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***Internal Benchmarking:  
Summary of Findings***  
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## ***Executive Summary***

- **The internal benchmarking study has examined differences in unit costs between Network Rail's territories in more detail than ever before. Using statistical techniques, we have normalised for the actual structural differences in delivered costs between territories, leaving cost differences that are, and are accepted by the asset renewal programmes to be, mostly within management's control**
- **We have been able to cover £686m of 2006/07 expenditure. If all territories reached best demonstrated practice in terms of normalised unit costs, then savings of 13% would be achieved. Reaching second-best practice would result in savings of 9%**
- **It was not possible to benchmark Maintenance unit costs, due to serious data quality issues within the Ellipse database which have been highlighted to the Maintenance team**
- **The work has carefully codified and quantified the impact of structural factors on unit costs, which have a number of applications of broader benefit to the business including: evaluating tenders; costing policy issues such as the 7-day railway, providing a sound basis for external benchmarking and informing whole-life cost trade-offs**
- **We have also defined good practice benchmarking, scored each asset area against it and then met with each asset area to provide guidance on how they can reach good practice in the future**

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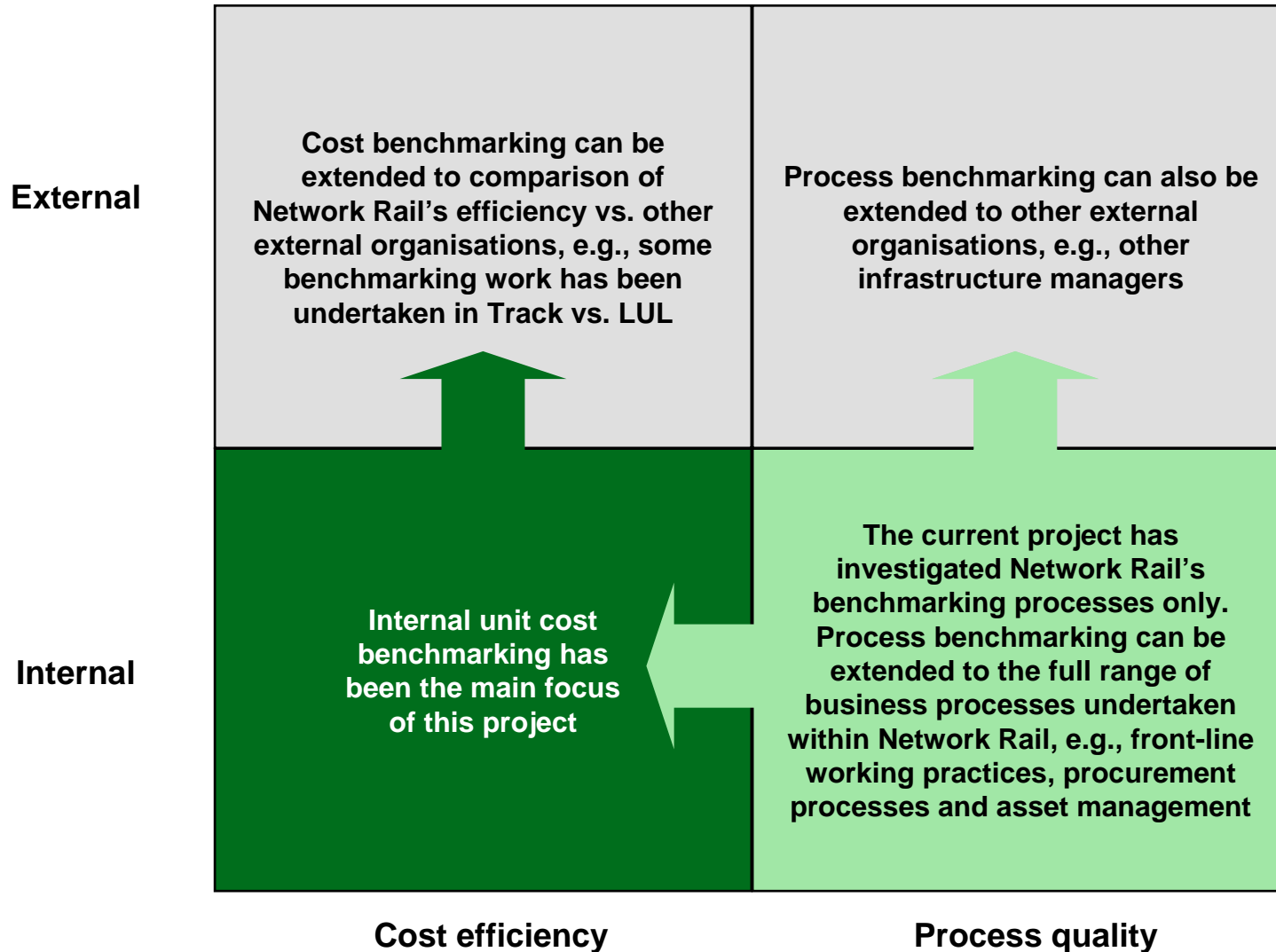
# Agenda

