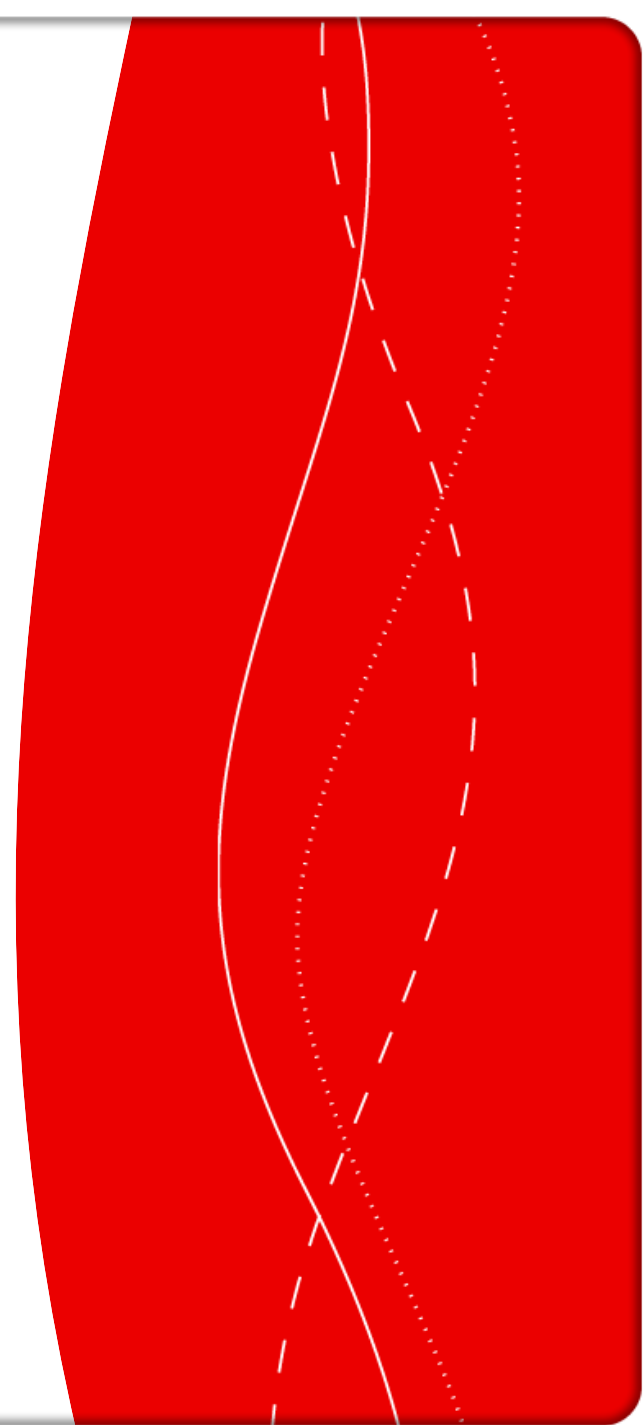




FINDING A BETTER WAY

**Development of LCC
during planning and
design of roads
- Swedish experience**

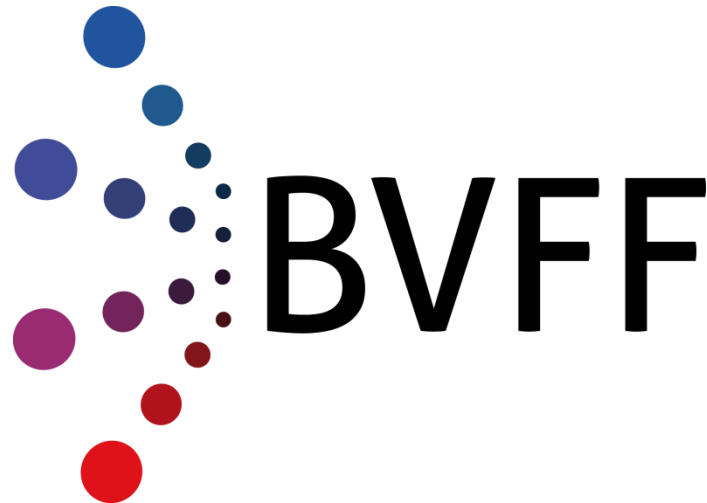
Robert Karlsson



Coordinator of BVFF

BVFF is:

- an programme for collaboration on research, development and implementation...
- ...in highway engineering and to some extent railways
- annual turnover > 50 million SEK
- see www.bvff.se for more information



Outline

- Master thesis as part of NVF working group
 - LCC model for assessment of pavements (maintenance)

Work on LCC for new construction:

- LCC – the missing link between cost-benefit analysis in planning stage and procurement for construction of new roads
- Purpose of LCC
- Combining components of LCC to match purposes
- Current development in Sweden
- Experience

Thesis 197

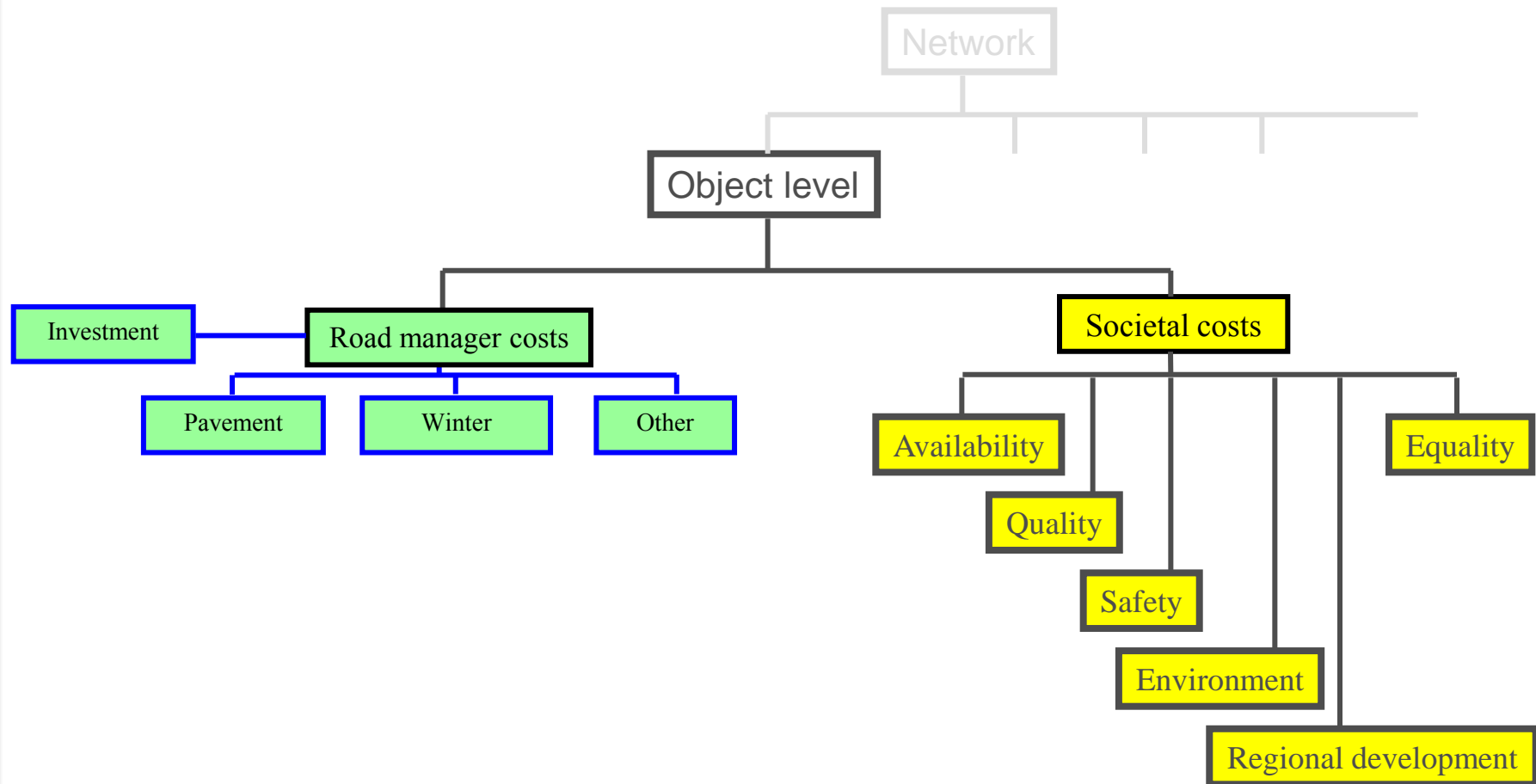
LCC för utvärdering av vägkonstruktioner

Niclas Olofsson



Trafik och väg
Institutionen för Teknik och samhälle
Lunds Tekniska Högskola, Lunds universitet

Infrastructure Cost Benefit Analysis – Swedish model



Purpose of LCC / LCCA in public organisation

Life cycle cost analysis (LCCA) / Life Cycle Cost(ing) (LCC)

Facilitate **decision making**...

