

Where Do You Go To My Lovely? (Freight-Train)

On the feast day of St. Vincent
Let's look the current national and
rail-freight timetable and think about
how to make it a bit better

2022-05-09T19:00/20:00



The Timetable is awesome...

'Madame Helena, the timetable is the most perfect product of the human mind'

R.U.R.
Karel Čapek



...but it's all Greek to me

μῆνιν ἄειδε θεὰ Πηληϊάδεω Ἀχιλῆος
ούλομένην, ἢ μυρί' Ἀχαιοῖς ἄλγε' ἔθηκε,
πολλὰς δ' ῥιθίμους ψυχὰς Ἄϊδι προΐαψεν
ἡρώων, αύτοὺς δὲ ἐλώρια τεῦχε κύνεσσιν
οίωνοῖσί τε πᾶσι, Διὸς δ' ἐτελείετο βουλή, ἐξ
οὗ δὴ τὰ πρῶτα διαστήτην ἐρίσαντε
Ἄτρεῖδης τε ἄναξ ἀνδρῶν καὶ δῖος Ἀχιλλεύς

The Iliad book 1 - Homer

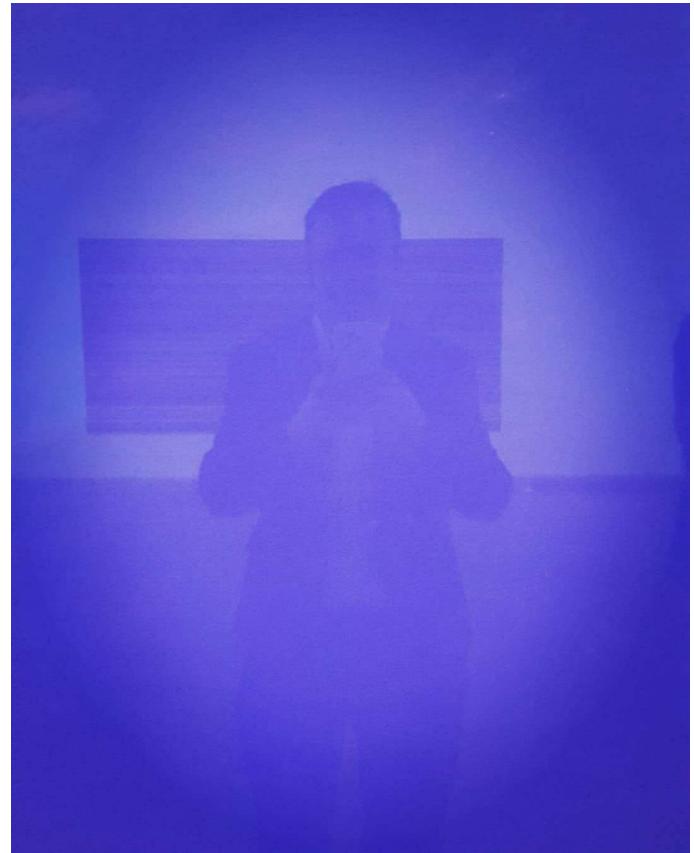


Introduction

Will Deakin

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Where creativity meets
technical excellence

What's it all about?



What's it all about?





Common Interface File (CIF)

End User
Specification
Version 29

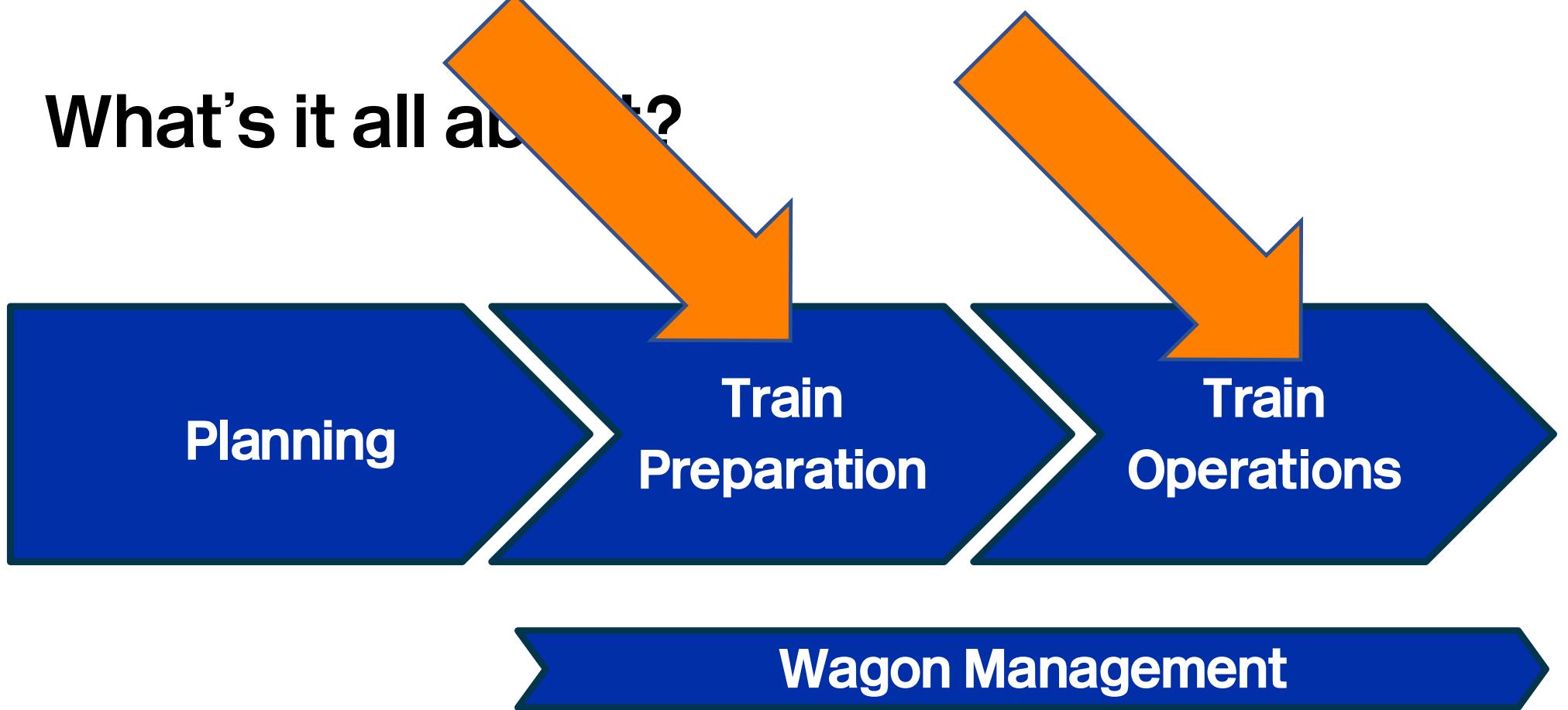
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|---|-------|----------------------|
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| TINLRTDBW00787705PDANBY WISKE | 15875 | 0 |
| TINLRTEJN00799621XNORTHALLERTON EAST JN | 15880 | 0 |
| TINLRTN 00799600HNORTHALLERTON | 15883 | 0NTRNORTHALLERTON |
| TINLRTNCH48799615PCASTLE HILLS LOOP | 15884 | 0 |
| TINLRTNUS00799601WNORTHALLERTON UP SDGS | 15886 | 0 |
| TINLRTREV00799605MNORTHALLERTON REV LINE | 15878 | 0 |
| TINLRTWDR08886100JNORTHALLERTON WENSLEYDALE | 15901 | 0 |
| TINLSN 00256500KNELSON | 29033 | 0NELNELSON |
| TINMBRLPK16697100BNORTHUMBERLAND PARK | 51929 | 0NUMNORTHUMBERLAND P |
| TINMILTON01588100HNEW MILTON | 86911 | 0NWMMNEW MILTON |
| TINMPT05000106922QNORTHAMPTON SIGNAL RY1050 | 70115 | 0 |
| TINMPT21600106920XNORTHAMPTON SIGNAL RY1216 | 70114 | 0 |
| TINMPT21800106919TNORTHAMPTON SIGNAL RY1218 | 70113 | 0 |
| TINMPTBAY56106915QNORTHAMPTON BAY | 70100 | 0 |
| TINMPTBST00106800DNORTHAMPTON BRIDGE ST CE | 70111 | 0 |
| TINMPTCMD56106811HNORTHAMPTON C.M.D. | 70112 | 0 |
| TINMPTCYG00106923RNORTHAMPTON CASTLE YRD GBF70109 | 0 | |
| TINMPTEMA00106921PNORTHAMPTON EMU ARRIVALS | 70098 | 0 |
| TINMPTEMD00106918ZNORTHAMPTON EMD | 70099 | 0XND |
| TINMPTHHT00106917YHUNSBURY HILL TUNNEL | 70120 | 0 |
| TINMPTMLJ56106916RNORTHAMPTON MILL LANE JN | 70097 | 0 |
| TINMPTN 00106900WNORTHAMPTON | 70100 | 0NMPNORTHAMPTON |
| TINMPTNCY48106904MNORTHAMPTON CASTLE YARD | 70102 | 0 |
| TINMPTNN416106015RNORTHAMPTON DGL | 70107 | 0 |
| TINMPTNNJ48106906XNORTHAMPTON NORTH JN | 70103 | 0 |
| TINMPTNRS48106001KNORTHAMPTON RIVER SDGS | 70101 | 0 |
| TINMPTNSJ48106907PNORTHAMPTON SOUTH JN | 70105 | 0 |
| TINMPTNTC48106000JNORTHAMPTON T.C. | 70104 | 0 |
| TINMPTNUS48106002LNORTHAMPTON TC UP SIDINGS | 70104 | 0 |
| TINMPTUR 24106005XNORTHAMPTON UP RECEPTION | 70108 | 0 |
| TINNRYMLJ56667813JNUNNERY MAIN LINE JN | 25635 | 0 |



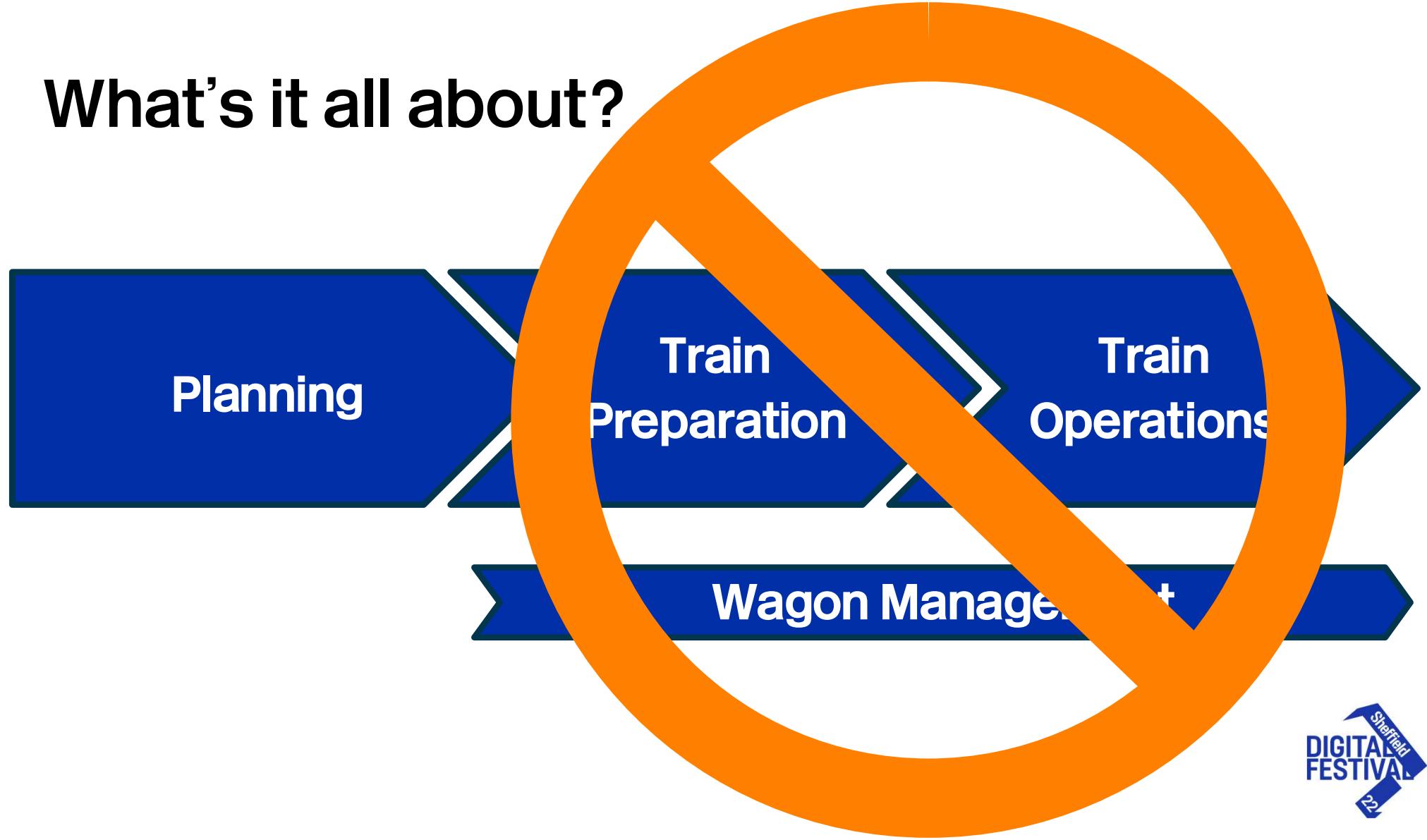
What's it all about?



What's it all about?



What's it all about?



