Capacity Trade-off Key Goals

Quick, Easy to use, High-level tool to:
• Change current mindsets and move away from pre-determined sub-system solutions
• Enable a whole-systems approach to ensure interdependencies are accounted for.

Which investment option(s) should be taken forward?
System thinking for the Railways

Railway Functions & Capabilities

Operations
Infrastructure
Rolling Stock

Performance of the railway
**Capability trade-offs Tool**

**Whole System Approach + Capabilities Trade-offs**

**Determine best way to ...**

- Get 50000 people an hour through Route A
- Get 300 people off the train every 3 minutes

**... by doing ...**

**... by comparing ...**

**Benefits of different innovations/improvements**

- **Capability design trade-offs**
  - High performance low capacity trains vs low performance high capacity trains

- **System design trade-offs**
  - Acceleration/braking vs number/size of doors.
Case Study

Improving East Coast Mainline (ECML) capacity

Problem
Significant passenger capacity increase needed to meet growing demand

Geographic Scope, East Coast Main Line Route Utilisation Strategy, Network Rail, 2008
Case Study – Peterborough to Doncaster

Sub-section on the major railway link between London and Edinburgh

Traffic
- 6 High Speed Intercity Passenger Services (200 kmh)
- 2 Regional Passenger Services (145 kmh) – *part of the route*
- 1 Freight (100 kmh)

Signalling
- 4-aspect

Tracks per direction
- 1 (Doncaster to Stoke Tunnel)
- 2 (Stoke Tunnel to Peterborough)

Structures
- > 30 Level Crossings
- > 100 bridges & 4 tunnels
Potential Solution: Reduce heterogeneity of the traffic

1. Increased train capabilities (braking/acceleration/max speed) allowing closer running
2. Introduce new freight paths elsewhere (find alternate routes/build new tracks for freight)
Case Study – Peterborough to Doncaster

- **Baseline**: current conditions

- **Investment Option 1**: Upgrade rolling stock

- **Investment Option 2**: Option 1 + remove freight from ECML

- **Investment Option 3**: Option 2 + upgrade to ETCS L2, optimised block sections

**Target**: Increase Capacity by 50%.
Case Study – Peterborough to Doncaster

Reporting Outcomes

Current vs Upgraded Rolling Stock

Current vs Upgraded Rolling Stock & Removal of freight

Current vs Upgraded Rolling Stock, Removal of freight & ETCS L2 (w/ Optimised Blocks)
Capabilities Trade-Off Tool

Demo

http://c4r.jerid.cz/
Capabilities Trade-Off Tool
Thank you for your kind attention

Aaron BARRETT
& Vijay RAMDAS

Transport Research Laboratory
vramdas@trl.co.uk
Abarrett@trl.co.uk