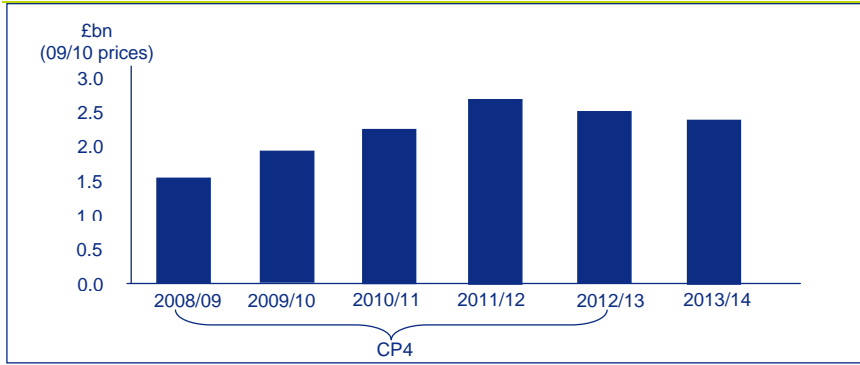


Source: CP4 Delivery Plan Update 2010, Network Rail



Source: CP4 Delivery Plan Update 2010, Network Rail

CP4 Delivery Plan – Enhancements Spend



Source: CP4 Delivery Plan Update 2010, Network Rail

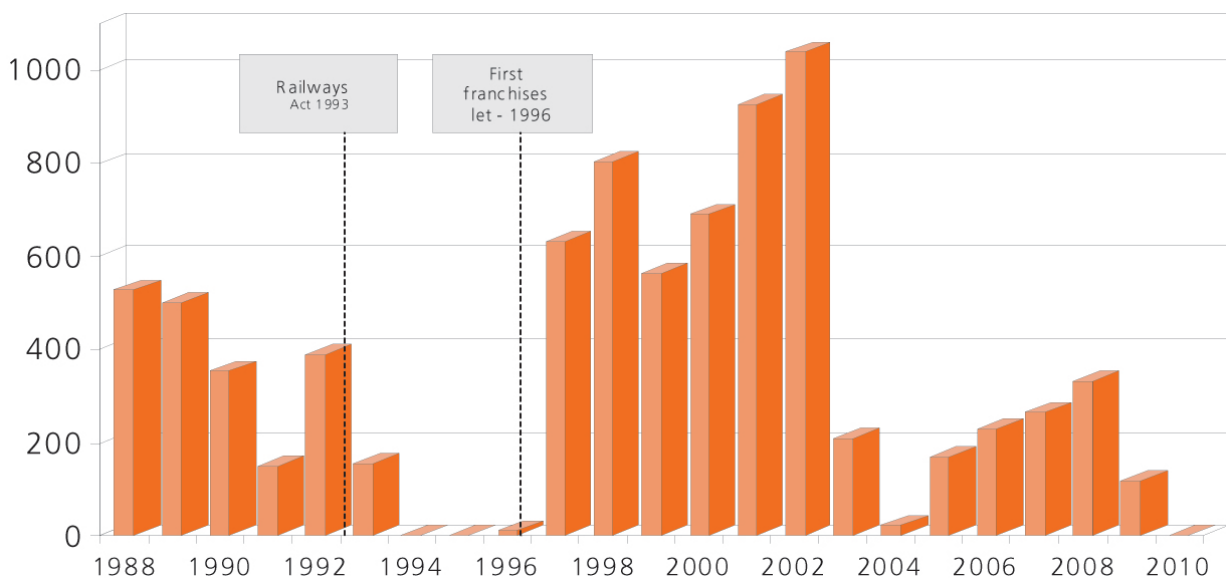
E:178 There is evidence that planning is improving within Network Rail e.g. in signalling, the projects have now been agreed for the remainder of CP4, with planning commencing for CP5; and Civils work-bank locked down with work packages awarded for FY11/12. There are, however, some areas that are recognised as still being immature in their planning projections e.g. enhancements that consequently prevent the early award of works. Furthermore, suppliers remain cautious about the prospect of work-banks ever becoming stable enough for them to commit to significant longer term cost reductions. Network Rail is seeking to address this issue with an increased line of sight, – stating an intention to tender for example, Signalling, Power and Communications and Track works for a 10 year period.

E:179 There is evidence to suggest a recent improvement in Engineering Access Planning, with Schedule 4 payments under budget by 17% in FY08/09. However Network Rail is of the view that Schedule 4 payments should reflect the loading of the train and introduce factors e.g. time of day and time of year to calculate payments more fairly. There is also currently no measure for calculating the increase (or decrease) in the levels of maintenance and renewals activity completed within possessions time.

E:180 It has been recognised that the end of GRIP 4 is too early for estimating possession requirements and, without the necessary understanding of the exact possessions requirements could result in insufficient possession times booked and additional cost and safety risk.

E.2.3.3 GB rail vehicles

E:181 Historically, demand for new passenger rail vehicles has been volatile, ranging from nominal orders to a peak of 1000+ vehicles in the last decade. Manufacturers, ROSCOs and TOCs have suggested that this increases the capital cost of new vehicles and may also increase the risks associated with the procurement and commission of new vehicles.



EMU / DMU orders for mainline railways by BR / TOC's

- E:182 Volatility in demand, state manufactures, causes increased risk and increased costs of 10-20% to their businesses. Reasons given for this increased cost include:
- Spare manufacturing capacity to cope with peak demands increases overhead costs.
 - Labour, redundancy and training costs associated with creating a right sized workforce to meet current demand.
 - Volatility of supplier prices and loss of scale opportunities further down the supply chain.
 - Changes in standards and regulations over time increasing development costs and risk.
- E:183 The DfT forecasts that there will continue to be volatility in the demand for new passenger vehicles in years to come; the causes of which include:
- The life expiry profile of the current fleet.
 - Known changes to standards, most notably the changes to Persons of Reduced Mobility regulations in 2020.
 - Major infrastructure programmes, such as Crossrail.
- E:184 The DfT estimates that, on average, between 350 and 400 new passenger rail vehicles will be needed every year to replace ageing stock and accommodate forecast increases in passenger demand.
- E:185 Freight operators on the other-hand have planned a progressive introduction of standardised traction equipment, including the Class 66 diesel locomotive, and believe this standardisation had led to improved performance and reduced costs.

E.2.3.4 Passenger and freight train operations

- E:186 TOCs believe they could do more to assist in the planning and specification of changes to train services and enhancement projects.
- E:187 Network Rail has suggested that TOCs have a role to play in optimising possession planning and should be consulted more on the optimisation of engineering access planning. It was stated that possessions should be better planned and always run like clockwork. TOCs also expressed a willingness to be engaged to discuss the optimisation of possession planning.
- E:188 There are minimum ticket office opening hours in the franchise agreements and the Ticketing and Settlement agreement - these restrictions impose increased costs on the industry. There is inertia to change for political and Industrial Relation reasons and these restrictions may also limit incentives to introduce new technology, such as smartcard tickets.

E.2.3.5 Non-GB rail

- E:189 The planning horizon within ProRail is on a 10 yearly rolling cycle that fixes budgets and work-plans, with projections also made on a 15 year outlook. Long-term planning (up to 20 years) is typically a top-down exercise; however, the 10 year plan is completed bottom-up. Were GB rail to take this rolling cycle approach it is expected that the peaks and troughs in work volumes along the supply chain would be smoothed.
- E:190 Renewals planning within ProRail is completed on a 3 and 5 year basis. A cost modelling system is used to predict costs for different alternative renewals scenarios using discounted cash flow methods to predict lifecycle costs and is used to explain the flow of expenditure between maintenance and renewals. Renewals are undertaken as discrete projects (i.e. not undertaken as part of maintenance activity), and the average costs for renewals have reduced since they were outsourced. Most efficiency improvements come from bundling activities across asset groups. Keeping the renewals outsourced in discrete projects containing bundles of activities is in contrast to GB rail where many activities are being brought in house and an asset-siloed approach still remains.

- E:191 ProRail has found that the overall cost and disruption to the network is reduced when longer blockades are used for maintenance activities.
- E:192 European railways utilise a far greater proportion of standardised design than is normal in GB rail, e.g. wiring of cabinets to standardised signal structures and foundations.
- E:193 There is a national rolling stock strategy led by Dutch operator NS which rolling stock maintainer NedTrain are consulted on (what if, cost queries, etc).
- E:194 It is the experience of other regulated industries that the ability to understand the maintenance and renewals cost base on a consistent basis greatly enhances the ability to manage costs and forecast expenditure. This allows for improvements both in-house and with contracted work.
- E:195 The water industry works on a 5 year investment period with a 25 year approach/demand plan. Similarly, the utilities industries are also mature in their planning and decision-making, enabling longer-length work-banks to be locked-in. Planning occurs at a network level with delivery planned by geography, and work is contracted regionally enabling local workforces to be deployed, saving additional travel and expenses. In GB rail a high degree of uncertainty dominates resulting in very short-term planning horizons. This is believed to be driven by the maintenance and renewals budgeting not being locked into an agreed long-term asset management plan.

E.2.4 Delivery

E.2.4.1 GB rail as a whole-system

- E:196 Since privatisation there have been a number of approaches taken by the industry to promotion, design, specification and implementation of infrastructure enhancements, and this function has been led from different points along the industry supply chain. The organisations procuring and taking risk during the design, procurement, build and commission phases have varied from scheme to scheme and have included:
- a. National, Regional and Local Government bodies.
 - b. Network Rail and its predecessors.
 - c. Train operators.
 - d. Developers.
 - e. Various combinations and joint ventures of these organisations.
- E:197 The Nichols Group (an Independent Report to the ORR), published a study in June 2010 into the comparative cost on scheme delivery routes (Nichols Group, 2010)⁵⁸. The data used in this report was deemed by the authors to be drawn from an insufficient sample size to be conclusive, however there were several examples cited of TOCs delivering projects for a lower unit cost than Network Rail.

E.2.4.2 GB rail infrastructure

- E:198 Network Rail's CP4 external expenditure is c.£31bn for the period split across maintenance (c.35%), renewals (c.44%) and enhancements (c.28%) activities. The CP4 pipeline for Enhancements is c.900 projects, of which 600 are in GRIP 3+ stages amounting to c.£5,300m (Network Rail, 2010)⁴⁴ of spend. £1bn of spend is also currently under threat due to decisions around rolling stock and 3rd party funding and more maybe affected by budget constraints.
- E:199 Network Rail has been challenged with significant budget reductions in CP4 including targets to reduce Maintenance opex from £918m to £704m (23%) and Track renewals from £4.7bn to £3.6bn (23%). There is evidence of progress towards these targets with a reduction of £25m in maintenance opex in FY09/10. The National Delivery Service has also delivered costs savings to the value of c.£35m in FY09/10.

- E:200 Network Rail has stated the intention to sustain its maintenance workforce through growing the proportion of major capex projects (renewals and enhancements jobs) it undertakes as a result of budget challenges and pressure to reduce its in-house maintenance service by 4,000 heads.
- E:201 Historically, Network Rail has exhibited poor supply chain best practice in the area of cost management in maintenance, through having only a basic understanding of its cost base, with large regional variability. This is a view supported by the 2009 Independent Auditors Report by Halcrow evidencing significant Route variation to national average MUC rates, in some cases by as much as 2,000% above the national average.

Figure 10.10.3 Average Territory Maintenance Unit Costs as a Percentage of the Average National Maintenance Unit Costs

Route Wide Variations		Key to Percentage of National Rate									Coefficient of Variation
		Within range -49% to 49% of National Rate			Within range -99% to 99% of National Rate			Greater than 99% of National Rate			
		Less than 50 - Stable			Between 50 and 100 - less stable			Greater than 100 - unstable			
		Percentage of National Rate 2008									
MNT	MUCs	Anglia	Kent	LNE	LNN	LNS	M&C	SCT	Sussex	Wessex	WES
001	MANUAL ULTRASONIC INSPECTION OF RAIL	-84.53%	138.82%	-9.25%	236.47%	148.36%	6.71%	142.68%	384.46%	-61.97%	143.8
002	RAIL CHANGING	-10.07%	110.80%	-7.59%	28.69%	-21.16%	-28.45%	73.51%	47.77%	-46.42%	49.4
003	MANUAL SPOT RE-SLEEPER	-29.97%	-56.23%	-22.99%	47.23%	-6.54%	-27.34%	120.31%	24.26%	-21.83%	50.6
004	PLAIN LINE TAMPING	171.65%	405.23%	103.91%	-42.98%	-19.35%	118.63%	-77.28%	142.26%	-6.55%	140.1
005	STONEBLOWING	331.52%	1006.54%	637.09%	-46.99%	485.13%	-84.06%	44.39%	1202.22%	204.28%	431.4
006	MANUAL WET BED REMOVAL	-0.73%	279.44%	-12.66%	17.64%	-33.53%	-45.29%	334.62%	-29.86%	-26.90%	137.1
007	S&C TAMPING	-89.74%	-62.95%	-32.99%	-17.87%	244.24%	137.10%	-95.62%	606.26%	-43.82%	218.6
008	S&C REPLACE CROSSINGS & SWITCH 1/2 UNITS	-78.53%	-20.58%	-4.54%	42.55%	22.82%	-79.99%	50.65%	36.45%	-22.54%	46.5
009	MECHANICAL SPOT RE-SLEEPER										
010	REPLACEMENT OF S&C BEARERS	9.77%	10.29%	-5.09%	7.31%	-26.65%	-22.32%	28.28%	10.14%	-2.43%	16.7
011	S&C ARC WELD REPAIRS	-24.56%	-56.39%	17.32%	23.52%	-15.95%	-39.40%	-8.08%	100.41%	-27.79%	43.8
012	MECHANICAL WET BED REMOVAL LEVEL 1 PATROLLING TRACK INSPECTIONS	516.10%	627.65%	89.87%	-67.78%	143.04%	-7.67%	322.35%	21.13%	25.13%	233.0
013	MECHANISED VISUAL TRACK INSPECTION	-16.72%	31.08%	25.81%	14.03%	0.37%	-27.51%	-15.98%	12.34%	-27.13%	21.1
014	ARC WELD REPAIR OF DEFECTIVE RAIL INSTALLATION OF PRE-FABRICATED IJR's	-100.00%	-100.00%	137.98%	181.67%	-100.00%	-25.92%	-100.00%	-100.00%	-18.42%	104.1
015	MECHANICAL REPROFILING OF BALLAST	-4.68%	-74.19%	-30.23%	-19.84%	-56.77%	-8.78%	2.59%	1773.29%	-47.81%	567.2
016	THERMIT WELDING	-37.63%	124.77%	96.98%	83.11%	-19.11%	26.59%	-81.69%	455.04%	91.01%	147.5
017	MANUAL CORRECTION OF PLAIN LINE TRACK GEOMETRY	-77.32%	1926.64%	672.68%	560.57%	-64.06%	-75.92%	438.09%	51.33%	-75.54%	619.1
018	MANUAL REPROFILING OF BALLAST	-9.06%	-16.41%	12.10%	10.40%	-8.80%	-10.79%	-41.62%	-6.36%	6.44%	15.8
019	POINT END ROUTINE MAINTENANCE	-0.91%	4.16%	-1.68%	30.10%	-10.95%	-26.04%	-32.20%	0.69%	-20.62%	17.7
020	SIGNALS END ROUTINE MAINTENANCE TRACK CIRCUITS ROUTINE MAINTENANCE	-8.16%	-58.80%	15.21%	25.13%	55.28%	33.70%	-34.20%	35.93%	-26.21%	35.6
050		26.54%	-13.78%	-3.60%	10.91%	-2.66%	-26.62%	1.29%	20.35%	-6.12%	16.0
051		-0.76%	-35.77%	-9.65%	-1.96%	-26.10%	-31.53%	-36.30%	-5.02%	-45.85%	16.3
052		-10.44%	-30.78%	-31.12%	1.45%	-33.57%	-25.78%	-5.81%	18.88%	-21.06%	16.8

- E:202 Network Rail has acknowledged that significant investment was undertaken to gain a clear understanding of its maintenance unit costs and cost drivers. Poor coding and poorly coded activity was stated as a barrier to understanding these drivers, and a cause of significant regional variation. Each delivery unit's maintenance costs are now compared to a theoretical unit cost for each activity based on standardised delivery methods and then benchmarked against each other on an annual basis to drive out poor performance and to drive down unit costs through knowledge sharing and best practice. Network Rail stated that they apply regression analysis to total Maintenance Delivery Unit Costs (MUC) (applicable to 65% of the 40 cost items measured and monitored); however, it is evident there is still some way to go as significant variations still exist. Network Rail stated that the roll out of cost modelling will facilitate management and use of cost information throughout the GRIP1-8 lifecycle.

- E:203 Using the activity 'manual correction of plain line track geometry' to compare Halcrow's 2009 MUC findings to the MUC for FY FCT 09/10, we can see that the spread has widened between the Delivery Units. It appears that the national average MUC has also risen from £18 in 2008 to c.£27 in FY09/10.

	Anglia	Kent	LNE	LNN	LNS	M&C	SCT	SSX	WSX	WES
Variance (national MUC ave.)	32.5%	44.1%	-122.4%	15.6%	12.9%	10.0%	6.1%	-170.0%	-62.0%	-15.7%

- E:204 In the area of track, Network Rail has stated that they now understand their cost to serve and claim to have the lowest unit costs in Europe for procurement of track commodities. A challenge by contractors that they could obtain cheaper prices than Network Rail failed – only one contractor was able to better the pricing that was for the disposal of ballast.

- E:205 Maintenance unit costs for rail replacements are being used as a target price for contractors, although the regional variability suggests that they are not fully built-up costs in all circumstances. It is not clear if other MUCs are being or will be used as a benchmark for

contractor target costs, though clearly this would bring benefits in driving down costs. The implication is that Network Rail is not able to say whether it is operating at the most efficient level, be that at a fully built up cost for the in-house provider or that of an outsourced one.

