



Institution of Mechanical Engineers

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London Overground – The Recipe for a Reliable Railway

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Overview

- Origins
- Overground Genesis
- Vision & Results
- Delivery method
- Achieving Consistent Performance
- Opportunities & Challenges
- Questions



Key

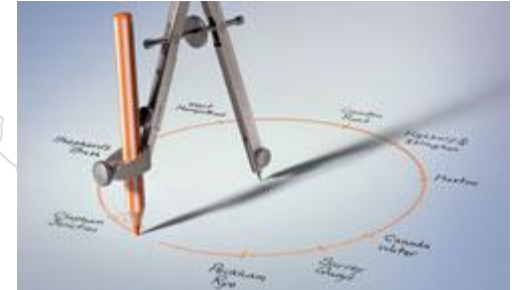
- Interchange stations
- Step-free access from street to train
- Step-free access from street to platform
- London Underground
- DLR
- National Rail
- Tramlink
- London Overground

MAYOR OF LONDON

Transport for London

OVERGROUND

London Underground map



Origins.....long history...

- Heyday 19th/early 20th century
- Undermined by competition from car & tube and depopulation
- Some investment in early 1980s funded by the Greater London Council
- Increasing prosperity and population during 1990s
- Regeneration opportunities
- A case of unfilled potential when TfL came into existence in 2000
- TfL vision of additional services, new routes and station improvements

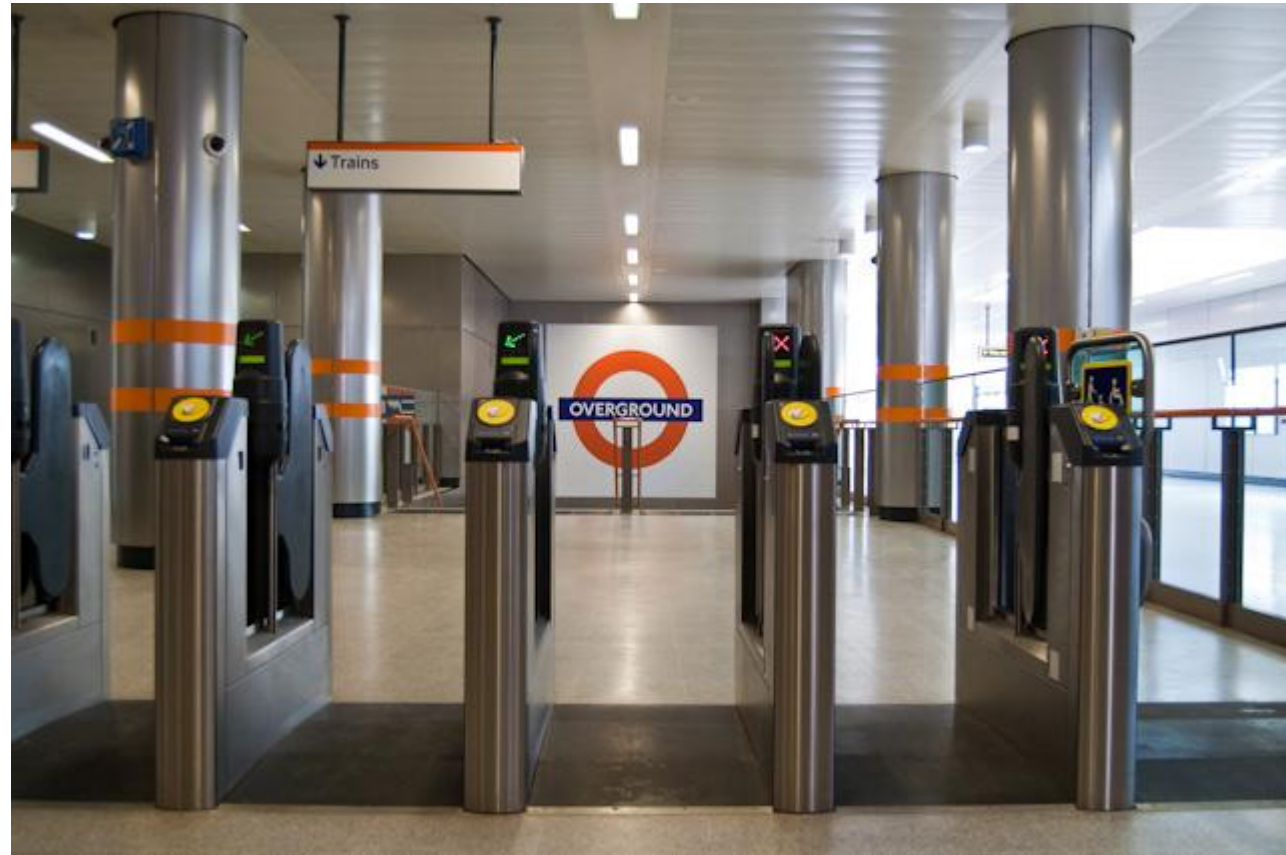


Garrett Bayne's UK Rail Timeline 2005
Silverlink Metro Class 313 3-Car EMU No. 313117 Richmond Norwich Woolwich service @ Gospel Oak station, North London, June 28th, 2005.
© 2009 Garrett Bayne - garrett.bayne@btinternet.com



Breakthrough: the Genesis of London Overground

- TfL gained control of passenger services under 2005 Railways Act
- Opportunity and confidence to invest in major improvements, and ensure high standards



Vision

“For decades, national rail services in London have been neglected and in many cases under-utilised. The transfer of responsibilities to TfL and the dawn of ‘London Overground’ will start the much needed revitalisation of London rail services, bringing the standards of service up to the levels of the Tube and the buses.....

