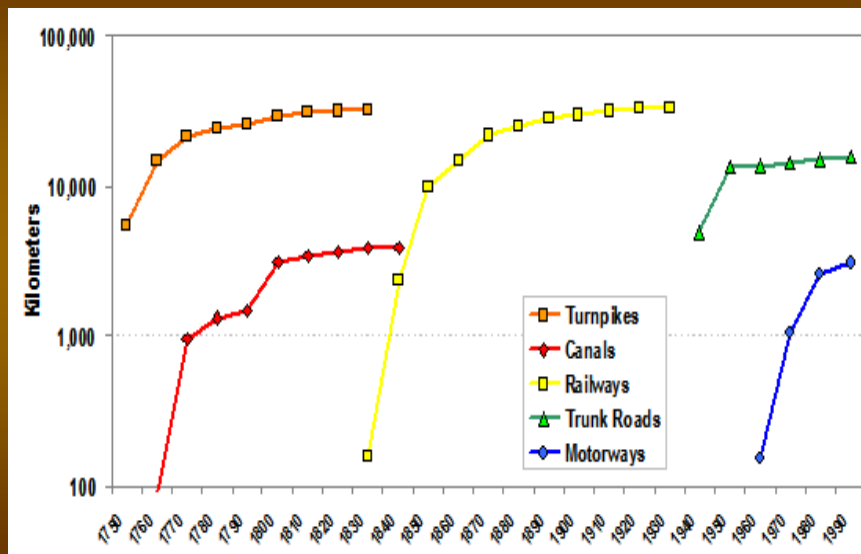


Sustainable Transport Systems

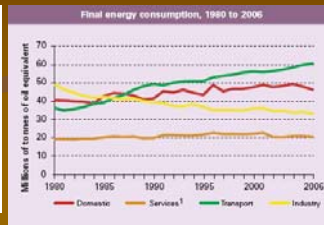
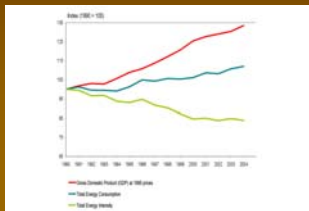
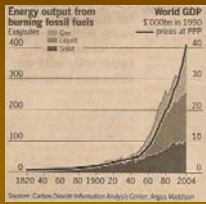
Professor Brian Collins
Chief Scientific Adviser
DfT and BERR