- Approach

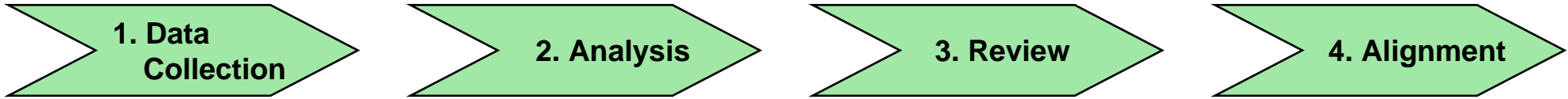
- Findings

- Recommendations

**Benchmarking can be undertaken in many ways. This project has focused on internal unit cost benchmarking**



**The approach we developed to assess the efficiency savings available from internal best practices can be viewed in terms of four high-level steps**



**Cost, Volume and Structural Factor Data**

**Determination of Normalised Unit Costs**

**Review of Normalised Unit Costs**

**Reporting of Results in Context of Business Improvement Actions**

- Cost and volume data has been collected for Maintenance, Track, Civils, Signalling, Estates, E&P, Maintainer Renewals, FTN/GSM-R, Telecoms
- Drawing on the databases developed by the business, including SBMT, CAF, P3e and the Signalling efficiency score cards
- c. 130 worktypes investigated
- c. 13,000 renewals jobs
- c. 4m maintenance jobs
- 402 structural factors, of which 65 required additional data

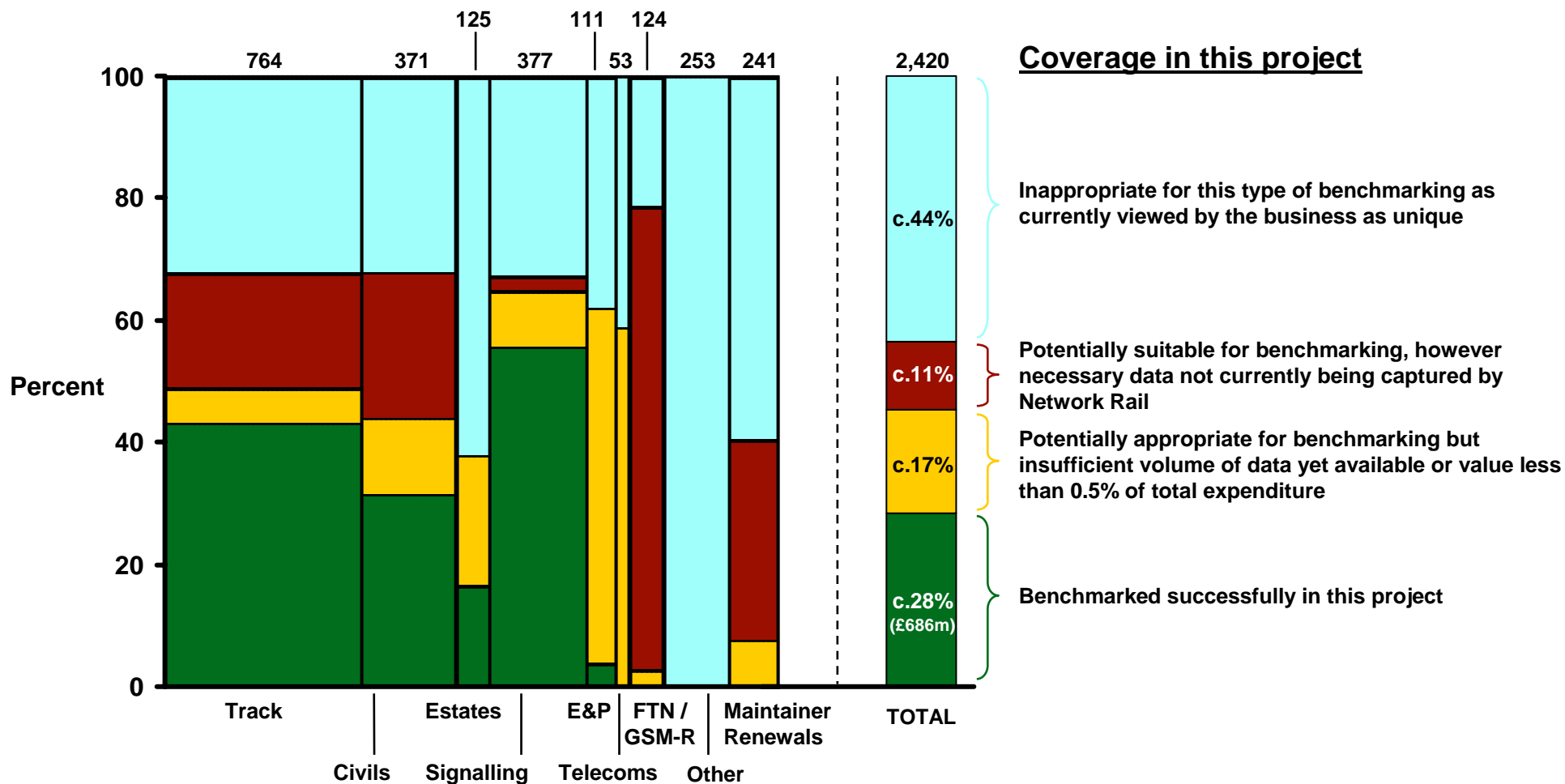
- Benchmarking results have been provided for Track, Civils, Signalling, Estates and E&P
  - not provided for maintainer renewals, FTN/GSM-R and Telecoms
- 213 structural factors were tested statistically
- 66 structural factors found to be significant
- Cost models used quantified impacts of structural factors to allow normalisation of costs between territories
- 24 work activities have been successfully benchmarked, covering c. £686m of costs