.....By joining together the North and East London Railways ahead of the London 2012 Olympics, we will create a new rail artery around the city, serving 20 London boroughs. This will create new opportunities for Londoners and encourage inclusion across our diverse economic and cultural centres. It will also be a vital means of increasing capacity on public transport as London’s population grows over the next twenty years.”

Ken Livingstone 2006



Policy

“TfL’s policy is to put passengers first using TfL’s values to raise standards for rail passengers, as we have for other transport modes in London.

.....a safe and secure railway with frequent, Metro-style train services. Passengers will benefit from a better quality of service with new, reliable trains, staffed stations and Oyster ticketing

We want the ‘London Overground’ to be as comfortable and familiar to Londoners and visitors to the capital as the London Underground. We’re entering a new era for London Rail and this is just the beginning.”

Ian Brown – London Rail MD 2006



“When they see the Roundel people expect quality”



Results.....Have we delivered ?



Brand new train fleet, greatly improved ambience...

From this...



To this...



Brand new, high quality stations on the East London Line



Existing stations refurbished with improved ambience, customer information, security and retailing



New , high quality Operator



- **Joint Venture between Deutsche Bahn and MTR Corporation**
- **Appointed by TfL in 2007 under a Concession arrangement**
 - **Service levels, standards and fares set by TfL**
 - **Operating fee**
- **Operates 1,090 trains a day for TfL, employs 1,200 people and looks after more than 400,000 passengers every day.**
- **2 year concession extension to November 2016 just granted**

“The two year extension is recognition of ...LOROL's excellent operational delivery”.



TfL Investment

- New fleet of Class 378 EMUs, initially 24, 3 car dual voltage trains, converted to 4 cars. Plus 13 further dual voltage trains and 20 single voltage trains **BOMBARDIER**
- North London Railway Investment Project – delivered jointly with NR 
- East London Line Project Phases 1, 1A & 2   
- Station Enhancements jointly with LOROL
- All delivered ready for the Olympics

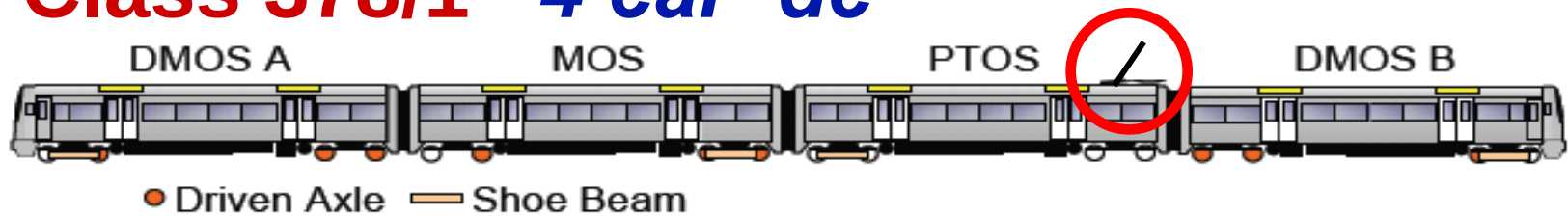


Class 378

BOMBARDIER



20 Class 378/1 *4 car 'dc'*



37 Class 378/2 *4 car 'dual voltage'*



North London Line Railway Infrastructure Project



- Remodelled trackwork between Dalston and Camden
- Allowing for the extension of East London Line
- Resignalling (Willesden Junction to Stratford)
- Civil Engineering works
- New platforms + platform extensions inc Stratford
- Channelsea freight loop (Stratford)
- Willesden High Level turnback
- Latchmere curve (West London Line)
- Traction power enhancement



ELL Phase 1

Balfour Beatty

carillion



- Enabling Works
- ELLP Main Works Infrastructure
 - Civil & Structures
 - Track
 - Stations and Buildings
 - Electrification & Plant
 - Signalling
 - Telecommunications
- Network Rail Infrastructure
- London Underground Infrastructure
- Bulk Supply Power
- Fleet of Class 378 dc EMUs
- New maintenance and stabling Depot at New Cross Gate