- E:206 Track has also adopted a new more sophisticated approach to procuring renewals – taking into account the state of the asset and level and type of traffic carried on each route, and forward planning works for a 3 year period taking account of geographies and day of the week. A new cost rate was calculated with contractor engagement to challenge and reduce unit costs, with price adjustments for structural factors. A 50:50 share-gain mechanism has also been introduced to incentivise innovative working practices to drive out costs, with reduction targets in place for the remainder of CP4.
- E:207 There is evidence that the Maintenance service is improving its performance and productivity against a range of internal metrics despite a reduction in its operating expenditure. Recorded productivity is targeted at 60% for FY10/11 and is currently tracking at 53%, however recorded productivity has been as low as 37% in FY09/10. To address productivity issues, Network Rail is introducing an employee incentivisation scheme for its maintenance staff linking bonus with performance. Further changes to working practices also aim to increase productivity levels.
- E:208 There was recognition by Network Rail that maintenance and renewals is a grey area with most light renewals and refurbishment more like maintenance in the capability of men and equipment required. This supports the strategy of the Maintenance service to increase the value of capex projects undertaken. Network Rail have stated that internal benchmarks comparing direct labour vs contingent labour costs should consistently provide a more cost-effective solution than contractors.
- E:209 The current in-house ownership of plant and distribution process within Network Rail may be a higher cost option versus outsourcing. The National Delivery Service however is reviewing opportunities to further increase the use of its own distribution supply chain to reduce the costs of contractors' logistics networks.
- E:210 There has been investment in in-house design capability, where cost effective, across Civils (10%), Signalling and peripheral areas to GRIP 4 within Network Rail to enable integrated designs from the outset of a project where historically a disjointed approach had been undertaken resulting in poor scoping of projects, redesign and rework leading to increased overall costs. There are pockets of the business where the majority of design is still undertaken externally e.g. Enhancements, however Network Rail is looking to develop internal resource to support this type of activity.
- E:211 It has been suggested by some contractors that Network Rail has a tendency to over complicate and engineer requirements leading to increased costs. One example cited is signal bases – whilst Spain use concrete pre-cast blocks that can be fitted within two possessions, GB rail employs a 'gold-plated' design which takes a number of possessions to fit. Recent trips by Network Rail to Italy have identified in-situ concrete foundations that are being installed without possessions. The relevance/application within the GB rail environment is under consideration and accounted for within their initiatives.
- E:212 Inventory management remains an issue for Network Rail. The level of material inventory held by the industry as a whole is not known and may contribute to high unit costs. There is also a perception that there is a security of supply issue, particularly from non-EU suppliers, resulting in some firms and prime-contractors stock-piling inventory (in some cases up to one year's supply) adding to cost. It is also not clear if the amount of materials used for each job is monitored. In some instances, contractors can also be unaware of what materials will be supplied for renewal activities resulting in job-site uncertainty and delays. Stakeholders have indicated that poor material control on site is exacerbated by the strategy of free-issuing materials to contractors which reduces the incentive to minimise materials ordered and to ensure unused materials are returned rather than left for local maintenance teams to recover.
- E:213 Contractors are reluctant to invest in new equipment due to investment risk if machines are under-utilised. Plant amortisation rates are typically underwritten over a period of 7-10 years against commercial contracts awarded for shorter periods. Network Rail recognises that companies will not invest in kit if they do not have the opportunity to make a return.

E:214 Network Rail has also stated that some larger innovations can only be funded by themselves (e.g. high output kit with a cost over £100m) and expressed the view that that contractors could not reasonably be expected to take that level of risk but should be spending £5m-£10m on investments. This view is supported by the recent procurement by Network Rail of 10 x new welding machines at a total cost of £14m however at a cost of £1.4m per machine, this could fall into the investment range that they would expect a contractor to undertake. Furthermore, Network Rail advised that the procurement was undertaken without full consideration of how the machines are to be utilised i.e. by direct labour or by contractors.

E:215 There has been industry collaboration to seek ways of cutting signalling renewals costs and to identify other renewals areas that could be delivered more efficiently and more quickly. A key finding determined that the dividing line between GRIP stages 4 and 5 is impractical and inefficient by the subsequently appointed implementation contractors (it is not uncommon for issues of principle to be challenged when the project tester is appointed in GRIP 5 leading to rework of scheme plans and subsequent impact on all documentation and references associated with the plan). It was argued that a tender should be released at GRIP 4.5 to overcome these issues. A significant proportion of identified improvement initiatives required Network Rail action, however it has been suggested, but not evidenced, that little has been completed to date.

E.2.4.3 GB rail vehicles

E:216 There has been a variety of approaches taken to the arrangements for train maintenance since privatisation. Generally these have included variations to the allocation of responsibility for risks and activities between ROSCOs, TOCs and manufacturers. During the interviews and workshops, strong opinions were expressed, both in favour and against, each of the possible approaches. On balance, an approach where manufacturers have a continuing responsibility for the performance of the train for a period after it has been introduced into service was favoured by most individuals and organisations.

E.2.4.4 Passenger and freight train operations

E:217 Currently the responsibility for the maintenance and renewal of assets used by TOCs is split between Network Rail and train operator. ATOC, and others, have raised concerns that these splits of responsibility lead to increased costs, reduced quality of output, and increased timescales to delivery. There are some examples of TOCs already taking a fuller role on the repair of fixed assets, for example Southern on one of its depots. Few operators express a view that ROSCOs should be directly involved in the asset management of the trains.

E:218 Generally, train operators are felt to deliver in a value-for-money way for taxpayers. The franchise bidding process has periodically market tested the cost base of each business and this has led to reductions in their controllable costs.

E.2.4.5 Non-GB rail

E:219 ProRail has found that most efficiency improvements in renewals have come from bundling different activities together and implementing them concurrently. ProRail is the decision maker and contractors deliver all maintenance and renewals services, including logistics and labour, within the Dutch railway system.

E:220 In Spain and Italy rail, contractors are typically responsible for the complete delivery of a scope of works e.g. for a signalling project, this includes provision of all the signalling equipment (signals, train detection, point machines, interlocking, MMI) and the associated power and telecommunications design, materials (including cabling), minor civil works such as concrete bases, hard-standings and small equipment buildings, trough routes, installation of cables, signal structures, termination and testing. In GB rail work is typically divided by the engineering discipline.

E:221 A standard set of unit costs are used by ProRail for lifecycle cost calculations, based on actual costs and regularly updated.

E:222 The Swedish Transport Administration, Trafikverket, stated that maintenance and renewal delivery has been progressively outsourced since 2002 and will be fully outsourced by the end of 2010. There are five contractors and the target is to have eight. Contracts are competitively

tendered by area (all asset types) covering a number of sections of line and generally of 5 year duration (sometimes extending to 7 years). These include inspection, tamping and associated maintenance plant (renewals and some preventive maintenance is procured outside these contracts). It was stated that base maintenance levels are generally agreed over the period with some variability on renewals and enhancements (which are most likely to be affected by annual budget levels). The contracts include a penalty regime, e.g. for slow failure fix, possession overrun.

- E:223 It was stated that there are separate, network-wide contracts competitively tendered for certain track activities requiring specialist plant (e.g. ultrasonic monitoring, grinding), traffic information equipment and power supplies. These are generally of 3 years duration extendable to 5 years. Unlike Network Rail, the Administration does not own any rail plant, engineering vehicles, etc and these are provided by the contractors.
- E:224 The Dutch rolling stock maintainer NedTrain takes a two year supply chain look ahead, forecasting based on historic demand using a dedicated tool (based on commercially available software). This has had some success but is not without difficulties. NedTrain discusses future needs with suppliers and has general volume agreements to ensure lead time issues are managed but this is not necessarily locked down or committed via firm orders two years out.
- E:225 The Dutch rolling stock maintainer NedTrain stated that a number of initiatives have been undertaken to improve costs including:
- a. A stock holding review to identify obsolete items and to forecast future demand.
 - b. Transfer of stock valued at 1m Euros to a supplier to hold under contract (transferring stock risk and improving lead time). Longer term savings are expected as a result.
 - c. Logistics and purchasing cost benchmarking with other railway companies around Europe (e.g. Swiss, Germans, Railpart) and a collaborative approach with suppliers to get good pricing.
- E:226 The Swiss outsource services under the motto “who does what, best and most efficiently?”. Long-term contracts are awarded and a long-term approach to cost control and management taken enabling contractors to plan long-term resourcing, logistics and investment.
- E:227 The Swiss rail network has the densest traffic regime in the world. The Sersa Group has stated that 80 - 90% of heavy renewal and maintenance work is undertaken in track access periods of 6-10 hours, with the length of track under renewal between 1km to 2 km. Heavy machinery such as renewal trains, cranes, excavators and tamping machines etc are usually owned by private contractors.
- E:228 The Sersa Group has quoted the following cost comparisons between Swiss and GB rail for S&C Renewals under a total service package model:
- a. Swiss – between £100k and £275k per unit typically in 6-10 hour possessions.
 - b. GB rail – between £415k and £585k per unit typically in 27 to 54 hours possessions.
- E:229 Sersa identified the following softer benefits of the service model:
- a. Long-term guarantee of cost / revenue for both parties.
 - b. Repetitive nature of work enables continuous improvement.
 - c. Costs are minimised due to optimisation of people, plant and process and due to the continuous improvement effect.
 - d. Contractor is incentivised to invest in new technologies and processes producing quality improvement and cutting unit costs.
 - e. Reduced management efforts for the infrastructure manager.
 - f. Aligned and focused teams providing consistent levels of service.

E.2.5 Continuous Improvement and Innovation

E.2.5.1 GB rail as a whole-system

E:230 There have been limited examples of pan-industry innovation and there were some views expressed that the current structure limits the ability of the industry to innovate.

E.2.5.2 GB rail infrastructure

E:231 Network Rail has recognised that it has been too bureaucratic in the past to enable innovation into the network resulting in a loss of potential improvement and benefits to the network. Reasons previously cited for the lack of innovation have included:

- a. Securing and developing accreditation and certification for new products was a significant barrier to entry for SMEs. A lack of test track meant new technologies could not attain certification for use on GB rail.
- b. Requirement for highly specialised bespoke GB rail products that only a few companies could feasibly develop and which had very little commercial value.
- c. Difficulty of SMEs / GB rail technology providers in forging relationships with global manufacturers to work within the GB rail supply chain.
- d. A complicated and lengthy approval process for new processes / equipment.
- e. A preference to do work “in house”, to the detriment of losing expertise from dedicated specialists.

E:232 A number of examples have been recognised by the industry as having taken Network Rail either too long to introduce or were not introduced at all despite being already proven elsewhere:

- a. Switches & crossings Second Life System (SLS) first trialled in August 2004; although a full approval was obtained in 2009, it was not extensively used as a solution.
- b. Modular Switch concept – although this is expected to be fully implemented by 2013, it will have taken 9 years to implement a process already proven elsewhere and may still be uncertain. Currently, 25% of the work-bank is modular component, and it is unclear whether an anticipated tender for modular S+C units (expected September 2010) is yet issued.
- c. A slow uptake of RailVac to avoid heavy lifting when renewing ballast. It's a multi-purpose track maintenance machine that other railways use widely to reduce costs, e.g. Reballasting switches and crossings on non-primary routes.
- d. High output stressing using heater stressing techniques not taken up as stressing operations undertaken by both internal maintenance staff and external contractors was treated as a separate activity.
- e. Suppliers encouraged to develop an enclosed barrier system for Britain, but then not used (Geismar).

E:233 A renewed vigour to innovate by Network Rail has been adopted with recent successes including the innovative ideas being developed and introduced to the rail market via the Form A/B sign off process. Examples within Building and Civils include GRP products, helical piling, combined heat/power schemes, envirowrap, LED lighting, polystyrene embankments and platform infills.

E:234 Investment costs however may remain a barrier to innovation (e.g. upfront costs prevent deployment of Slab Track).

E.2.5.3 GB rail vehicles

E:235 Innovation has enabled the introduction of more-efficient machinery onto the network e.g. rail-borne infrastructure monitoring (historically a manual task) and a world-wide pilot for new stoneblowing equipment that will increase utilisation (see also Appendix E3 on the bespoke nature of GB rail vehicles and limitations on use).

E:236 A train manufacturer also cited the ability to convert existing rail fleet from diesel multiple units to bi-mode (diesel and electric) operation which they believed would provide a range of benefits including: a cost-effective and affordable solution for increased capacity and reduction in carbon emissions; releasing other significant additional benefits if carried out in conjunction

with electrification through enabling operating cost reductions and enabling the electrification of difficult and expensive sections of route to be deferred or avoided .

E.2.5.4 Non-GB rail

- E:237 Changes in Dutch law since 2007 have affected the way works have to be carried out which would have led to extra possessions if innovations and developments in the areas of remote monitoring, remote inspection and use of measurement trains had not been done by ProRail.
- E:238 In Sweden, Railvac technology was introduced onto the network in a period of under 2 years. In GB rail evaluation trials have been ongoing for 5 years, although it has been successfully introduced onto London Underground infrastructure within this time.
- E:239 In Switzerland, a dedicated purpose built depot and equipment is used to refurbish any serviceable track and signalling components that can be reused. Contractors in GB rail however can be unaware of what materials will be supplied for renewal. The National Delivery Service has also recently opened (or due to open) 3 new facilities dedicated to recycling.
- E:240 In both Switzerland and Sweden, contractors are encouraged to develop new processes for renewal of S&C. In GB rail the approvals process for new processes and equipment can be convoluted; recently however, introduction of certain technologies e.g. machinery has been passed for approval within a number of weeks. Modular S&C components are also being introduced into the system though full utilisation of modular S&C components is not expected until 2013.
- E:241 In Switzerland, France, Austria and the Netherlands, enclosed barriers are used extensively across the infrastructure, particularly in tunnel locations. In GB rail suppliers have been encouraged to develop an enclosed barrier system, however, it has then subsequently not been used, e.g. Geismar.
- E:242 In Austria and the USA, the supply industry is heavily involved with the provision of technology, plant and ballast distribution. GB rail undertakes in-house ownership of plant and the distribution process. The ballast profile also often impairs 'Quality' maintenance activities.
- E:243 In Europe, the supply chain is heavily involved with specialist plant design, development and provision of bespoke plant to undertake track renewals. A partnership approach to solving delivery problems is taken. In GB rail Road Rail Vehicles are favoured, and specialist plant suppliers are rarely involved (see also Appendix E3).

E.2.6 Processes and Tools

E.2.6.1 GB rail as a whole-system

- E:244 Currently, there are limited processes established for pan-industry engagement on supply chain issues e.g. planning, specification development and innovation and no consistent approach to the management of projects and data collection.
- E:245 Input specifications are heavily utilised within the industry which can result in inefficiencies, increased cost, a lack of innovation, and disregard of best practice.

E.2.6.2 GB rail infrastructure

- E:246 A number of issues have been recognised by Network Rail in its Contracting and Procurement processes: an inflexible governance process and unclear consequences of poor performance; unaligned processes; post-contract award changes; and asset performance management have all been cited. It is evident that significant changes have been made by Network Rail in the last 18 months to address some of these issues including improvements to strategic sourcing process, introduction of category management and a strategic supplier account management programme (SAM), and the deployment of supporting systems, across Network Rail.
- E:247 A category management approach to expenditure and a commercial approach to contracting is based on supply market positioning and segmentation of the commodity base. Whilst category management seems to be generally understood within Network Rail, there is recognition that there are still pockets of the organisation, with a project focus, that requires further educating to realise the full benefits of category management.

- E:248 In track renewals from 1 April 2010, contractors have been asked to deliver lower volumes and to work with Network Rail to calculate a new set of unit cost rates that would deliver the needed volumes of work under the CP4 budget. Network Rail told contractors there were no “sacred cows” and they were free to challenge all assumptions. New cost rates also include “structural factors” such as third rail or tunnels and there are adjustments to price to take account of these issues. The unit rates have been set for the remainder of CP4 with an annual ratchet to reduce costs every year. A benefit / risk share has also been introduced so that if contractor can do it for less there is a 50/50 sharing of gain.
- E:249 In Buildings and Civils, Network Rail has found tendering is 30-40% cheaper than the Framework rates and competition is strong with c90 contractors in the market. Currently 30% of work is competitively tendered with the remaining 70% spend through the Frameworks; in 18 months it is anticipated that 70% will be competitively tendered.
- E:250 In Signalling and Communications, 5 geographical frameworks were awarded across 6 regions for major resignalling between 2005-2026. Frameworks are let on a 5 + 5 yr basis (the first expiring June 2011) and define individual projects, scoped by size, SEU and duration. Framework value is c.£250m. Suppliers bid against the declining SEU determination set by ORR as a target price. Type ‘C’ minor works frameworks (renewals on a like-for-like basis) are operated by SP&C and works undertaken by Maintenance. Funds are transferred between the budgets. The frameworks expire in December 2011 (5yr framework). There is intention that future frameworks will be let on a national basis and with more work within the scope. Enhancements projects may also be tendered within the scope in line with category management approach. Type A frameworks (hub and spoke model encompassing telecoms, power, civils) will also be revised given increased visibility of works.
- E:251 Changes to contracting approach have also been introduced in an effort to manage costs more effectively, particularly from GRIP 4 onwards. However whilst some value is being derived, it will take time for significant benefits to materialise. We note that Network Rail’s engagement with the supply chain is complex and continues to change and that this report reflects the examples we were able to gather as part of our findings at the time of the study. Some of the approaches that have been deployed are:
- a. From a design perspective works may be undertaken from GRIP 1 to GRIP 5 utilising a variety of arrangements including:-
 - i. In-house design resources
 - ii. PSERV framework
 - iii. Tier 1 - framework contracts for early engagement of contractors during development stages to effectively become Network Rail Design arm in GRIP 4
 - iv. Design and Build contractors
 - b. Projects can be delivered by a multitude of arrangements including:-
 - i. Minor works frameworks (schedule of rates)
 - ii. In-house Maintenance
 - iii. Frameworks including MAFA: Multi Asset Framework agreements, introduced September 2009, 14 contracts to be set up nationwide to enable efficient procurement processes for projects £1- £15m from GRIP 4. Network Rail anticipates that around £150m of spend will be awarded through this by the end of 2010
 - iv. Competitive Design & Build Contractors: There is intention within Network Rail to increase the volume of work awarded through competitive tender, particularly in the area of Civils.
 - v. Construct only Contractors
- E:252 Historically, Framework contracts have largely been let on a reimbursable-cost basis and at nil commitment volumes. There has been a move away from these cost plus contracts to fixed price or target costs. Framework contracts have been let on a zero-value basis offering no committed volumes despite evidence to suggest that frameworks (particularly in Civils) often

exceed the indicative value stated within the tender. One respondent stated that savings in the region of 20% - 30% could be achieved through guaranteeing volumes. Network Rail is now moving away from “zero value frameworks” across all assets, using either open competition or frameworks with annually packaged work volumes with the stated aim of helping suppliers better manage their resource efficiency. Network Rail believes that, whilst there is still a place for other frameworks enabling competition or agreed workbanks, guaranteeing volumes in frameworks is inefficient and that frameworks are generally not cost effective in comparison to a competitive market.