- Iterative review meetings
  - “asset specialist” reviews for each programme
  - reviews of normalised results with each programme team
- Final results presented to Programme Directors for each asset
- There have been no bilateral results discussions between territories to determine precise sources of savings (agreed as out of scope of the project)

- Development of benchmarking process scoring grids and assessment of current state of each asset
- “Embedding” meetings with each programme team to explain methods and draft action plans
- Handover to the asset efficiency analysts
  - normalisation models
  - regression analyses
  - specific data collection problems to resolve

**We have been able to benchmark expenditure from five different asset renewal programmes**

**Breakdown of renewals expenditure (£m)  
(2006/07)**



Source : Network Rail; L.E.K. Analysis

***This project has involved extensive work to identify and understand structural factors impacting unit costs***

A structural factor is a characteristic of a job or activity which has a material impact upon its cost but which is substantially outside of management's control

Compile detailed database of jobs, actual direct comparable costs and structural factors

L.E.K. Experience    Engineering Input    CAF Fields    Brainstorm with Network Rail

**Long List of Structural Factors**



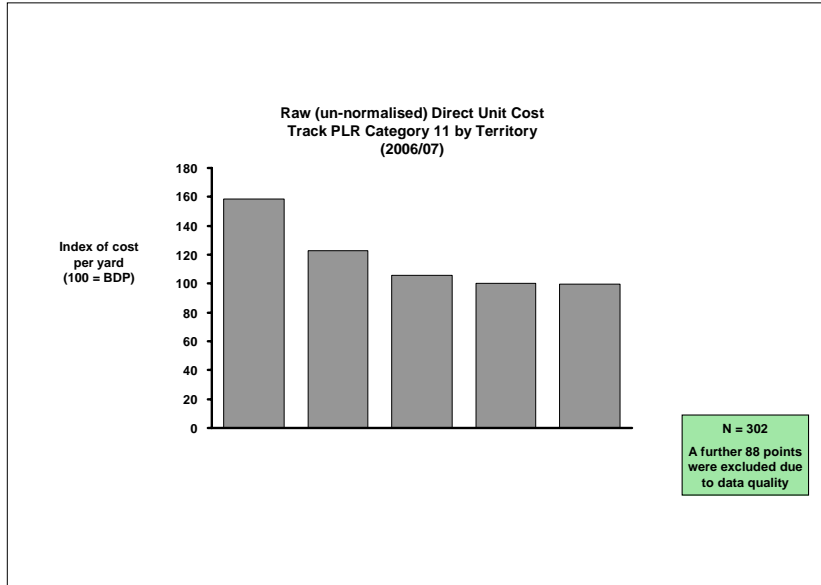
**Short List of Structural Factors**

Statistical Model

For small sample sizes (signalling projects), codification of tacit knowledge

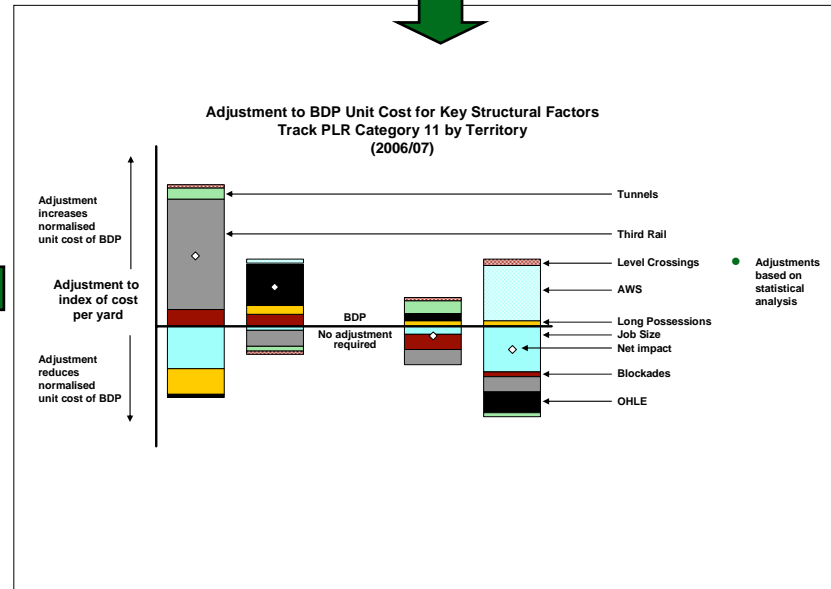
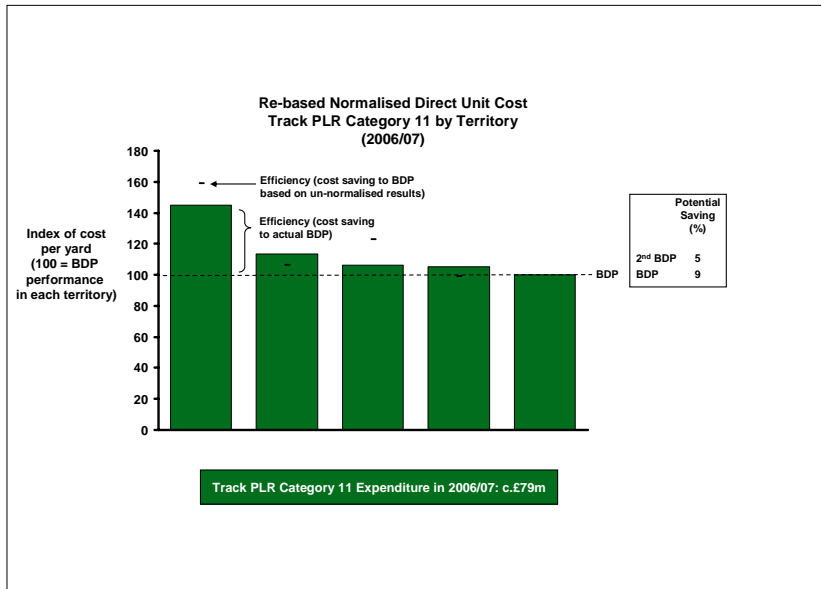
**Quantified impact of structural factors on actual costs, based on empirical data**