Traffic Management

TM1: Manage and Monitor Train Movements

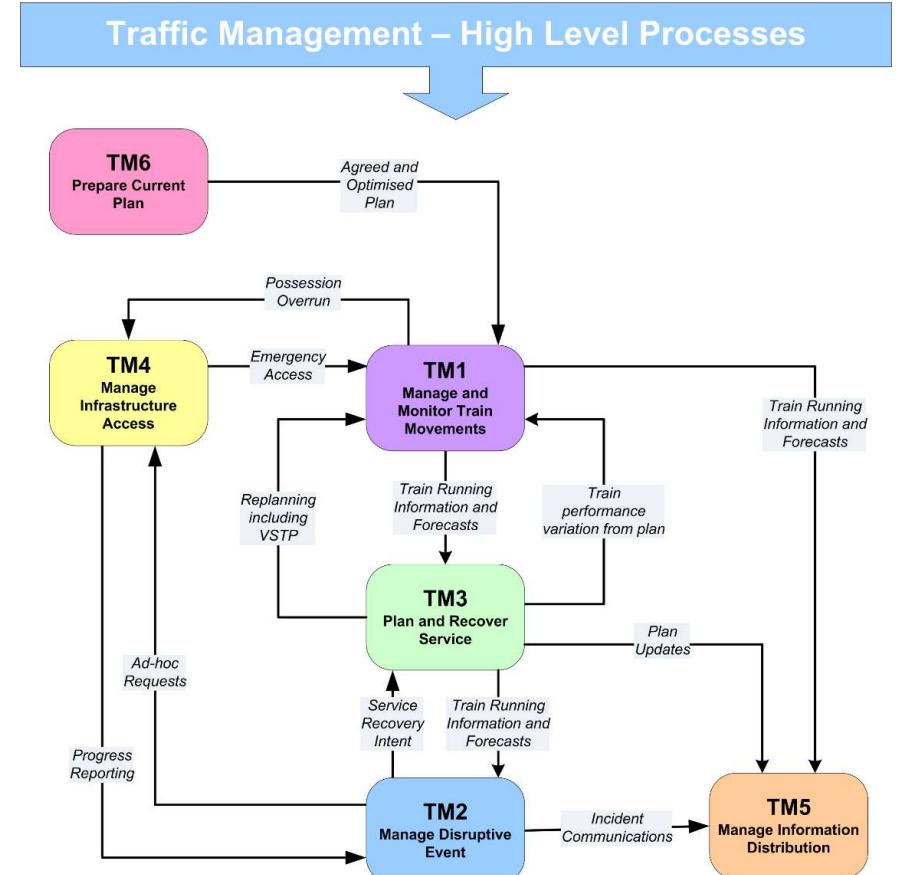
TM2: Manage Disruptive Event

TM3: Plan and Recover Service

TM4: Manage Infrastructure Access

TM5: Manage Information Distribution

TM6: Prepare Current Plan



Traffic Management

TM1: Manage and monitor Train Movements

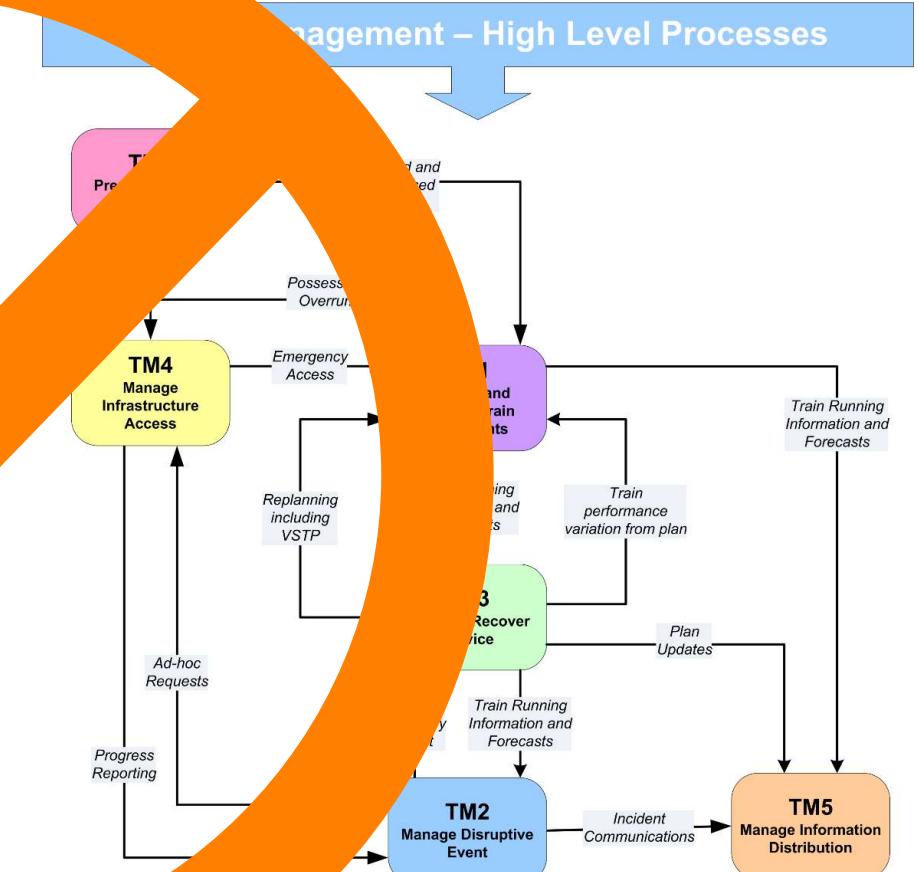
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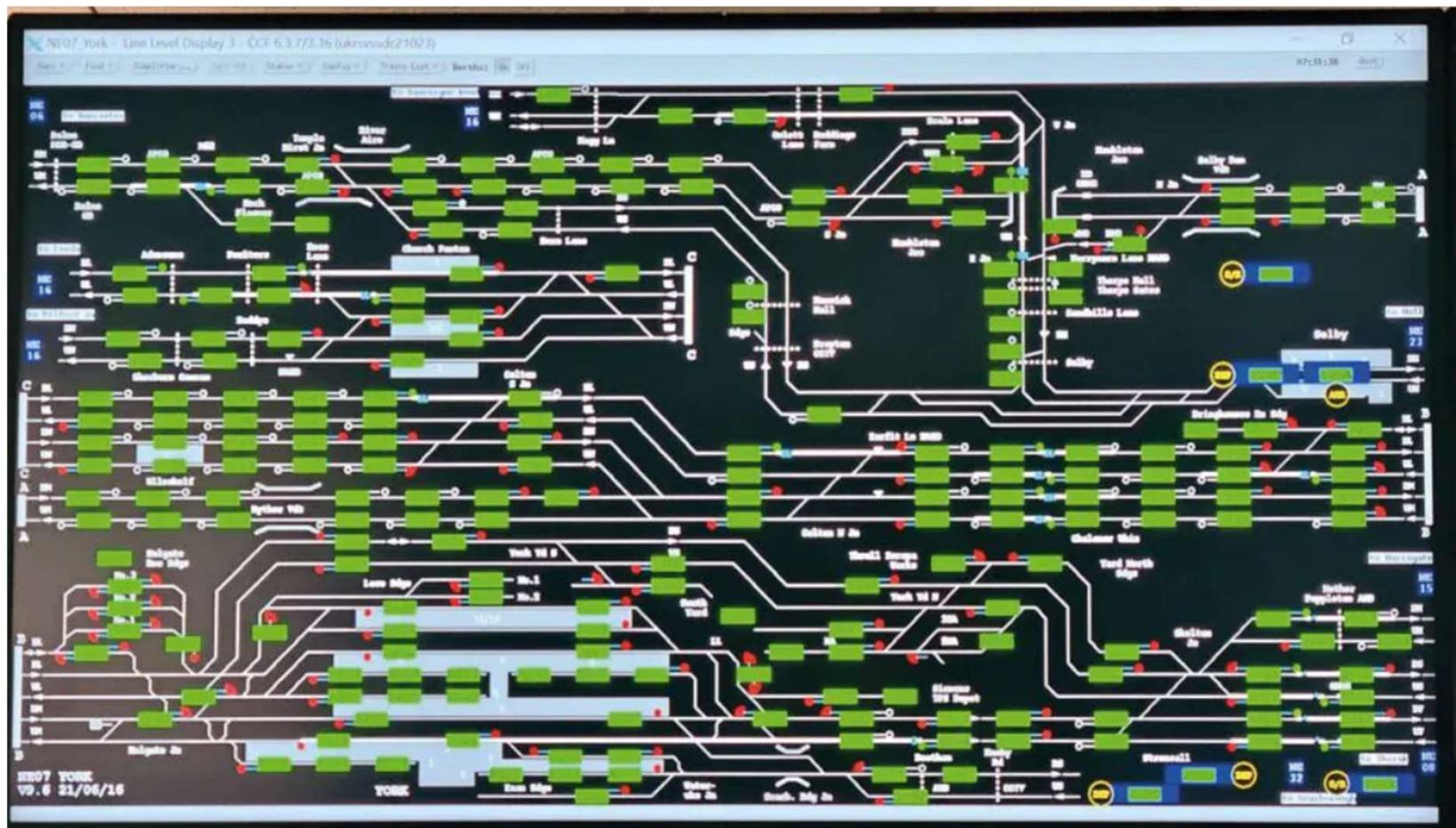
TM3: Plan and Recover Service

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TM5: Manage Information Distribution

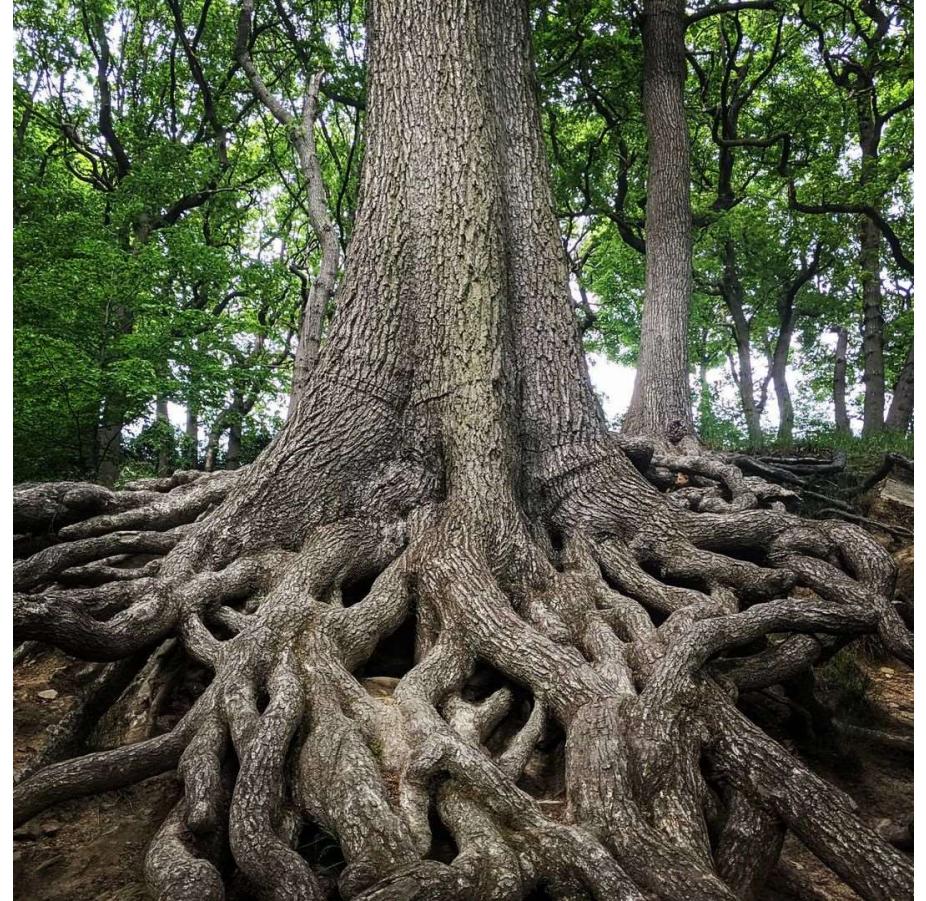
TM6: Prepare Capacity







Why rail-freight?



Blah, blah, blah

Climate change and environmental degradation are an existential threat to UK, Europe and the world

We need UK rail modal shift to rail freight transport to delivery

- no net emissions of greenhouse gases by 2050**
- economic growth decoupled from resource use**
- no person and no place left behind**



The European Green Deal, 2019

UK Freight

In 2020 in the UK 176Bn tonne km (tkm) domestic freight was moved

- 135.5Bn tkm by road (77%)
- 24.6Bn tkm by water (14%)
- 15.9Bn tkm by rail (9%)

Historically peak rail was 22.7Bn tkm in 2012/13



DfT Transport Statistics (2021)

Green House Gases (CO₂)

UK produced 455 million tonnes CO₂ equivalent (mtCO2e) in 2019

Transport accounted for 122 mtCO2e (26.8%) of which

- HGV 19.5 mtCO2e (16.0%/4.2%)
- All rail 1.7 mtCO2e (1.4%/0.04%)

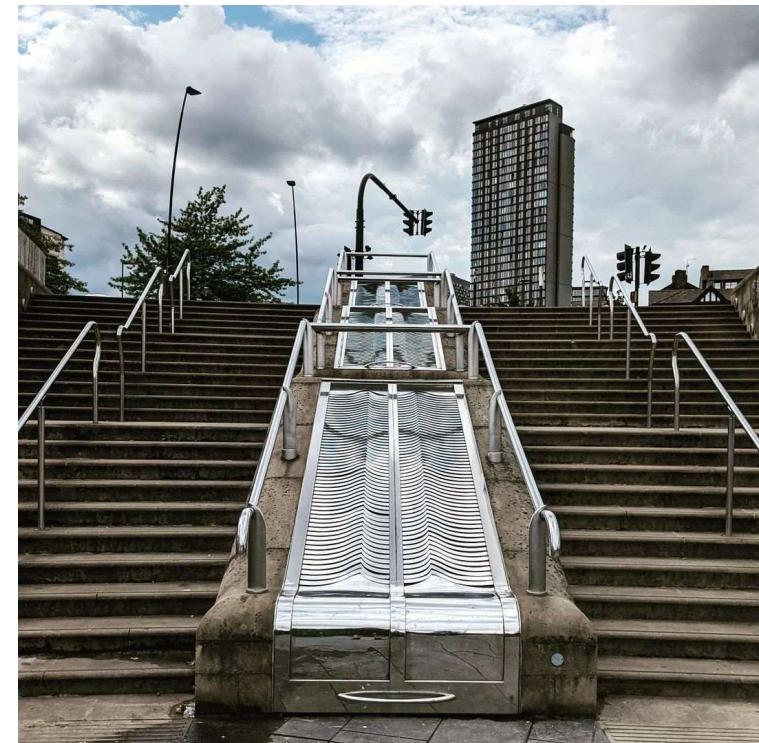
A freight train removes up to 76 HGVs from our roads



DfT Transport Statistics (2021)

CO₂ Comparison

| Activity | Type | kg CO ₂ / tonne km | Ratio |
|-----------------|----------------|-------------------------------|-------|
| Cargo ship | General cargo | 0.01323 | 0.52 |
| Cargo ship | Container ship | 0.01614 | 0.63 |
| Rail | Freight train | 0.02556 | 1.00 |
| All Articulated | 50% Laden | 0.10775 | 4.22 |
| All Articulated | 100% Laden | 0.06713 | 2.63 |
| All HGVs | 50% Laden | 0.14606 | 5.71 |
| All HGVs | 100% Laden | 0.0882 | 3.45 |

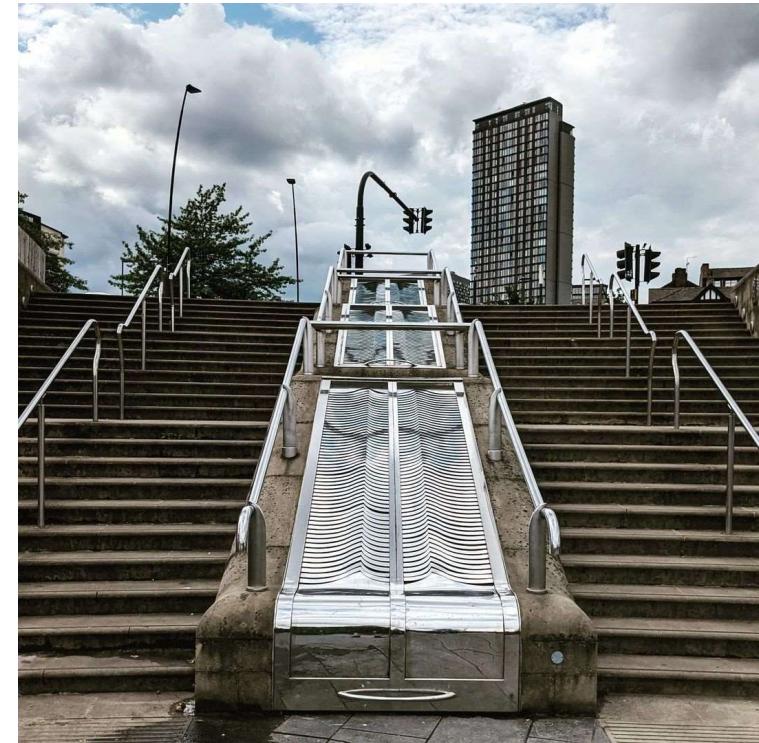


UK Government GHG Conversion Factors
for Company Reporting



CO₂ Comparison

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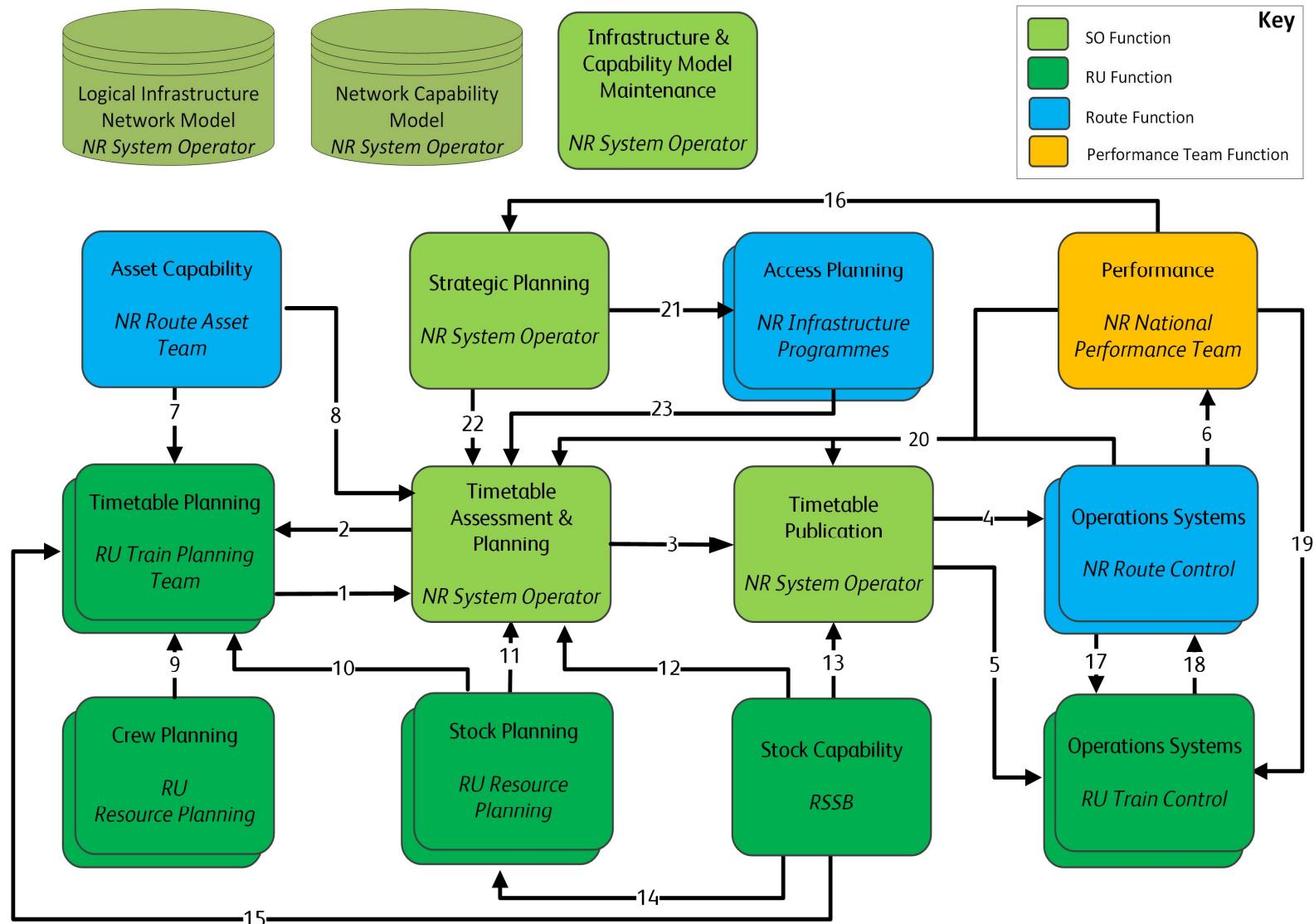
One freight train removes 76 HGVs from our roads