E:253 Network Rail also facilitates ‘employer facilitated contracts’ negotiating industry prices for goods, materials and services where Network Rail can leverage its mass to secure preferential pricing. Call-off and consumption is monitored by the National Delivery Service organisation, however it is unclear how the information is further used. Network Rail stated that various supplier engagement models are being developed which will be selected based on the dynamics of each project, staff and the market.

E:254 In the area of Maintenance and Renewals, although the flexibility that frameworks offer is recognised as having some advantages, many stakeholders, particularly labour suppliers and smaller tier 2 and below firms have said that they offer too little certainty on future work and make investing in capability high risk.

E:255 It has been suggested by contractors that Network Rail’s tendering process is overly convoluted and onerous, with a vast amount of information that often lacks cohesion between the technical information provided and the commercial information required, and in some cases, a lack of clarity of the true scope of works. Contractors have stated significant time is spent reviewing and making sense of the information.. Further issues cited include the ‘intrusive’ level of cost detail required during the tender, with the template to collect cost information often containing thousands of line items that change from project to project, resulting in an overly time-consuming process which leaves contractors limited opportunity to provide value-add within the submission and within the tender timescales. A clear direction covering scope, commercials, interfaces with the peripherals and timescales were suggested to help accuracy when bidding for work. This issue has been recognised by Network Rail and is starting to be addressed within their Efficient Infrastructure Delivery programme, as part of the wholesale changes underway within their capital investment procedures. Network Rail are not only approaching this from a procurement aspect, but also from a post-contract perspective regarding cost management throughout the life of the project. Network Rail has stated it will roll out cost models across the renewals and enhancements programmes (which will also capture maintenance delivered capex work and compare this to market delivered works).

E:256 Strategic partnerships have been developed with some key suppliers to secure preferential pricing, continuity of supply, and innovation and development, however there is still caution within Network Rail regarding partnership arrangements which may prevent the true benefits from being realised, particularly where a limited supply base exists e.g. for signalling.

E:257 There are disparate systems in place across Network Rail’s National Delivery Service for use in planning engineering and access requirements. A common system would be expected to drive efficiencies and improvement in planning (planned deployment of Oracle applications is expected to help).

E.2.6.3 GB rail vehicles

E:258 There has been significant change to the technical standards and specification of rail vehicles over the last ten years. This rapid rate of change has led to some benefits such as lower emissions from diesel engines but is thought to have increased capital and maintenance costs and potentially increased performance risks. Most private industries have reached a standard approach to the specification of operating assets.

E:259 According to RIA and a rolling stock manufacturer, significant cost is incurred during the procurement process ranging between £500k when bidding for a simple follow-on order to £15m for a complex major project. Costs can increase by as much as 20% where customisation creeps into the process, e.g. the level of product change between projects with similar requirements leading to non-recurring design, procurement and approvals costs (since 1993, 23 different variants of train have been put forward by the (one) manufacturer in

response to independently conceived procurement exercises) or an inconsistent approach deployed for the bidding of manufacture and finance, or abortive costs where projects are delayed or cancelled.

E:260 Design costs and production line ramp-ups also account for a significant proportion of train costs as stated by one TOC. Efficiencies with train procurement could be achieved if planning and control is right. For example, orders for Lot 10A Electrostar trains were quoted at £1.1m per vehicle with options for follow on orders as low as £780k per vehicle. The delay in obtaining a decision from the DfT however resulted in the lapse of the option and the eventual price increased to £1.25m per vehicle.

E.2.6.4 Passenger and freight train operations

E:261 The OJEU regulation and procurement requirements in rail industry have been cited as a constraint to the development of partnering approaches between train operators and their suppliers. Some train operators have questioned the value of tendering for procurement of certain product classes where they have strong relationships with an existing or preferred supplier.

E.2.6.5 Non-GB rail

E:262 In ProRail, larger renewals activities are competitively tendered, with framework contracts also in place. Maintenance contractors are not guaranteed renewals work but are able to tender for it; they are not given any concessions over other contractors.

E:263 A multi-disciplinary approach is taken to planning and tendering within ProRail with systems engineers, renewals planners, and maintenance inspection teams inputting into a 'renewal project initiation document' to ensure that all parties requirements are captured in the initial stages of a project.

E:264 Historically maintenance contracts were based on activity within ProRail, although output contracts (introduced in 2008) are now commonplace and are based on performance and incentives. Contracting periods are typically 6 year periods.

E:265 In France, Germany and Japan, long-term framework agreements are used to procure rolling stock, allowing manufacturers to take a long-term view and promote investment in skills, technology and standardisation. It was suggested by a rolling stock manufacturer that a 10 year Framework covering rolling stock supply plus standardised base level service support and financing (taking account of whole-life costs) could be advantageous.

E:266 It has also been shown in other industries that framework agreements work for continuous maintenance workloads but significant savings can be made through separately negotiating agreed work packages, even with incumbent suppliers. It is the selection of the appropriate approach that is critical to driving the required cost efficiencies. A recent example from the UK Offshore industry demonstrated a 50% discount saving \$4m over framework rates when a renewal/construction activity was packaged and separately negotiated with the incumbent suppliers.

E:267 The MoD's view to procurement of long-life assets is to move to longer-term relationships for more cost-effective solutions.

E:268 The Highways Authority sees itself as an intelligent buyer and uses its position to negotiate directly with contractors (prime and sub) to set the target costs for projects and to drive efficiencies. Contractors are obliged to provide project costs in the Highways Authority's standard work breakdown format which is then benchmarked against their intelligence. The Highways Authority is looking to further drive the market through developing 'should' costs for projects.

E:269 The Highways Authority has recently employed an innovative shared incentivisation scheme across 5 of its delivery partners to drive improved results through continuous learning and collaborative working. The scheme is linked to the performance of 7 defined major projects; savings generated against each project target cost are diverted into a shared savings pool. Contractors are expected to benefit two-fold – through their own improved operating efficiencies enabled by fixed scope of works, and a share of the savings bonus. Conversely, contractors undertake the risk of poor performance – any of the projects failing to deliver

against target cost will result in the contractor in charge losing its fee and any deficit taken from the shared savings pool.

- E:270 Highways Authority activity is aligned to an industry-wide work breakdown structure, bespoke to their requirements, to capture, monitor and control unit costs; these are used in estimating the cost of future projects. The Highways Authority has recently converted from range estimating to 3-point estimating to improve cost accuracy and management.
- E:271 Actual cost contracts are employed by the Highways Authority and a Total Cost Management approach, aligned to industry benchmarks and best practices, has been introduced to manage activities. Behavioural workshops are also held with Tier 1 suppliers to drive Highways Authority expectations of suppliers during tender and negotiation.
- E:272 A Benefit Cost Ratio model supports major capital project decision making.
- E:273 The Highways Authority utilises off-the-shelf software packages to manage its project and unit cost database, and for parametric estimating of project costs and scenarios.

E.3 CONSIDERATION OF ‘NATIONAL ENGINEERING SERVICES’ MANAGEMENT

E.3.1 Introduction

E:274 Certain GB rail activities (or the organisation of their provision) can be considered to be ‘national services’, e.g. Network Rail’s National Delivery Unit, high output track renewal systems and asset inspection vehicles. This may be significant in terms of cost, performance definition and the effect on the railway (provision (or non-provision) risk). There appear to be various ways of approaching this (highly centralised, significantly outsourced, etc) but the key is to manage this effectively to make it work. There is a need to consider how such items fit in a structure where local accountability and effective decision making are sought as part of improved asset management, taking account of non-GB rail examples.

E.3.2 Scope of Engineering Services

E:275 We have considered the range of potential engineering services that could be deemed ‘national services’ by identifying a number of service types:

- a. Regular Maintenance Support.
- b. Less-Frequent Engineering Support.
- c. Rare / Specialist Support.
- d. Information Support.
- e. Facilities.

E:276 These service types represent a wide range of activities, some discrete and some part of a significant and widespread end to end arrangement. In some cases they involve dedicated assets to deliver the service and the accountability considerations involve both current provision/coordination and future investment responsibility, i.e. upgrades and replacements.

E:277 We have provided examples of services and a provisional allocation to a service type in the following table. This is based on a single workshop and should not be assumed to be definitive. Where stated, vehicle numbers are indicative and subject to confirmation.

Service Type	Example Services		Factors for Consideration
Regular Support to Maintenance Function and to Renewals / Enhancements	Inspection vehicles	New Measurement Train, track recording coach, gauging train, ultrasonic units, video inspection trains, saloon	Currently up to 20 vehicles / trains owned by Network Rail which are quite bespoke. Significant (and growing) dependency for these services. An expectation that more inspection will be possible from service trains in future.
Note: There are			

Service Type	Example Services		Factors for Consideration
potentially different (conflicting) planning / response demands (currently managed by NDS) for the different clients for these services (local Maintenance Functions and 'central' Renewals / Enhancements)		inspection vehicles	
	Works delivery vehicles	Plain line and S&C tampers, stoneblowers, regulators, etc	<p>Approximately 70 vehicles currently (mainly owned by contractors and procured / operated under contract).</p> <p>Stoneblowers owned by Network Rail are mostly for plain line use but recent ones are multi-purpose for switch and crossing use.</p> <p>GB rail sleeper spacing varies so unable to use equipment for high output tamping at optimal rate.</p>
		Rail grinders	<p>Network Rail own 7 (5 S&C) and some leased equipment. There are plain line grinding trains and smaller S&C grinders.</p> <p>Limited options as GB rail environment constrains use of other fleets.</p>
	Rail engineering fleet (for provision of materials)	Open wagons, tipping wagons, tilting wagons for S&C delivery, auto-ballaster wagons, long welded rail trains, locomotives	<p>Network Rail owns the tilting wagons. All engineering wagon haulage is outsourced (contractor locomotives and crew). Network Rail has a small locomotive fleet mainly used by contract operators to haul specialist inspection trains.</p> <p>TOC fleets now less locomotive based and therefore less / different ability to support.</p>
	General purpose road rail support vehicles	Range of rail-wheeled yellow plant able to access from lineside and travel to worksite by rail.	<p>Around 1000 vehicles owned and provided by contractors.</p> <p>Have evolved to mirror track access and possession management arrangements.</p> <p>Track lifting equipment mothballed as 'difficult' to store and deliver to worksites (rail delivery only) in comparison to RRVs. It has a greater lifting capacity than two RRVs and enables higher site productivity. Some contractor use on track renewal sites where 'just in time' rail delivery is possible.</p>
	Materials distribution logistics	Sourcing and delivering ballast, sleepers, rail and other equipment to site (and removal of spoil, recyclables, etc)	<p>Track related items generally delivered by rail (see 'rail engineering fleet (for provision of materials' above) – end to end provision (purchase to site) arranged by Network Rail.</p> <p>Other items may be part of contracted provision using road transport.</p>
	Materials storage	Distribution centres, stockpiles	<p>Network Rail has a number of dedicated sites (the number and location have been rationalised). Contracted suppliers, e.g. DHL, Unipart, also hold stocks.</p>
	Engineering access delivery	Possession management and staffing on site	<p>Network Rail staff in conjunction with operations (PICOP, MOM, etc).</p>
Less-frequent Engineering Support	Specialist rail engineering fleet (high output)	Track renewal trains, ballast cleaners	<p>Network Rail own with outsourced operation and maintenance (Colas) to Network rail requirements.</p>
	Specialist rail engineering fleet	Wiring trains, MPVs, rail mounted cranes, snow ploughs, PLUMS/PEMS panel layers (specialist plant for S&C renewals), scissor lifts, single line gantries, drain train	<p>Network Rail own two wiring trains (1 based EC and 1 based WC).</p> <p>Network Rail owns 32 self propelled MPVs and 25 loco hauled Rail Head Treatment Trains. The Rail Head Treatment activity also covers the application of addition modifier during the autumn season.</p>

Service Type	Example Services		Factors for Consideration
Rare / Specialist Support	Provision of high value / critical equipment	Strategic spares	
	Technical / Incident investigation	Investigating allegations of equipment wrong side failure, accidents or near miss root cause analysis	
Information Support (see also E5)	Interface to operational data	Central train running / performance / tracking systems	Needs to be able to deal with heritage and future systems
	Evaluation / analysis of asset information	Deterioration modelling, defect trends, unit cost, etc	
Buying	Coordination of national services contracts and procurement	See table in E3.3 for overview of current arrangements for provision	
Facilities	Stabling and marshalling facilities for engineering trains	Storage, light maintenance, fuelling, loading, unloading, etc	
	Test facilities	Test track, ERTMS test bed, environmental testing, reliability growth, etc.	

E.3.3 Initial Appraisal of Engineering Services Provision

E:278 The identified service types and examples have been considered in terms of attributes impacting central or devolved provision. This starts from the perspective of the current arrangements and is shown in the table below. This appears to show a quite strongly ‘central’ leaning reflecting, in particular, Network Rail’s development of National Delivery Services with more centralised planning and procurement over the last few years. The following table is based on a single workshop and should not be assumed to be definitive or comprehensive, nor to advocate a particular approach.

Service Type	Example Services		Current Arrangement	Impacting Attributes
Regular Support to Maintenance Function and to Renewals / Enhancements Note: There are potentially different (conflicting) planning / response demands (currently managed by NDS) for the different clients for these	Inspection vehicles	New Measurement Train, track recording coach, gauging train, ultrasonic units, video inspection trains, saloon inspection vehicles	<p>Involves collecting, storing and translating data and providing processed information (what to collect and how often is specified by NR standards) to NR Engineering as (single) client.</p> <p>NR Asset Information do data processing and provide on-board technicians to operate equipment (ultrasonic output processing outsourced to Sperry).</p> <p>NR NDS plan and arrange crewing of the trains centrally using NROL system. Train</p>	<p>Central coordination and provision enables network timetabling (runs to equivalent of working timetable, bidding for paths, etc), crew rostering (ensuring appropriate route knowledge), weather factors, possession avoidance, etc.</p> <p>Stated that standards cannot be met efficiently without this service</p> <p>This inspection stated as a core integral function for which outsourcing is</p>

Service Type	Example Services		Current Arrangement	Impacting Attributes
services (local Maintenance Functions and 'central' Renewals / Enhancements)			drivers and train maintenance outsourced.	<p>considered a major risk by Network Rail (previously contracted but no investment in equipment. See also E3.5 which notes how other rail organisations are successfully outsourcing inspection and E2.4.2 which notes that contractors are reluctant to invest in new equipment where the risk of under utilisation and a typical 7-10 year return on investment is not underpinned by contract duration.</p> <p>Consider technological development (leadership, funding, collaboration, etc) and how best coordinated across industry.</p> <p>Data capture and storage management needs to be consistent to enable comparison.</p> <p>Data is critical to forward planning of renewals, tamping programme, etc.</p> <p>Geography (volumes of inspection) drives cost but planning nationally optimises this.</p>
	Works delivery vehicles	Plain line and S&C tampers, stoneblowers, regulators, etc	<p>Local engineering discretion (quality/output/target driven rather than standards driven). Policy is not consistently implemented currently.</p> <p>Whilst allocated geographically, NR NDS plan and route all provision centrally using NROL system (accessible to NR and customers in a single system). Customers are NR maintenance, renewals and enhancements who book a service (could be any contractor's equipment).</p> <p>NR NDS centrally procure tamper services.</p>	<p>Provision of more expensive and complex (multi-purpose) vehicles supports policy of S&C geometry retention for longer life (less renewal) and extended track quality and life for secondary routes.</p> <p>Potential to rebalance track form provision (life v fettle/renew) – higher first cost for quality, lower whole life cost.</p> <p>Risk of reduced utilisation of assets due to limited possession time. Potential for operation in traffic.</p> <p>Tampers are not designed for numerous long range transits so broadly they are best based and planned to operate in a (flexible) geographic area. It should be possible to allocate tampers and stoneblowers to particular areas matching annually reviewed maintenance workload plans (organising this around more 'fixed' renewals / enhancement support</p>