# Example Analysis for Category 11 PLR



**List of Structural Factors Affecting Category 11 PLR**

	Included	Further analysis required	Data capture required	Network Rail should reassess in future
Factor identified	✓	✓	✓	✓
Factor believed to be important by Network Rail team	✓	✓	✓	✗
Data available	✓	✓	✗	?
Factor determined to be statistically significant	✓	✗	?	?
Factor determined to be statistically significant	<ul style="list-style-type: none"> <li>Job size</li> <li>Blockade</li> <li>Long Core Possession(s)</li> <li>3<sup>rd</sup> Rail Electrification</li> <li>OHLE</li> <li>Tunnel Environment</li> <li>AWS</li> </ul>	<ul style="list-style-type: none"> <li>Short core possessions</li> <li>Short follow-up possessions</li> <li>Station environment</li> <li>Single-line Check rail</li> <li>Adjustment switches</li> <li>Viaduct</li> </ul>	<ul style="list-style-type: none"> <li>IBJs</li> <li>Geotextiles</li> </ul>	<ul style="list-style-type: none"> <li>Quality of track renewals</li> <li>Asset condition</li> <li>Access to site</li> <li>Depth restrictions</li> <li>Height restrictions</li> <li>Dead end jobs</li> </ul>



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# Agenda

- Approach

- Findings

- Recommendations

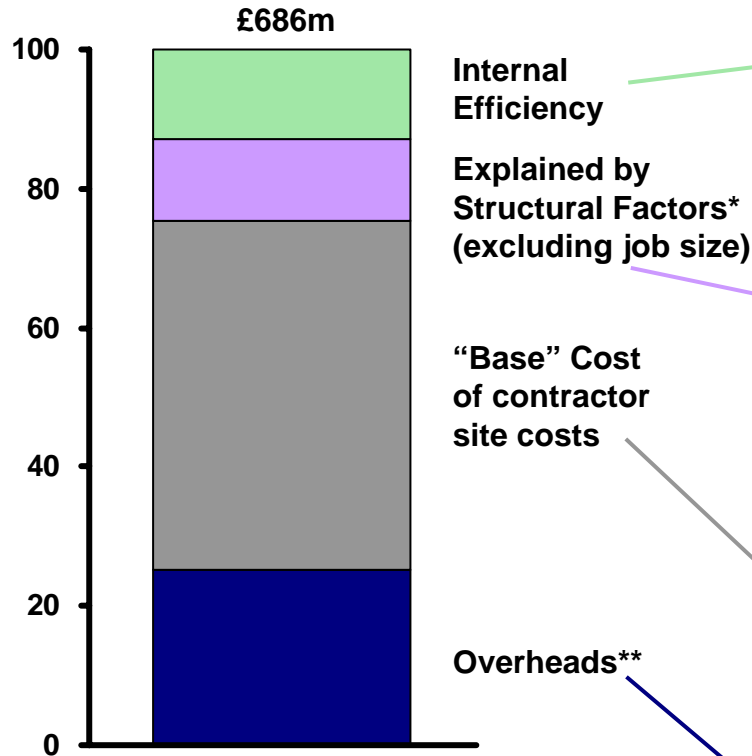
***Maintenance: Meaningful benchmarking analysis was not possible because the range of productivities in the Maintenance raw data was too wide to plausibly represent genuinely comparable activities***

- **The underlying data shows an implausibly wide range in performance and is therefore unusable for benchmarking analysis**
- **Many benchmarking methods were attempted but none delivered reasonable results**
- **It is urgent that Network Rail address these issues so that normalised unit cost benchmarking is possible in the future**
- **Nevertheless, the study provided important outputs to Network Rail**
  - **identified a detailed list of structural factors**
  - **provided a clear definition of good practice benchmarking and a detailed action plan to deliver this**

**The breakdown of costs revealed by the benchmarking analysis is important context for any top-down efficiency estimates and highlights a range of possible sources of savings**