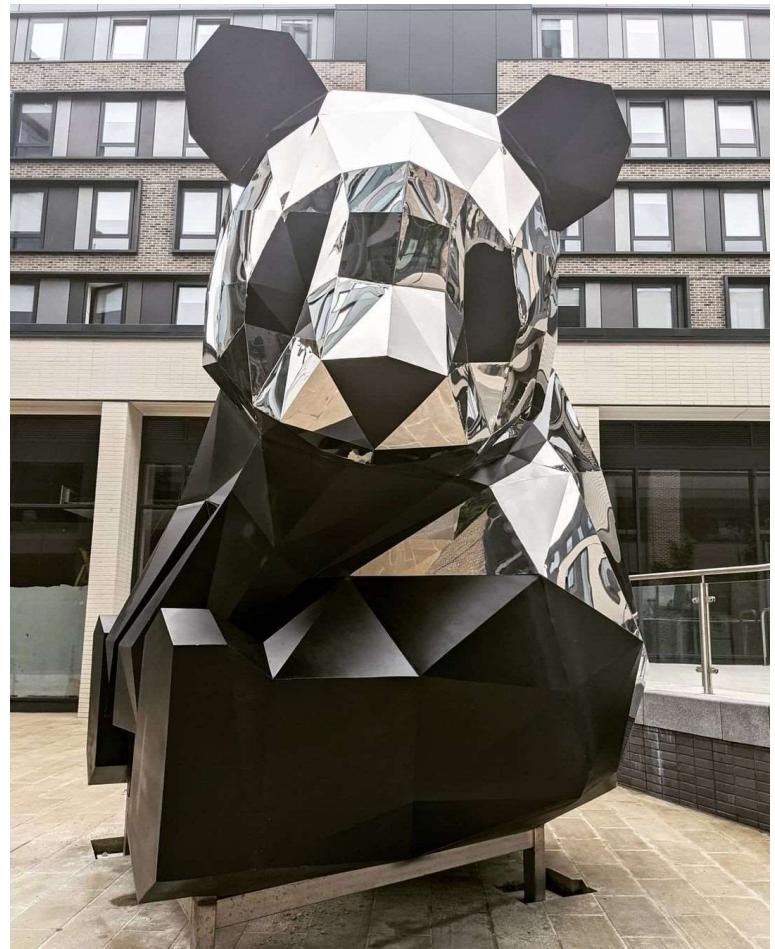
How we plan today





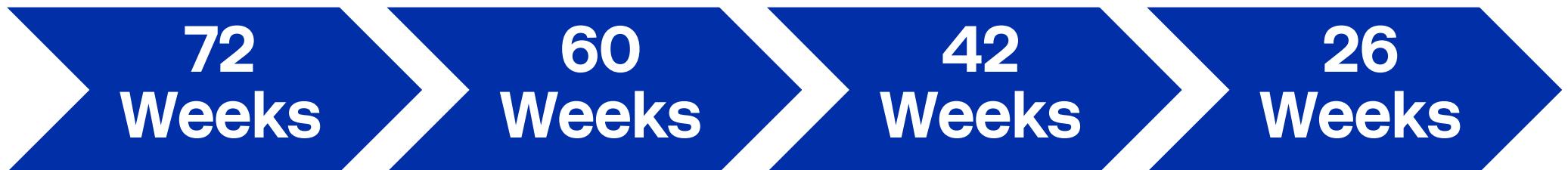


Timetable Development

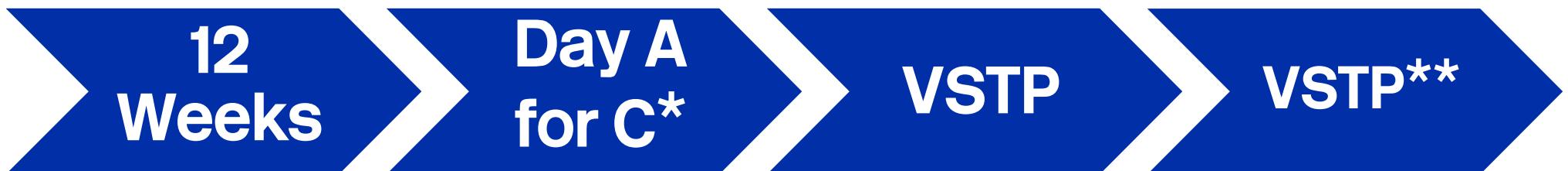


Timetable Development

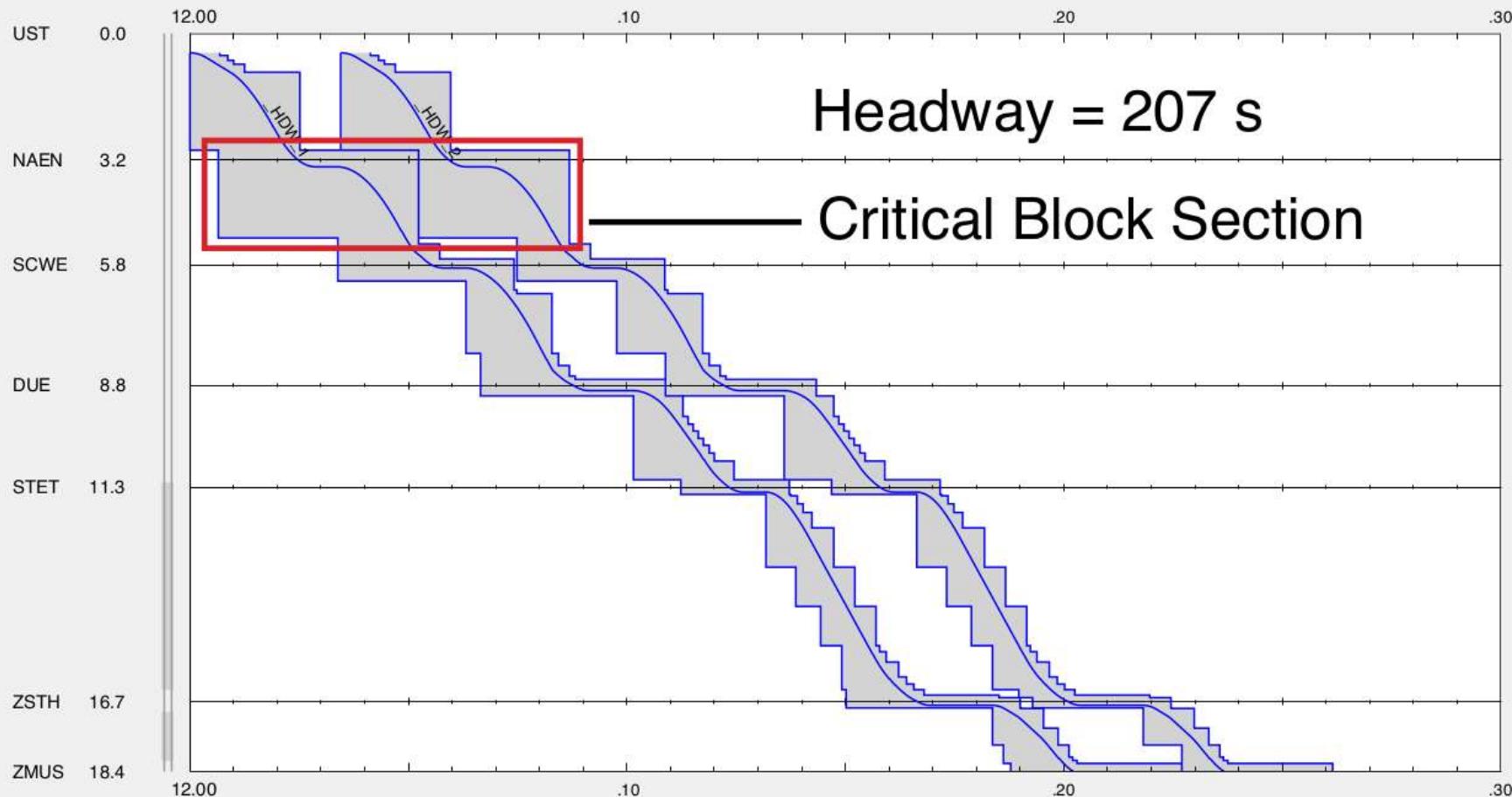
Long Term Planning (LTP)



Short Term Planning (STP)



UST-ZMUS: Headway Calculation Uster - Zurich



| VSTP SCHEDULE REQUEST FORM | | | | | |  | |
|--|--|--|----------------------------|-------------------------------------|------------------------------|---|---------------------|
| (Note: only use for trains required to run within 48 hours) | | | | | | | |
| TO: | NETWORK RAIL CONTROL: WESTERN (CARDIFF) | DATE: 14/11/2017 | TIME: 1400 | | | | |
| FROM: | A TOC A TOC House 123 Railway Road London RA11 WAY | REF: Tel No: B.R.T.: Tel No: B.T.: Fax No: TOPS LATA | 01234567890 01234567890 | | | | |
| TRAIN DETAILS Requested | | | | | | | |
| Reporting Number: | 5W14 | Days Run: | ThO | Dates: | 14/11/2017 | Unit/Traction Type: | 220 |
| Train Category: | | Sector: | 27 | Train Service Code (Profit Centre): | | | |
| PE - Empty Coaching Stock | | Sub-sector: | 01 | Voyager/HST ECS moves | | | |
| Origin Location | Stanox | Requested Departure Time | | | | | |
| Bristol Barton Hill Depot | 81432 | 0530 | | | | | |
| Destination Location | Stanox | Requested Arrival Time | | | | | |
| Birmingham New Street | 65630 | 0720 | | | | | |
| Requested Route ("via") and comments: No driver relief required. Set to form 1W14 0745 Birmingham New Street - Camp Hill. To depart depot North end. | | | | | | | |
| Max speed of slowest vehicle | 125 mph | Number of Vehicles: | | | | | 4 |
| Driver Only Operation: | | Is return working involved? | | If yes, Number of forms attached | | | |
| YES | | NO | | | | | |
| Intermediate Calling Points NOTE - Network Rail to input all other timing, passing and TRUST points as required. | | | | | | | |
| Location Name | Stanox | Requested Arr/Dep/Dwell | Type of Consist | Power Change? | Remarks/Reversal Points etc. | | |
| None | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| The Above Additional Train Movement To The Publicised Timetable is Requested To Run. | | | | | | | |
| Representative (Print Name): | A CONTROLLER | Signature | | | | | <i>A.Controller</i> |
| Position/Job Title: | ROUTE CONTROLLER | | | | | | |
| NETWORK RAIL CONFIRMATION | | | | | | | |
| The above additional train movements to the publicised timetables is AGREED/DECLINED | | | | | | | |
| Train Reporting No: (UWTTID) | | Departure Time: | | | | | |
| Train will be run by Regional Control arrangement and every endeavour will be made to meet the schedule requested but pathway and performance cannot be guaranteed. NOTE: The completed document forms a contract. | | | | | | | |
| Representative (Print Name): | | Signature: | | | | | |
| Reference Number: | | Date & Time Request Received: | | | | | |
| Any queries regarding this pathway should be made to the above Regional Control on: | | | | | | | |
| Telephone No: | | Fax: | | TOPS LATA: | | | |

VSTP Request



| | | |
|---|-------|----------------------|
| TINLRT69100799603KNORTHLALLERTON SIG. 691 | 15888 | 0 |
| TINLRTDBW00787705PDANBY WISKE | 15875 | 0 |
| TINLRTEJN00799621XNORTHLALLERTON EAST JN | 15880 | 0 |
| TINLRTN 00799600HNORTHLALLERTON | 15883 | 0NTRNORTHALLERTON |
| TINLRTNCH48799615PCASTLE HILLS LOOP | 15884 | 0 |
| TINLRTNUS00799601WNORTHLALLERTON UP SDGS | 15886 | 0 |
| TINLRTREV00799605MNORTHLALLERTON REV LINE | 15878 | 0 |
| TINLRTWDR08886100JNORTHLALLERTON WENSLEYDALE | 15901 | 0 |
| TINLSN 00256500KNELSON | 29033 | 0NELNELSON |
| TINMBRLPK16697100BNORTHUMBERLAND PARK | 51929 | 0NUMNORTHUMBERLAND P |
| TINMILTON01588100HNEW MILTON | 86911 | 0NWMNEW MILTON |
| TINMPT05000106922QNORTHAMPTON SIGNAL RY1050 | 70115 | 0 |
| TINMPT21600106920XNORTHAMPTON SIGNAL RY1216 | 70114 | 0 |
| TINMPT21800106919TNORTHAMPTON SIGNAL RY1218 | 70113 | 0 |
| TINMPTBAY56106915QNORTHAMPTON BAY | 70100 | 0 |
| TINMPTBST00106800DNORTHAMPTON BRIDGE ST CE | 70111 | 0 |
| TINMPTCMD56106811HNORTHAMPTON C.M.D. | 70112 | 0 |
| TINMPTCYG00106923RNORTHAMPTON CASTLE YRD GBF70109 | 0 | |
| TINMPTEMA00106921PNORTHAMPTON EMU ARRIVALS | 70098 | 0 |
| TINMPTEMD00106918ZRNORTHAMPTON EMD | 70099 | 0XND |
| TINMPTHHT00106917YHUNSBURY HILL TUNNEL | 70120 | 0 |
| TINMPTMLJ56106916RNORTHAMPTON MILL LANE JN | 70097 | 0 |
| TINMPTN 00106900WNORTHAMPTON | 70100 | 0NMPNORTHAMPTON |
| TINMPTNCY48106904MNORTHAMPTON CASTLE YARD | 70102 | 0 |
| TINMPTNN416106015RNORTHAMPTON DGL | 70107 | 0 |
| TINMPTNNJ48106906XNORTHAMPTON NORTH JN | 70103 | 0 |
| TINMPTNRS48106001KNORTHAMPTON RIVER SDGS | 70101 | 0 |
| TINMPTNSJ48106907PNORTHAMPTON SOUTH JN | 70105 | 0 |
| TINMPTNTC48106000JNORTHAMPTON T.C. | 70104 | 0 |
| TINMPTNUS48106002LNORTHAMPTON TC UP SIDINGS | 70104 | 0 |
| TINMPTUR 24106005XNORTHAMPTON UP RECEPTION | 70108 | 0 |
| TINNRYMLJ56667813JNUNNERY MAIN LINE JN | 25635 | 0 |



Common Interface File (CIF)

End User
Specification
Version 29

Where is my Train? Decoding CIF

3.2.5.1. Layering and Compounding of Timetable Schedules

The timetable schedules as communicated by CIF use the principle of a ‘base schedule’ for the normal route and timings, each base schedule may have zero, one or more ‘overlay schedules’ for any temporary changes to route and/or timings (for example during engineering works).

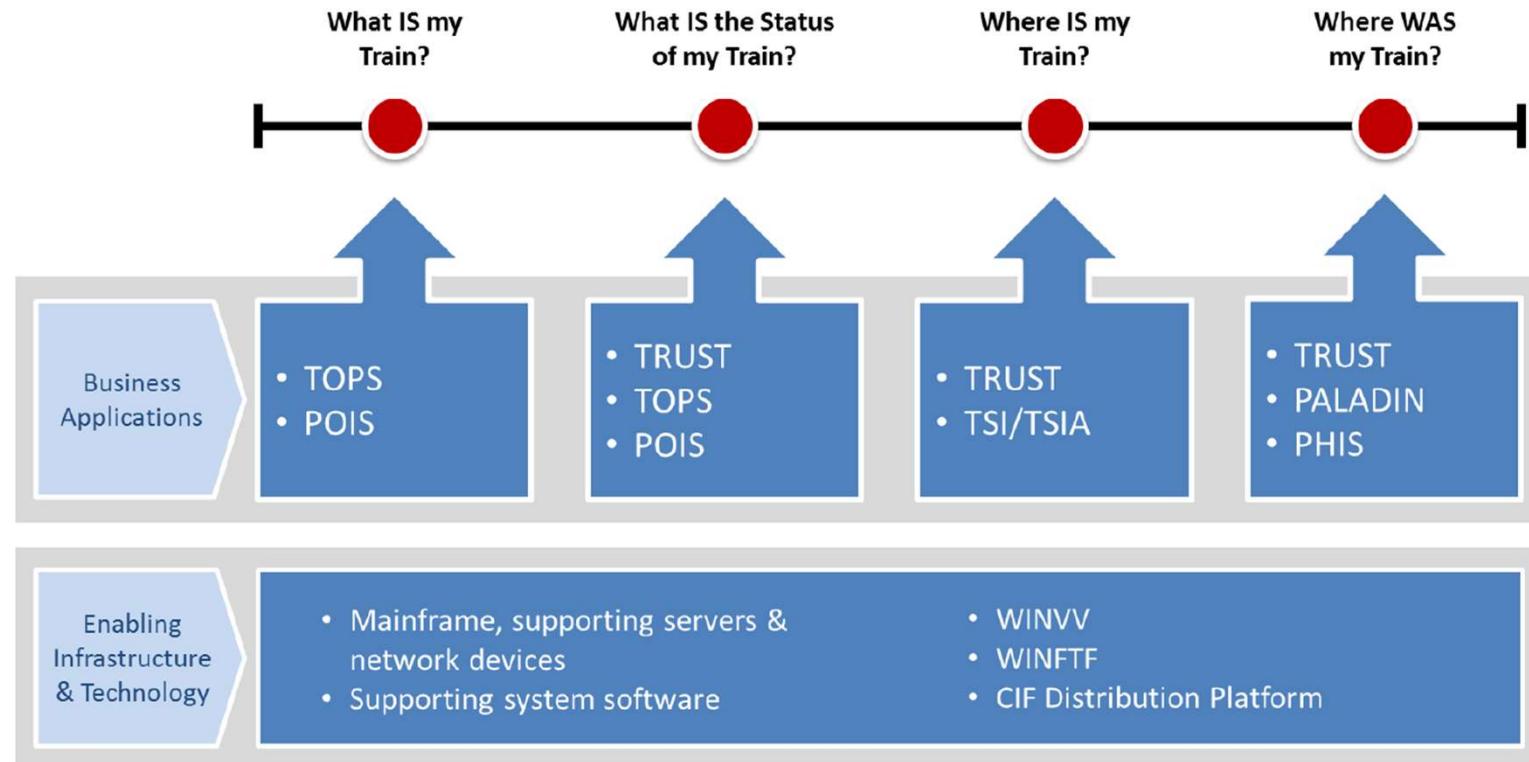
Each base and each overlay schedule can also be amended during the ‘life’ of that schedule.

As CIF is a delta-based mechanism, transactional updates must be applied to the accumulated schedule data in the correct order by the Consuming System.