Transport capacity growth

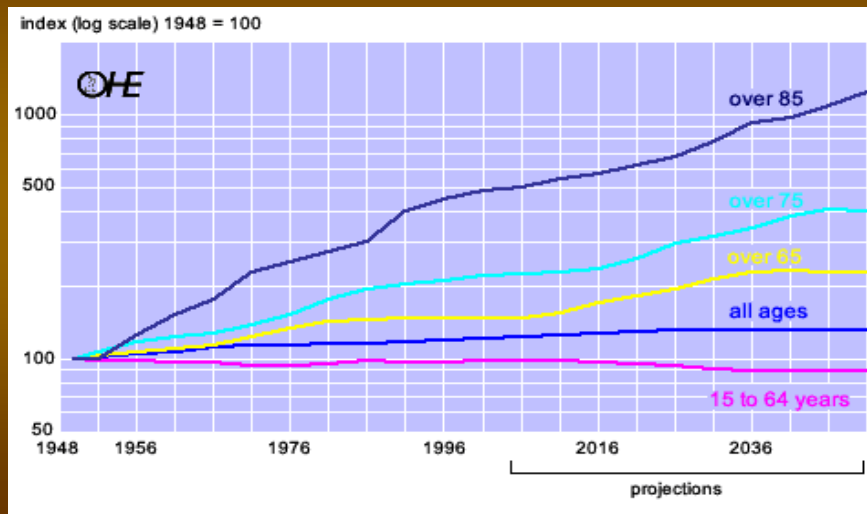


Courtesy of ICE

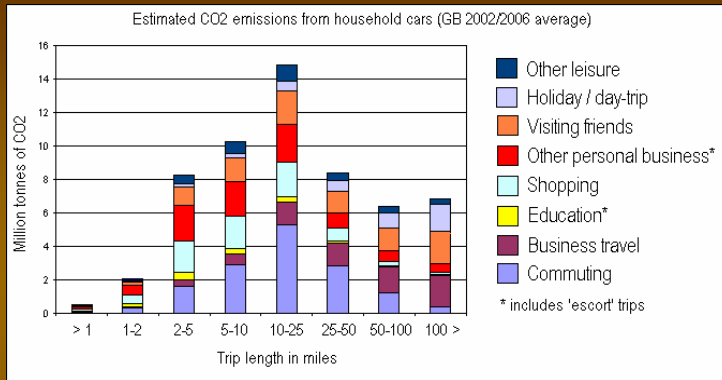
Energy Investment and Use



UK Population predictions



Carbon reduction pathway work

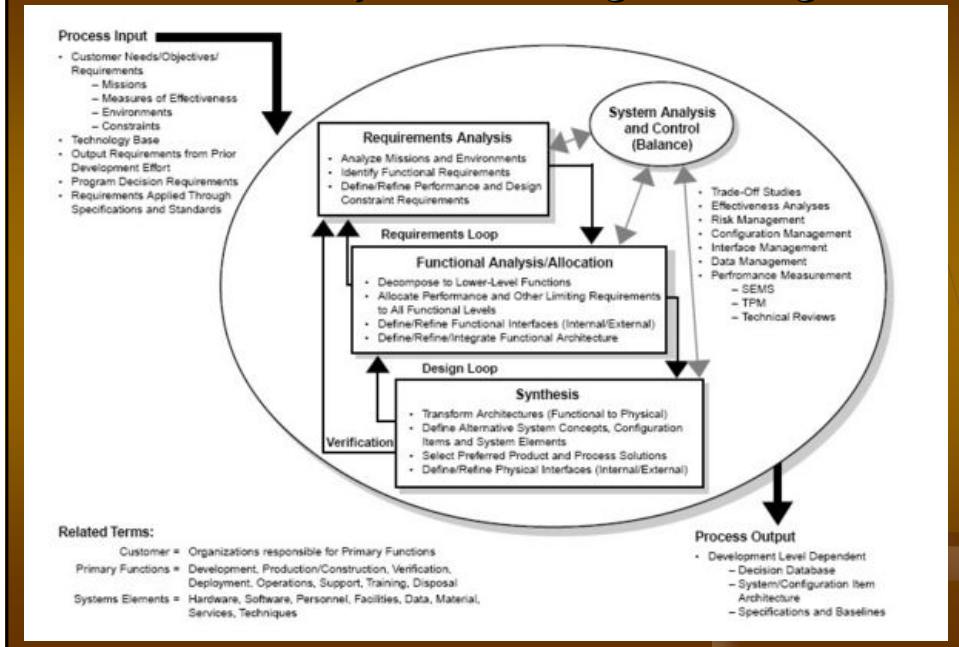


- Which trips generate the CO₂?
- Which policy interventions give us the biggest reduction in CO₂ for the smallest adverse impact on other goals?
- What CO₂ reduction can we achieve
 - from cross-cutting measures?
 - on the city & regional, national and international networks?