Service Type	Example Services		Current Arrangement	Impacting Attributes
				<p>needs).</p> <p>Central coordination enables network timetabling, possession avoidance, etc.</p> <p>Support costs can be significant as include track access charges, possession management staff, transit to site, etc</p> <p>Potential for local provision (would need good forward planning to understand workload).</p>
		<p>Rail grinders</p>	<p>Standards drive this from prescribed tonnage and curve radius.</p> <p>Much is reactive (remedial) rather than proactive maintenance – fleet sized for latter but cannot beat bow wave.</p> <p>NR NDS plan and route all provision centrally using NROL system (accessible to NR and customers in a single system). Customer is NR maintenance.</p>	<p>Requirement driven by policy. Potential to trade off against track-friendly trains – stiffer suspension extends train maintenance but impacts on track. Similarly can harden rail – German example (more train damage).</p> <p>Significant operational / engineering interface for optimal whole life cost solution</p> <p>No clear cut central v local choice. Might be appropriate to devolve control of smaller S&C grinders using local cooperation with TOCs to enable more flexible possession / access to S&C and small plain line sections where this might avoid rail replacement or TSRs.</p>
	<p>Rail engineering fleet (for provision of materials)</p>	<p>Open wagons, tipping wagons, tilting wagons for S&C delivery, auto-ballaster wagons, long welded rail trains, locomotives</p>	<p>The Autoballaster wagon fleet is managed by NR NDS, generally supporting a programme at a site on demand.</p> <p>NR NDS plan and route all provision centrally using NROL system (accessible to NR and customers in a single system).</p>	<p>There is a ‘holding cost’ for storage of any central fleet for devolved use on application.</p> <p>Preservation or dedication of train crew / haulage provision is a potential limiting factor and potentially more difficult if devolved. There needs to be good interaction and cooperation with operators, etc. – including delegated authority to amend train running and engineering work times/lines.</p> <p>Overall fleet usage integrates with bigger picture train and engineering possession planning arrangements. There are examples of cooperative behaviours with GW and East Midlands enhancement works.</p>

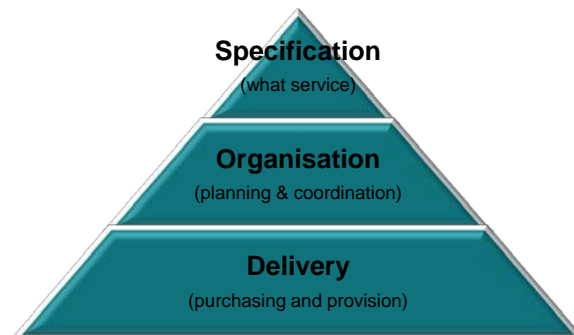
Service Type	Example Services		Current Arrangement	Impacting Attributes
				<p>Local control or coordination can ensure wagons best suited for the job, local engineering processes and infrastructure (OLE, etc) are provided and therefore understood, used correctly and looked after, but need to consider resource availability.</p>
	<p>General purpose road rail support vehicles</p>	<p>Range of rail-wheeled yellow plant able to access from lineside and travel to worksite by rail.</p>	<p>Tend to be allocated / driven by works activity and campaigns and adapt to working methods.</p> <p>Stated there are deployment and planning shortfalls with devolved provision.</p>	<p>Currently backbone of works driven by track access.</p> <p>Cost is impacted by whole system consideration of engineering works management in future.</p>
	<p>Materials distribution logistics</p>	<p>Sourcing and delivering ballast, sleepers, rail and other equipment to site (and removal of spoil, recyclables, etc)</p>	<p>The provision of materials via NR NDS is a combination of central procurement and provision – obtaining best cost on the ground (end to end supply including the transit).</p>	<p>Devolved local decision making and planning may affect logistics value and likely to require greater maturity.</p> <p>Optimal re-use of materials would probably benefit from national coordination to ensure all opportunities are identified and considered. Trade off decisions on affordability of buying new or recycled for a particular job is best led locally.</p>
	<p>Materials storage</p>	<p>Distribution centres, stockpiles</p>	<p>Progressively rationalised and currently coordinated by NR NDS.</p> <p>National logistics contracts in place and local stockpiles favoured for critical items over just in time delivery.</p>	<p>Stakeholders have stated poor material control on site, exacerbated by strategy of free issue to contractors (reducing incentive to minimise materials ordered and to ensure unused materials are returned). The latter can become a virtual maintenance subsidy as materials are recovered by local teams. The level of material inventory held by the industry as a whole is not known and may contribute to high unit costs. There is also a perception that there is a security of supply issue, particularly from non-EU suppliers, resulting in some firms and prime-contractors stock-piling inventory (in some cases up to one year's supply) adding to cost. It is also not clear if the amount of materials used for each job is monitored. In some instances, contractors can also be unaware of what materials will be supplied for renewal activities resulting in job-site uncertainty and delays. E212 (E2.4.2)</p> <p>Network Rail stated that free</p>

Service Type	Example Services		Current Arrangement	Impacting Attributes
				issue to contractors allows material provision at lowest cost, taking into account of economies of scales throughout the UK. Network Rail stated they were unaware of any security of supply issue and believes the amount of material used for each job is quantified and monitored. Network Rail also stated that contractors should be aware of what materials will be supplied for renewal activities, therefore there should not be uncertainty and delays.
	Engineering access delivery	Possession management and staffing on site	Engineering access planning central with NR NDS – resource team can see whole provision. Common national planning packs and presentation supporting a standard approach locally delivered.	Local representation at planning meetings to find best methodology is encouraged. Previous regional access planning with local needs 'blocked' wider provision for greater good and no national overview.
Less-frequent Engineering Support	Specialist rail engineering fleet (high output)	Track renewal trains, ballast cleaners	NR NROL system now coordinates all planning provision – accessible to NR and customers (single system). Campaign planning is used for optimum utilisation.	This is effectively a specialist central unit pre-planning to support local needs. The assets have a high investment cost.
	Specialist rail engineering fleet	Wiring trains, MPVs, rail mounted cranes, snow ploughs, PLUMS/PEMS panel layers (specialist plant for S&C renewals), scissor lifts, single line gantries, drain train	NR NROL system now coordinates all planning provision – accessible to NR and customers (single system). Some campaign use to support enhancements. These vehicles are generally responsive to incidents and environmental conditions. Driver provision is difficult in the Autumn 'peak' even as a central provision – TOCs provide limited assistance with crewing and pathing.	Devolved MPV / ploughing provision (perhaps to TOCs) may incentive more optimum provision of weed killing, de-icing, etc.
Rare / Specialist Support	Provision of high value / critical equipment	Strategic spares		
	Technical / Incident investigation	Investigating allegations of equipment wrong side failure, accidents or near miss root cause analysis	On demand activity	Need for retained skills and equipment.
Information Support	Interface to operational data	Central train running / performance / tracking		Need to understand 'real' performance and asset-impacting events.

Service Type	Example Services		Current Arrangement	Impacting Attributes
		systems		
	Evaluation / analysis of asset information	Deterioration modelling, defect trends, unit cost, etc		Need to consider specific information types - functional (configuration and limits), condition, financial, environment (operating context), legal (compliance), commercial – and potentially changing requirements through the asset lifecycle (see also E5)
Buying	Coordination of national services contracts and procurement	See this table for overview of current arrangements for provision		
Facilities	Stabling and marshalling facilities for engineering trains	Storage, light maintenance, fuelling, loading, unloading, etc	NR NDS have reviewed and mapped vehicle stabling facilities, refurbished some and closed others.	
	Test facilities	Test track, ERTMS test bed, environmental testing, reliability growth, etc.		

E.3.4 Decision Criteria and Factors To Determine ‘Central’ v ‘Devolved’ Provision

E:279 The services need to be viewed in terms of their contribution to the provision of reliable railway operations, i.e. their role and importance in whole-system optimisation. This will indicate benefits which can be valued and may influence the ability to devolve or the extent to which central planning, provision or coordination is required. In general each needs to be considered in terms of three elements; specification, organisation and delivery.

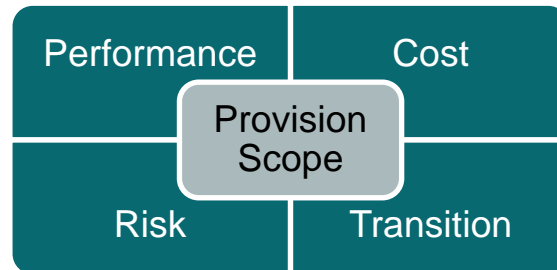


E:280 Service specification needs to take account of the end user requirements but also the impacting ‘command and control’ policies, principles and standards which inform (and in many cases constrain) the operating context. Some engineering services are dictated by high level standards, e.g. facing point lock testing, whilst some enable discretionary, local decisions (within company standards), e.g. tamping to improve track alignment and level for improved ride quality. The ‘command and control’ standards themselves are key to the industry going forward and their coordination, review and management on behalf of the industry is a key consideration.

E:281 Decision criteria should be determined to enable the most appropriate future provision when considering GB rail structure alternatives. This initial review has not considered who is best placed to provide or organise the services (or which are most appropriate to outsource)

but would anticipate that collaboration between multiple organisations is likely to be required in order to optimise provision. We suggest an initial basis for consideration could be:

- a. Provision scope. Who specifies, how service is accessed or procured, e.g. from / by whom.
- b. Performance. How service affects railway operations, business criticality.
- c. Cost. What drives the service cost, what is that cost (the service itself and the assets to deliver it) and who is buying it.
- d. Risk. What is the impact of disrupting or losing this service, how dependent is the operating railway, what resilience.
- e. Transition. How can the existing service arrangement (specification, organisation and delivery) migrate to one (or more) new GB rail structure(s), how easy, what enablers needed.



E:282 A number of factors for consideration were raised at the workshop:

- a. Take account of what works well with centrally specified, organised or delivered services and take account of the risks inherent in devolving this.
- b. Local involvement and knowledge is valuable even if a service is centralised and a means of injecting local insight should be considered.
- c. In determining services, consider what experience and knowledge is required to make them work effectively and efficiently, where this resides in the industry and how/if it can be made available. This should involve looking beyond any one organisation and therefore inform the means of best structuring and procuring the service.
- d. Take a wider look at the governance and regulatory arrangements that the services operate (and will operate) in as these can constrain value, e.g. complexity of Network Change arrangements and 'compensation culture' in the context of trading-off engineering access, working hours, speed restrictions, etc.
- e. Consider what aspects of service provision are appropriate for customer input, which should be engineering-led technical solutions, etc.
- f. Consider how technological development of services and associated specialised assets can be best focussed and coordinated (leadership, funding, collaboration, etc) across the industry.

E.3.5 Initial Consideration of Scenarios

E:283 We have noted case studies that indicate commonality with GB rail in terms of taking a central approach to functions such as train-based inspection of the infrastructure, but a very different approach to their implementation. For example, all share a significant dependency on the timely and accurate provision of inspection information. Network Rail stated that outsourcing of inspection trains was considered to present a significant business risk and currently own and operate a range of related assets. However, we note ProRail's successful contracted provision in The Netherlands. Inspection train information is maintained up to date by an independent supplier who provides and runs the infrastructure inspection trains / data collection and supplies required management information to both ProRail and contractors throughout the Netherlands. The Swedish Transport Administration, Trafikverket, stated that maintenance and renewal delivery was to be fully outsourced by the end of 2010. They operate competitively tendered, minimum 3 year, network-wide contracts for certain track activities requiring specialist plant, e.g. ultrasonic monitoring, grinding. Unlike Network Rail,

the Administration does not own any rail plant, engineering vehicles, etc and these are provided by the contractors.

E:284 We have considered two scenarios in order to illustrate pros and cons; a heavily centralised approach to services and a heavily devolved approach. These are shown in the table:

Heavily Centralised Scenario	Heavily Devolved Scenario
<p><u>Pros</u></p> <ul style="list-style-type: none"> • Suited to engineering services specified by national standards • Suited to provision of technical specialist support for multi-site applications • Network planning efficiencies, e.g. optimal timetabling of engineering and inspection trains • Better national trend big picture • Simpler management processes (less users) • Facilitates end to end sourcing and delivery (exploiting buying power, e.g. ballast provision from quarry to site, outsourcing materials logistics) • Better opportunities for optimum service fleet / infrastructure deployment and staffing economies of scale • Facilitates business case and funding for innovation in service delivery mechanisms, e.g. move to monitoring via service trains rather than bespoke vehicles 	<p><u>Pros</u></p> <ul style="list-style-type: none"> • Suited to engineering services specified by (or responding to) local conditions • Freedom to vary and optimise intervention frequency to suit local context, e.g. asset inspection periodicity • Adaptable to local business criticality and risk, e.g. seasonal response (de-icing, leaf fall) • Better able to use local knowledge to support local decisions quickly • Infrastructure / TOC liaison more focussed
<p><u>Cons</u></p> <ul style="list-style-type: none"> • Less locally responsive • Less asset knowledge (or more difficult to apply to decisions) • Greater effort and need to assimilate multi-local decisions and requests (and to resolve conflicts) • More difficult to amend and adapt interventions and frequencies (may be over-inspecting) 	<p><u>Cons</u></p> <ul style="list-style-type: none"> • Requires more staff and interfaces to achieve national coverage • Increased potential for overlap / duplication • Requires greater definition / specification and management of 'single source of truth' about assets • Greater potential for different interpretation of core processes • Greater potential for duplicated fleet / infrastructure to support services (less economy of scale)

E:285 In reality this preliminary review indicates that the choices are complex and that there is unlikely to be a single 'one size fits all' solution at either end of the central / devolved spectrum. It is envisaged that arrangements will require:

- a. Centrally set frameworks enabling local application and provision.
- b. A contracting strategy permitting local flexibility.
- c. The ability to best exploit economies of scale.
- d. The ability to provide both a network and local view to enable appropriate optimisation.
- e. The ability to identify and champion good practice.
- f. Incentives to collaborate.

E:286 We conclude that further consideration is needed of services best suited to central or devolved provision (and whether best in or out sourced) in order to offer them efficiently and to

optimise the utilisation/value of associated assets and resources. It will be important to ensure this can reflect local knowledge and adaptability whilst providing the benefits of standard, best practice approaches. Aligning objectives should assist this.

E:287 It will also be necessary to consider how to transition to the chosen approach, requiring assessment of the efficiencies of various strategies. In this report it is difficult to assess the relative merits of current and alternative approaches in isolation and therefore we would propose a progressive transition, aligned with other Rail Value for Money developments.

E.4 CONSIDERATION OF THE VALUE OF COLLABORATION

E.4.1 Good Collaboration

E:288 We have considered what good collaboration looks like in other industries (in both partnering and competitive situations). Collaboration takes a number of forms from situations that are competitive to what might be called super-collaborative.

E:289 In a competitive situation a company might collaborate with a supplier on a one-off project where although there is no immediate commercial benefit to selecting that supplier due to a fairly even competitive landscape, there may be a R&D collaboration that could yield future benefits. This might be considered just a co-operation as there is no commercial benefit in either direction, just a mutually acceptable set of terms and conditions.

E:290 This can be seen in industries with a significant technology element to it such as computing where the supplier of a current commonly available component may be chosen in order to allow a simple transition to install future technology that is under development. In this situation the collaboration has clear risks on both sides, the buyer is hoping the supplier can deliver the future technology ahead of its competition and at a competitive price and the supplier is hoping they can obtain a long-standing supplier of choice relationship.

E:291 The second example of collaboration in a competitive environment is between suppliers. The example comes for the logistics and distribution area in Ireland but could be applied elsewhere as it relates to the avoidance of pockets of low utilisation within a region. Distribution in and out of Ireland is less cost effective due to many drops, poor load fill, less-developed supply chain infrastructure than in other European countries. One of the key features a form of supply chain management that encourages the sharing of information and development of partnerships between suppliers for the mutual benefit of all. It was proposed that when scaled up that suppliers should encourage appropriate government bodies, trade associations etc., to act as 'honest brokers' in encouraging the development of collaborative efforts between companies in all areas of the supply chain'.

E:292 Moving up the scale of collaboration the next level would be some sort of partnership. Partnerships make up a small percentage of the customer-supplier relationships. The emphasis is on creating mutual benefit rather than trying to gain control of the relationship or focus on price reductions.

E:293 In a partnership the target is to maximise the value of the relationship. Examples of this are found in the oil and gas industry where a key strategic supplier is in partnership with an oil and gas producer. It is common for energy services companies who have a global reach to sign a collaboration agreement with an oil and gas company for the provision of services such as subsurface consultancy, well engineering, and well operations management. These services boost the capability of the oil and gas company to deliver its growth targets by releasing its staff to concentrate on new developments. Such a collaboration agreement is unlike standard contractual agreements in that it is based on a cooperative relationship which is underpinned by high levels of trust and commitment. It operates in a similar way to a master services agreement, where specific terms and conditions relating to future projects are agreed in advance.

E:294 These agreements are focused on the alignment of people, values, resources and strategic objectives. From the suppliers point of view, they are working in a partnership arrangement where they are closely aligned to the needs of their client and to them is the most efficient, rewarding and successful way of doing business. When both parties are committed to the

same long-term strategic objectives and the relationship is based on trust, commitment and team work, the benefits to both parties far outweigh those of traditional contracting strategies.

- E:295 Often a steering group led by directors from both companies is established and will meet regularly to review progress, performance, strategy and potential opportunities for the supplier's work scope to extend to other services.
- E:296 One or two relationships can be said to be super-collaborative in which a buyer would choose one supplier who would become almost merged into their organisation. In this type of relationship the results of the absolute best-cost models (i.e. the best practices) are implemented by the super-supplier, the result is the best cost – profitably. Correctly managed, the supplier gains significant competitive advantage by adopting unbiased competitive intelligence, insights, and engineering expertise, and using it against their competition. It is best to start this journey with only one supplier.
- E:297 Procurement will need to analyse which supplier is best suited for super collaboration, if any, and which could generate the expected benefits if the efforts were successful. Also, with which supplier can mutual trust be generated and reciprocal preferential treatment be obtained? Managers in both firms will have to work diligently to form a relationship that can bear long-term pressure and scrutiny, and create a system of continuous measurement. An example of this is Dell who have a few super-suppliers who are located within 15 minutes of their manufacturing sites and these logistics service providers assemble components of customer order into single delivery.