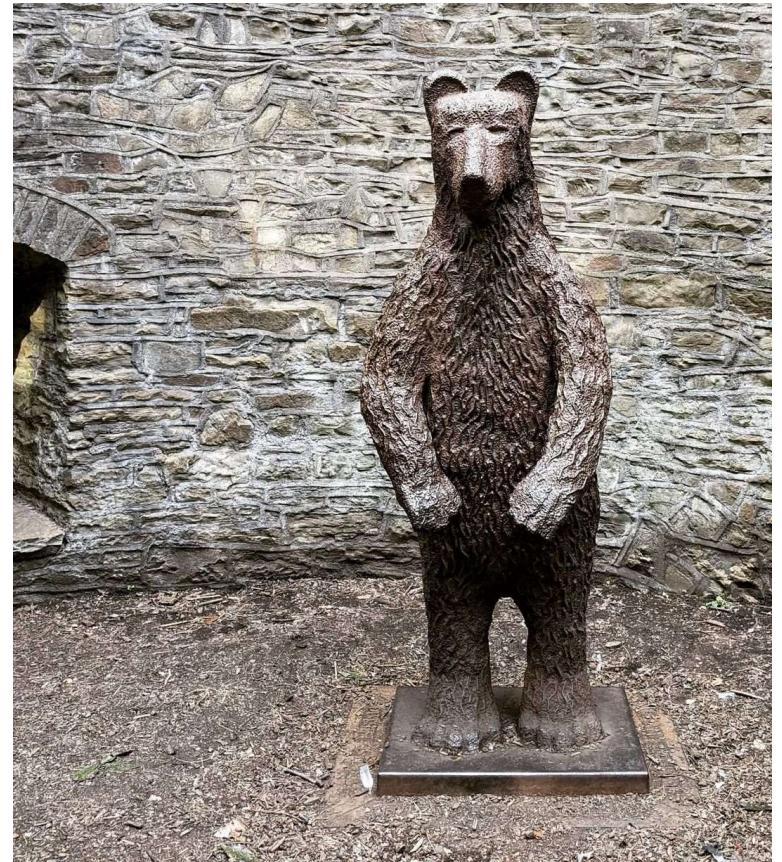
| Ref | STP Indicator Field Value (Character 80 in CIF File ‘BS’ Record) | Schedule Type: (STP Indicator Field Description) | Comments |
|-----|---|---|---|
| 1 | P | Permanent | Long Term Plan Base Schedule |
| 2 | N | New STP | New Short Term Schedule |
| 3 | O | STP Overlay | Short Term Overlay (variation) to Existing Schedule |
| 4 | C | STP Cancellation | Short Term Cancellation of Existing Schedule |

Table 5: CIF File Schedule Types denoted by the STP Indicator Field

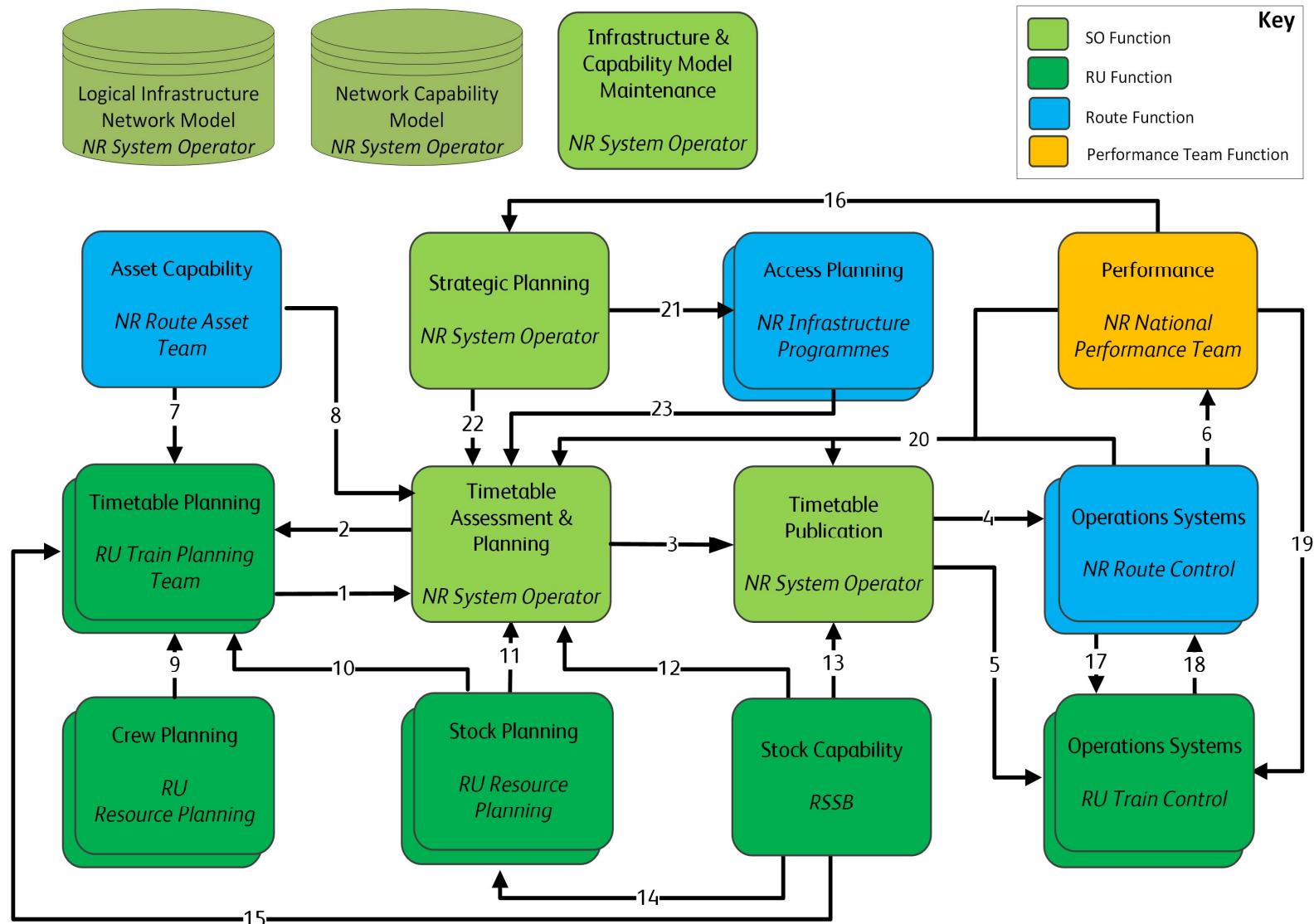
Where is my Train? Systems



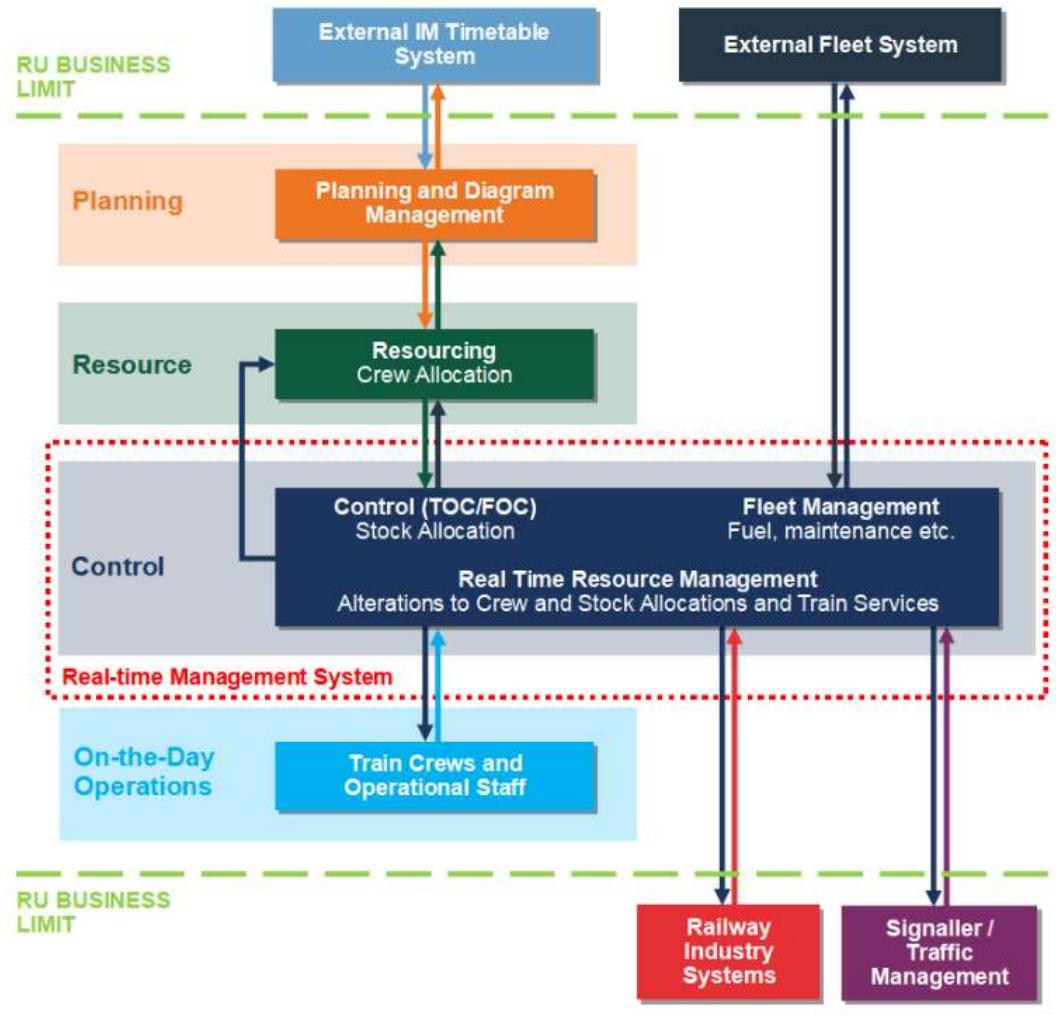
Freight Operator Timetable Planning







Crew and Stock Management



Example Stock Diagram

| | | | | | | |
|-------------|-------|-------|--------|------------|------------|-------------|
| Diagram | : | ABC | 123 TO | 14/11/2017 | 14/11/2017 | STP |
| Fleet | : | | 421/7 | | | |
| OFF | : | | | | | |
| VICTORIA CS | | 05+03 | 5S04 | | | |
| VICTORIA | 05+10 | | | REVERSE | | |
| VICTORIA | | 06.00 | 1S04 | | | 2752 |
| DOVER MAR | 07.37 | | | REVERSE | | |
| DOVER MAR | | 09.00 | 1P16 | | | 2365 |
| VICTORIA | 10.37 | | | REVERSE | | |
| VICTORIA | | 12.00 | 1S28 | | | 1274 |
| DOVER MAR | 13.37 | | | REVERSE | | |
| DOVER MAR | | 15.00 | 1P40 | | | 8435 |
| VICTORIA | 16.37 | | | REVERSE | | |
| VICTORIA | | 18.00 | 1S52 | | | 6432 |
| DOVER MAR | 19.37 | | | REVERSE | | |
| DOVER MAR | | 21.00 | 1P64 | | | 3582 |
| VICTORIA | 22.37 | | | REVERSE | | |
| VICTORIA | | 23+00 | 5P64 | | | |
| VICTORIA CS | 23+10 | | | | | |
| WORKS | : | | | | | |
| MILES | : | (LD) | 484.2 | (ETY) | 6.4 | (TOT) 490.6 |

Example

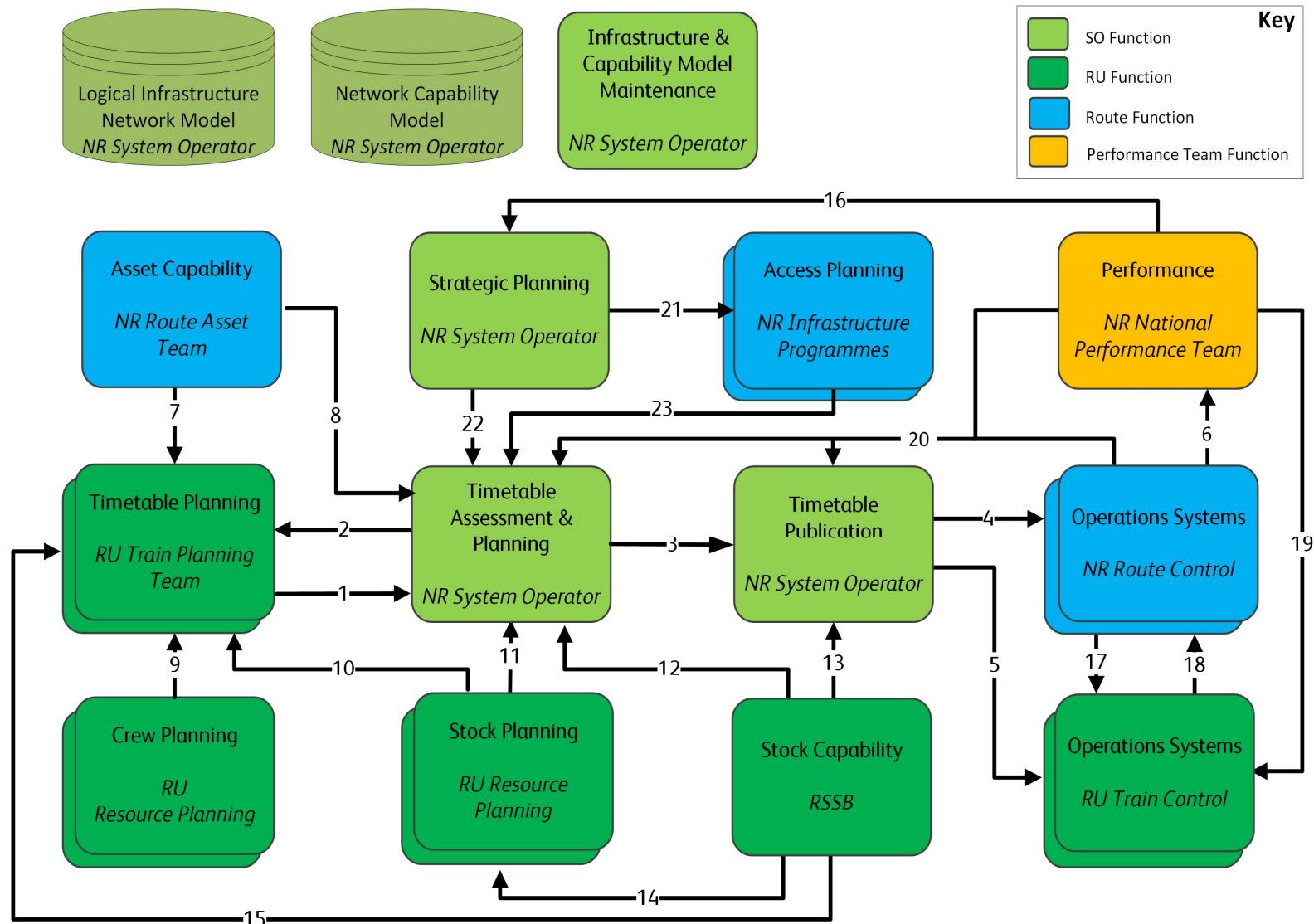
Crew Diagram

| Turn Number | Loco/ Unit | Action Location | Arr Time | Dep Time | Train | GSMR Code | Ref | Days |
|--------------|-------------------------|-----------------------------------|--|-------------|-------|--------------|------|-----------|
| A TOC | | | | | | | | |
| STP: | ABC | 123 | | | | | | |
| DVR | | | | | | | SO | |
| On | 09:00 | MOB | | | | | | |
| Off | 17:00 | 416 | London Broad Street | | | 09:15 | 2U82 | DOO 32564 |
| Hrs | 8.00 | | (after working 08:50 from Primrose Hill) | | | | | |
| Days | SO | | Norton Bridge | | 11:00 | | | |
| From | 01/01/2017 | IMMO | | | | | | |
| To | 31/12/2017 | | | | | | | |
| | TAXI | Norton Bridge | | | 11:10 | | | |
| | | Standon Bridge | | | 11:30 | | | (A) |
| | MOB | | | | | | | |
| 310 | | Standon Bridge | | | 11+33 | 5S11 | | 62351 |
| | | (after working 10:23 from Weedon) | | | | | | |
| | | (via Relief Line) | | | | | | |
| | RM | Hawick | | | 12+17 | 12+20 | 5S11 | 62351 |
| | | Deadwater | | | 12+50 | | | |
| | IMMO | | | | | | | |
| | PNB | | | | | | | |
| | MOB | | | | | | | |
| 316 | | Deadwater | | | 13+50 | 5L54 | | 87429 |
| | | Claypole | | | 15+25 | | | |
| | IMMO | | | | | | | |
| | BREAK | | | | | | | |
| | MOB | | | | | | | |
| 373 | | Claypole | | | 16:05 | 1A36 | | 57238 |
| | | (after working 15:16 from Heck) | | | | | | |
| | | Kings Cross York Road | | | 17:00 | | | |
| | IMMO | | | | | | | |
| | (A) | also conveys ABC456 | | | | | | |
| Routes | FH4 DL7 AK3 KR5 ER3 NH4 | | | | | | | |

Network Rail Timetable Assessment







National Planning Team

**Network
Services**

**Freight
Informed
Traveller**

**Rolling Spot
Bids**

A for C

Charters

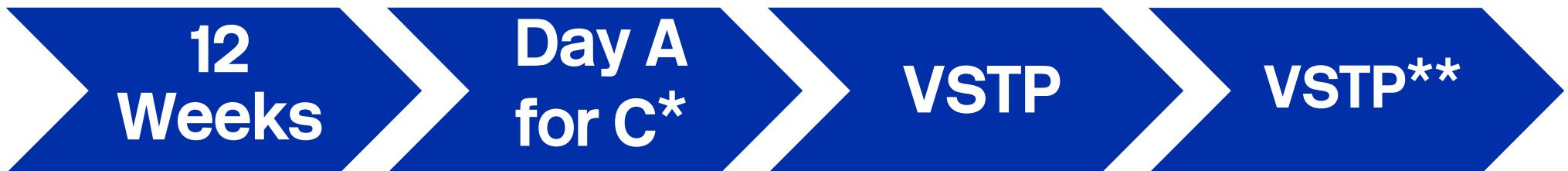
**Freight
Planning
Performance**

Timetable Development

Long Term Planning (LTP)



Short Term Planning (STP)