...when there is a **choice between alternatives**...

...which have consequences for **future maintenance costs** and/or...

...road users and society.

Thus...

...reducing the total costs of present investments and future costs (road manager or business costs)...

...while considering external consequences on users and society (the latter required for public bodies).

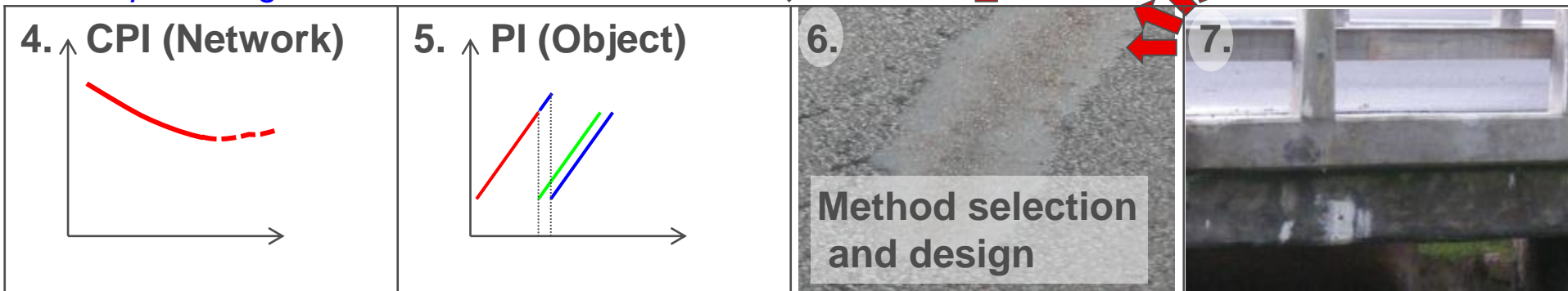
Which decisions need to consider life cycle?:

1. Physical planning for investments in new roads (network + object levels)
2. Selection of technical solutions
3. Design of technical solutions + procurement
4. Long-Term Planning of maintenance of existing roads
5. Operational Planning of maintenance of existing roads
6. Design of maintenance and proactive operations (and project management)
7. Follow-Up, Accounting and Reporting of projects, Compensation, Bonus-malus