Phases 1A & 2

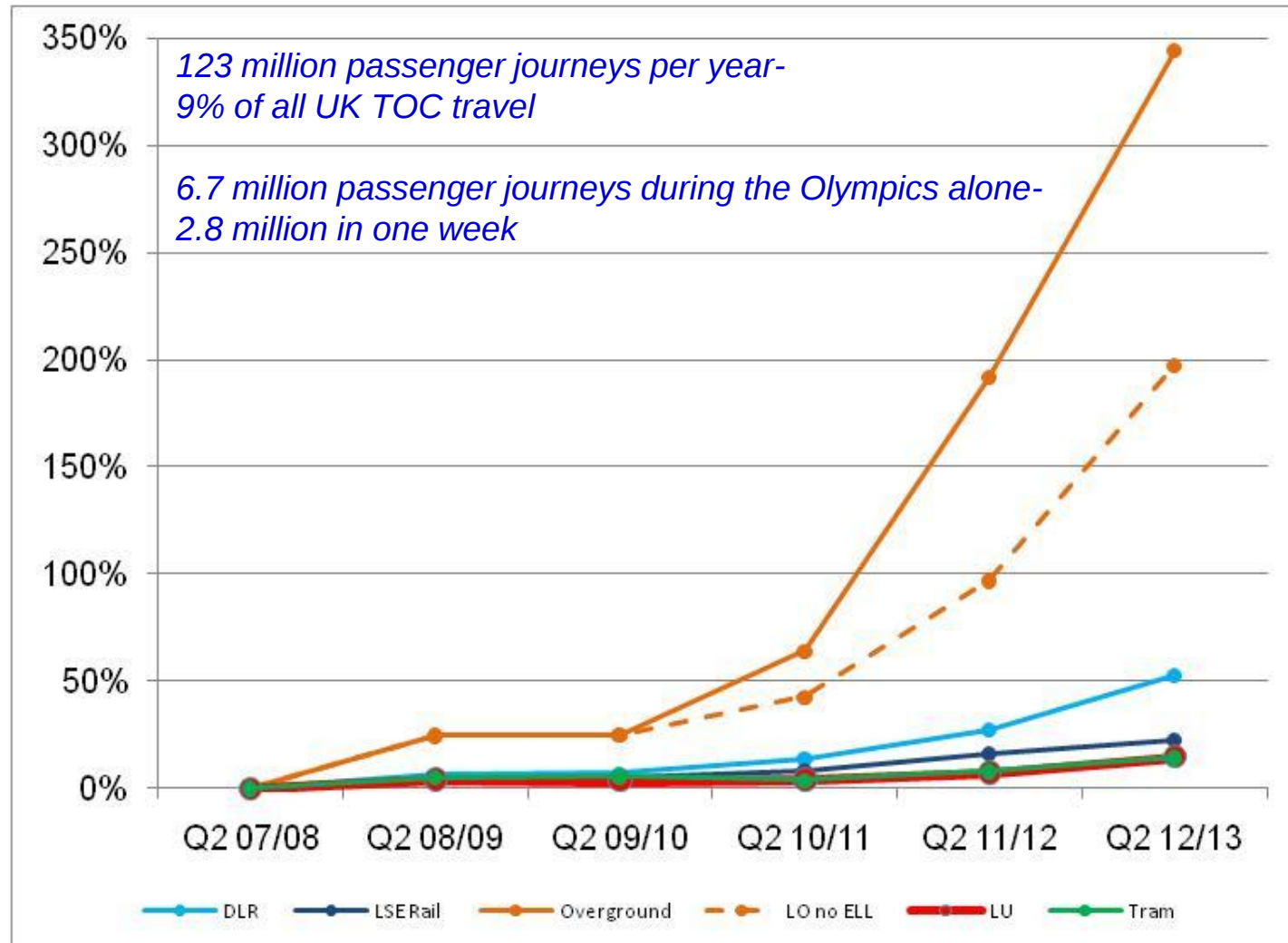
Birse
Metro



- Phase 1A Extension to Highbury & Islington - opened February 2011
- Phase 2 Extension to Clapham Junction - opened December 2012
- Orbital route now completed
- Now delivering a 25% capacity increase on cl 378 operated routes