**INDICATIVE**

**Breakdown of Benchmarked Costs**



Potential sources of savings

- Drive to achieve Best Demonstrated Practice
  - sharing of best practices across the business
  - optimisation of engineering scope for whole life cost
- Reducing costs associated with specific work environments (i.e. structural factors)
  - manage specification and packaging where possible
  - identify other work methods to reduce the costs incurred due to presence of structural factors
- Pursue "frontier" efficiencies
  - external benchmarking to identify best practices in other rail infrastructure companies
  - new methods and techniques, e.g., modular S&C
- Scope efficiencies (and whole-life efficiencies) can be traded off against job-size impacts on unit rates as quantified in this work
- Organisational review

Note: Based upon 2006/07 expenditure;  
 \* Estimated based of structural factor impact for Civils and Track;  
 \*\* Overheads benchmarked for Civils and Track;

Source : L.E.K. Analysis

## ***Guidance on interpretation of results***

- **Unit costs have been normalised for structural factors which have either been shown to be significant through regression analysis or for which a quantified adjustment was possible**
- **Post-normalisation, a gap remains between the unit costs achieved by the best demonstrated practice ('BDP') territory and other territories. This unexplained difference may be due to:**
  - **structural factors, such as asset condition, for which Network Rail has been unable to provide sufficient data for normalisation to be tractable**
  - **statistical variation (i.e., variability in data due to error in measurement, error in sampling, or random variation in the cost, volume and structural factors being measured)**
  - **differences in asset management policy between territories, in terms of both quality and scope of work**
  - **efficiency differences between the territories**
- **The cost savings identified in this report represent the gap to BDP. This implicitly assumes that all unexplained unit cost differences which remain post-normalisation can be addressed through management action**
- **It should also be borne in mind that the level of disaggregation and the groupings of activities chosen (e.g., to territory level) will affect the results of the analysis, leading to greater or lesser implied efficiency savings depending on how that grouping reveals or averages out best practices. We have generally used the groupings which Network Rail currently uses to manage and report each particular activity**
- **Reduction of unit cost differentials relative to internal BDP is not necessarily the most appropriate efficiency target:**
  - **driving out all inefficiency relative to current BDP may not be cost effective due to the costs associated with implementation, e.g., investment may be required in restructuring the supply chain**
  - **driving out all inefficiency may not be the highest priority relative to other efficiency initiatives, e.g., broader changes to working practices, external benchmarking**
  - **targeting BDP unit cost efficiencies may not optimise cost efficiency where asset management considerations justify higher cost (quality) work**
- **In this context, when setting efficiency targets going forward, the business should use this benchmarking analysis in conjunction with other efficiency investigations (with the careful avoidance of double-counting) considering, in the round, all of the efficiency savings available to the business, of which internal unit cost differentials are just one**

## Summary of indicative savings (Renewals), based upon 2006/07 expenditure

Benchmarked Activities	Expenditure (£m)	Cost Saving Percent (BDP)	Cost Saving Percent (2nd BDP)	Cost Saving (£m) (BDP)	Cost Saving (£m) (2nd BDP)
<b>Track</b>					
Category 11	79	9%	5%	7	4
Category 2	13	13%	9%	2	1
Category 4	40	13%	10%	5	4
Category 7	7	0%	n/a	0	n/a
Category 5	9	16%	n/a	1	n/a
Category 10	12	3%	n/a	0	n/a
Category 14	10	5%	4%	1	0
PLR Overheads	132	5%	5%	7	7
S&C Costs	31	17%	n/a	5	n/a
<b>Track Subtotal</b>	<b>332</b>	<b>8%</b>	<b>6%</b>	<b>28</b>	<b>16</b>
<b>Civils</b>					
Underbridge Repair	15	27%	11%	4	2
Underbridge Replace	16	15%	8%	2	1
Underbridge Preventative	17	31%	14%	5	2
Earthworks Preventative Regrading	13	7%	0%	1	0
Earthworks Preventative Rocknetting	8	9%	6%	1	0
Tunnels Repair	5	1%	n/a	0	n/a
Tunnels Preventative	0	18%	9%	0	0
Overbridge and BG3 Replace	2	35%	2%	1	0
Overheads	41	39%	11%	16	5
Footbridge Repairs	1	6%	n/a	0	n/a
<b>Civils Subtotal</b>	<b>118</b>	<b>25%</b>	<b>9%</b>	<b>30</b>	<b>10</b>
<b>Estates</b>					
Platform Refurbishments	17	1%	n/a	0	n/a
Footbridge Repairs	3	0%	n/a	0	n/a
<b>Estates Subtotal</b>	<b>20</b>	<b>1%</b>	<b>n/a</b>	<b>0</b>	<b>n/a</b>
<b>Signalling</b>					
Major Projects: Type A	162	14%	13%	23	21
Major Projects: Type B	50	21%	10%	10	5
<b>Signalling Subtotal</b>	<b>212</b>	<b>15%</b>	<b>12%</b>	<b>33</b>	<b>26</b>
<b>E&amp;P</b>					
Points Heating Contractor Costs	4	1%	n/a	0	n/a
<b>E&amp;P Subtotal</b>	<b>4</b>	<b>1%</b>	<b>n/a</b>	<b>0</b>	<b>n/a</b>
<b>Total</b>	<b>686</b>	<b>13%</b>	<b>9%</b>	<b>91</b>	<b>52</b>