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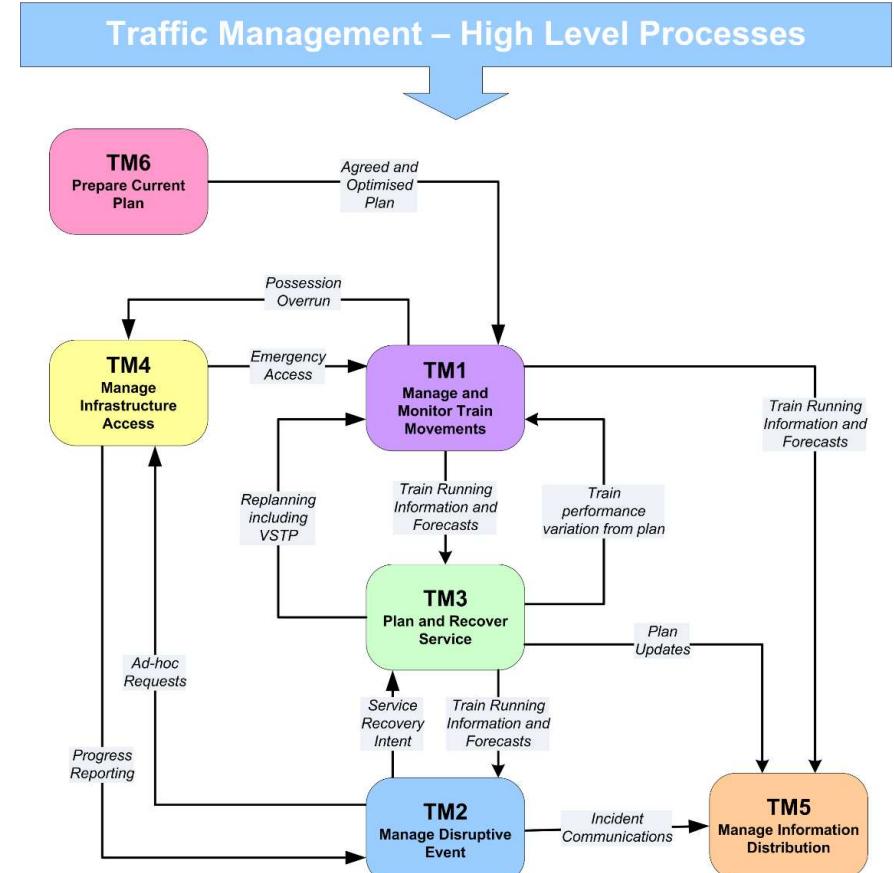
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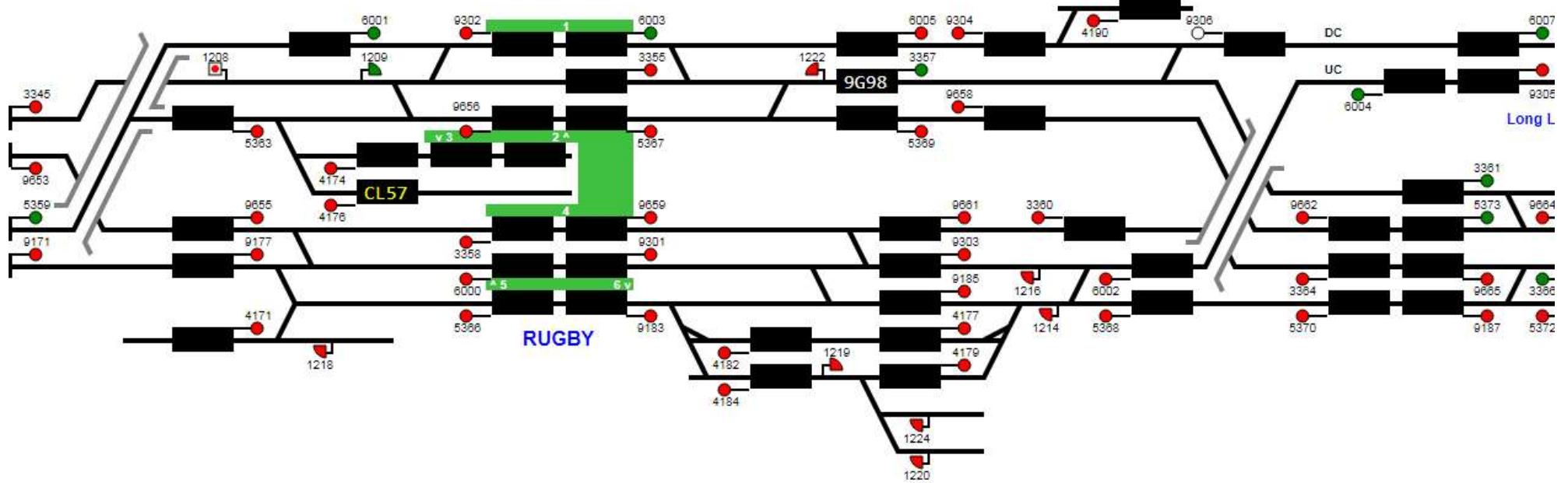
TM6: Prepare Current Plan



Timetable Assessment



A Logical Network Model



| LOR | Seq. | Line of Route Description | ELR | Route | Last Updated | |
|----------|------|---|-----------------|------------------------------------|---|----------------------|
| LN804 | 003 | Tapton Jn to Gascoigne Wood (via Sheffield) | TJC1 | London North Eastern | 22/03/2021 | |
| Location | | | Mileage M Ch | Running lines & speed restrictions | | Signalling & Remarks |
| | | | | | | GSM-R |
| | | | | | <img alt="Diagram of the Sheffield station area showing running lines and speed restrictions. The diagram includes platforms 1 through 8, various sidings, and connections. Speed limits are indicated by arrows and boxes (e.g., UM 15, DHL 15, DM 50, UM 25, UM 40, UM 70). Various lines are marked with asterisks (*), numbers (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 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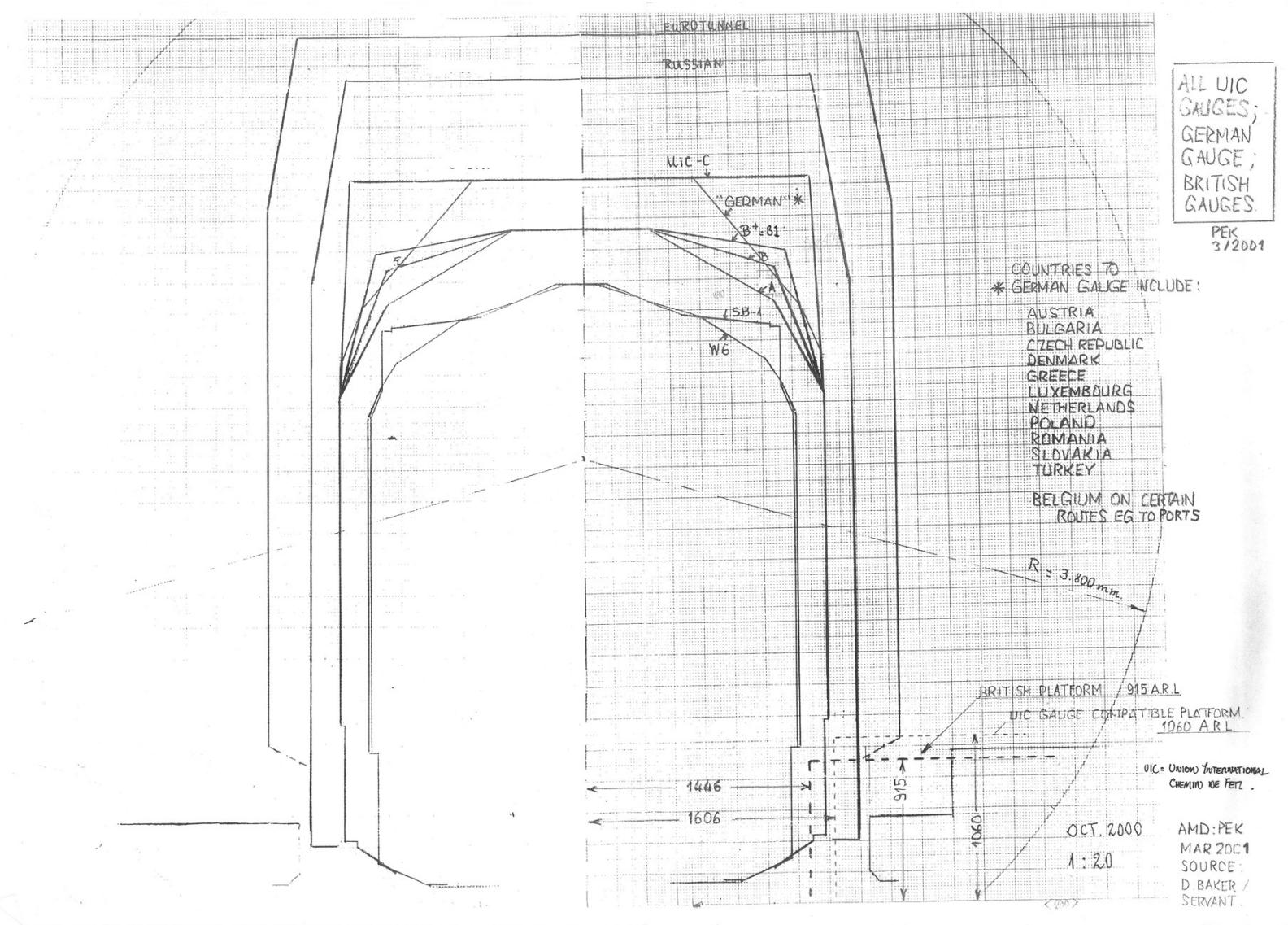
Infrastructure Constraints



Loading Gauge



Loading Gauge



Sectional Appendix

| LOR | Seq. | Line of Route Description | ELR | Route | Last Updated | | |
|---|------|---|----------------------------------|------------------------------------|--------------|--|-------|
| LN804 | 003 | Tapton Jn to Gascoigne Wood (via Sheffield) | TJC1 | London North Eastern | 22/03/2021 | | |
| Location | | | Mileage M Ch | Running lines & speed restrictions | | Signalling & Remarks | |
| | | | 158 18 * | | | TCB RA8 Sheffield workstation (S) | GSM-R |
| Sheffield South Jn | | | 158 27 | | | BETWEEN 158 18 AND 158 60 DOWN 158 67 UP ALL LINES AND CONNECTIONS 15MPH EXCEPT AS OTHERWISE SHOWN | |
| SHEFFIELD | | | 158 32 * | | | (1) To/From Sheffield Fish Dock AWS Gap in Station area between 158 07 Down / 157 79 Up and 159 08 | |
| | | | 158 40 | | | (2) = Up Station Siding No1 (3) = Up Station Siding No2 (4) = Down Station Siding TL = Through line | |
| Sheffield North Jn | | | 158 52 | | | PP is authorised on Platforms 1, 2, 5, 6 and 8 for trains booked to call at Sheffield. | |
| | | | 158 60 * | | | PP - Permissive Working - full use for class 1, 2, 3 (ECS), 5, 9 & 0 trains in Platforms 2c, 3, 4 & 7. | |
| | | | 158 67 * | | | (\\$) = 4062 points temporarily removed. | |
| Nunnery Main Line Jn Broad Street Tunnel (100m / 109 yards) | | | 158 77 158 77 to 159 02 | | | DHL = Down Heeley Loop CW Up at 158 63 (80 yards after passing signal S150) | |

Route Availability

| LOR | ELR | from | to | Line of Route Description | M | Ch | M | Ch | 142 | 143 | 144 | 150 | 153 | 155 | 156 | 158 | 159 | Notes |
|-------|------|-------------------------------------|--------------------------------|--|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| LN804 | TJC1 | Route Boundary (LN3201) (Tapton Jn) | Dore South Jn | Route Boundary (LN3201) (Tapton Jn) - Dore South Jn | 146 | 64 | 153 | 71 | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| LN804 | TJC1 | Dore South Jn | Sheffield Station | Dore South Jn - Sheffield Station | 153 | 71 | 158 | 40 | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| LN804 | TJC1 | Sheffield Station | Nunnery Main Line Jn | Sheffield Station - Nunnery Main Line Jn | 158 | 40 | 158 | 77 | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| LN804 | TJC1 | Nunnery Main Line Jn | Site of Former Grimesthorpe Jn | Nunnery Main Line Jn - Site of Former Grimesthorpe Jn | 158 | 77 | 160 | 47 | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| LN804 | TJC2 | Site of Former Grimesthorpe Jn | Site of Masborough South Jn | Site of Former Grimesthorpe Jn - Site of Masborough South Jn | 160 | 47 | 163 | 74 | Y | Y | Y | Y | Y | Y | Y | Y | Y | |
| LN804 | TJC3 | Site of Former Masborough South Jn | Swinton Jn South | Site of Former Masborough South Jn - Swinton Jn South | 161 | 77 | 166 | 56 | Y | Y | Y | Y | Y | Y | Y | Y | Y | |

NESA*

*Route Clearance Tables

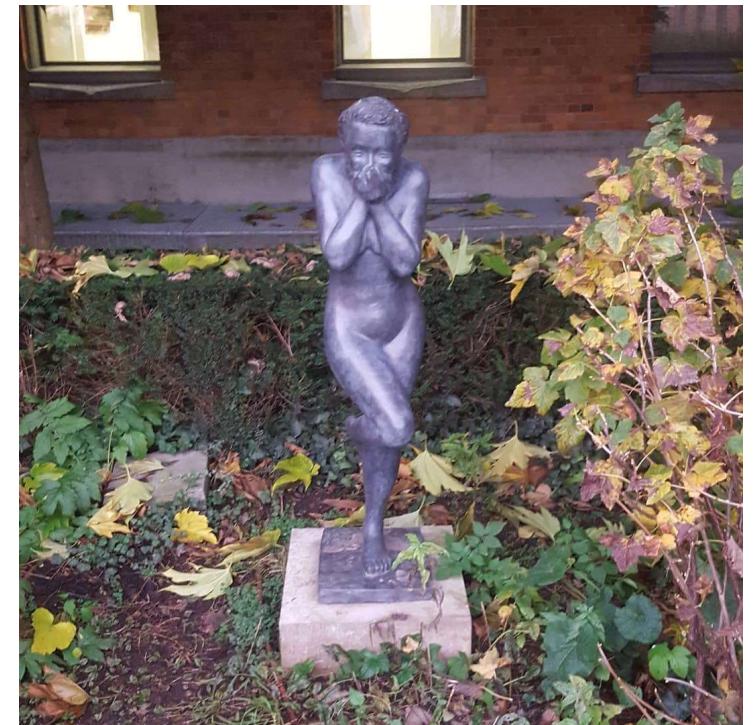
| LOR | Seq. | Line of Route Description | ELR | Route | Last Updated | | | | | | | | | | | | |
|----------|------|---|--|----------------------|--------------|---|---|---|---|---|---|----|----|----|----|----|----|
| LN836 | 008 | Doncaster, Marshgate Jn. to Neville Hill East Jn. | DOL2 HUL4 | London North Eastern | 02/04/2016 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| Location | | Mileage M Ch | Running lines & speed restrictions | | | | | | | | | | | | | | |
| | | | <table border="1"> <tr><td>F</td><td>E</td><td>D</td><td>C</td><td>B</td><td>A</td></tr> <tr><td>25</td><td>25</td><td>25</td><td>25</td><td>25</td><td>25</td></tr> </table> | | | F | E | D | C | B | A | 25 | 25 | 25 | 25 | 25 | 25 |
| F | E | D | C | B | A | | | | | | | | | | | | |
| 25 | 25 | 25 | 25 | 25 | 25 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | <p>TCB RA8 York SB AC: York ECR</p> | | | | | | | | | | | | | | |
| | | | <p>A =A Line B =B Line C =C Line D =D Line E =E Line F =F Line</p> | | | | | | | | | | | | | | |
| | | | <p>PP- Permissive Working - platforms 1 to 7 & platforms 10, 13, 14, & 17 - full use for class 1, 2, 3 (EC5), 5, 9 & 0 trains. PP is authorised in Platforms 8, 9, 11, 12, 15 and 16 TL=Through Line</p> | | | | | | | | | | | | | | |
| | | | <p>15mph PSRs on Platform 11, Through Line, and Platform 12 in Up direction continue to 180mi 95ch, including over S & C</p> | | | | | | | | | | | | | | |
| | | | <p>RA8 all lines except RA2 Platform 7</p> | | | | | | | | | | | | | | |

National Electronic Section Appendix

The majority of industry timetable data is published as PDF

Other data is available through the Network Rail Open Data Feeds

Using python to convert Loading Gauge tables to Excel format report is available to download [here](#)



Why PDF* is evil

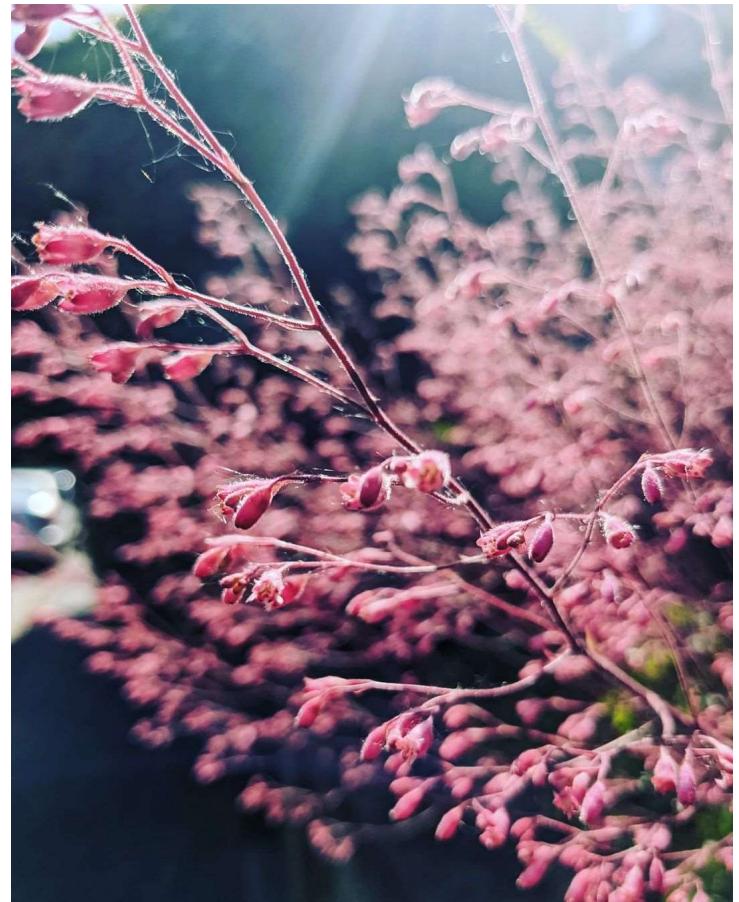
To extract text from PDF, formatting issues such as grey-scale background route-clearance columns breaks text extraction

- To overcome this, the PDF files are converted to an uncompressed CMYK PDF/A format
- the grey background removed by deleting the call and graphic state for the embedded grey background image. While it seems to work, this is in no way a recommended approach as
- It breaks the PDF files, as the PDF checksums no longer match
- It assumes the grey colour is encoded as `110 rg` and rendered via a call to `f*`
- Were the PDF rendering software used by Network Rail, or Ghostscript, or qpdf to change this would just break

*and PostScript



How should we plan?