E.4.2 Transferability to GB Rail

- E:298 We have considered how this could be transferred to improve collaboration in GB rail, including which markets in the GB rail supply chain would benefit most from collaboration.
- E:299 We consider that collaboration would be of the most benefit in those markets where utilisation of resources is less efficient or the demand on the supply chain the most variable. In GB rail these are those resources used during engineering access windows and the supply and maintenance of rolling stock.
- E:300 Collaboration with major renewals and enhancements contractors in the regions to provide them with the visibility of the whole work-plan across all streams (Maintenance, Renewals and Enhancements) and all asset types so that both sides can collaborate on getting the most value out of each engineering access, planning them like campaigns with multiple parallel activities in each engineering access achieved by collaboration with one super-supplier or a collaborative group of suppliers. This would yield benefits over the individual activities being provided by individual suppliers in their own pre-allocated engineering access window. The true value in collaboration is the sharing of data in the form of plans, current workloads, resource shortfalls, current and expected costs, and using previous delivery costs as benchmarks.
- E:301 Maintenance are also an internal supplier into the renewals and enhancement arena and collaboration with them is just as effective but like any collaborative supplier arrangement, requires completeness, consistency and transparency of productive hours and fully built-up cost information.
- E:302 The second area where collaboration would be beneficial is between the DfT, RoSCOs, TOCs and the train manufacturers to deliver a smoothed procurement of new and refurbished rolling stock. At present the DfT believes that market forces will create a competitive and, it is assumed, better quality but lower price rolling stock fleet. Unfortunately these parties are all working to different objectives so the rolling stock fleet will only change when it becomes obsolete, or the TOCs start a new franchise and are prepared to accept a higher lease charge for a better quality fleet if they can recover this over the life of the franchise. If each of these parties were working together to achieve a common objective of a better quality but lower price rolling stock fleet then the supply chain would improve.
- E:303 Thirdly with train maintenance, where this may benefit from a small group of strategic rolling stock maintenance companies that have contracts with the following features:
- a. collaboration between a number of TOCs to maintain common fleets.

- b. consistency of maintenance regimes across fleets.
- c. longer terms contracts than franchises to be able to manage whole, or at least half, life costs.
- d. contracts with break clauses for non-performance.
- e. visibility of forward refurbishment plans to allow extended response times to tenders.

E:304 Opportunities for TOC and supplier collaboration on technology such as GSM and WiFi on trains will also yield industry savings. Common platforms will gain economies of scale in both installation and maintenance but as these are cross-TOC it may require ATOC or another body to act as the honest broker to help transfer the relationship between TOC if they change over at franchise renewal.

E.5 CONSIDERATION OF THE MANAGEMENT OF ASSET INFORMATION

E.5.1 Introduction

E:305 Asset Information is critical to running any asset intensive business effectively and efficiently. It is recognised as a key enabler to good asset management, supporting the people, processes and systems needed to deliver the agreed strategy, objectives and plans. It is also crucial to an effective supply chain relationship. It is fundamentally required to enable effective decision making.

E:306 A number of case studies highlighted in the report have recognised this and tackled asset information centrally as a core driver to effective management. Whilst some may interpret this as advocating a centralised information system (and further relate this to a single IT system) this is not necessarily the case. There is general recognition that a common and accurate basis for defining the available assets (asset register) is appropriate but there are very different approaches highlighted for deploying, maintaining and using the asset information.

E:307 Similarly, there is a need to recognise where delivery of requirements or business processes has to span organisational (and commercial) boundaries. An industry architecture which enables appropriate information access, sharing and (potentially) technical systems integration needs to be considered.

E:308 The report findings (section E1.4.2) highlight a number of industry viewpoints on the GB rail position in terms of asset information management. The report proposes (in section 4.2.2) that GB rail should develop integrated information arrangements that support asset decision making and performance measurement (within a national framework). It recognised that commitment and investment are required including a significant near term effort to populate and cleanse data to achieve appropriate and consistent levels of asset knowledge. This will require agile arrangements for intra-industry and inter-organisation information sharing.

E:309 The report has highlighted the value of clear objectives and appropriate decision making accountability for good asset management. We consider that the strategy for the supporting asset information management should be aligned with industry objectives. Even if this is determined centrally this does not imply that devolved 'local/regional/route' arrangements are not best suited to delivering this.

E:310 As part of the Rail Value for Money study it is necessary to consider how asset information can be managed to best support GB rail, particularly where future industry structures may differ. This involves understanding the types of information and their users (which are likely to remain constant) and ensuring resilience to the shape of the industry.

E:311 The terminology 'central' (common, shared) and 'local' (devolved and possibly differential methodology) has been used throughout as a generic basis for analysis. The terminology 'asset information' has been used throughout for simplicity though it is accepted that there is a difference between data collected/stored and useful information obtained from this through evaluation and analysis.

E.5.2 Industry Information Model

E:312 Through workshop discussion we have evolved a high level model for industry asset information (shown as Figure E1). This can be used as a basis for consideration of all or part of the information needs.

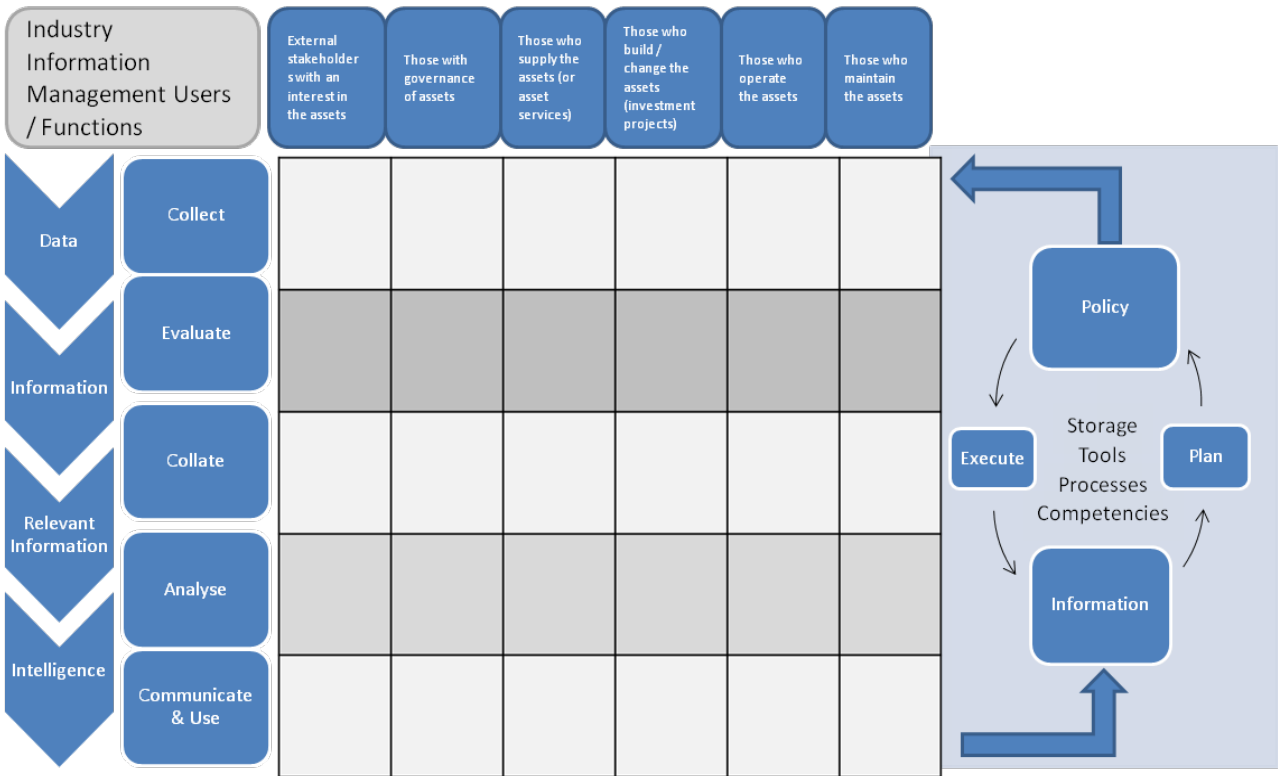


Figure E1: Industry Model for Asset Information

E:313 This model considers the interaction of industry users and the broad phases of the asset information lifecycle, reflecting elements of the National Intelligence Model which is understood to be used by a number of UK public sector authorities. Network Rail presented their organisational thinking in this respect and we consider that this (shown in Figure E2) would align with the industry model.

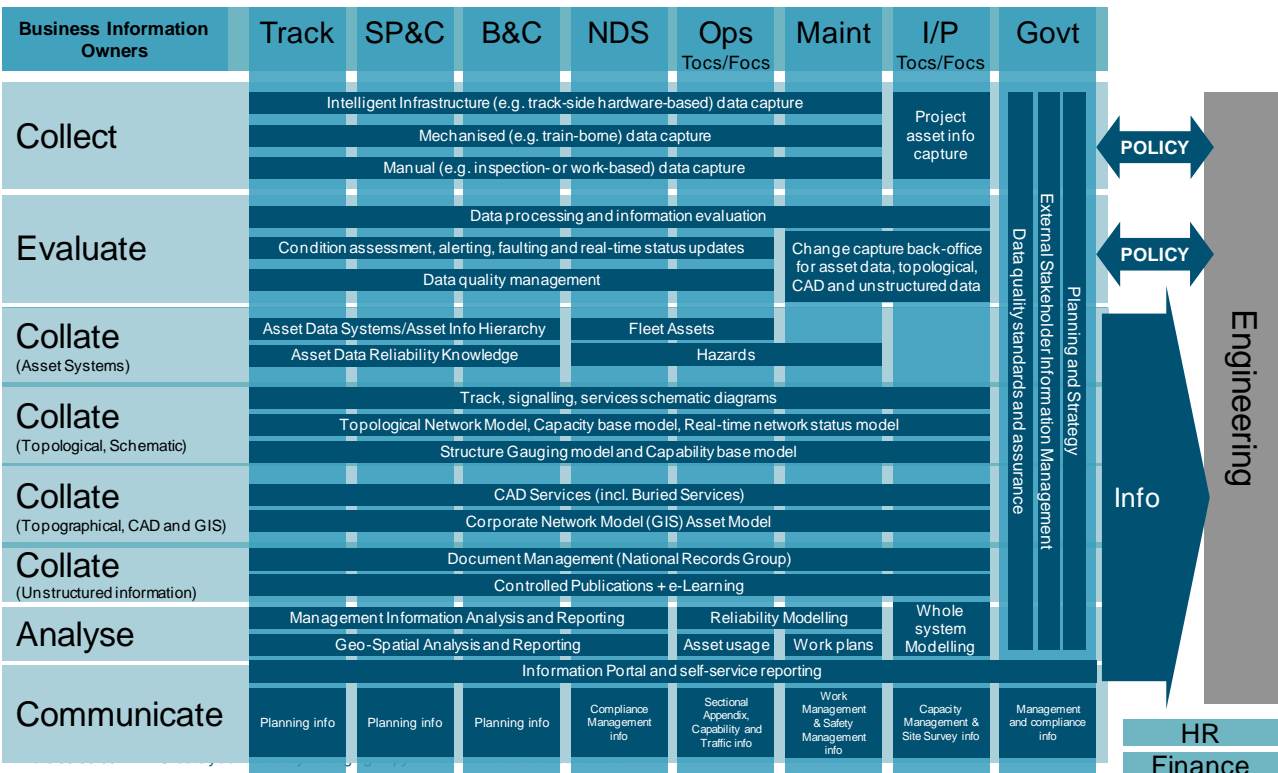


Figure E2: Network Rail Initial Information Mapping

E.5.3 Asset Information Lifecycle and Information Types

- E:314 Asset information is considered to be anything that describes the physicality, context and value of an asset. Certain aspects may be required not only to manage local assets locally but also to underpin the management and planning of the network/industry as a whole. In some cases this may extend beyond national boundaries to indicate inter-operability.
- E:315 At an industry level the information types related to assets might include:
 - a. Functional (including operational specification, limits and configuration).
 - b. Condition.
 - c. Financial.
 - d. Environment (including detail sufficient to provide context).
 - e. Legal (including standards compliance assurance).
 - f. Commercial.
- E:316 Asset information will generally have a static and dynamic dimension over time and be used as the basis of decisions for both day to day operation and long term forward planning. The type of information required can vary by asset type and lifecycle phase, for example a new structure and an old point machine will use asset criticality and age information differently.
- E:317 At an industry level there are considered to be six broad phases in the asset information lifecycle:

Asset Information Lifecycle phase	Notes
Collection	Data capture through manual, mechanised or automated means
Evaluation	Determine meaningful information and assure content
Collation	Group relevant information by type or other classification, such as fixed asset description (e.g. track type at a location), topological properties (e.g. continuous network structure gauge), locational properties (e.g. GIS, coordinates), form (e.g. CAD, engineering drawing)
Analysis	Process information to learn, e.g. trends
Use	Communicating the information and acting on it, e.g. make decisions
Storage	Medium and location for archive and ongoing access

E.5.4 Asset Information Users

- E:318 At an industry level there are considered to be six broad categories of asset information users. Generic sub categories have also been provided to help illustrate this:

User Category	Sub Category examples
Those with governance of assets	GB National Government (DfT) GB Regulator (ORR)
Those who operate the assets	Route Manager (Regional Operations) Route manager (Network Operations) Train Service Manager (Train Operator)
Those who maintain the assets	Infrastructure Manager (Day to Day) Vehicle Manager (Train Engineering)
Those who build / change the assets as part of investment projects	Infrastructure Manager (Programmes)
Those who supply the assets (or asset services)	Supplier (Rail Vehicles) Supplier (Rail Infrastructure)

<p>External stakeholders with an interest in the assets</p>	<p>EU GB Local Government (PTEs) Interest Groups and Trade Associations Insurers Investors</p>
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E.5.5 Asset Information Good Practice

E:319 We consider good asset information management practice to include:

- a. Identifying the information needed to make effective and efficient business decisions and to comply with legal requirements.
- b. Defining the business rules, roles and responsibilities, access rights and status of the information (and the most appropriate structure, forms and location for this).
- c. Establishing the most appropriate systems for managing different information sets.
- d. Defining the criticality of information sets and the risks to the business of not having dependable information.
- e. Implementing appropriate mitigation and control measures to ensure resilience and business continuity (considering potential changes in technology).
- f. Implementing appropriate data collection methodologies responsive to changing asset lifecycle activities.
- g. Implementing agile evaluation and analysis arrangements aligned with the evolving asset management framework (ensuring this continues to support business decision making).
- h. Establishing the most appropriate means of information transfer between parties to meet the identified range of business needs (ensuring controlled access to all those that need it).
- i. Ensuring that information is maintained in a safe and secure environment, meeting defined data quality targets.
- j. Ensuring continued compliance with legal and other requirements, applicable standards and organisational policy.
- k. Defining information retention arrangements (archiving, disposal, etc to comply with policy or legal requirements).
- l. Implementing ongoing assurance and monitoring arrangements to evaluate and improve the effectiveness and efficiency of asset information management processes and systems.
- m. Using the information and knowledge appropriately, supporting the decision making process.

E:320 We consider that good and well managed asset information management is a major dependency for the successful achievement of the various industry improvement plans and initiatives noted in the report. Accordingly the report recommends (recommendation paragraph 6:7) that improved and coordinated asset management information arrangements should be established, facilitating the controlled sharing of asset information and knowledge across the industry. These arrangements should:

- a. Include protocols designed such that information relevant to cross industry decision making is available not just within organisations but between them. This may require interface standards to be defined.
- b. Allow innovation within organisations, whilst ensuring a common approach at key information interfaces.
- c. Ensure that the information captured meets the requirements of long-term strategic planning, research and development, and standards development in addition to meeting the tactical and operational needs of organisations.

E:321 A UK Warship Support Agency review (Macaulay/Jenkins, 2003)⁷⁹ into similar issues around Navy fleet support concluded:

- a. There is no 'one size fits all' solution to information sharing as the environment complexity, information location and sensitivities such as existing supply chain agreements and differing stakeholder needs are likely to mean that a single technical solution would take too long and cost too much.
- b. The greatest benefit is achieved from improving end to end processes rather than just sharing information as process efficiency and behaviours can (and need to be) addressed.
- c. Improvement requires the motivation of all parties gaining some benefit.
- d. It is not necessary to share all information (or the same level of detail) with all parties. Simple categorisation can be applied to understand who needs what and when.

E.5.6 Asset Information Principles and Functions

E:322 A number of core principles and functions have been established for industry asset information management from the workshop discussion. These are considered to facilitate implementation of good asset information management practice, regardless of the industry or organisational structure. A key factor will be establishing standardised interfaces that support freedom to innovate across the industry. Where centrally specified, information should address the minimum (and only the minimum) needs, setting out the interface requirements, the basics for information interchange between parties and the minimum core information required to sustain the railway. It should avoid imposing restrictions on how asset information arrangements are defined and implemented within different organisations.

E:323 There are four over-arching principles:

- a. Local specification of asset information should apply unless it can be demonstrated that this is more efficient and effective as central.
- b. Asset information provision (what) should be determined based on why it is required and who needs it to undertake their role.
- c. Asset information provision (what) should be risk-based (business critical) and considered within the context of the railway as a whole system.
- d. Centrally defined information should be formally documented including quality, timing and format requirements.

E:324 An initial indication has been provided of asset information functions and whether they might be specified or enacted centrally or locally. It should be noted that central definition does not necessarily imply central implementation / monitoring:

- a. The minimum specification of information required to support development of asset policies and plans (including new asset products) should be centrally defined.
- b. The minimum specification of information required to enable assessment of sustainability of asset plans should be centrally defined.
- c. The minimum specification of information required to support and justify asset funding/output decisions should be centrally defined.
- d. The minimum specification of information required to enable monitoring / assurance of required asset outputs/performance should be centrally defined.
- e. The minimum specification of information required to enable comparison of local outputs/performance (including assurance and consistency of data structure) should be centrally defined.
- f. The minimum specification of information required to enable monitoring / assurance of asset compliance (with standards, regulations, asset management policies and other defined constraints) should be centrally defined.
- g. Information required to plan and facilitate access to railway assets should be centrally defined.