Overground passenger demand is over four times the level when TfL took over

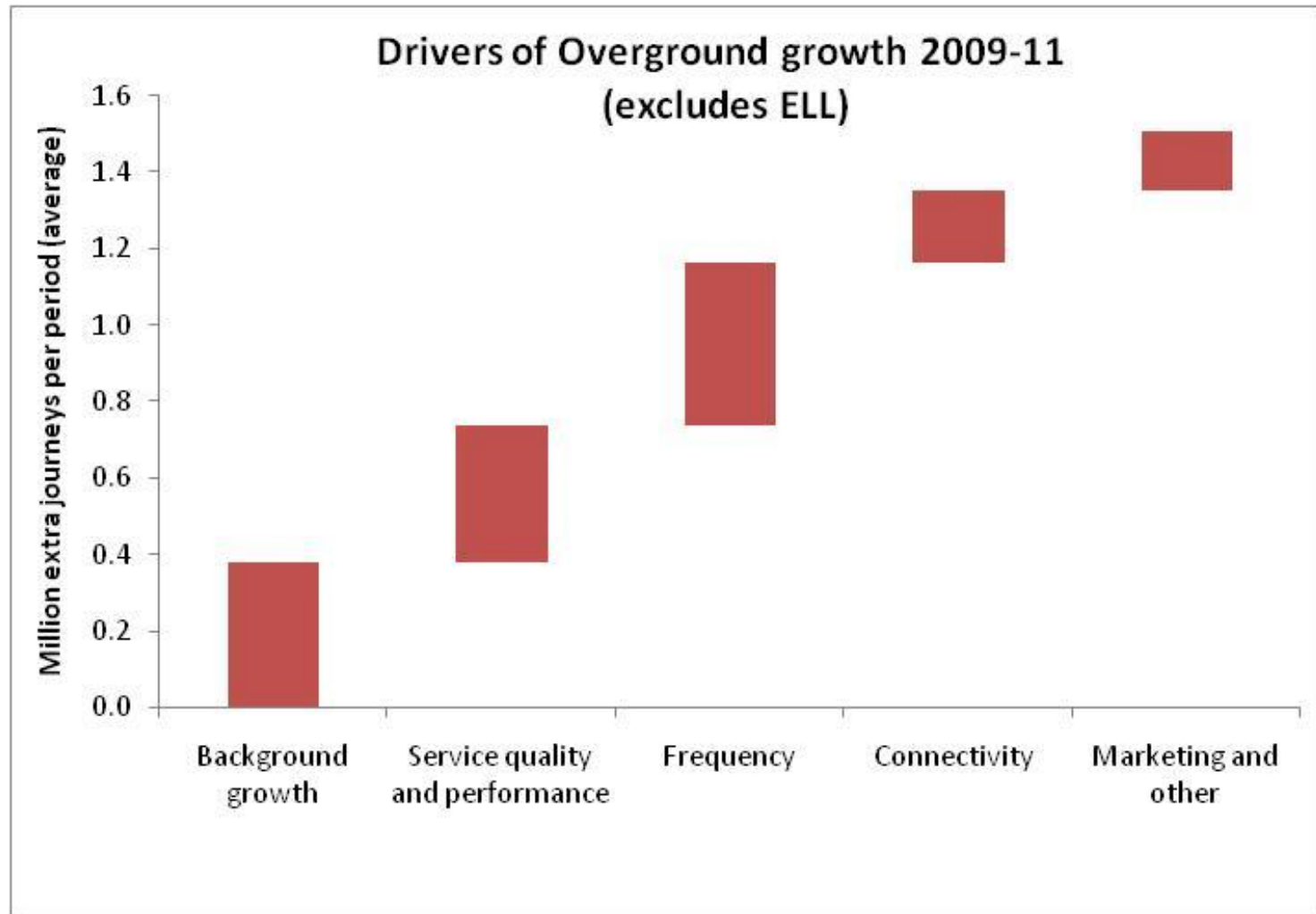


Customer Satisfaction is at an all time high

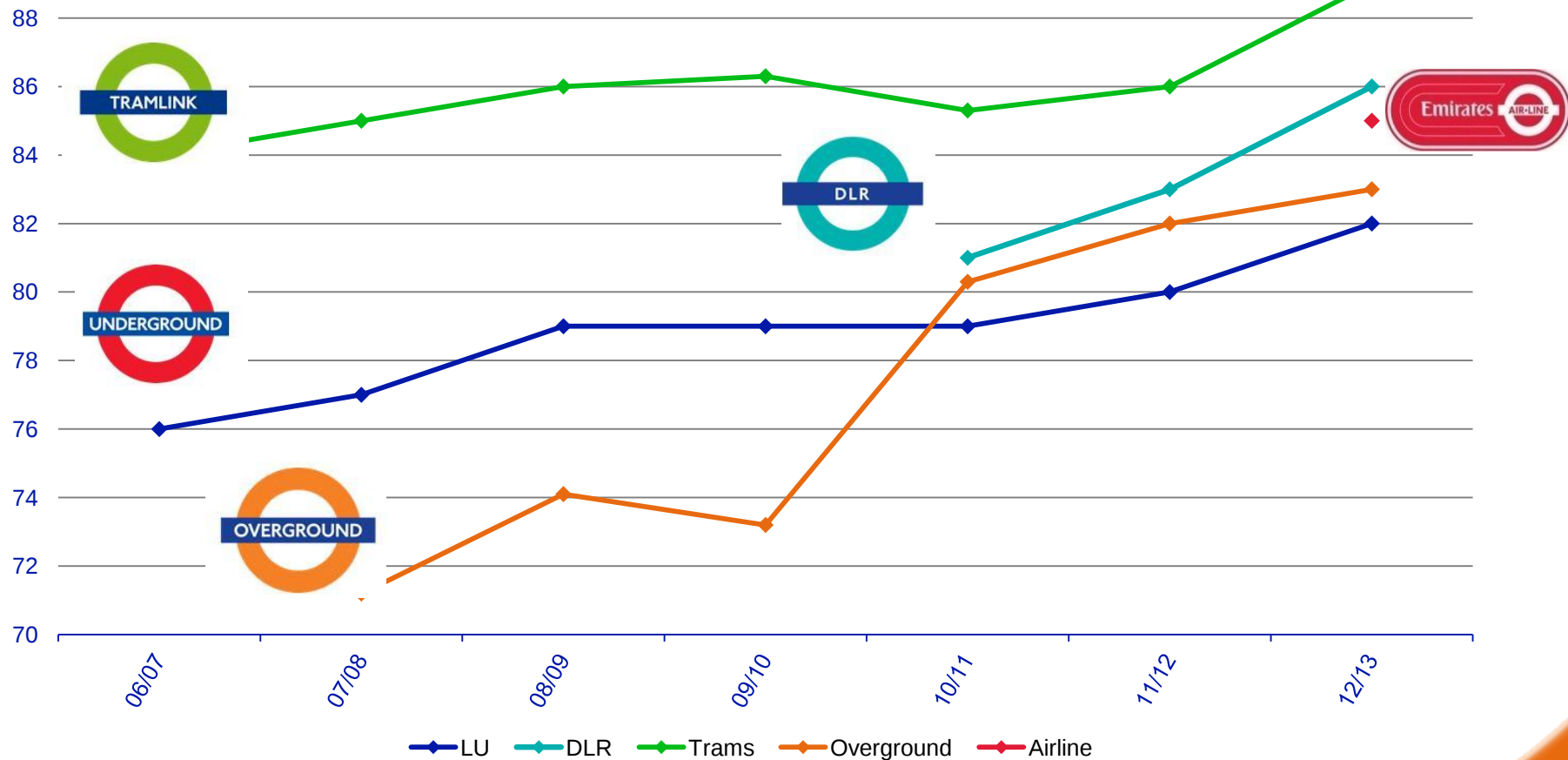
- UKs highest passenger satisfaction of any franchise or concession, according to a new survey by the independent watchdog Passenger Focus.
- The orbital network shares its “most satisfied customers” accolade with C2C in the results (Autumn 2012). London Overgrounds 93% is well above the 85% average score for satisfaction in the London and South east region
- Mirrors London Overground’s consistent scores in the top bracket of Network Rail’s tables for punctuality
- Overground is setting a new benchmark for rail operators in London