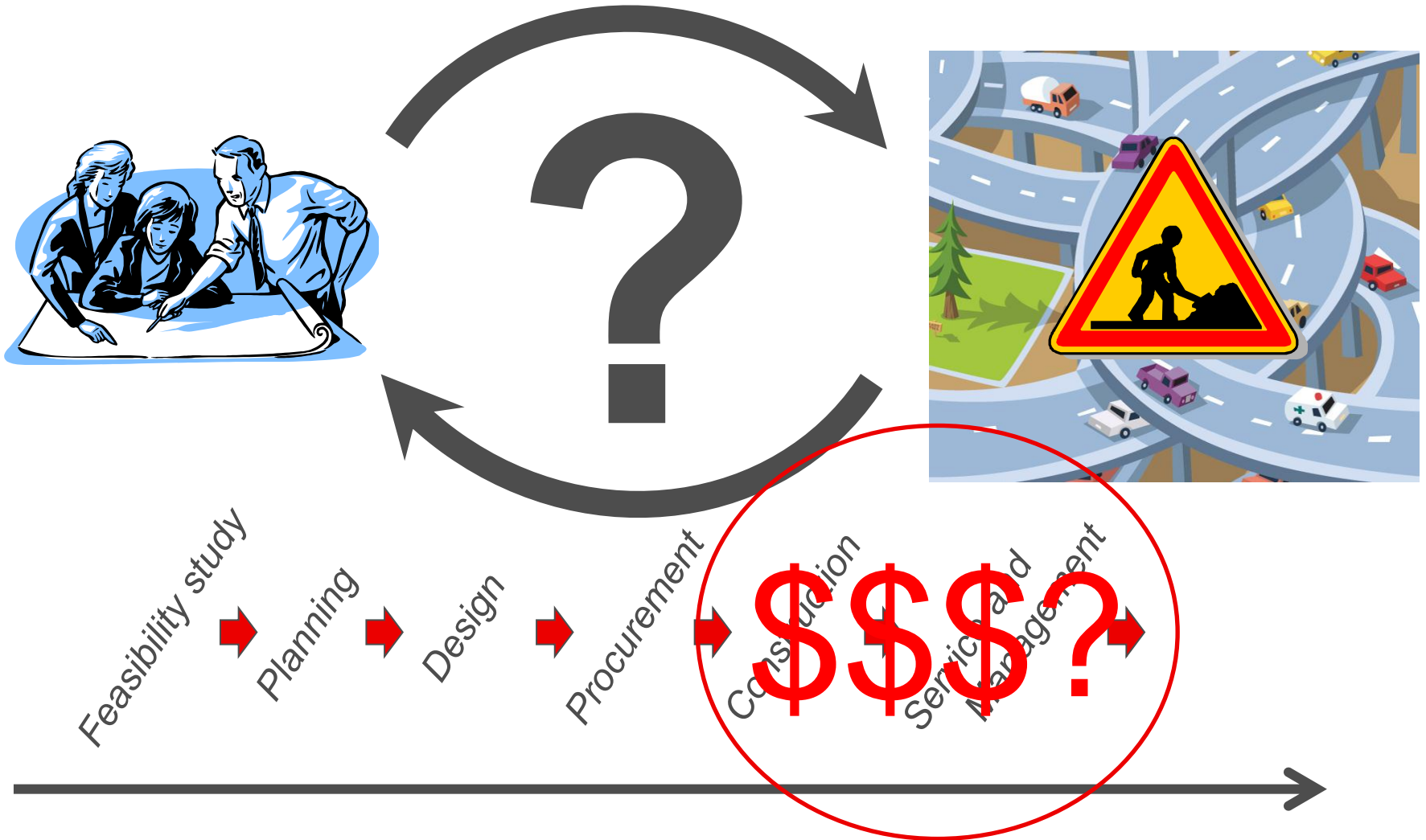
Add new roads:



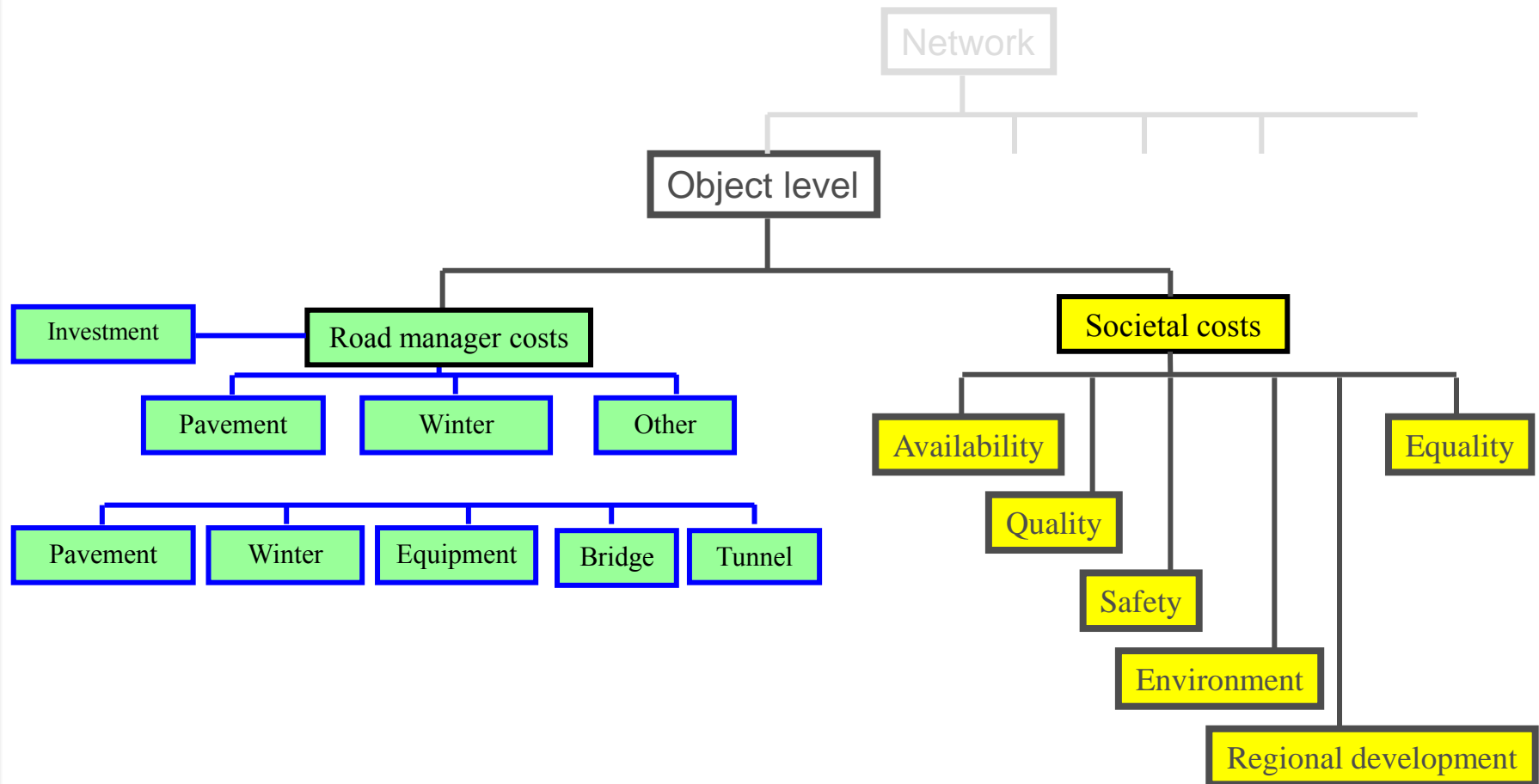
Develop existing roads:



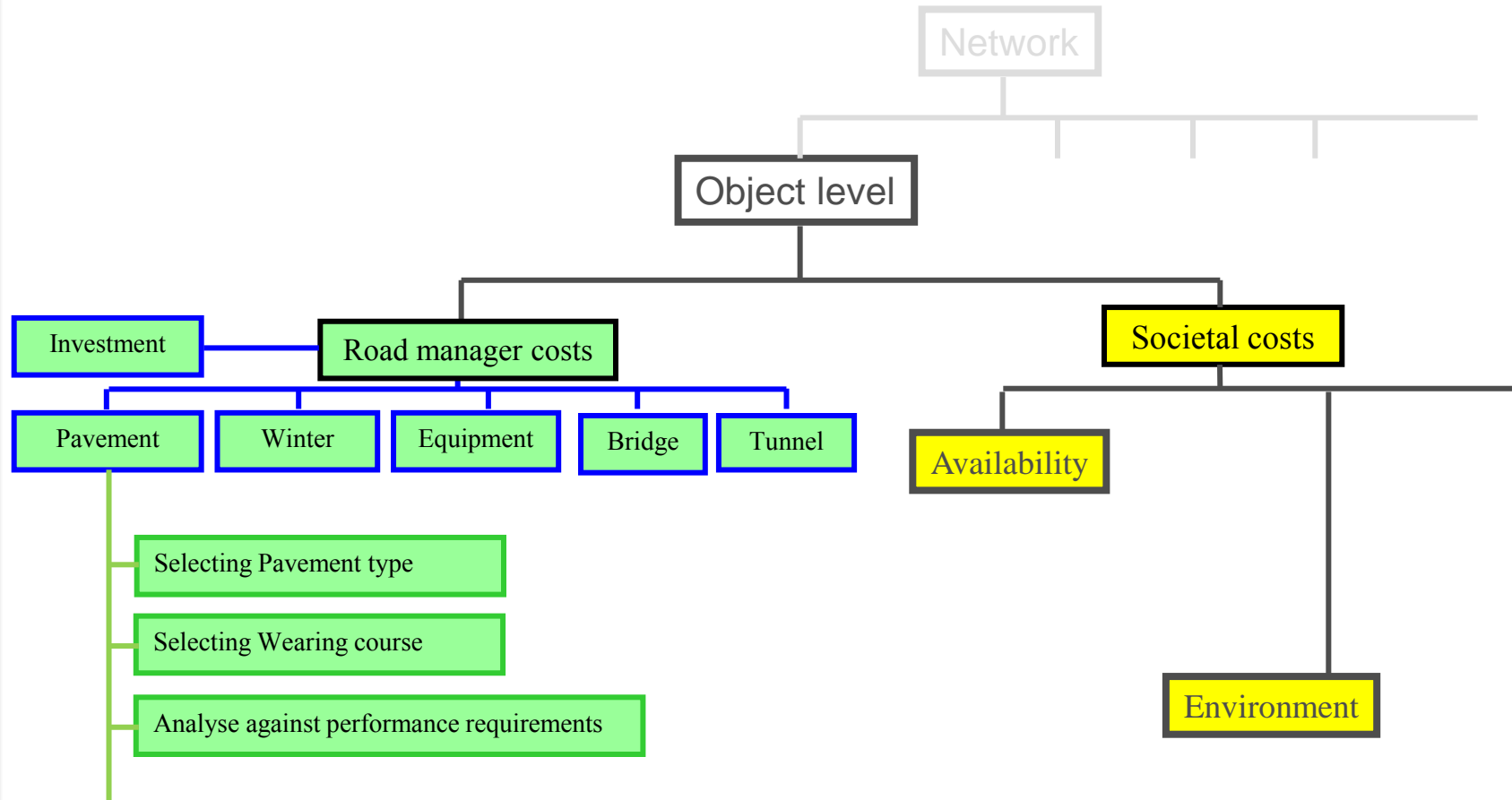
From planning to service and management



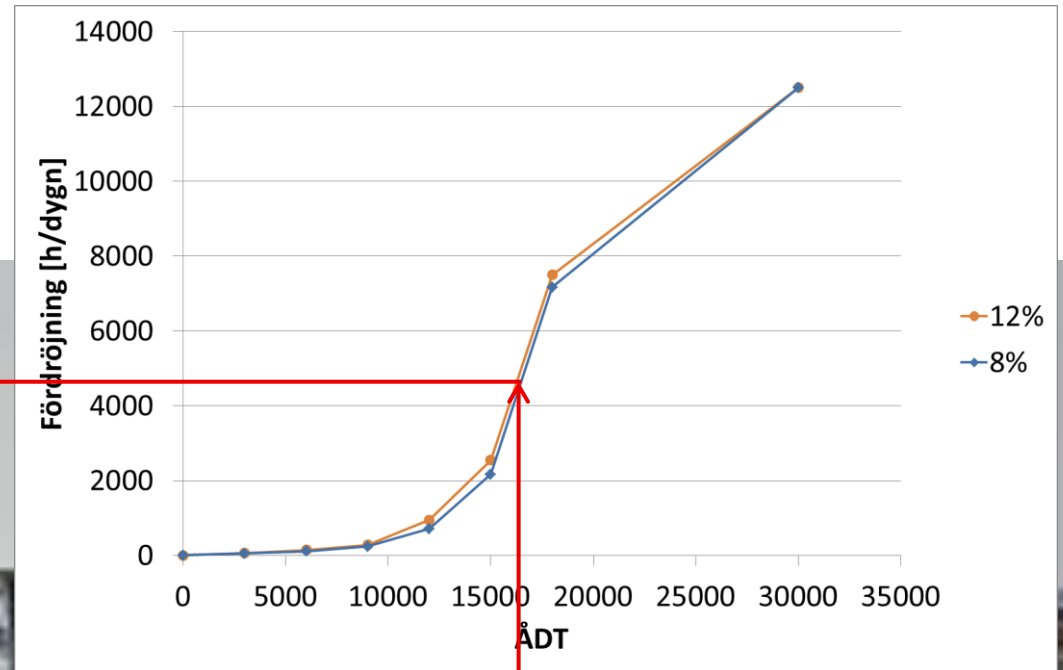
Detailed road manager costs



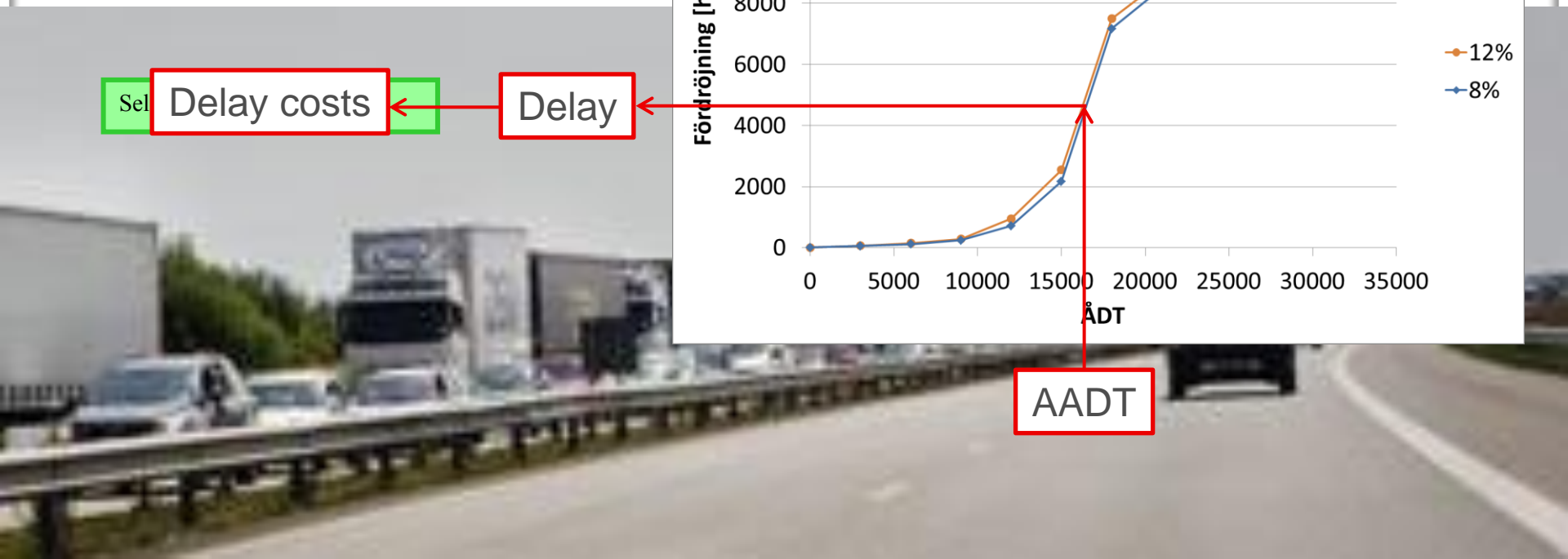
Detailed road manager costs



Road manager costs vs. societal costs - example



AADT



Case studies / demo projects

Identify:

- where LCC estimations can make a difference
- the decision makers
- the type of information needed

Cases:

- Calculate maintenance costs for road object (E45 Norr Göta – Edet Rasta)
- Reconstruction of road and shift of traffic standard – compare alternatives (E18 Hummelsta, RV35)
- Select pavement maintenance strategy on 2+1 road (E20 Kungsör)
- Several more cases for autumn 2012
- Choose road corridor – more developed costs compared to CBA of today (Norrliden Norrköping)

Efforts towards tools for LCC by Swedish Transport Administration



TRAFIKVERKET

Status for roads

	Model - concept	Developed module	Tool
Pavement	Ja	Ja	Ja
Bridge	Ja	ja	delvis
Tunnel	ja	nej	nej
Equipment	ja	delvis	delvis

Status for railways

	Model - concept	Developed module	Tool
Tracks	Ja	delvis	nej
Track switches	ja	Ja	nej
Bridge	Ja	delvis	nej
Tunnel	ja	nej	nej
Signal systems	ja	nej	nej

Critical issues:

- Data on cost of maintenance
- Models on performance and expected life/maintenance intervals
- Models for effects of maintenance and maintenance strategies (i.e. a sequence of treatments)

My experience from implementation of LCC:

- 8 of 10 underestimate the complexity needed to create LCC based systems for decision making...
- ...but – “Gut feeling” is not a desirable solution
 - Consequences of planning and design issues should be described based on facts
- It is crucial to facilitate transfer of knowledge and experience about maintenance and service back to planning and design
 - Data is difficult to extract
 - Models are scarce
- Implementation of LCC need identification of:
 - the type of decisions/alternatives (design issue),
 - the role of decision maker (Client, Consultant, Contractor)
 - the responsibility and consequence of decision (internal use, evaluation of bids, ...)
- Supporting decisions on LCC require purpose orientated adaptations...
- ...but framework, data and models can be “reused”