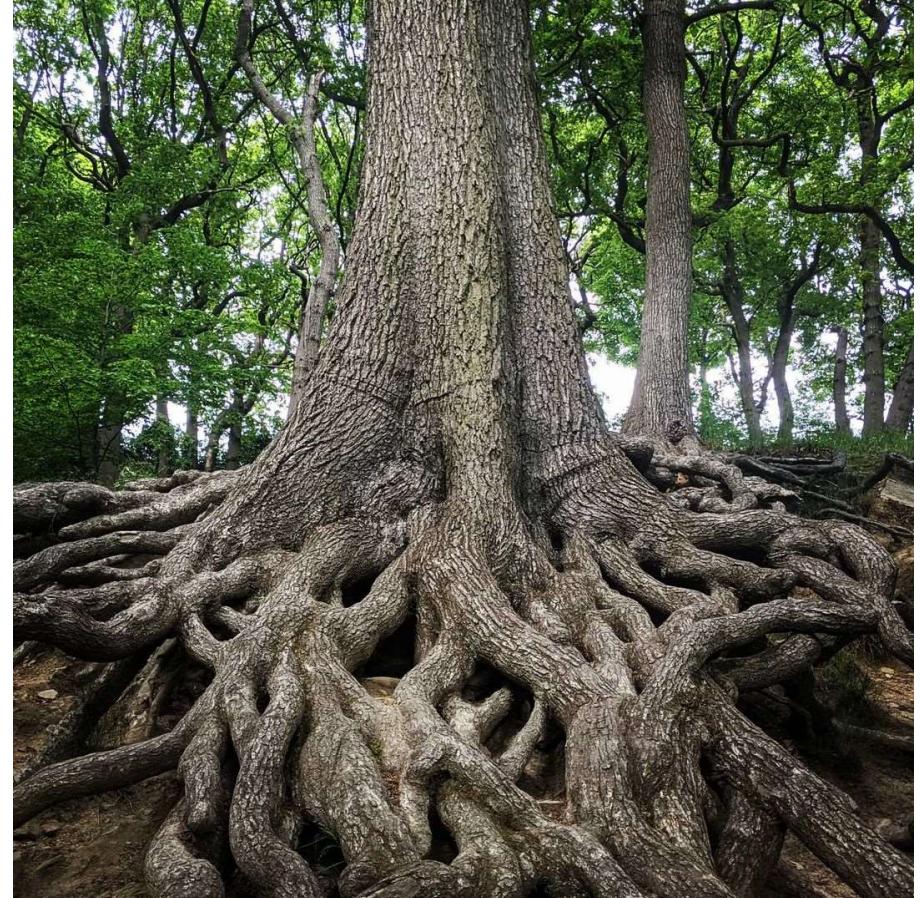
Planning Freight

Where do you want your goods to go?

- Where people are
- Where there is railway

Do you want to change behaviour?

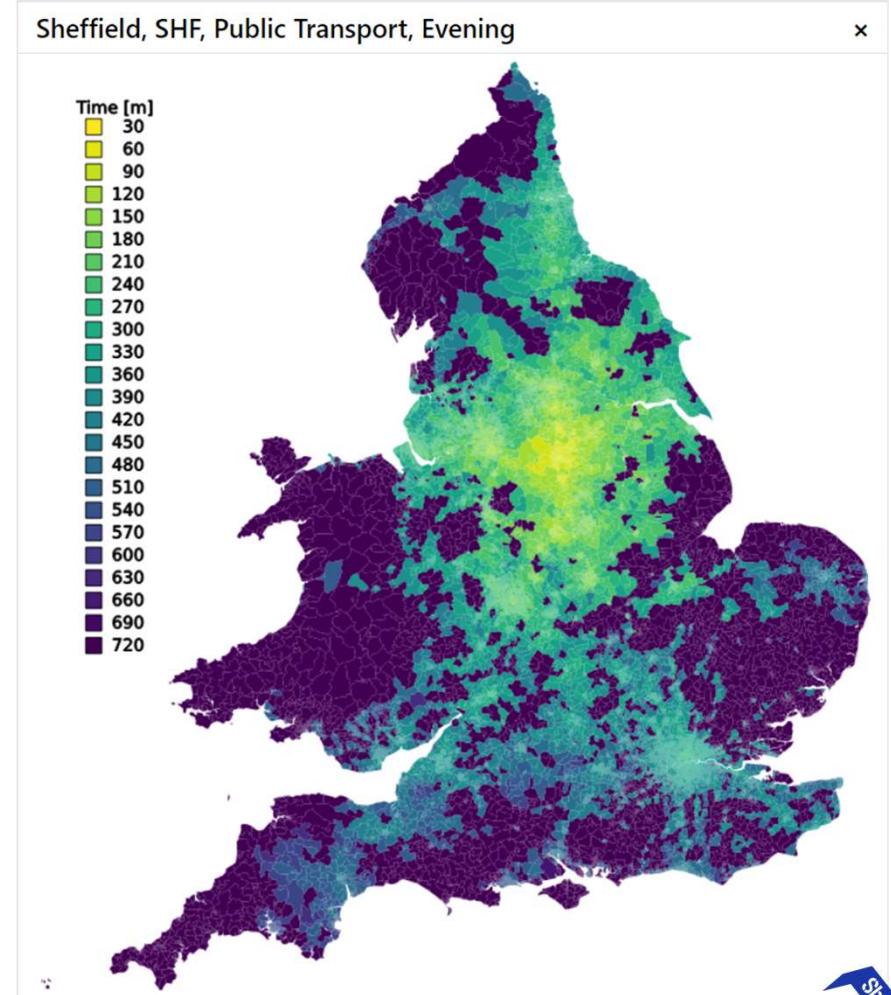
- Where do goods go now?
- Where are the main roads?
- Where are there problems?
- Where do you need new railway?



Public Transport Travel

Department for Transport (DfT)
**2001/2011 travel-time
chloropleths for train-station
public transport for England and
Wales**

Office for National Statistics (ONS)
Lower Layer Super Output Areas
(LSOA) geography



Where my Railway Goes

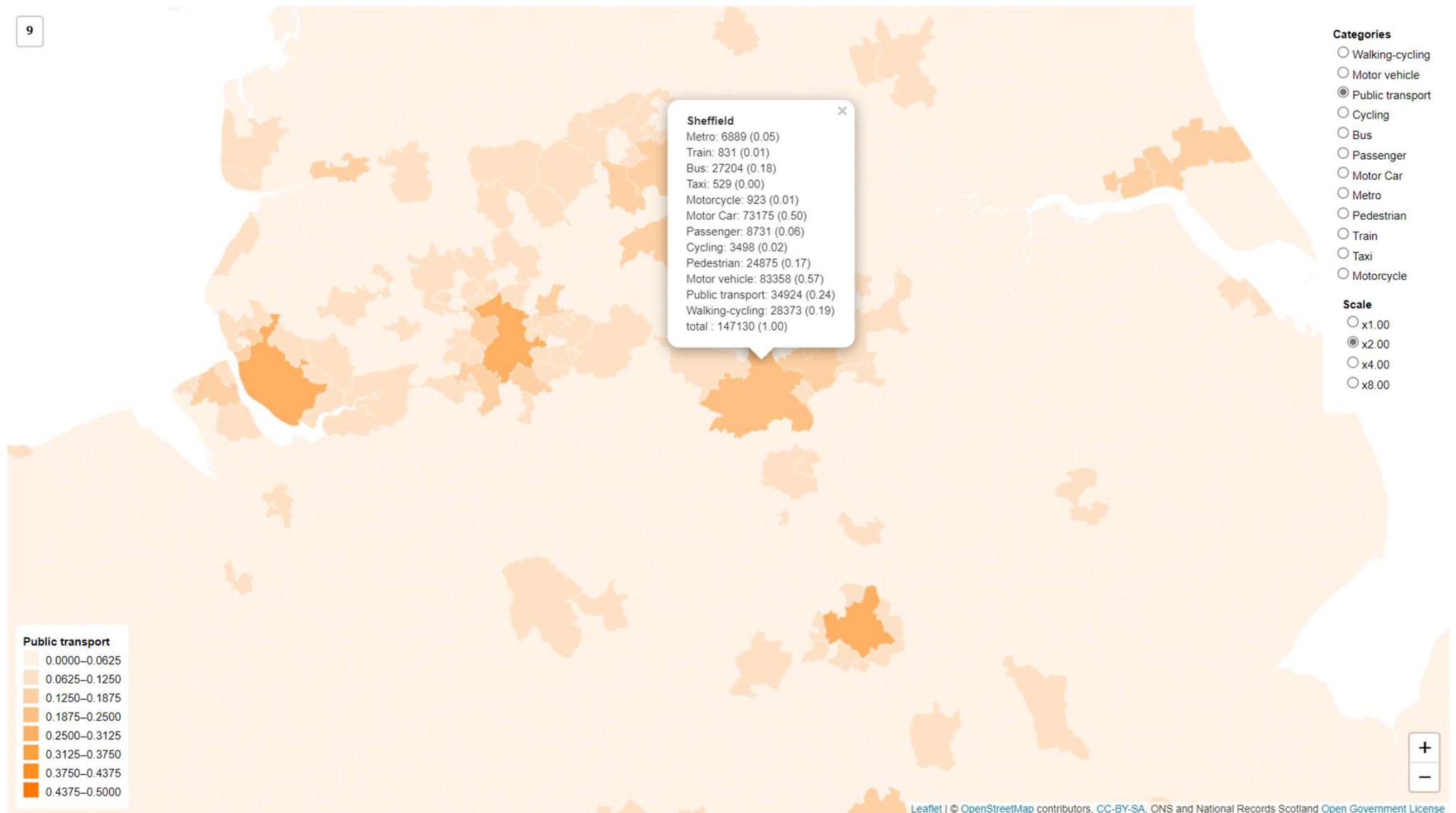
Using 2011 Census data

- station-location data from National Passenger Transport Access Node (NaPTAN)
- Super Output Area (SOA) population data
- Middle MSOA travel data