Impact of drivers on demand



Customer Satisfaction is at an all time high



Delivery Method

Birse
Metro



BOMBARDIER



Systems Integration



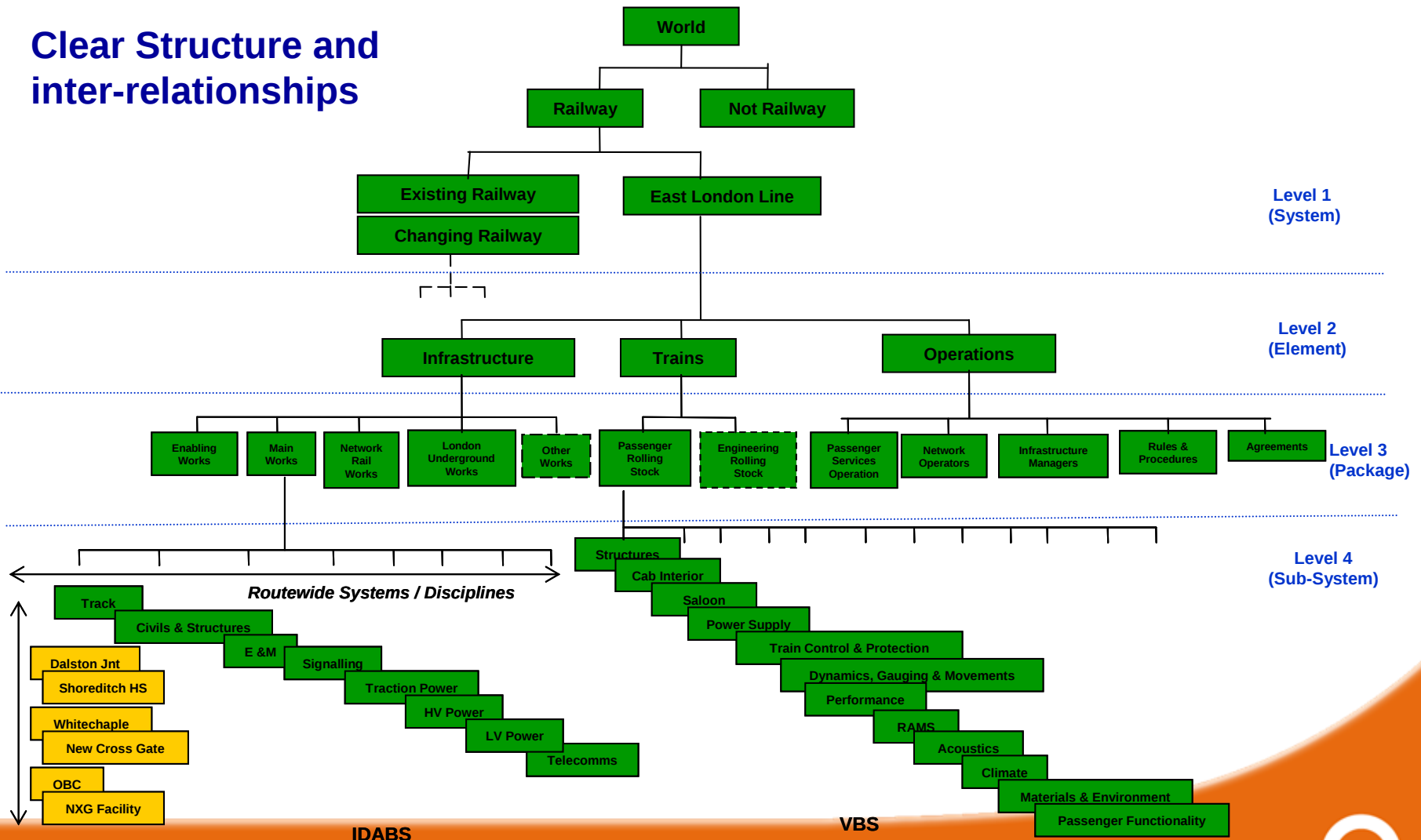
Systems Integration

- ELL Project delivered with integration of all elements at its core
- Three main elements
 - Infrastructure
 - Performance and compatibility with trains
 - Trains
 - Performance and compatibility with infrastructure
 - Operations and maintenance
 - Systems designed around Operations Concepts
 - Design for maintenance