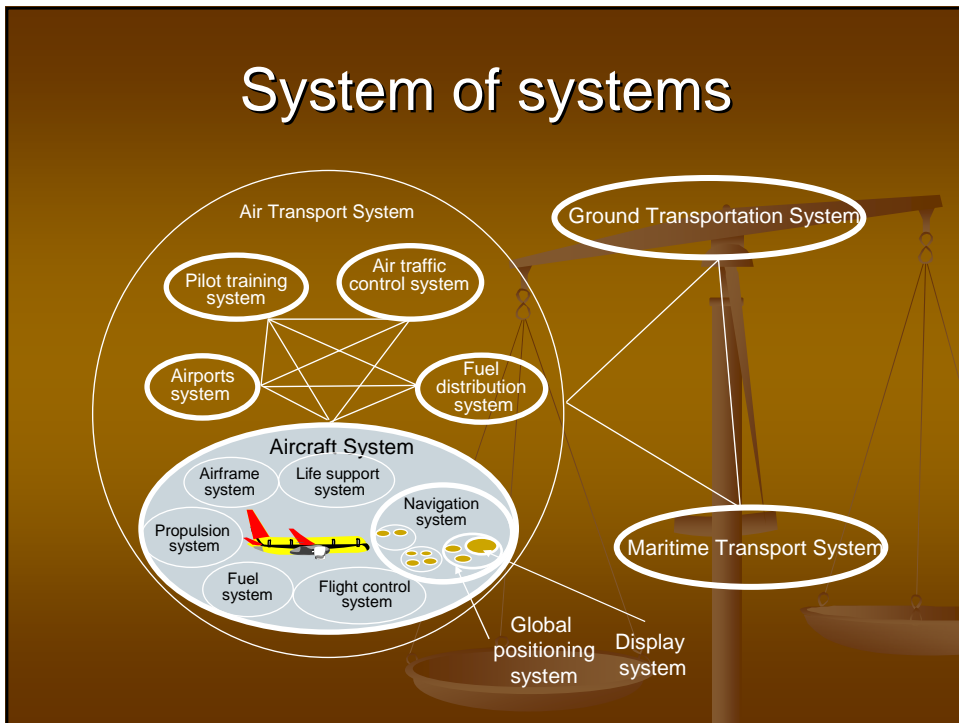
London Underground System



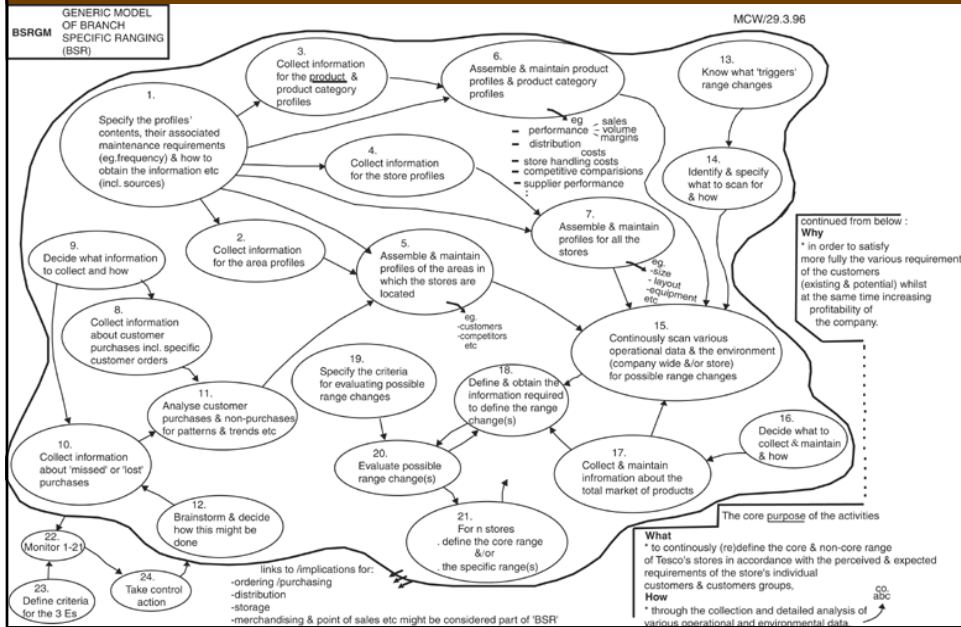
Basic Systems Engineering



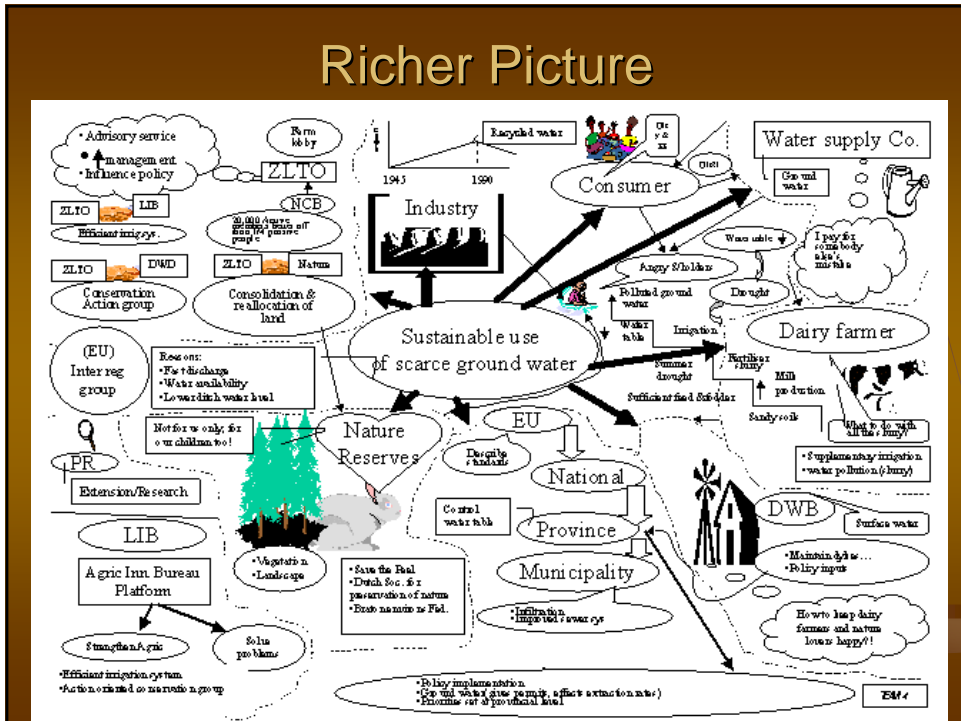
System of systems



Rich Picture



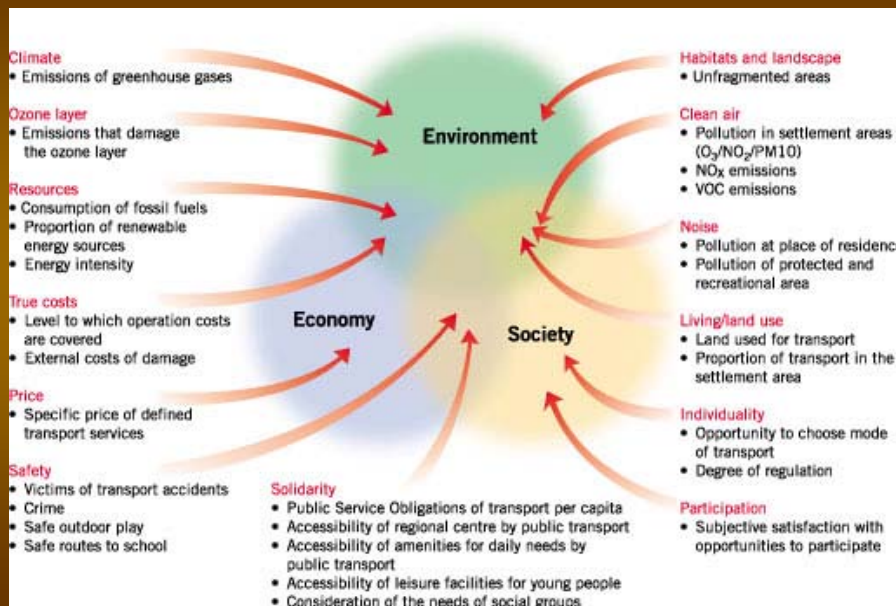
Richer Picture



Ground Truth



Preliminary top level analysis map



Challenges Matrix – Extract

The perceived problem space

Challenges	Climate change	Competitiveness & productivity	Equality of opportunity	Health, safety & security	Quality of life and the Natural Environment
Cross-network (national policy)	1. Deliver quantifiable reductions in CO ₂ emissions consistent with supporting delivery of DfT strategic objectives and other wider Government goals.	1. Support productivity by ensuring a competitive transport industry, simplifying and improving regulation to benefit transport users and providers and maximising the value for money from transport spending.	1. Enhance social inclusion by enabling disadvantaged people to connect with employment opportunities, key services, social networks and goods through improving accessibility, availability, affordability and acceptability.	1. Reduce the risk of death or injury to the public due to transport accidents 2. Reduce the risk of death or injury for transport industry employees and those driving for work 3. Reduce social and economic costs of transport to public health, including air quality impacts 4. Reduce vulnerability of transport networks to terrorist attack.	1. Bear down on noise. 2. Minimise the impacts of transport on the natural environment and seek solutions which deliver long-term environmental benefits. 3. Minimise the impacts of transport on heritage, landscape and communities 4. Improve the experience of end to end journeys for transport users.

Proposition for analysis and synthesis

- Exploration of the use of new techniques
 - Soft Systems
 - Systems dynamics
 - Synthetic environments
- New ways of articulating problems
 - Rich Pictures
 - System of systems concepts
 - Value models
- Develop a synthesised architecture for transport infrastructure
 - National principles and standards – minimal
 - Integrated data gathering – technical and social
 - Integrate consideration of transport infrastructure with other components – energy, water, housing, spatial planning, economic and social development