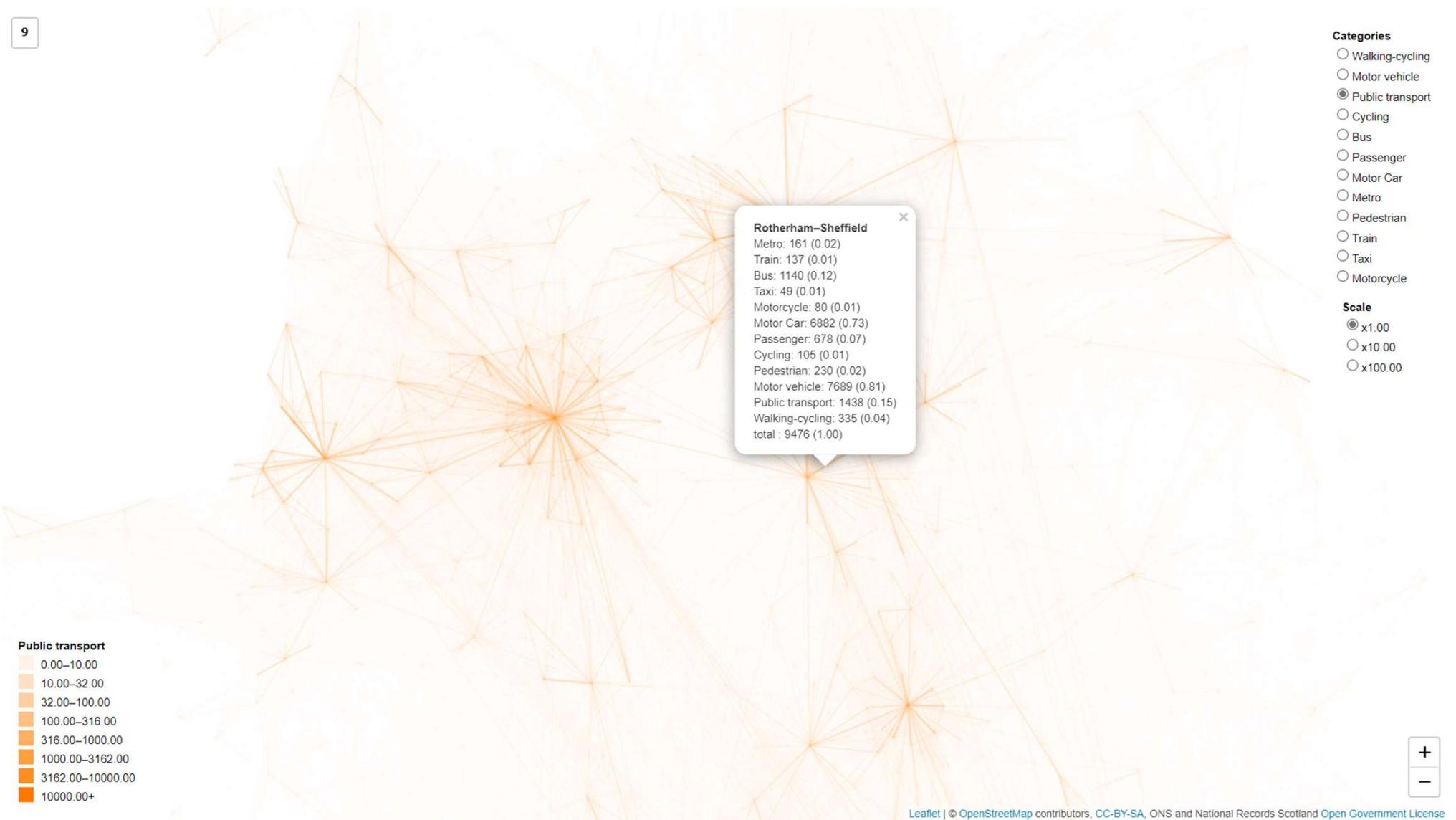
Using python GeoPandas

#Network2050





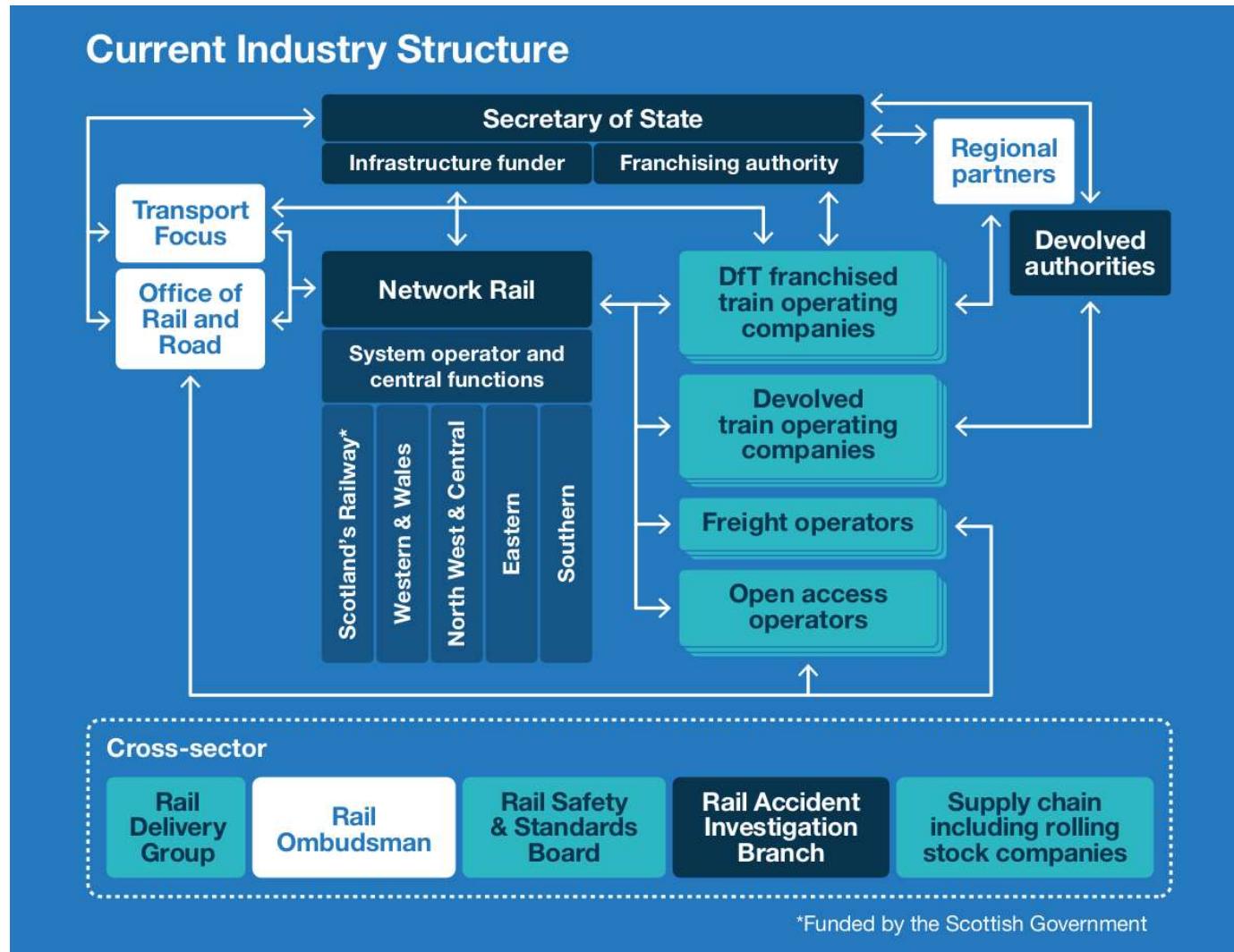
9



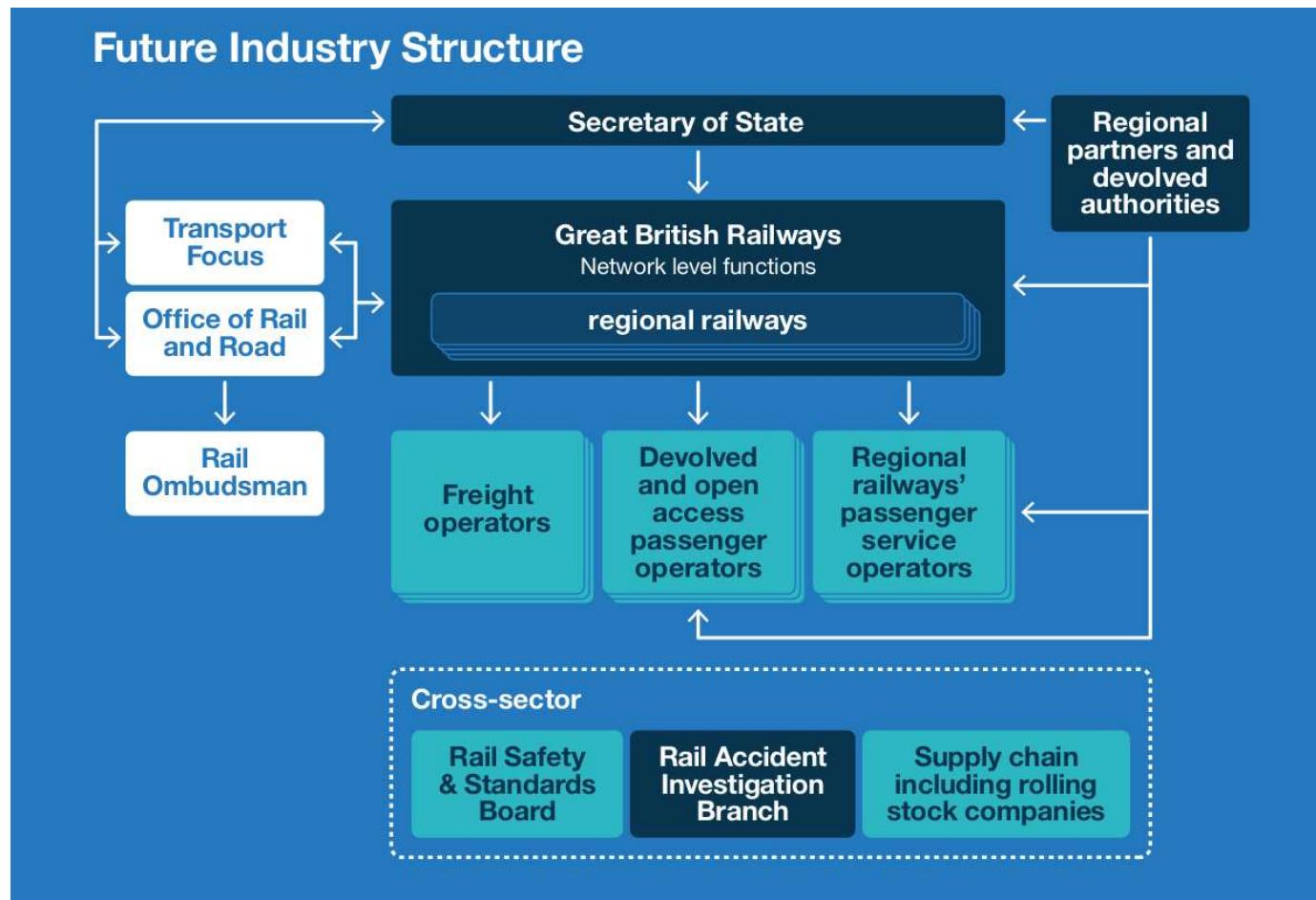
A Strategic Railway



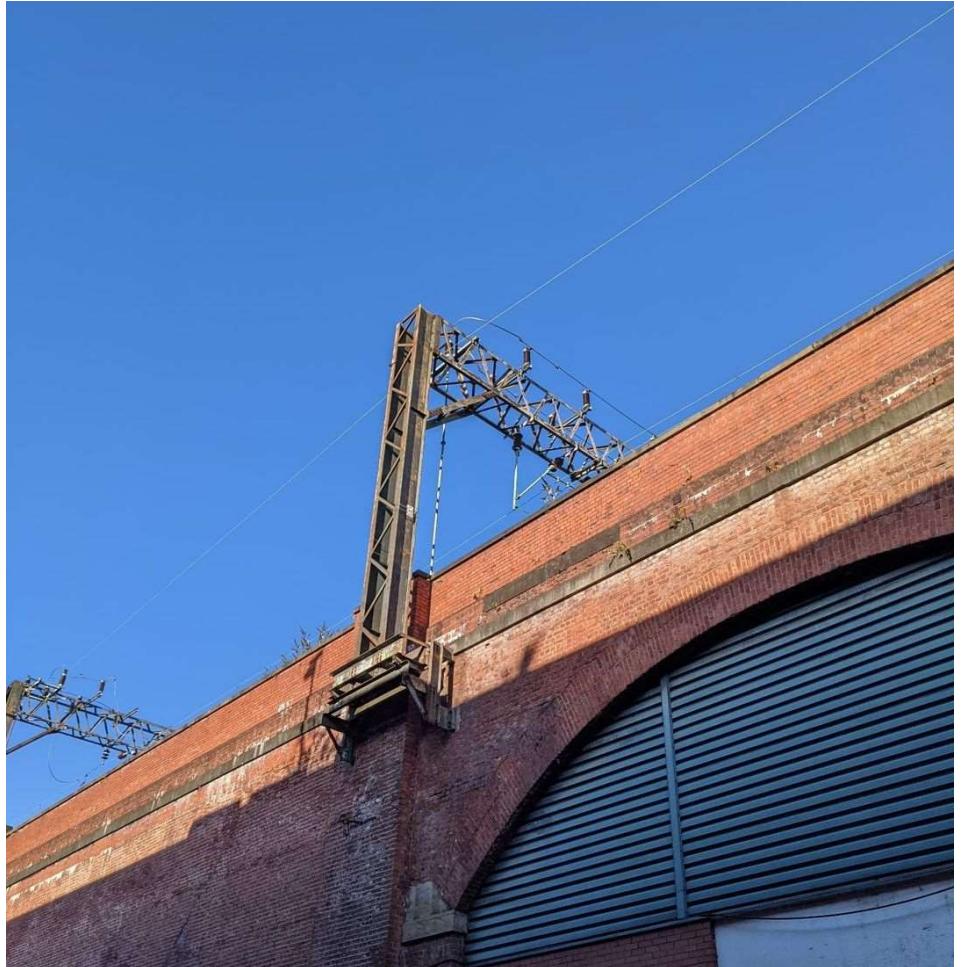
Great British Railways: Williams- Shapps plan for rail 2021



Great British Railways: Williams- Shapps plan for rail 2021



Rail Electrification



Rail Electrification

‘Once upon a time on a hot day in May 2020 amidst a pandemic lockdown, a rail engineer tweeted....’



Garry Keenor (He/Him)
@25kV

If anyone out there has experience of building an instance of [@openstreetmap](#), could you get in touch? I've had a dangerous idea, but I don't have all the necessary technical skills to implement

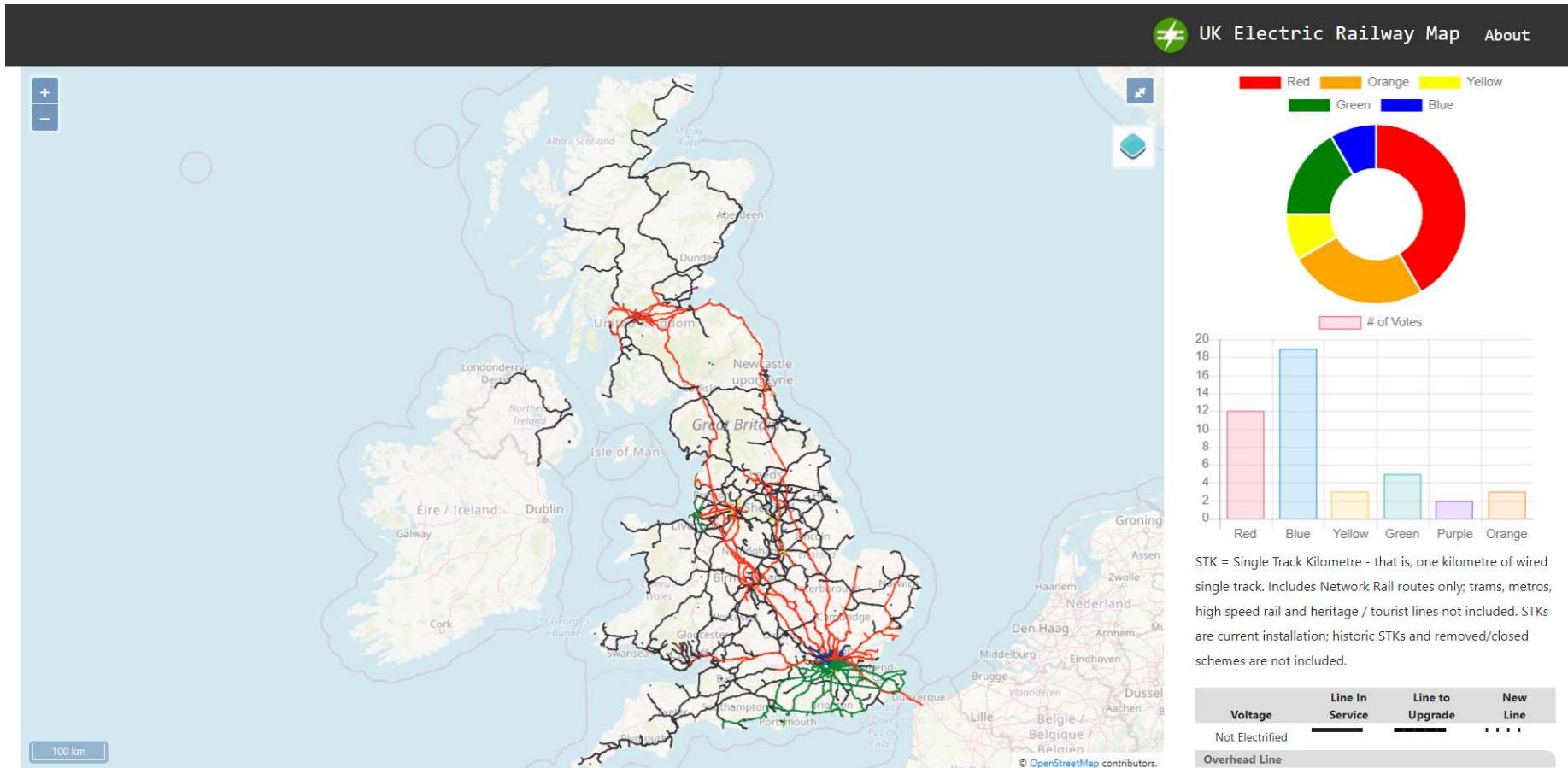
10:42 am · 25 May 2020 · Twitter for Android

1 Retweet 12 Likes

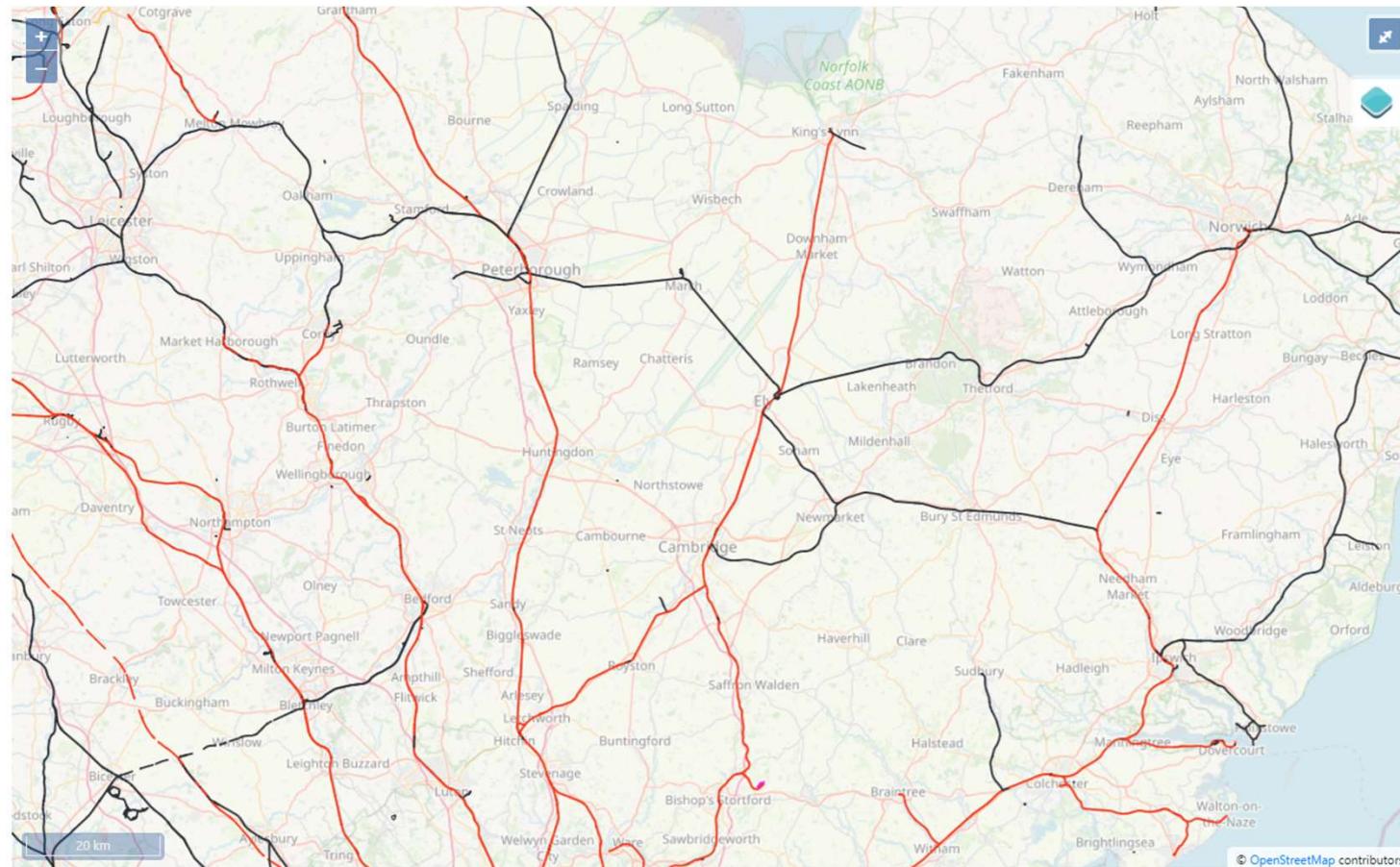
...



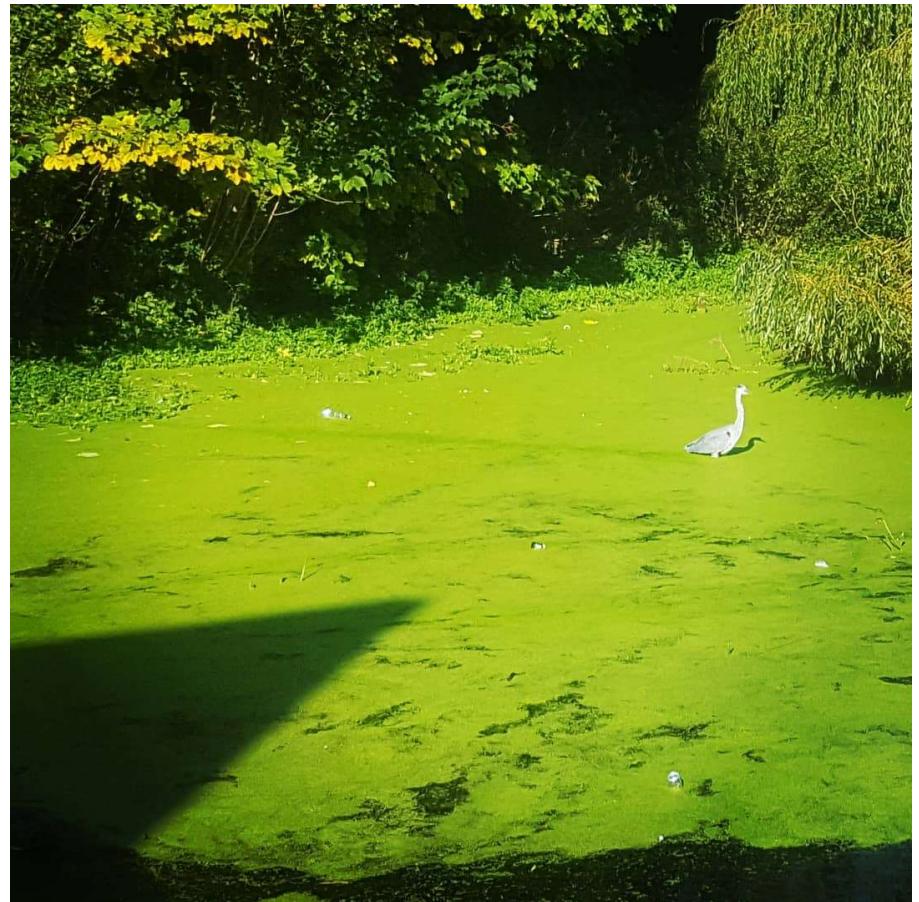
Rail Electrification



Rail Electrification



Data Access



British Open Transport and Rail Data

- 1. Public Transport Freight statistics**
- 2. National Electronic Sectional Appendix**
- 3. A Strategic Railway plan**
- 4. Rail Electrification plan**
- 5. Freight Movement**

Stick to the Plan!



Freight Traction



Diesel Locomotives

Class 70 (I Feel Alright)

This is...apparently...Britain's
most powerful diesel freight
locomotive



“Why Rail Electrification”,
Railway Industry Association 2021

Electric Locomotion

**The Electric 92
(Danger! High Voltage)**

**The class 92 electric is twice
as powerful as a class 70**



**“Why Rail Electrification”,
Railway Industry Association 2021**

Diesel Locomotives (slight return)

Class 66...revisited
When they do good!