Defining the Elements

Clear Structure and
inter-relationships



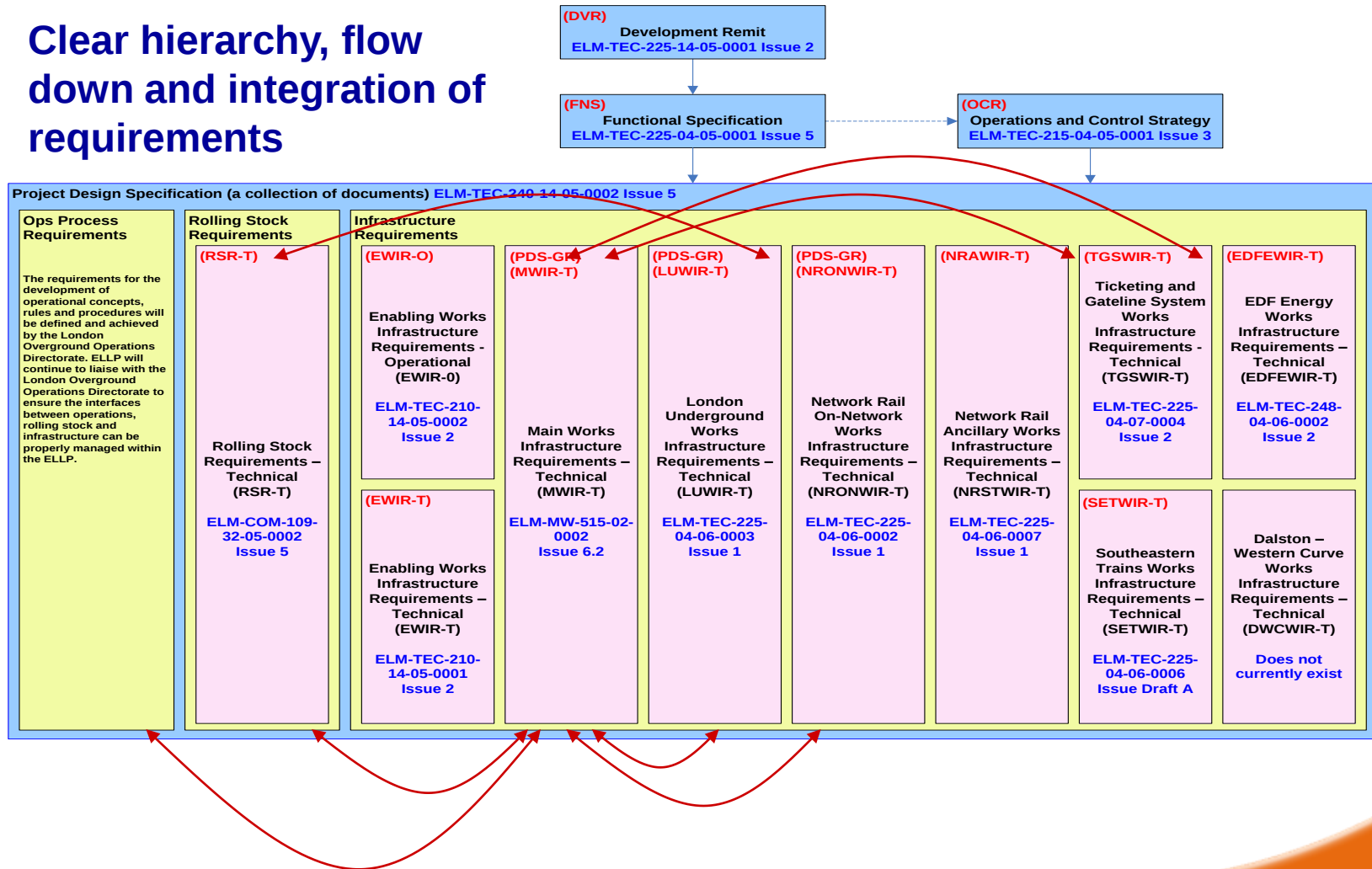
IDABS

VBS



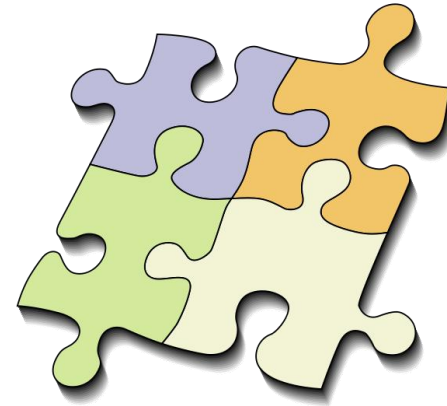
Defining the Requirements

Clear hierarchy, flow down and integration of requirements



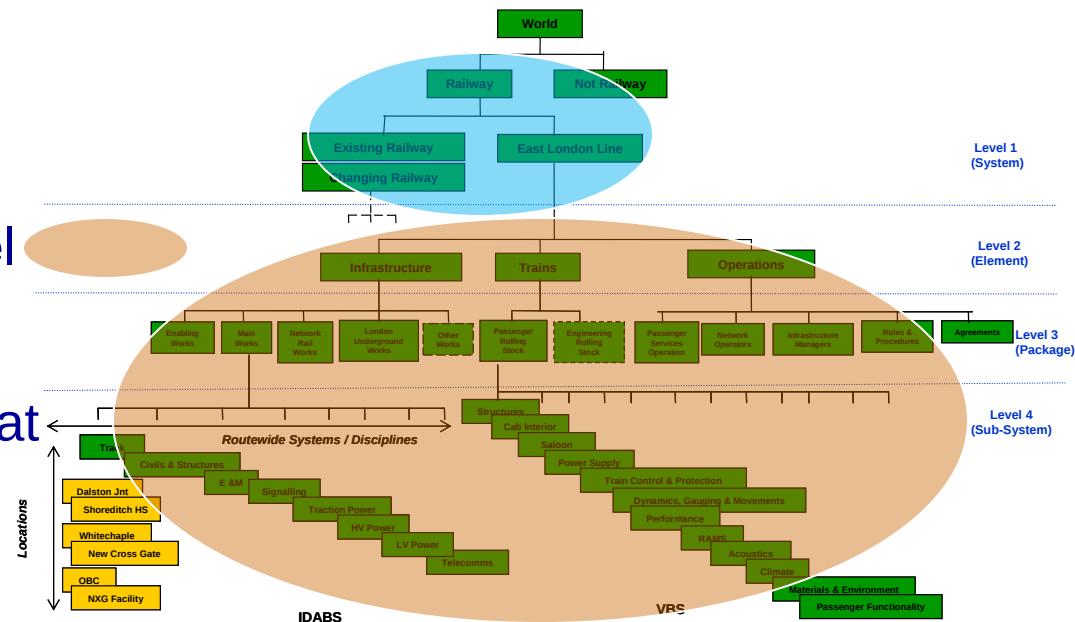
Assurance

- What ?
 - Assurance that the elements of the railway
 - Perform to specification
 - 'Click' and work together as an integrated system
- Why ?
 - 'No Surprises'
 - Assurance that the railway will work safely and reliably from 'day 1' and deliver the required output
- When ?
 - Progressive assurance
 - Check points at project stages
 - Requirements specification
 - Design
 - Build
 - Commissioning
 - Acceptance



Progressive Assurance

- How ?
- Technical Cases at each project stage at 'subsystem', 'package' and 'element' level
- 'Click' together to form overarching Technical Case at the 'railway' level
- Assembly of compliance evidence:
 - “Product based argument”
 - Elements, and the combination of the elements will deliver the required behaviour
 - “Process based argument”
 - correct processes used



How did we prepare

- Holistic approach at conceptual and detailed design development – the bringing together of all key disciplines through TfL
- System engineering approach fully enabled in client team and promulgated down the supply chain who were required to operate to the same principles
