

# Rail Systems Engineering

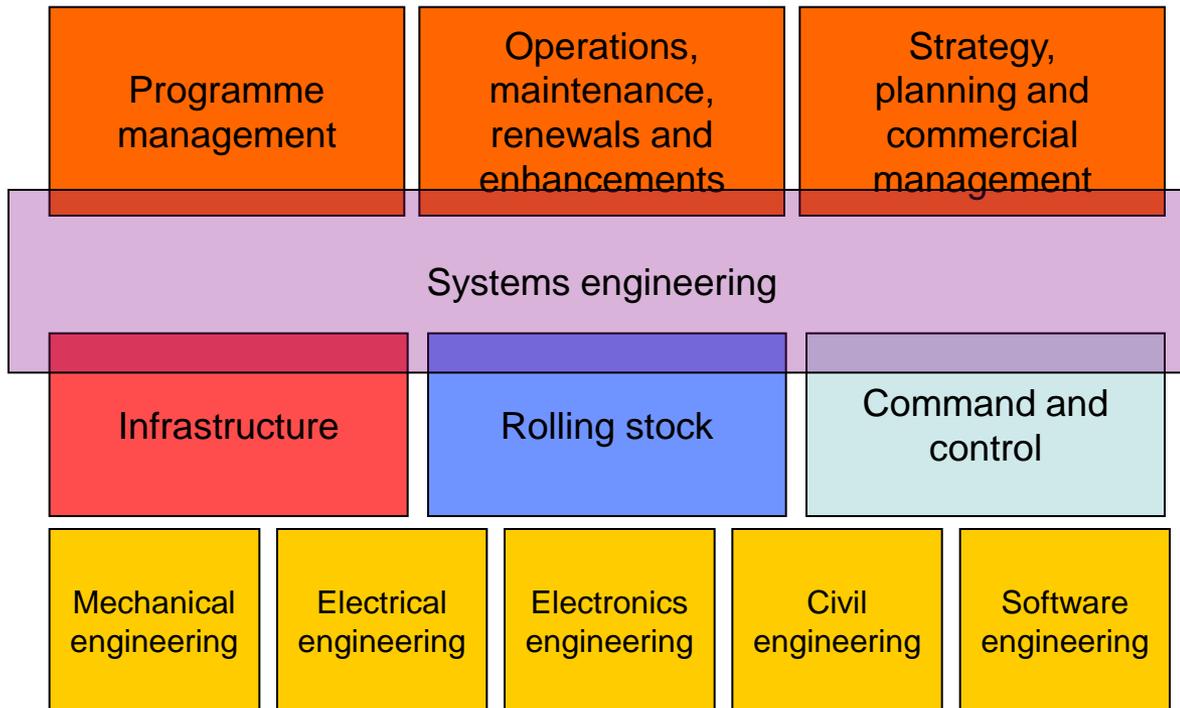
A whole system whole life approach to rail  
transport

David Clarke  
Deputy Director Rail Systems  
Department for Transport

# Overview

- Rail systems engineering in DfT
- Challenges to whole system whole life rail systems engineering
- Rail technical strategy and the technical strategy advisory group
- Current Rail SE initiatives

# Systems engineering, programme management and specialist engineering



- We are already doing some SE
- The key change is doing whole system, whole life SE
- We need to fill in the gaps – not change things that are working fine

# Why do we need to do SE in rail or in DfT?

## Why SE?

- SE needed to 'join up' railways
- Our measures of success are whole system whole life issues
  - Customer experience (reliability, PPM, uninterrupted journey)
  - Carbon (infrastructure-rolling stock-operations trade-offs, throughout lifecycle)
  - Cost (infrastructure-rolling stock-operations trade-offs, throughout lifecycle)
  - Capacity (rolling stock-infrastructure-operations trade off)

## Why SE in DfT?

- Where we have clearly delegated accountability we need to be a 'good customer' – classic client side systems engineering
- DfT is the de-facto 'design authority' for rail transport – are we optimising the rail industry?
- CP4 targets might be met without systemic intervention – CP5 probably cannot be met without systemic interventions
- Need to work with SE peers across the industry to deal with common issues

# Department for Transport

## Rail systems engineering

- **Vision:** Optimise the railway on a whole life, whole system basis
- **Mission:** Identify, and exploit, opportunities to make better system wide decisions and trade-offs
- **Objectives:**
  - Improve strategic whole life, whole system decision making
  - Support current and future rail programmes
  - Grow systems engineering competence in DfT and the rail industry
- **Approach:** Collaborate with industry to establish an agreed and accepted approach to Systems Engineering