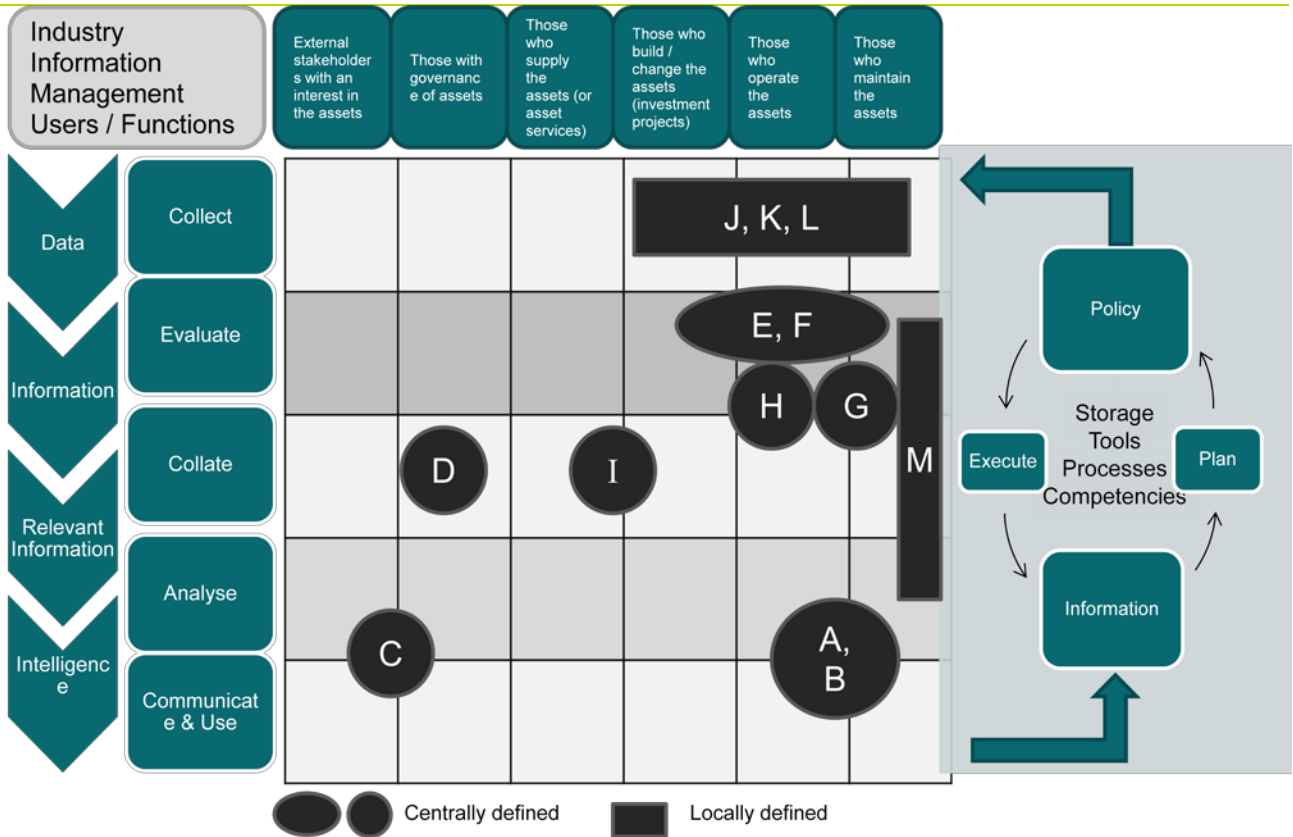


Figure E3: Information Functions Mapped to Industry Model for Asset Information

- h. Information required to facilitate safe operation of railway assets (within one or across multiple local entities) should be centrally defined, e.g. necessary to deliver Rules, state Sectional Appendix or detail a speed restriction.
- i. Information required to facilitate changes to railway assets, e.g. renewals and enhancement programmes (within one or across multiple local entities), should be locally defined (with minimum criteria centrally defined).
- j. Information required to facilitate day to day management of assets should be locally defined.
- k. Information related to the specific geographic configuration of specific asset types should be locally identified.
- l. The method (how) for asset information collection and storage should be locally defined (with central protocols for information exchange and specification of some central services).
- m. The method (how) for asset information evaluation, collation and analysis should be locally defined (with minimum criteria centrally defined).

E:325 These asset information functions have been mapped onto the high level model for industry asset information (shown as Figure E3).

E.5.7 Considerations for GB Rail Implementation

E:326 Certain methodologies relating to the asset information lifecycle, e.g. data collection, are likely to represent significant cost to the industry. This report has not been able to consider the current GB rail arrangements, costs and savings potential in any detail. There is a need to consider the approach giving best industry value, e.g. collective buying opportunities, centrally managed and contracted specialists, etc. This might involve specific technical specialism, e.g. deterioration modelling, investment and operation of tools or provision of plant, e.g. infrastructure monitoring trains. Such services should include defined Service Level Agreements.

- E:327 Consideration should be given to the facilitation of asset information collaboration independent of organisational constraints. This may include local placement of centrally affiliated staff to ensure local knowledge is considered.
- E:328 Local arrangements need to have sufficient size, scale and evaluation/analysis capability to identify trends and ensure suitable and consistent response. In some cases such findings will have an industry/network implication and therefore a sharing mechanism should be considered.
- E:329 There is a need to recognise that people play a critical part in the asset information management system and as well as what is in an individual's head there remains a lot of verbal and local written instruction as part of day to day management within the industry.
- E:330 There is a need to consider the required information integrity and speed of provision as part of risk-based determination of industry needs. Examples might include providing diverse arrangements for safety-related information, more explicit specification of information supporting funding requests, stating better integration of engineering and operational information to enable real-time control and passenger information provision, etc.
- E:331 There is a need to consider the assurance activities necessary to ensure the quality and compliance of devolved asset information arrangements.
- E:332 There is a need to consider industry funding and incentive mechanisms to encourage use of the core approaches and principles but also encourage innovation in local arrangements which can demonstrate efficiencies.
- E:333 The defined framework needs to be resilient to an evolutionary approach with different parts of the industry (whether by area/geography or industry function) coming 'on stream' at different times and having differing maturity. Any centrally defined arrangements therefore need to be flexible to accommodate an evolving business model. There is a need to maintain the 'line of sight' with industry objectives at all times.
- E:334 We conclude that further consideration is needed of the requirements outlined and how these might best be developed and delivered through central or devolved provision. This should take account of (and align with) other Rail Value for Money developments. Central provision would not be anticipated to mean a single, national IT system. Fundamentally we believe there is an initial requirement for a national framework (or information architecture) which will support local decision making and enable cost to be controlled. There are lessons to be learned from other industries such as water and defence logistics which support the need to clearly define requirements before any significant devolution. The industry needs to know (and agree) what it needs to know.

Appendix F – Hypotheses

We generated a range of hypotheses with potential for generating better value for money from asset management and supply chain management, based on the findings and our industry knowledge and experience. These are shown below prefixed AM for Asset Management and SC for Supply Chain, though it was recognised that there are a number of synergies and dependencies between them:

Hypothesis AM1: Significant cost savings can be achieved by optimising enhancement and asset renewal appraisal criteria through rigorous modelling of lifecycle criteria (whole-life costs, performance, risk, condition and degradation), supported by improved asset knowledge and information.

Hypothesis AM2: There is a significant opportunity to optimise asset management activity across GB rail by having clarity and alignment of objectives (including performance objectives) and joining this up with long range strategic planning for the overall industry.

Hypothesis AM3: More economic and efficient decisions can be made by enhancing asset knowledge and its availability across the industry.

Hypothesis AM4: Rigorous application of maintenance optimisation within organisations will lead to improved asset performance, cost savings and better understanding of retained risk.

Hypothesis AM5: Applying harmonised (industry-wide) strategic planning and specification for rail vehicles could incentivise investment and optimise use of these assets.

Hypothesis AM6: Better industry performance measurement (aligned with industry objectives, outcomes and regulatory regimes) will result in strategic alignment of efforts across the industry leading to greater efficiency and effectiveness.

Hypothesis AM7: Better infrastructure stock management and processes could save costs.

Hypothesis AM8: A common and shared method of assessing the benefits of asset management activity across GB rail linked to industry objectives would encourage stakeholder buy-in and investment, encouraging more innovation.

Hypothesis AM9: Alignment of accountability for delivering outputs with responsibility for balancing cost, safety and performance will lead to optimised decisions.

Hypothesis AM10: Adopting whole-life (lifecycle) planning approaches as part of the asset management strategy and aligning this with finance / procurement strategy will lead to a reduction in the whole-life cost of asset ownership.

Hypothesis AM11: Performance-based product acceptance processes would enable more innovation, encourage new players and reduce project costs.

Hypothesis AM12: Early completion of long range route utilisation strategies and associated whole-system Route Asset Management Plans (with trade-off between enhancements, renewals and maintenance) will expedite benefit realisation across the industry.

Hypothesis AM13: Better alignment of EU and GB rail standards would aid cost efficiencies.

Hypothesis AM14: A stable long-term industry technology strategy will promote greater innovation, competitiveness and sustainability of GB rail.

Hypothesis AM15: A less restrictive asset management environment between Network Rail and TOCs will encourage facility improvement and commercialisation of railway space and retail development, the revenue from which can be used to fund infrastructure and stations improvements.

Hypothesis AM16: Improved enterprise level risk management would help effectiveness.

Hypothesis SC1: The current funding mechanisms for certain asset classes in the supply chain do not take account of structural changes to the capital market and increased rate spreads between public and private sectors. If DfT were to use its covenant to underwrite funding it would reduce the rate charged on financing for assets such as rolling stock.

Hypothesis SC2: There is evidence that NR would gain significant value through challenging the unit costs for repeatable work in maintenance and renewals but requires a stable basis.

Hypothesis SC3: A locked-in 3 year rolling renewals work-plan of a significant proportion of the renewals spend will yield a reduction in cost. For civils there might be the opportunity to create a rolling programme that can be locked-in across Infrastructure UK.

Hypothesis SC4: More accurate work specifications and a stable set of standards could achieve reductions in the cost of renewals through less re-scoping delays, waiting on material and labour and rework.

Hypothesis SC5: Smoothing the procurement profile of new rolling stock will give the manufacturing supply chain surety of demand and lead to reduced capital costs of rail vehicles.

Hypothesis SC6: The train operators should use their skills, knowledge and capabilities to take the lead role in procurement of rolling stock. This will better enable train operators to integrate the planning of their operations, train maintenance and spare parts supply. It will also enable operators to better manage the risks associated with procuring and commission new rail vehicles.

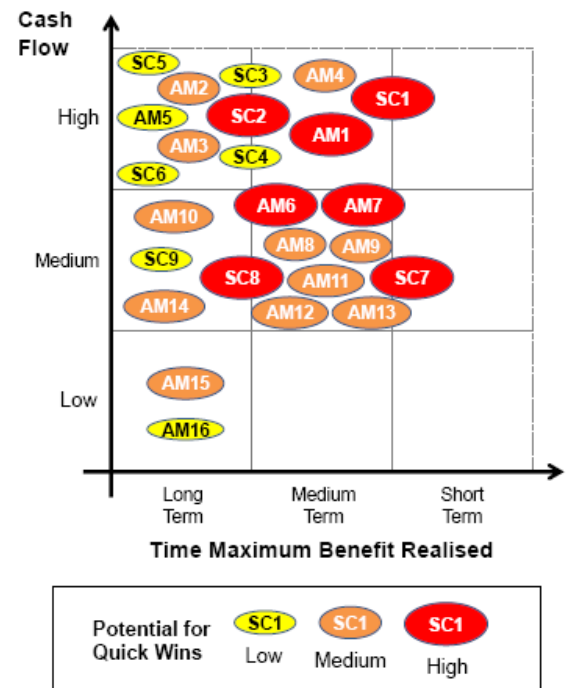
Hypothesis SC7: Transparency of materials inventories across NDS and contractors can reduce working capital.

Hypothesis SC8: An increased role for train operators in the maintenance and/or renewal of stations and depots buildings and assets based at stations and depots will internalise cost, performance and revenue consideration. This may reduce long-term net cost, accelerate delivery and enhance the passenger facing environment.

Hypothesis SC9: The design, procurement, funding and implementation of smaller scale infrastructure enhancements [i.e. less than £50m] would be quicker and cheaper if train operators took a fuller role and were more easily able to openly tender packages of work to the wider supplier market.

The hypotheses were initially categorised and ordered based on the following preliminary elements (see graph):

Key	
Cash flow / value tied up with this issue	High >£1bn pa Medium £100m-1bn pa Low <£100m pa
Time maximum benefit realised	Long-term >2 years Medium-term 1-2 years Short-term <1 year
Potential for quick wins	High good potential for early savings from pilot(s) Medium some potential for early savings from pilot(s) Low little potential for early savings from pilot(s)



A workshop involving key members of the Value for Money team and industry experts, drawn from different industry sectors within Atkins and our sub-consultants, was used to:

- Review a selection of these hypotheses, which we considered to have the greatest potential to deliver value.
- Test our assessment of those which have the greatest potential to deliver value.
- Identify any further opportunities.
- Inform a distillation to generate the opportunities now shown in Section 4.

Appendix G – Update on Network Rail’s Transformation

We note that Network Rail is progressing a Transformation initiative which is aimed at improving a number of areas relating to asset and supply chain management. In some respects this underpins the degree of savings and overlaps assumed in the report. It is not possible to assess these initiatives in detail in the timescales of the study (and this initiative has continued since the study research in the summer). Network Rail has provided an update (December 2010) on initiatives related to the study themes in this report which is attached below for information:

P7 TRANSFORMATION PROGRAMME UPDATE FOR EFFICIENT INFRASTRUCTURE DELIVERY, ASSET MANAGEMENT AND ACCESS MANAGEMENT PROGRAMMES			
Project	Title	Network Rail Description	Network Rail Update
EID01	Standard plain line track delivery	<p>Faster and cheaper plain line track renewals, in two phases:</p> <p>Phase 1: Optimisation of current best-practice delivery methods - the elimination of waste in time, and resource - employing lean techniques to drive process improvement and to spread best practice</p> <p>Phase 2: Development of new standard delivery techniques - standardise specifications (e.g. 50m, 216m, 432m units) and develop new, standardised delivery techniques (e.g. consistent use of people and plant with new process and / or technology.)</p> <p>Both phases drive improvement in workforce productivity. They are dependent on work-bank smoothing (in week/year and geography) to enable improved resource (people/plant) utilisation.</p>	Briefings completed with major projects and benefits being seen as best practice delivery methods introduced. Further initiatives continue to drive down unit rates towards annual targets.
EID02	High-output plant optimisation	<p>The purpose of this project is to make the High Output / Medium Output Ballast Cleaner (HO/MOBC) systems achieve (and go beyond) a low unit cost of track work renewals delivery as originally set out within its business case.</p> <p>The HO/MOBC cost structure is based on a very high fixed cost but a low variable cost when delivering the work due to its speed and efficiency of track renewals. Other methods of track renewals have a lower fixed cost base, but their variable cost is much higher when delivering the work. Therefore, the key to this project is to maximise the utilisation of the HO/MOBC plant thereby using a lower unit cost of operation when delivering the track renewals and spreading the high fixed cost of the plant across a greater volume of work.</p>	<p>A new contractor was appointed in 2009. The track relaying system is due to be delivered into service in Q2 2011. Further equipment and improved techniques are scheduled for delivery into service in Q2 2012.</p> <p>High-output track renewals on the Western and London North East (LNE) routes are at record levels with costs per kilometre dropping significantly. Our third high-output ballast cleaner also entered service, allowing eight hour mid-week possessions on the West Coast Main Line, meaning less disruptive weekend working.</p>
EID03	Modular switches and crossings (S&C)	<p>Develop modular concept for installation of switches and crossings to enable faster and cheaper track renewals:</p> <p>S&C units will be factory assembled and tested and shipped to site ready to install without dismantling and re-assembly</p> <p>Replacement time will gradually reduce in stages over the next three years from the traditional 54 hours to 8 hours during midweek and weekend nights</p> <p>Enables the 7 day railway</p>	Current possession times for S&C replacements have been reduced from 54 to 21 hours through modular techniques. Tilting Wagons are in use and increasingly utilised. Lessons from full system proving trials are being captured for modular S&C activities and processes. The target is for all depots to have used modular S&C by Q3 2011 and being used in a high proportion of the workbank. Further enhancements will continue into 2013.
EID04a	Modular signalling	<p>Develop modular signalling design and installation methods to enable faster and cheaper signalling renewals and enhancements.</p> <p>Traditional approach aims to maximise choice and capacity, resulting in bespoke designs that are complex to install and that add time and cost to the process</p> <p>Modular approach reduces choices in project development (use of best fit models) and enables use of design modules across multiple projects (generic assurance process).</p> <p>The scope of the initiative consists of: two deployments (Norwich to Ely & Crewe to Shrewsbury)</p> <p>Application of modular concepts and products to Secondary and Mainline routes</p>	<p>Work progresses towards obtaining product approval. First modular signalling pilot is planned for Nov 2010 with deployment of early MS elements from Q3 2011 and full product approval by Q1 2012.</p> <p>GRIP 1-4 modular handbook has been produced and briefed. Modular signalling applied to signalling workbank</p>