- Early project lifecycle decision to deploy certain higher-reliability components e.g. Axle counters, LED signals, slab track, and the use of previously approved products
- The use of proven and best practice technology and system redundancy, delivering robust solutions supported by modern diagnostic capability.



How did we prepare

- Design for maintenance and operations
- Strong and empowered, but lean client team
- Seamless rolling stock, infrastructure and stations interfaces
- Testing and commissioning, Fault Free running – An integrated system approach to infrastructure rolling stock and operations
- Redress known failure modes and arising early life failure trends.
- Seasonal preparedness addressed through design (e.g. 378 anti-icing capability)



Rolling Stock Factory Type Testing



Basic rotation



Table drive





The 378 Rolling Stock Fleet - outline Specification

- 20 Single Voltage (750v DC), 4 car formation units – To be operated on the East London Line (ELR)
- 37 Dual Voltage (750v DC & 25Kv) 4 car formation (24 initially 3 car formations) units – Capable of operating on any of London Rail's operational network
- All units equipped with HVAC, wide gangways, saloon and forward facing cctv, passenger information systems, sanders, and can be operated in passenger service, driver only operation (DOO-P) and load weigh
- Improved acceleration and deceleration rates as compared with 313 rolling stock, category 1A fire rating and fully accessible (DDA & RVAR complainant)