# Key challenges for rail systems engineering



- Whole life, whole systems approach to control period 5
- Rail systems engineering people and competencies
- Integrating client and supply side systems engineering
- Innovation and technology management
- Programme systems integration
- Whole system reliability
- Systems engineering services, infrastructure and rolling stock
- Systems engineering the rail industry

# Rail Technical Strategy

- The DfT White Paper 'Delivering a Sustainable Railway' and the Rail Technical Strategy consider the potential future challenges for the railway over a 30-year horizon.
- They identify several long-term agendas for Government and the rail industry working in partnership. These can be summarised as the '4Cs':

**CUSTOMERS:** Increase Customer Satisfaction

**CAPACITY:** Increase Capacity

**CARBON:** Reduce Carbon Emissions

**COST:** Reduce Costs

# Technical Strategy Advisory Group (TSAG) What is it, what does it do?

- TSAG is an independent cross-industry expert group established to:
  - Develop the Rail Technical Strategy
  - Set the agenda
  - Be the strategic research client group
  - Coordinate the activities of the Systems Interface Committees, linking current tactical work to long term strategy
- TSAG is focussed upon
  - CP5 and beyond
  - Taking a whole life/whole systems sustainable approach
  - Developing and publishing next version of the Rail Technical Strategy in 2012



Rail Industry Association



# How to meet future demands?

- **We need innovation, doing more of the same is not enough... TSAG is leading a step change in approach**
  - **£15m strategic research fund**
  - **Identifying long term technology solutions: Route Mapping**
  - **Making it real, moving from idea to strategy to development and implementation**



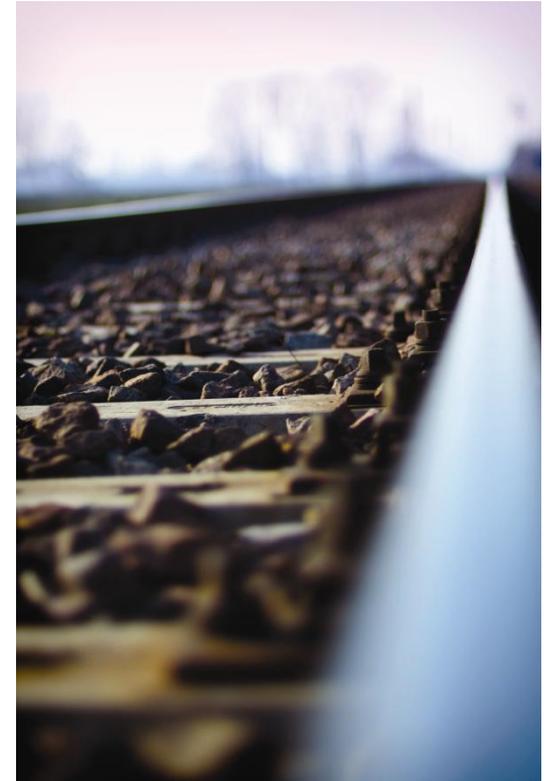
# Not just about research

## **Exploiting existing technology**

- Some technology, that can assist rail to meet the demands of the 4C's, already exists. TSAG needs to work with all of its partners and engage with the industry planning processes to facilitate its adoption within rail.

## **Helping to overcome industry hurdles**

- Representing all parts of the rail system, TSAG is well placed to develop thinking on a whole system basis.
- The rail market can be daunting for suppliers and the route mapping will help in sign posting future technical directions.
- TSAG is supporting the work led by RIA on technology development.