- Results are normalised for identified and quantified structural factors
- Results have been reviewed by asset teams, and remaining cost differences are understood to be mostly within management's control
- In order to understand what differences in working practice explain the unit cost disparity, bilateral (between territories) reviews of working practices between should be held
  - such meetings are out of the scope of this project and so it has not been possible for us to identify the reasons for the performance differences

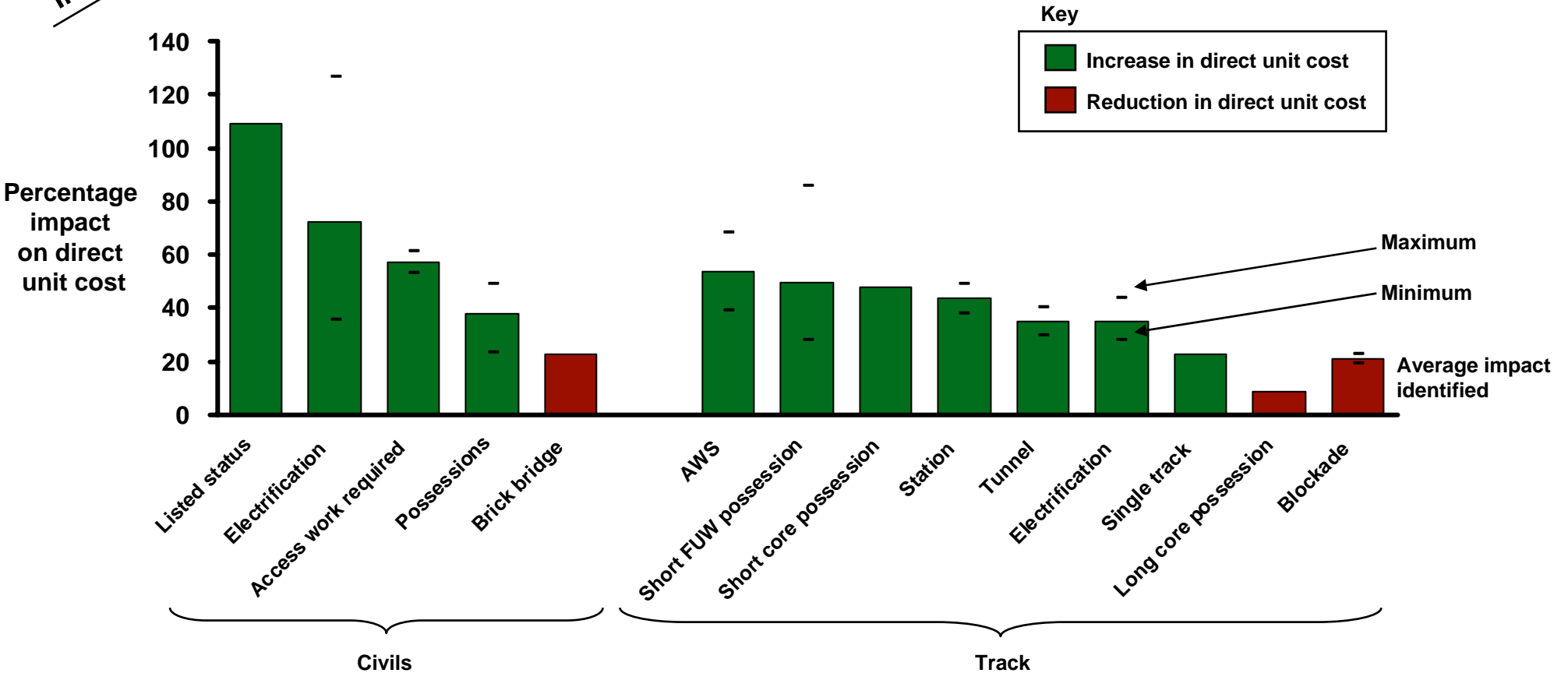
Source: Network Rail; L.E.K. Analysis

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**The benchmarking analysis also reveals the actual average cost of structural factors. Over time these could be reduced through new work methods and equipment**

**INDICATIVE**

**Structural factors' impact on direct unit cost**  
(based on quantification of actual cost impact as part of this project)



**Note :** Across this project the impact of 66 structural factors have been quantified; These results have been calculated using the normalisation analysis