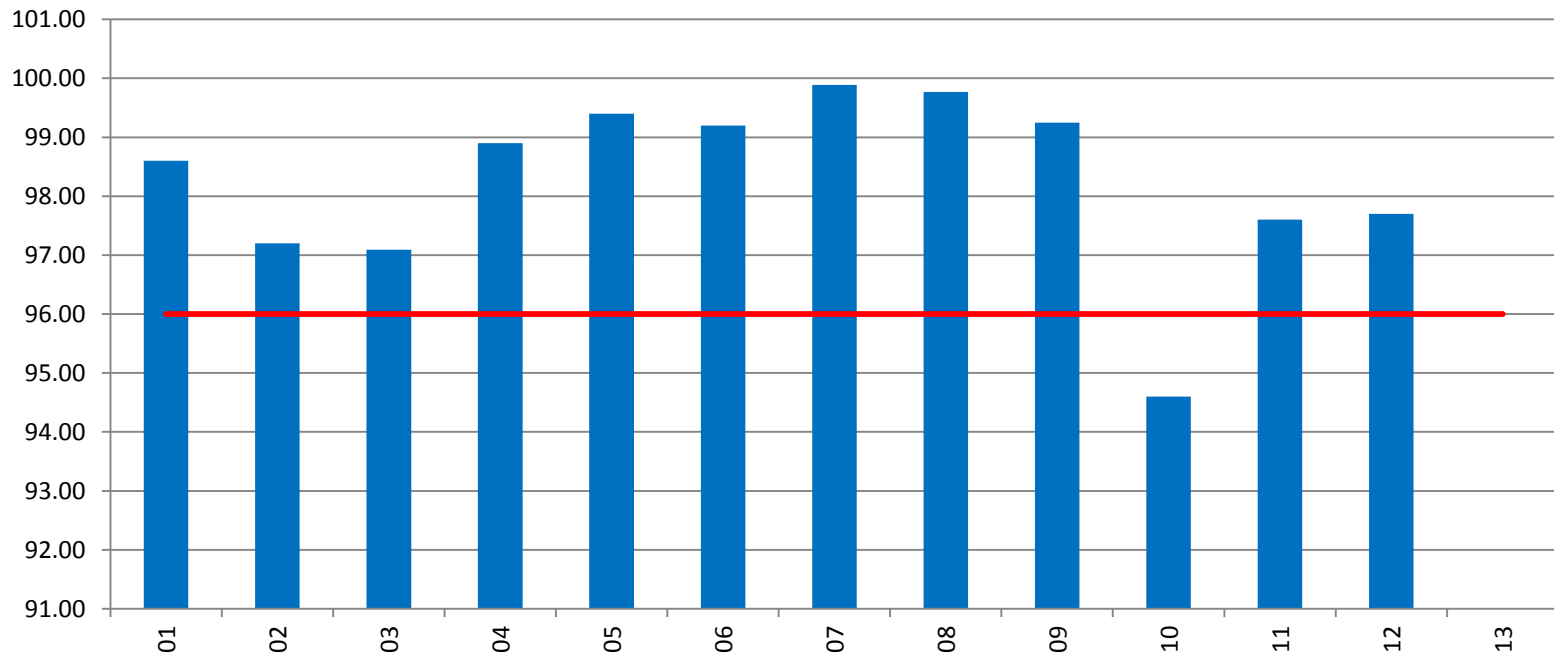
ELL System Performance

- TRAIL Modelling used to allocate reliability targets
 - Concept stage – PPM < 92%
 - Preliminary Design stage – PPM 92.9%
 - Detailed Design stage – PPM 93.5%
 - As built stage – PPM 95.14%
 - Current PPM performance MAA (period 11) – 97.7
- Infrastructure
 - Used actual data where possible
 - Infrastructure reliability was area needing most focus
 - Used proven systems to avoid development risk
 - Current performance (period 11) – 532 impact mins & 22 PPMs
- Rolling stock
 - Mean miles to failure event (>3 mins) MAA period 11 – SV 16k, DV 18K (period actual SV - 10K, DV 28k).



Lift Performance

Availability Shadwell and Wapping



■ Availability

— Target



How do we achieve this performance?

- Collaboration !

- Infrastructure Maintenance



- Rolling Stock Maintenance

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- Operations



How do we achieve this performance?

- Ruthless attention to detail on a daily basis
- Very high system and component in service performance and minimal operational impact following failure.
- Continuous and relentless approach to identifying trends, repeat failure modes and fast implementation of mitigations (short, medium and long term)
- Dedicated infrastructure and rolling stock maintenance and repair support with key spares located within railway boundary. Train doctor located within control room 24/7.
- An integrated approach to Maintenance planning and the requirements of train plan parameters. Depots equipped to deal with all eventualities.
- Implementation of perturbed, degraded operations, pre-agreed service recovery strategies plus CUTandRUN policy
- Dedicated HOT spare train-sets, standby drivers and infrastructure response team
- Bespoke train maintenance facility and a permanently manned satellite depot facility
- Seasonal monitoring and direct management, with early implementation of establishing mitigating plans and strategies



378 Schedule Maintenance Planning

- The balanced maintenance plan tailored for our operations has been generated for the life of the units, and has been based on extensive in service experience for similar fleets of trains and industry best practice. Daily Fleet utilisation is relatively high for a UK application at above 90%
- Train preparation is undertaken by the Maintainer at all depots and berthing locations on a daily basis, mandatory checks are supplemented with system performance checks to improve unit performance
- Units pass through a carriage wash at least 48 hourly
- Units are subject to a 15000 miles balanced exam regime, with an initial interim pantograph 7500 inspection and a heavy clean, these inspections provide for all routine maintenance, (average unit mileage approx 80K miles per annum)
- Routine inspections are supplemented by mileage and time based Component exchange programmes, such as bogie exchanges at 500k miles. Components are overhauled at their respective suppliers
- Wheel turning has been predicted to take place, on every axle at 250K miles, this prediction is subject to change dependent on in service experience



Collaborative approach to problem solving

- New and upgraded infrastructure – Passenger Service
- Introduction of the wide gangway design – Class 378 fleet
- Optimisation of Maintenance scheduling
- GSMR implementation
- Stabling at Dalston Junction
- Adverse weather performance
- Trip Cocks
- DOO system performance stability
- NLL 25kv traction harmonics and system resilience
- Optimisation of train cab environment



Overground Opportunities and Challenges

- High duty cycle and TPH with 4 car train, delivering consistent performance
- Restrictive ecs train paths and network possessions and isolations
- Current DOO system, performance optimisation and improvements
- Overcrowding at key locations in the peaks
- Implementation of capacity improvements (5 car trains, disruptive infrastructure works to stations, depots and two new sidings. Change in operations to accommodate SDO and right side door release functionality
- Overhaul programme – Optimise current periodicities and deliver within constrained operational requirement and a limited spare asset base.
- Aesthetic condition – maintenance of Overground standards with an aging train and infrastructure whilst passenger growth continues to rise.



The Key Ingredients

- The railway is a system and must be planned, constructed and operated as one
- Focus on performance is what the customer wants
- Plan for resilience and put people and resources in the right place
- Analyse performance in detail and then do what is needed
- For projects plan for the commissioning and work back to ensure everything needed is covered



LO Audio / Visual Presentation





Questions?