# Current initiatives – building a rail SE capability

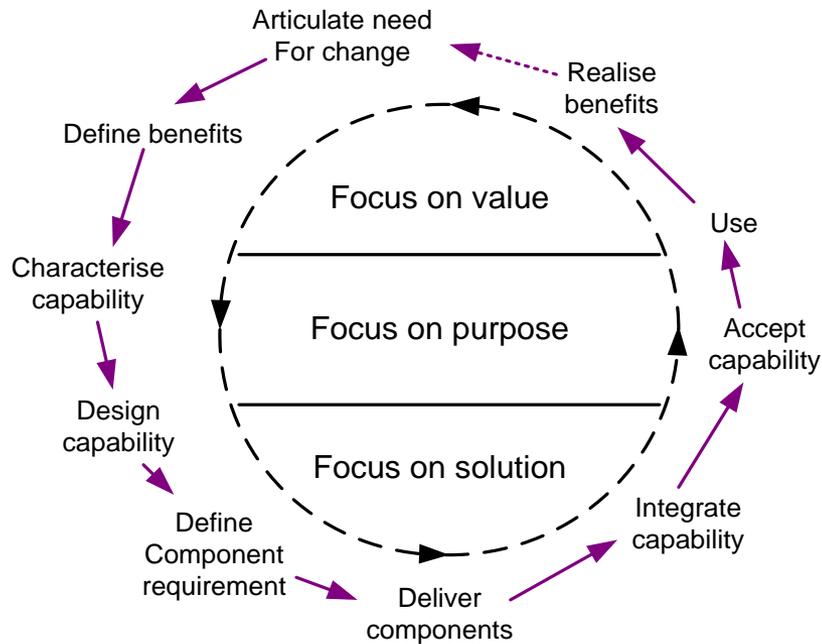


- Individual organisational view
- Industry view

# Current SE initiatives – High reliability / High capacity

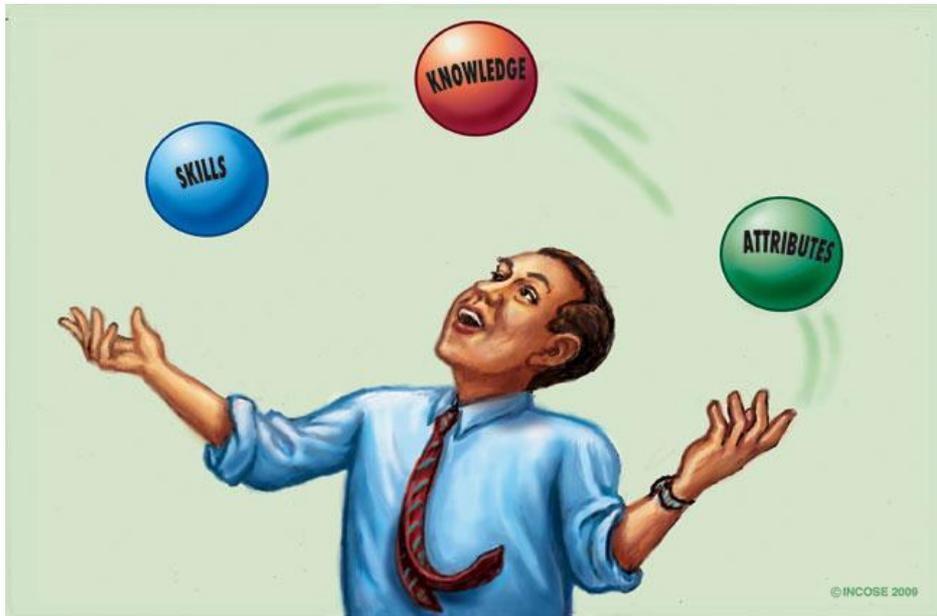
- A reliability group has been established under the leadership of Brian Halliday and Duncan Kemp
  - Current practice
  - Grand challenge
- Key roles
  - Leadership, develop the culture and values needed
  - Communications
  - Integration of the related route mapping applications
  - Coordination
- How do we get 99.9% PPM?  
(and do we need it?)
- Initial workshop findings
  - No overarching approach to reliability that addresses infrastructure, rolling stock and operations
  - Range of individual improvements that it would be beneficial to implement
  - This will cost, so the value of reliability must be understood
  - Actually need an industry wide transformation to be a safe and reliable railway
  - This requires top level commitment

# Current SE initiatives – Thameslink System Integration



- Thameslink programme requires changes to:
  - Infrastructure
  - Rolling stock
  - Franchises
  - Operations
- ... in order to deliver c43,200 people an hour
- Thameslink systems integrator
  - Network Rail, DfT, TOCs
  - Benefits to acceptance
  - Collaborative working

# Current SE initiatives – Rail SE people



- Deep competence for some – basic skill for all
- Skills and knowledge can be trained
- How do we get people with the right attributes
  - Seeing issues from multiple perspectives
  - ... and at multiple levels
  - Rapport building
  - Knowing when to continue to analyse – and when to stop
- Where do we get them
  - From rail or other sectors
  - In house or consultants

# Any questions?