P7 TRANSFORMATION PROGRAMME UPDATE FOR EFFICIENT INFRASTRUCTURE DELIVERY, ASSET MANAGEMENT AND ACCESS MANAGEMENT PROGRAMMES			
Project	Title	Network Rail Description	Network Rail Update
EID04b	Signalling Plug & Play	Achieve cost savings in signalling project testing. Benefits of improved safety, performance and availability Maximising testing in a factory environment and minimising site testing Initiatives which will change working practices, remove duplication and increase efficiency in signalling testing and installation include: Re-writing the Signalling Works Testing Hand Book (SWTH) Fitment of plug couplers to all new trackside signalling equipment and tail cables Trackside testing tool (a system using hand held computers to record testing data trackside)	Signalling suppliers have been invited to submit tenders for plug & play signalling technology which will feature in the Stourbridge to Hartlebury, Newport Resignalling and Hertford Loop projects. This technology allows for quicker installation on site, but also improves safety by allowing most of the testing work to be done away from the tracks. The first contract should be awarded by December.
EID05	Make versus Buy (Enabler)	Identify opportunities to bring currently outsourced selective Capex activities in-house.	10/11 maintenance workbank successfully locked down and being delivered. 11/12 workbank to be locked down by December. Maintenance delivered capex cost model analysis per worktype completed.
EID07	Access Planning	Minimise amount of disruptive access bookings by: Producing a robust Confirmed Period Possession Plan (CPPP) Optimise and prioritise delivery plans across Asset Management Improving access planning engagement with stakeholders Provide business direction for next generation engineering access planning system Provide platform for revision of engineering access compensation regimes	Centralisation of access planning team in Milton Keynes completed. New process changes completed. T-38wks access planning timescale principles completed and now handed over to Access Management transformation team for delivery.
EID08a	Workbank Planning (Track)	The project aims to lower the cost of unit delivery and reduce access disruption By: Smoothing and stabilising workload to maximise labour and plant utilisation Reduce levels of aborting plans and associated development costs Increase lead time of confirmed work for suppliers Increase planning horizons to reduce level of change within the forward workbank	Project is in the final stage of delivering its objectives (an enabler for related track projects) and the project will complete shortly with the benefits captured in EID 01, 02 and 03)
EID08b	Workbank Planning (Signals and Telecoms (S&T))	The project aims to lower SEU rates and reduce access disruption By: Smoothing and stabilising workload to maximise resource utilisation Reduce levels of aborting plans and associated development costs Increase lead time of confirmed work for suppliers Increase Planning horizons to reduce level of change within the forward workbank	On-Line workbank completed. Data continues to be loaded and available on the Workbank Planning web page.
EID08c	Workbank Planning (Mechanical & Electrical)	The project aims to lower the cost of unit delivery and reduce access disruption By: Smoothing and stabilising workload to maximise labour and plant utilisation Reduce levels of aborting plans and associated development costs Increase lead time of confirmed work for suppliers Increase planning horizons to reduce level of change within the forward workbank	Traction power supply strategy approved. Project is working closely with Contracts & Procurement for negotiation of framework contracts. Workbank planning targeting to lockdown the workbank by Q1 2011.
EID08d	Workbank Planning (Enhancements)	The project aims to lower the cost of unit delivery and reduce access disruption By: Smoothing and stabilising workload to maximise labour and plant utilisation Reduce levels of aborting plans and associated development costs Increase lead time of confirmed work for suppliers Increase planning horizons to reduce level of change within the forward workbank	On-Line workbank completed. Data continues to be loaded on the Workbank Planning web page. Processes continue to be enhanced as further efficiency opportunities are delivered by project EID 11, such as remit lockdown.

P7 TRANSFORMATION PROGRAMME UPDATE FOR EFFICIENT INFRASTRUCTURE DELIVERY, ASSET MANAGEMENT AND ACCESS MANAGEMENT PROGRAMMES			
Project	Title	Network Rail Description	Network Rail Update
EID08e	Workbank Planning (Buildings & Civils (B&C))	The project aims to lower the cost of unit delivery and reduce access disruption By: Smooth and stabilise workload to maximise labour and plant utilisation Reduce levels of aborting plans and associated development costs Increase lead time of confirmed work for suppliers Increase planning horizons to reduce level of change within the forward workbank	On-Line workbank completed. Workbank planning detail is available on the WP web page for Civils. Workbank planning continues embracing the opportunities identified. Buildings workbank to be published by December 2010.
EID09a	Cost Modelling & Investments	This project seeks to drive down project budget allocation reducing the potential for scope creep. This will be achieved through: Improving the development and management of budgets through referencing to best value unit cost model information. This not only includes lowest cost of delivery, but also lowest solution costs Enabling investment challenges on investment budgets as well as solution options Revising the policy of contingency and confidence levels allocation in order to reduce the amount of monies allocated to projects at an early stage that are then not usually removed later on when the project has developed a greater level of cost and risk confidence	Project has already identified where levels of contingency and skimmed values can be reduced. Project is increasing the profile of effective contingency management and has three strands to deliver in the coming months: - Risk Categorisation - a pilot is underway to capture & analyse data to establish improved decision making over the use of contingency and reserve/value add - Anticipated Financial Cost (AFC) Tracking - a solution to enable all AFC change to be captured during a project lifecycle to ensure only authorised expenditure and remove surplus funding - Uplifts and Optimism Bias - provide greater guidance to projects to improve early cost estimations
EID09b	Unit cost modelling and investment (UCM)	To create a single system for developing unit cost models and capturing delivered project costs against these models, which can be filtered to enable views of different outturn cost types in order to understand historic best value based on different solution/situational types. The cost models will be in a fixed hierarchy structure that allows sight of previously delivered solutions (e.g. cost to renew, maintain or replace) and their costs on delivering these similar assets, as well as being then able to drill down into the high level cost models to determine the component elements of the solutions and their respective costs	Project has delivered simplified Cost Analysis Framework (CAF) reporting & forms; a CAF performance tracker; a pilot for the estimating validation tool (available to all with access via Connect). Cost model hierarchy has also been created across all assets and is currently being populated through the CAF process. At end of November, Civils will be piloting the cost models within the investment papers.
EID10	Standard designs	This project is aimed at developing and assessing new and more effective ways of delivering standard designs as well minimising the scope of schemes in order to meet the aesthetic and functional requirements, by avoiding preferential engineering. Costs will be reduced by eliminating design variation, reducing the quantity of bespoke specifications / designs, and by introducing a number of disciplines into the early GRIP stages to systematically challenge projects. Carry out robust value management for all projects.	Project wise has been chosen as IT system for holding standard designs. This will be rolled out in January and then web-enabled in April. Phase 1 of the standard designs will be rolled out in January, and phase will be completed in April
EID11	Efficient project governance	Faster, slicker and aligned end to end project processes/governance Reduced bureaucracy without importing risk Avoidance of man-marking & excessive reporting Failing/missing processes identified and rectified Better process compliance Reduced contractors overheads Reduced uncontrolled project scope changes Reduced Claims	Project has been broken down into nine work streams. The GRIP process flow charts will be implemented by March 2011. Whilst some changes are already implemented (new investment templates, discipline management), the majority of changes will be implemented by March 2011.
EID14	Standardisation of Maintenance Organisation	The specific objectives of the initiative are to create an organisation that: Meets the business needs for CP4 Is able to maintain and respond as required for core Maintenance and CAPEX works Has a response structure aligned to performance requirements Initiative also includes the review of opportunities for optimisation of cross discipline maintenance activities	The identified and appropriate change has been endorsed for introduction. All routes and delivery units have been briefed on the changes and preparations are well in hand to go live by the start of 11/12 financial year.

P7 TRANSFORMATION PROGRAMME UPDATE FOR EFFICIENT INFRASTRUCTURE DELIVERY, ASSET MANAGEMENT AND ACCESS MANAGEMENT PROGRAMMES			
Project	Title	Network Rail Description	Network Rail Update
EID15	Maintenance workforce productivity and utilisation	Develop a set of standard and efficient approaches to improve maintenance productivity through: Standardisation of delivery methods: Driving towards optimum methods, using LEAN techniques, improving unit cost information Better Works Planning – Increasing the competency of Section Planners and simplifying the planning process Introduction of new plant, equipment and technologies Making the best use available working time in possessions	Initiatives continue to be progressed, piloted and rolled out, supported by a comprehensive communication plan to support the introduction of change. Some examples, Cembre Clipping Machine, Mobile Flashbutt Welding, Bracke Vegetation Cutter.
EID16	Plant Strategy	Improve the utilisation of Road Rail Vehicles (RRVs) Consolidating requirements Lower unit costs per RRV Associated improvements in safety Simplified training	Work is currently underway to further develop the strategy for this project and maximise engagement with other areas of the business to provide better utilisation of RRV through RRV workbank planning along with central coordination of RRV's based on core hire
EID18	Value Management (VM)	To apply VM to existing projects that have not already applied it. To introduce VM into the standard project lifecycle to enable application in the future	The project has delivered increased VM coverage, reflected by circa 30% more workshops held and value adding opportunities identified. The final element from the project, to fully substantiate that opportunities have captured real benefit, is progressing and planned to deliver by December 2010 using ARM as the tool to expedite opportunity going forward
AM01	Whole Life Cost Optimisation	Update asset policies and standards for track renewals so as to differentiate between routes based on the output criticality of that route	This project is now complete and further policy changes will now be managed through preparation of the CP5 funding submission
AM02	Route Asset Management Plans	Update other assets policies as per AM01 and deliver Route Asset Management Plans to optimise investment in Strategic Route Sections (SRS) <i>note AM07- data capture improvement has been closed and now forms part of AM02</i>	The next set of Route Asset Management Plans will be delivered in December 2010. The primary focus of this work is to improve the robustness of the data used in the plan and to test the business processes implemented to manage RAMPS.
AM03	Standards Database	Implementation of a database to control standards changes and rationalise the current set of standards	This project is now 87% complete and the final transfer of standards for Telecoms and Power assets will complete in early 2011.
AM04	Track Friendly Trains	Design and implement revised wheel profile and suspension for trains which increase the occurrence of Rolling Contact Fatigue	The first train set to run in a 'live trial' will be running on the network from November. The programme remains on plan to deliver a full roll out with South West Trains. Work has now started on engaging other TOCs who run Desiros on their routes.
AM05	Video Inspection	Implement switches and crossings (S&C) and Plain Line Video Inspection to reduce the frequency of manual inspection to make inspection safer, more accurate and more efficient	Final modifications are being made to the S&C video inspection vehicle prior to roll out.
AM06	Network Criticality Map	Develop a prioritisation matrix for the network based on outputs required and safety. To be used to inform investment decisions	The Network Criticality Map is now being used in the Asset Management function of Network Rail both for operational purposes and to guide development of the CP5 funding submission. Ownership of the model has been transferred to the Planning & Regulation function and work is now underway to define further enhancements to be made to the model in 2011.
AM08	Intelligent Infrastructure	Develop and implement Remote Condition Monitoring solutions	The implementation of points condition monitoring will be completed by mid-December 2010. Solutions for Track Circuit Monitoring are now being tested in a live environment with a target to roll out to the network over 2011. Enhanced Points Conditions Monitoring solutions are now being developed to provide the business with phased introductions of failure mode avoidance solutions between 2011 and 2013.
AcM01	Enabling benefits in EID projects	The focus of these projects is to work with EID project to fully realise their benefits from the Access Management Programme as a whole	The project is working with EID to deliver fully on their benefits

P7 TRANSFORMATION PROGRAMME UPDATE FOR EFFICIENT INFRASTRUCTURE DELIVERY, ASSET MANAGEMENT AND ACCESS MANAGEMENT PROGRAMMES			
Project	Title	Network Rail Description	Network Rail Update
AcM02a	Axle Counters	High Output and Maintenance can now increase their work volume per composite kilometre per possession involving axle counters together with an increase in productive time in some possessions by up to 60 minutes.	A new standard (to be applied to 100% of possessions in axle counter areas) is being written for national rollout of an Enhanced Vehicle Management process that no longer requires clear line verification processes; this will begin in Feb 2011
ACM02b	Isolations	A suite of initiatives looking to improve the planning, processes and delivery of possessions requiring isolations; initiatives include: Concurrent isolations and possessions – increases productive window for possessions B3 procedure – application of earth straps in DC areas – already operating in Wessex route	On concurrent isolations and possessions- RSSB coordinating industry consultation/feedback. Will deliver changes to possession process from June 2011. On B3 procedure currently running safety and technical review with the aim of creating a national standard applicable from June 2011
AcM02c	On Track Machines (OTM) under signal protection (Tampers operating as trains)		TNC operating currently. Establishing tamper trials to run in November/December 2010. Aiming to go for formal union consultation February 2011. Rule book change in December 2011
AcM03a	Business Rules and Possession Profiles	Design and profiling of access demands. Understanding how this contributes to reliable delivery of access and timetable outcomes	The setting of Access Planning criteria and rules is being created. This optimises the decisions made for long term planning of access. The project and approach is being targeted to support business priorities and forward possession plans over the next six months
AcMo3b	Engineering Access & Resource Solution (EARS)		The scope of the project extends from timetable planning through to delivering possessions on the night. Currently within feasibility stage of the project and mapping as-is process and assessing the benefits case to proceed to the next stage of the project. The review of current planning resources, supportive systems, processes, customer interfaces and overall strategy is on track for agreeing implementation strategies in Feb 2011.
AcM03c	Cross industry planning		Rescoping of the project currently taking place. The project is currently focused on developing scope and remit of the project and to gain industry buy in to the approach.
AcM03d	Cost Modelling and E2E measures		A framework has been developed to begin to cost possessions. This is to be refined using real data over the next six months. The development of CP5 metrics has begun working with key cross-industry groups to propose a revised set of metrics. The development of these metrics will align with CP5 Strategic Business Plan submissions
AcM04	Data and Technology	Improving the way NR deliver access through improved operating practices and the definition of delivery performance	This project has developed a methodology and system to capture and analyse the possession process from planning to actual delivery. It takes all the existing manual and paper-based information sources and pulls this into a data base. This will provide an accurate view of end-to-end possession performance and predictive access capability; leading to better planning, asset information and predictable performance measurement. Over the next three months the project will transition this product and capability into the business

Appendix H – Benefit Maps

The initial benefit maps developed to inform the benefits evaluation, in support of Section 5.