**Source :** L.E.K. Analysis

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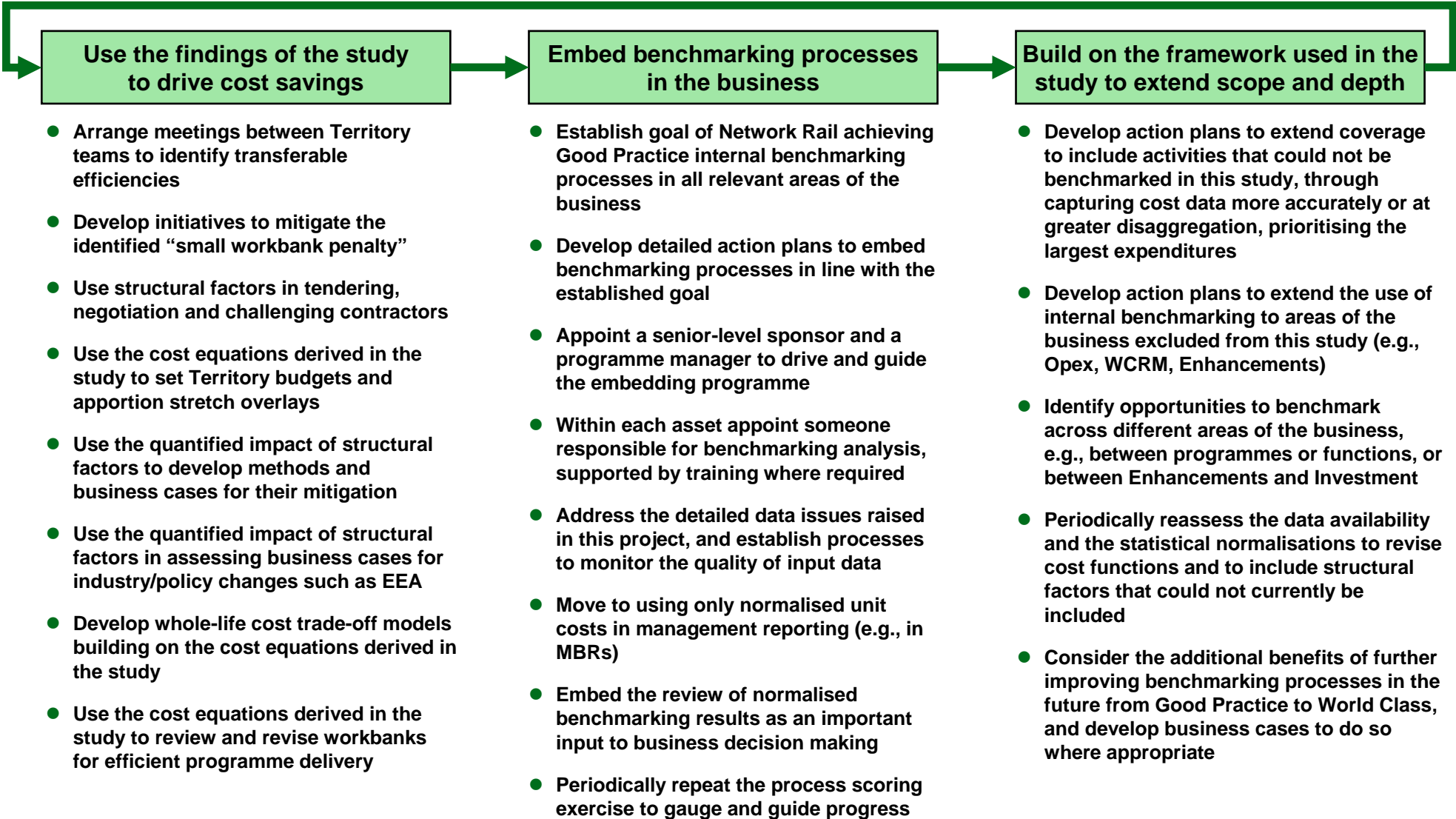
# Agenda