- First mile
- Last mile
- Engineering
- Power's off



“Why Rail Electrification”,
Railway Industry Association 2021

Casting shade on the alternative powers

| | By Volume | | By Weight | |
|------------------------|-----------|---------|-----------|---------|
| | MJ/litre | Volume* | MJ/kg | Weight* |
| Diesel | 36 | | 43 | |
| Hydrogen (at 700 bar) | 4.8 | 7.5 | 71 | 0.6 |
| Hydrogen (at 350 bar) | 2.9 | 12.4 | 71 | 0.6 |
| Battery pack - current | 1.7 | 21.2 | 0.7 | 61.3 |
| Battery pack - at 2035 | 2.6 | 13.83 | 1.03 | 42.9 |

*diesel = 1.0 (density 850.5 kg/m³)

Table 3.1 Comparative energy densities of diesel, hydrogen, and batteries from "Why Rail Electrification", Railway Industry Association 2021

A Very European Railway



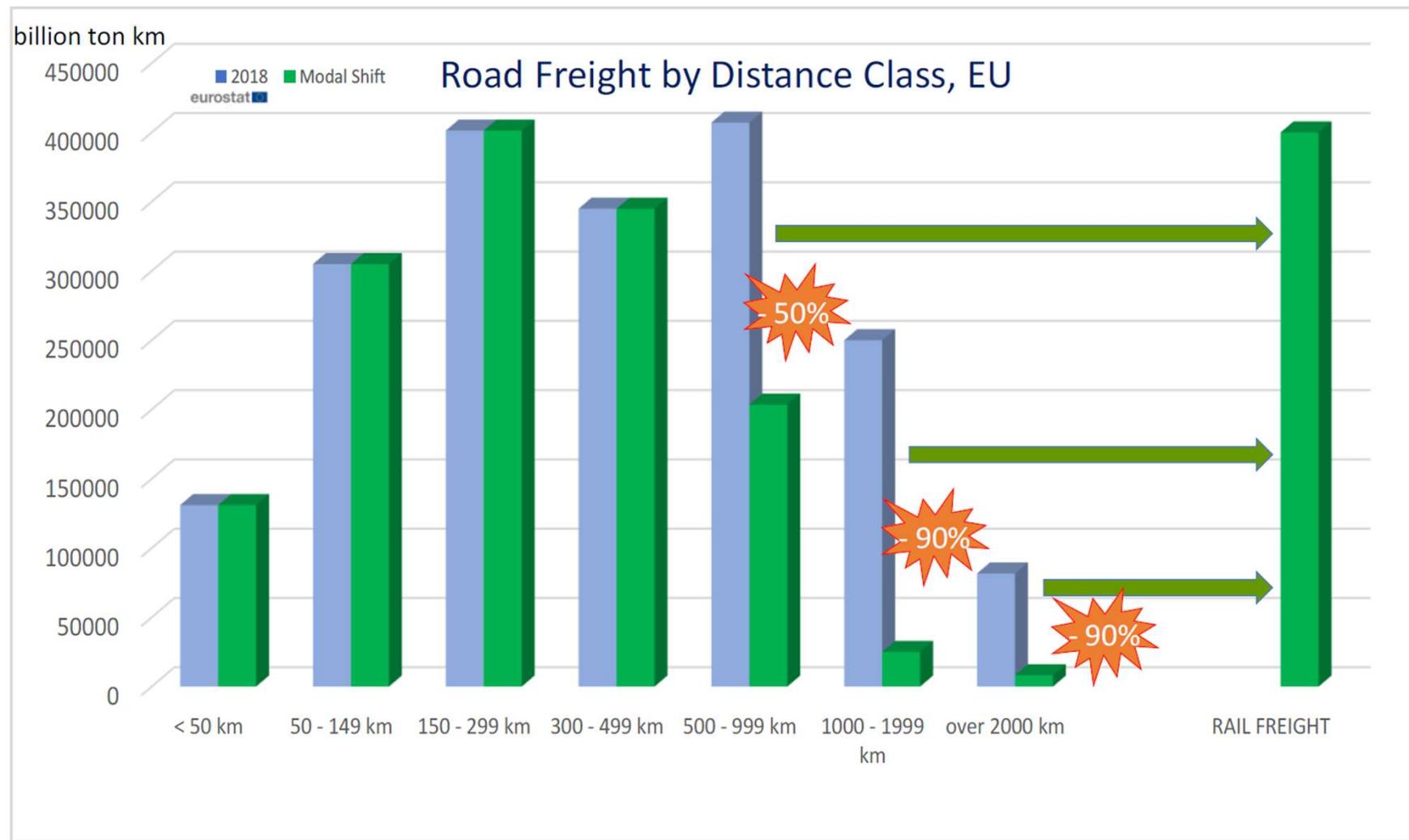
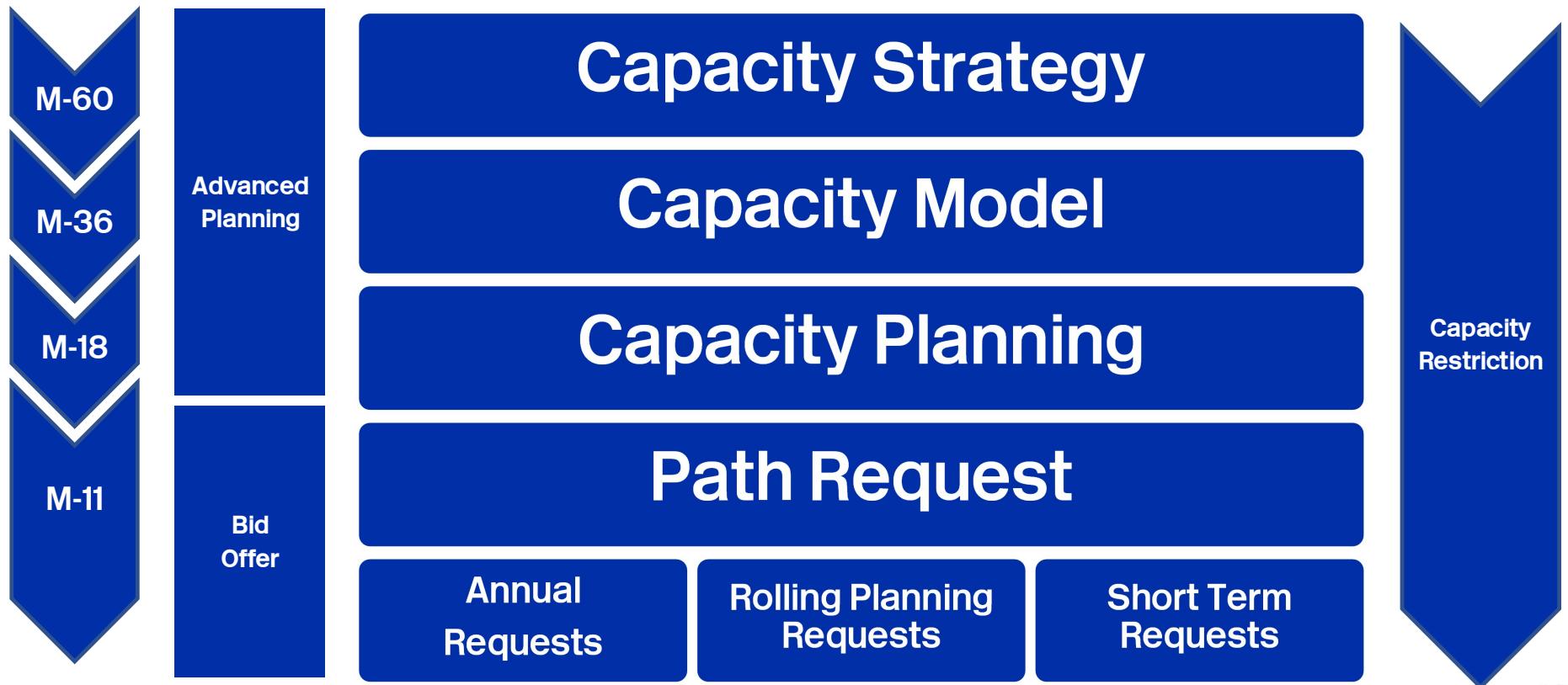


Figure 5 from “Fostering Rail Through Green Deal - part 2 Freight”, European Agency for Railways, 2021

Time Table Redesign



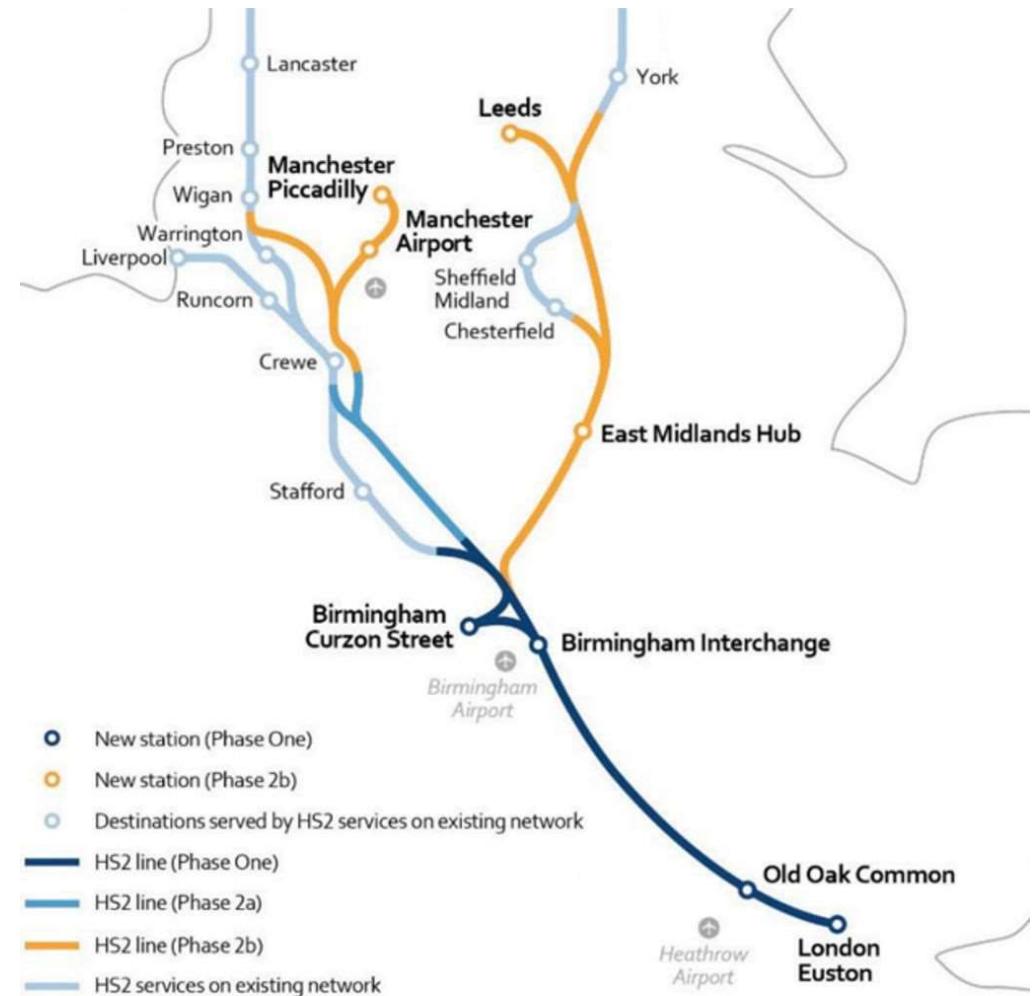
Based on "Timetabling and Capacity Redesign (TTR)", RailNet Europe, 2022

Rail Capacity



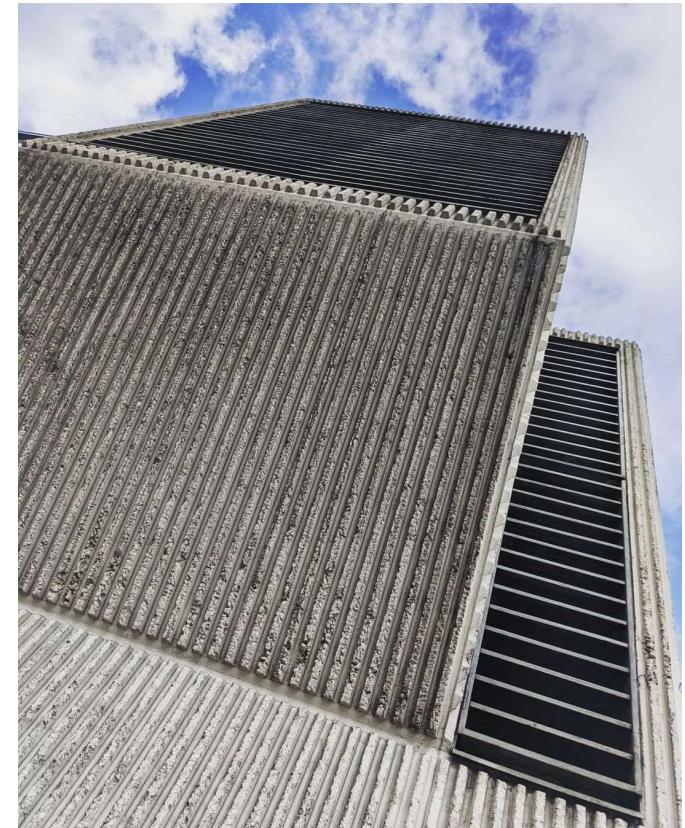
HS2 for Freight

All HS2 phases frees capacity for up to 144 freight trains a day



Fixing the Network

**Longer freight trains
Smoother freight paths
Improve service recovery
Reduce engineering work impact**



"Future Potential for Modal Shift in the UK Rail Freight Market", DfT 2016

A British Approach



UK Freight today

Transport accounted for 122 mtCO₂e (26.8%)

In 2020 in the UK 176Bn tonne km (tkm) domestic freight was moved

- 135.5Bn tkm by road (77%)
- 24.6Bn tkm by water (14%)
- 15.9Bn tkm by rail (9%)

Historically peak rail was 22.7Bn tkm in 2012/13



From 2022 to 2034

**Where switching is easy, freight
is competitive and price
sensitive**

**“If road and rail were to pay full
external costs then rail freight
is significantly favoured”**

**“Rail-freight-forecasts-Scenarios-for-2033-34-and-
2043-44”, Network Rail 2016**



2034-2044 and beyond

**Build a dedicated European
gauge freight route between the
Channel Tunnel Rail Link in East
London to the East Midlands,
South Yorkshire, Manchester,
Carlisle and Glasgow**

Network Rail “Rail-freight-forecasts-
Scenarios-for-2033-34-and-2043-44” 2016



2034-2044 and beyond

With 72tpd (peak 4tph)

- 7.8Bn tkm (50%) increase in rail**
- 5% increase in total (50% of 10%)**
- 5% reduction in road-freight**
- 26.8% of UK total**

1.25% reduction in UK CO₂ emissions

Network Rail 'Rail-freight-forecasts-
Scenarios-for-2033-34-and-2043-44' 2016



In conclusion



What's it all about?

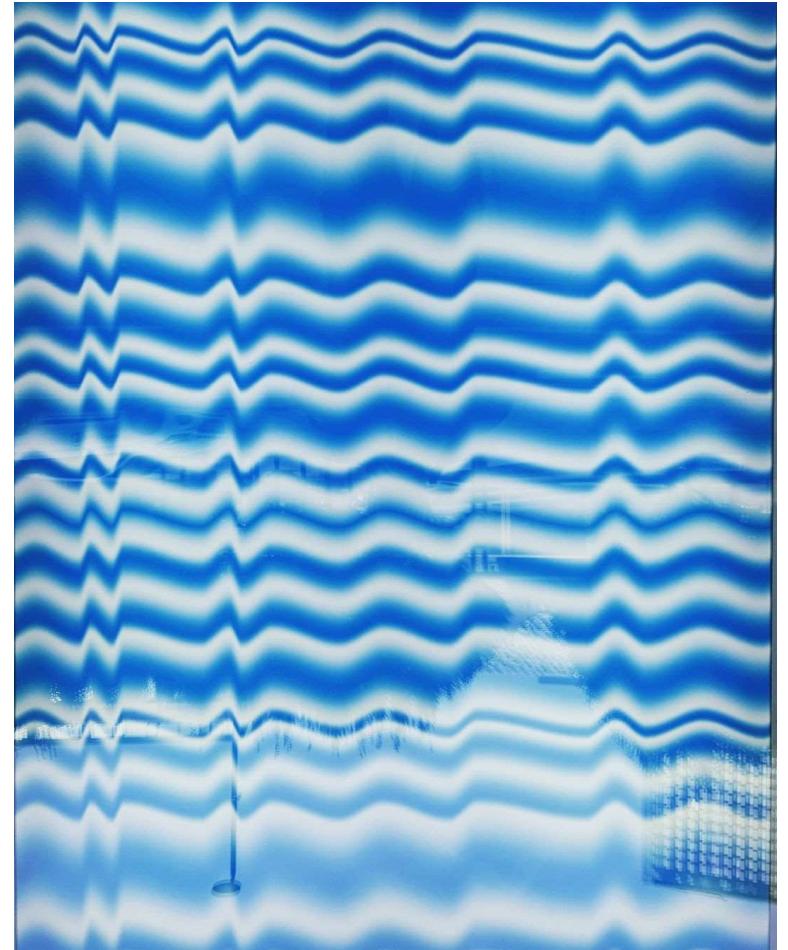


Incremental Change

**Significant investment in rail freight
will make a difference**

**A total of 1.25% reduction in UK CO₂
emissions by 2044**

Is it enough?



Is it enough?



Questions and Answers





**Build it and
they will
come!**



Parting Words



The Timetable is awesome...

'Madame Helena, the timetable is the most perfect product of the human mind'

R.U.R.
Karel Čapek



...but it could be better

On this feast day of St. Vincent, let us look at data starting with the publication and interpretation of the current rail timetable in Great Britain, with examples from rail-freight, see the challenges and think about how to make things a bit better

This talk provided a general albeit nerd adjacent audience with an overview of the current rail-freight timetable and processes



Thank You



Will Deakin
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Postscript

'It is better to ask some of the questions than to know all of the answers'

- James Thurber

My thanks go to Gareth Dennis, Xander Veitch, Garry Keenor, and my ever and long suffering family, all friends, colleagues and contributors to all the projects I have wilfully used for their help, support and advice

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