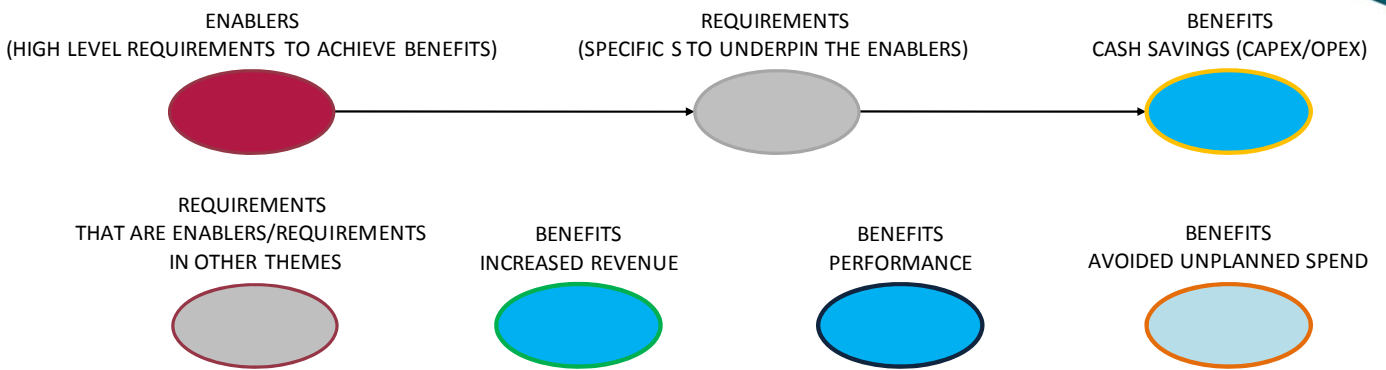


Figure H1: Benefit Map Key

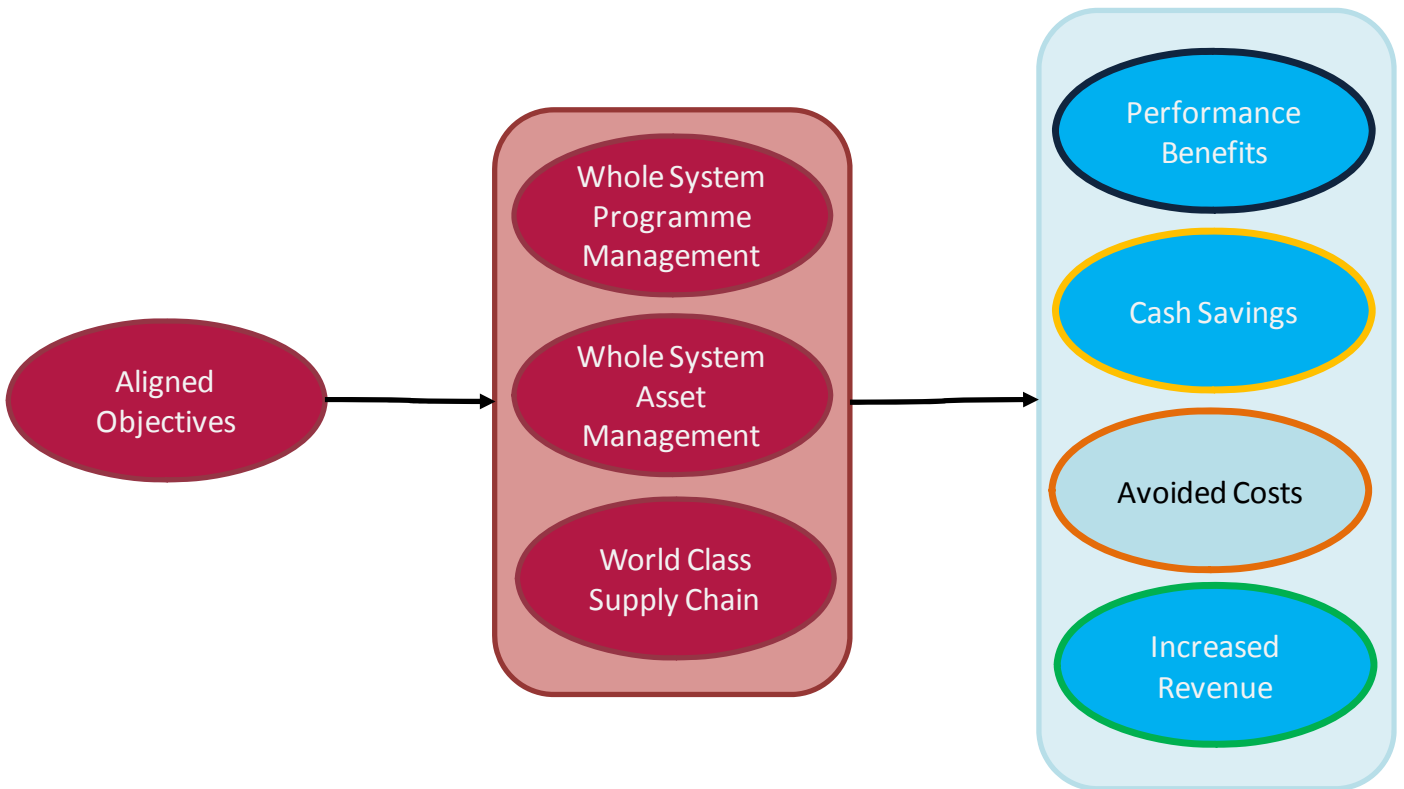


Figure H2: Overall Structure of Improvements and Benefit Areas

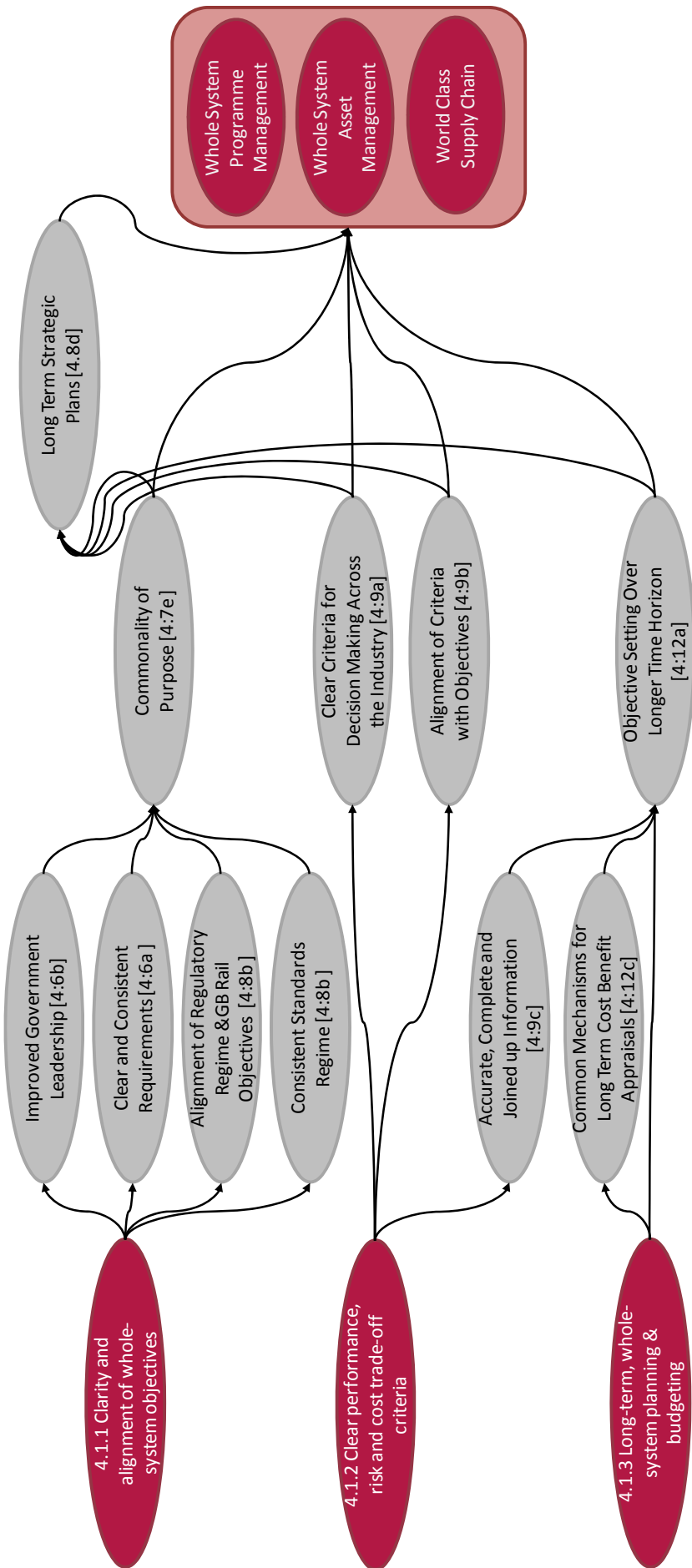


Figure H3: Aligned Objectives Benefit Areas

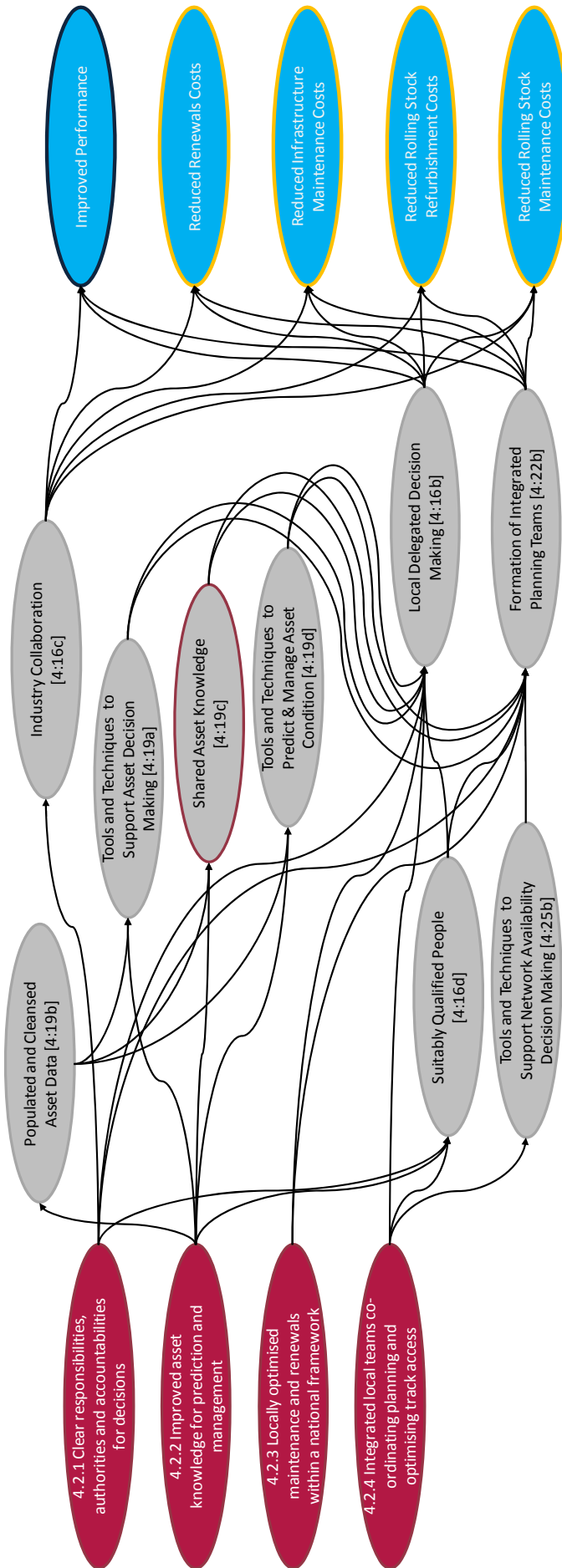


Figure H4: Whole-life Asset Management Benefit Areas

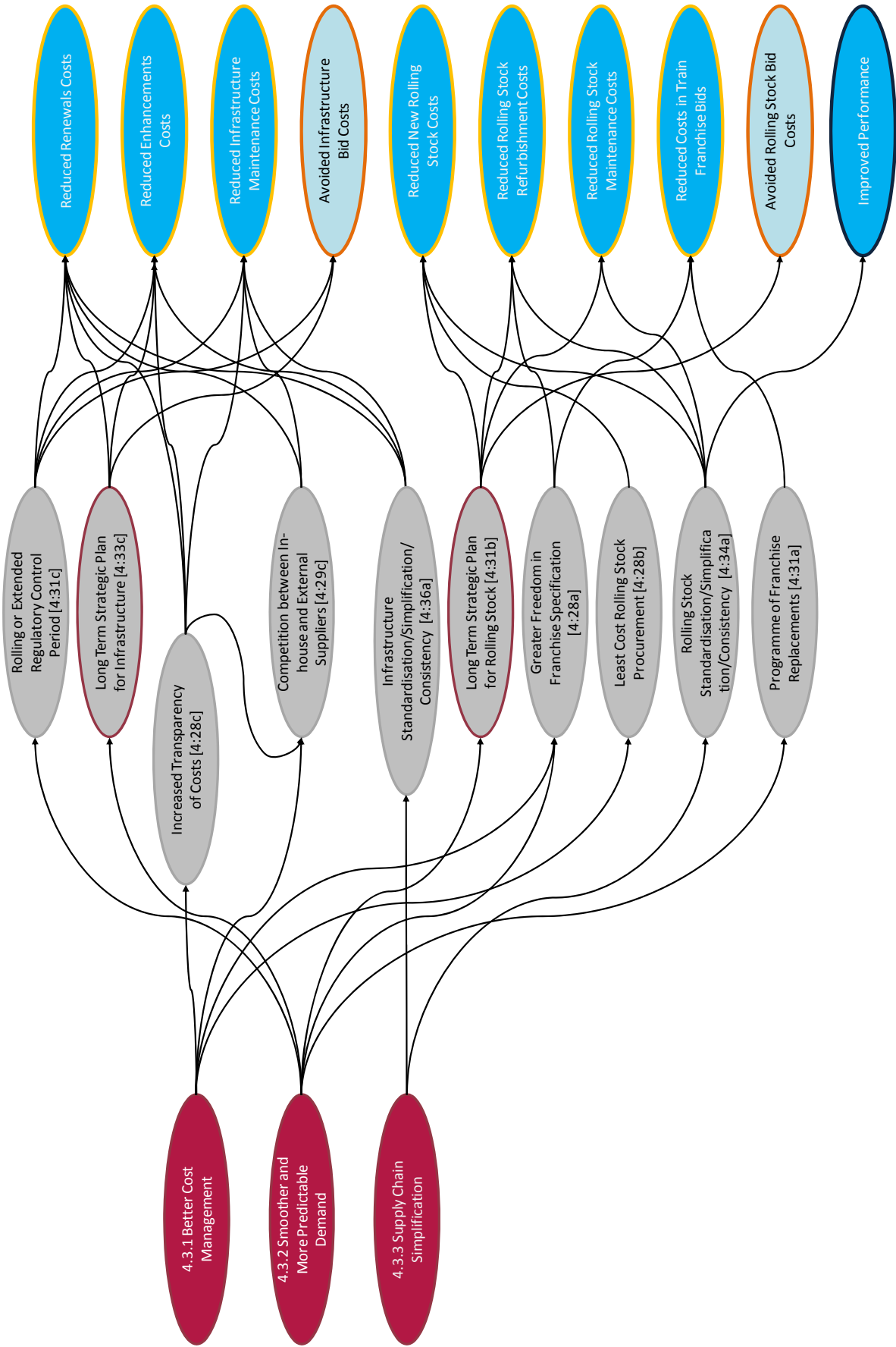


Figure H5: Supply Chain Management Benefit Areas

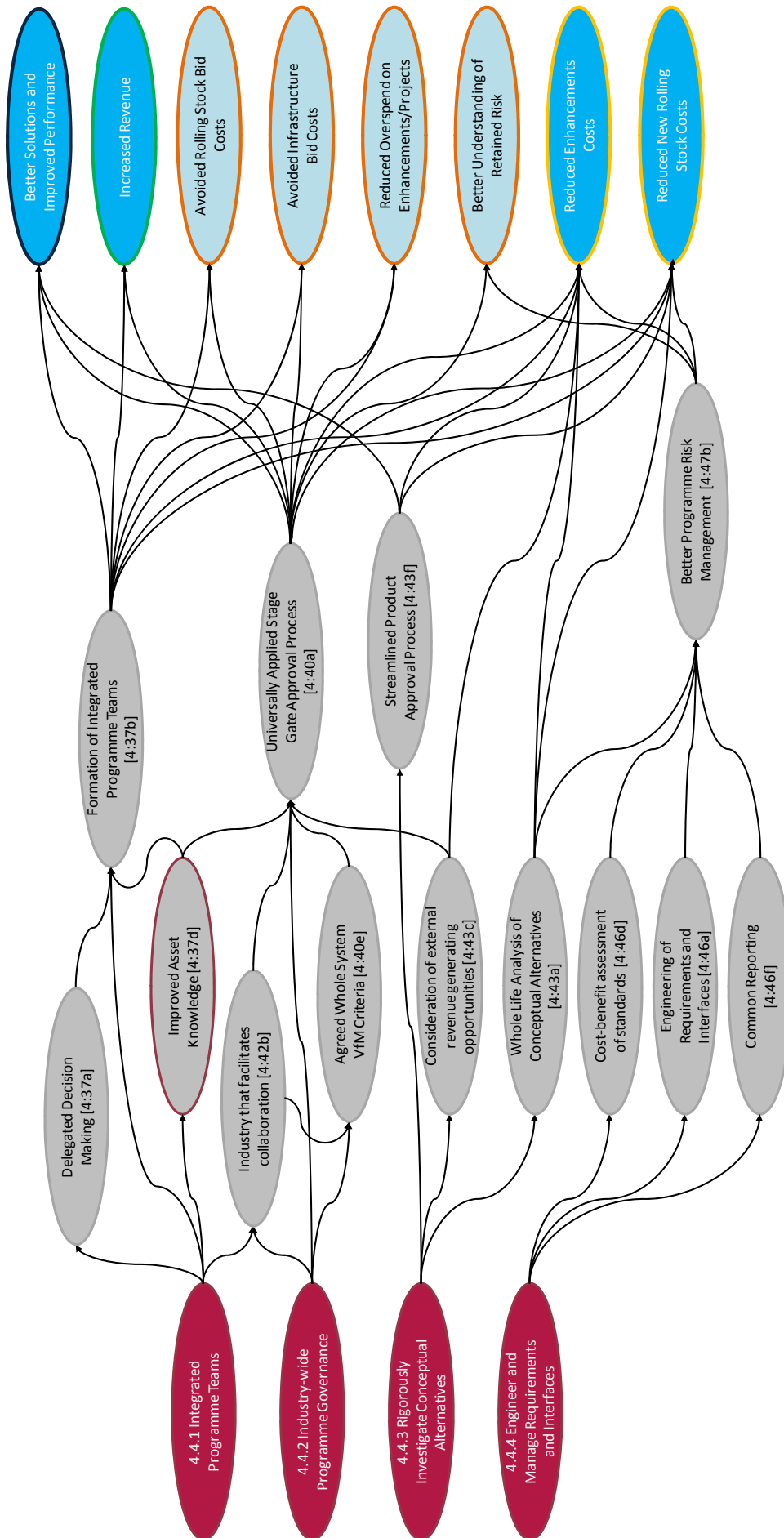


Figure H6: Programme Management Benefit Areas

Glossary

ATOC	Association of Train Operating Companies
BAU	Business as Usual
BCR	Benefit-Cost Ratio
BP	British Pounds
CIS	Customer Information System
CP	Control Period
DfT	Department for Transport
FOC	Freight Operating Company
FY	Financial Year
GB rail	Great Britain's railway, defined for the study as the heavy rail network, excluding TfL
GRIP	Guide to Railway Investment Projects
HA	Highways Agency
HLOS	High Level Output Specification
IEP	Intercity Express Programme
IPT	Integrated Programme Teams
MoD	Ministry of Defence
M, R & E	Maintenance Renewal and Enhancements
MSP	Managing Successful Programmes
MUCs	Maintenance Unit Costs
NATA	New Approach to Transport Appraisal
NR	Network Rail
OFGEM	Office of the Gas and Electricity Markets (regulator)
OFWAT	Water Services Regulation Authority (regulator)
OGC	Office of Government Commerce
OLE	Overhead Line (electrification) Equipment
OPEX	Operating expenditure
ORR	Office of Rail Regulation
PICOP	Person In Charge Of Possession
PPM	Public Performance Measure – of passenger train service punctuality
PRM TSI	Technical Specification for Interoperability for Persons with Reduced Mobility
PSBR	Public Sector Borrowing Requirement
PTE	Passenger Transport Executive
RCF	Rolling Contact Fatigue
RCM	Reliability Centred Maintenance
ROSCo	Rolling Stock Companies
ROSE	Reliability centred maintenance Of Signalling Equipment
RUS	Route Utilisation Strategies
RV	Residual Value
RVAR	Rail Vehicle Accessibility Regulations
SBB	Swiss Federal Railways
SMART	Specific Measurable Attributed Realistic and Timely
SME	Small and Medium Enterprise
S+C	Switch & Crossing
SP+C	Signalling Power and Communications
TfL	Transport for London
TIS	Train Interface Specification
TOC	Train Operating Companies
TPWS	Train Protection and Warning System
VfM	Value for Money
VTAC	Variable Track Access Charge
VTSIC	Vehicle-Track System Interface Committee

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