- Approach

- Findings

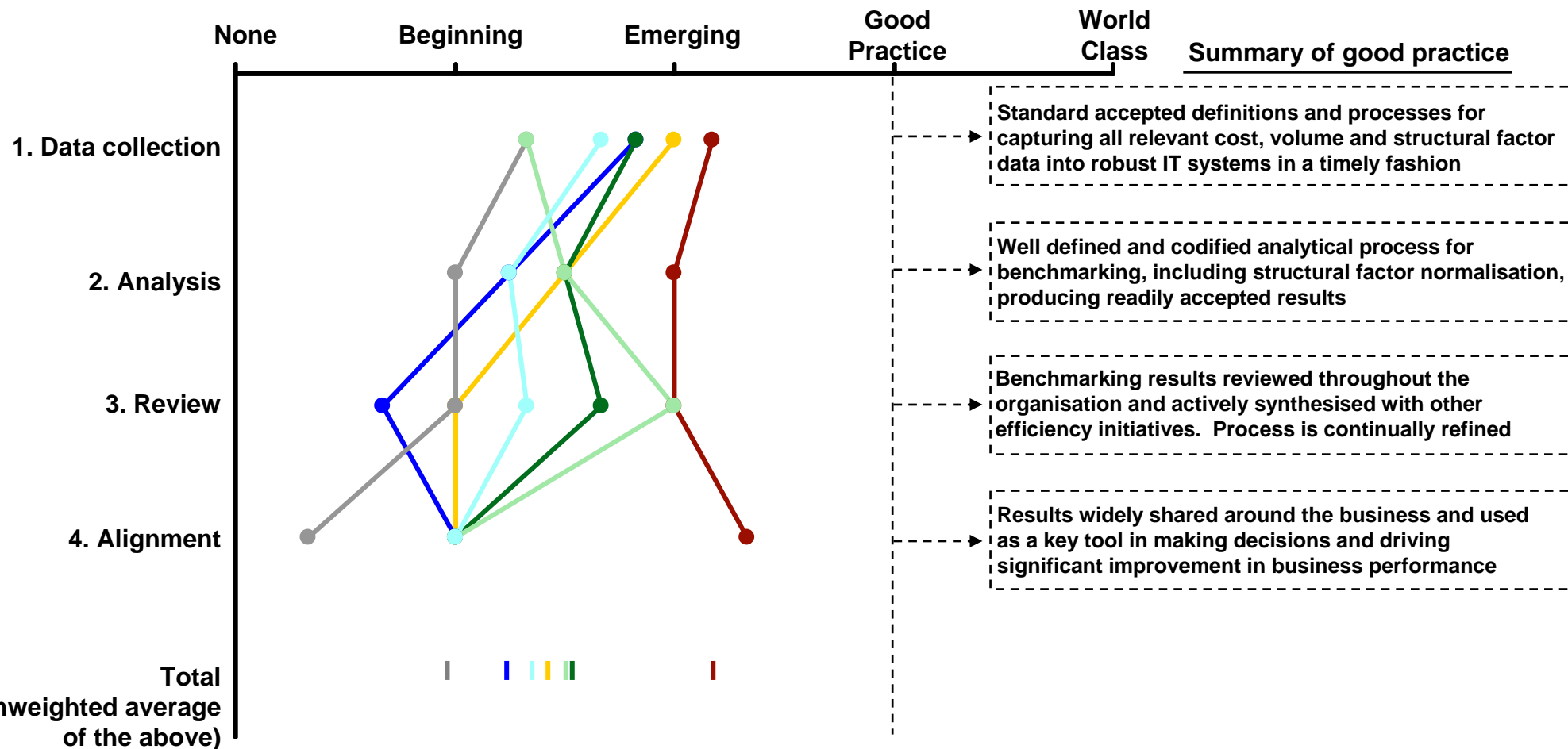
- Recommendations

# Recommendations for Network Rail to derive further future benefit from the study



**We have provided a clear definition of good practice and scored the business against it. The gap should drive the development of action plans**

**Benchmarking process scores  
(2006/07, before any impact from this L.E.K. project)**

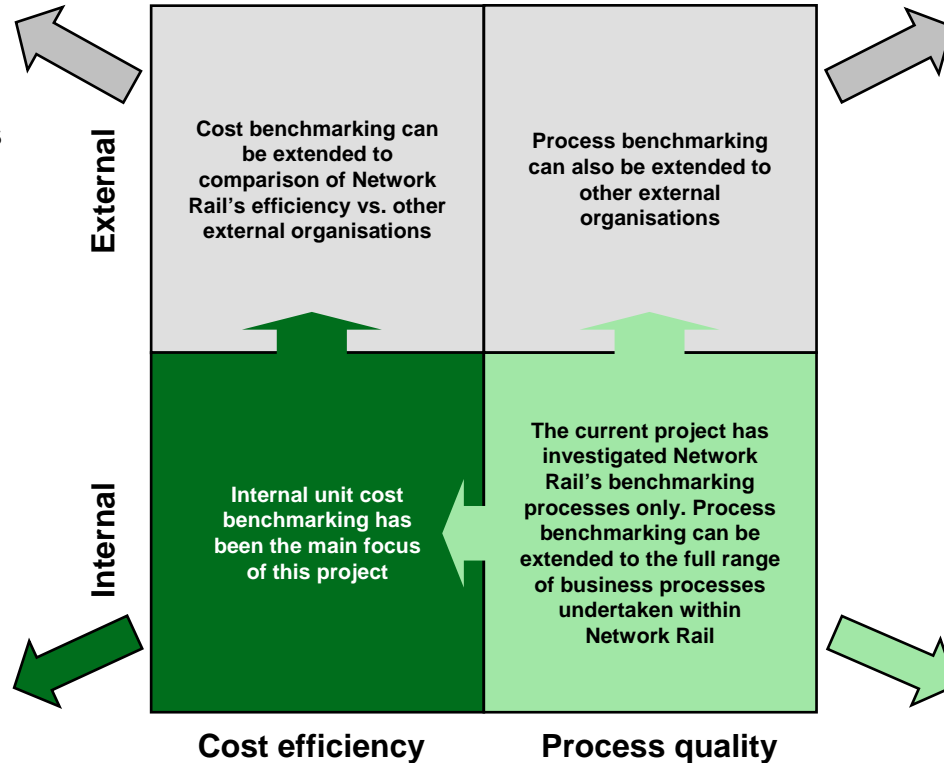


**Key :** Civils (Red), Estates (Yellow), E&P (Blue), Track - PLR (Green), Track - S&C (Grey), Maintenance (Light Green), Signalling (Cyan)

- Standard accepted definitions and processes for capturing all relevant cost, volume and structural factor data into robust IT systems in a timely fashion
- Well defined and codified analytical process for benchmarking, including structural factor normalisation, producing readily accepted results
- Benchmarking results reviewed throughout the organisation and actively synthesised with other efficiency initiatives. Process is continually refined
- Results widely shared around the business and used as a key tool in making decisions and driving significant improvement in business performance

**Benchmarking can be absorbed into a business’s culture in many ways. This project addresses just one approach and Network Rail should consider ways to adopt benchmarking more widely**

- Proven statistical method can be used to compare with other railways and other relevant comparators (e.g., construction firms) - and to excite them into involvement



- Process quality versus absolute standards across asset management companies

- Embedding action plans
- Redefine “unique” activities
- Peer circles
- Incentives

- Process quality benchmarking across whole business
- Standard (BDP) process across territories (and assets) to optimise unit costs

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