Region Stockholm Transport Administration

Kristina Löwenberg
Robert Lagnebäck

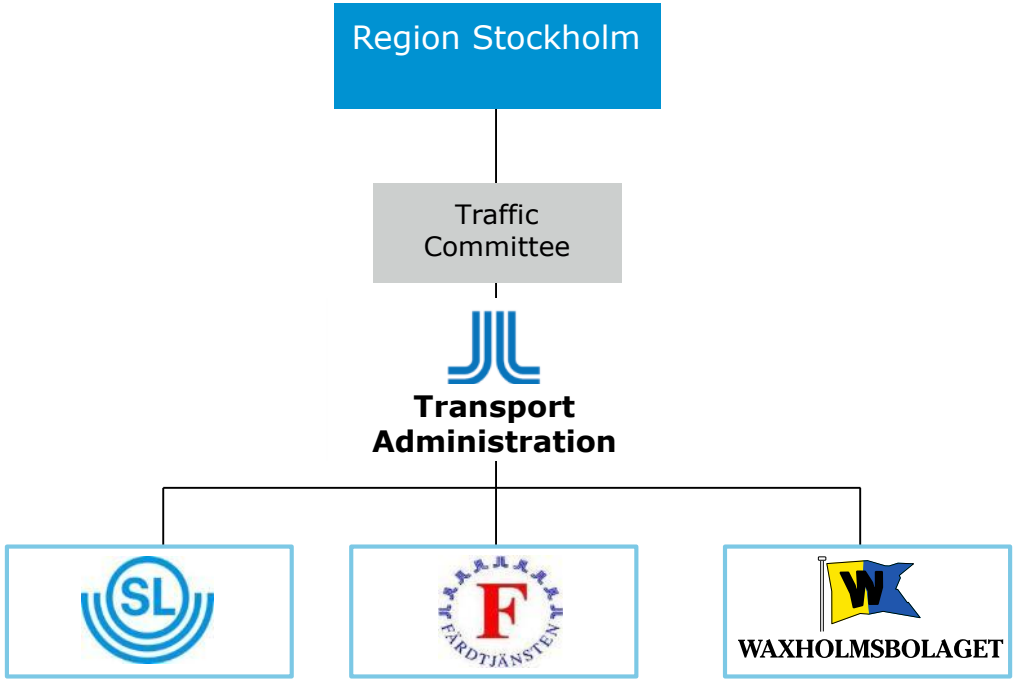
Vision

An attractive, sustainable and growing region in Stockholm with freedom for residents to shape their own lives and make vital decisions

Why? Our mission!

- We provide the region with public transport
- We take responsibility for the system
- We get more to choose public transport in stead of cars

Region Stockholm Traffic Committee



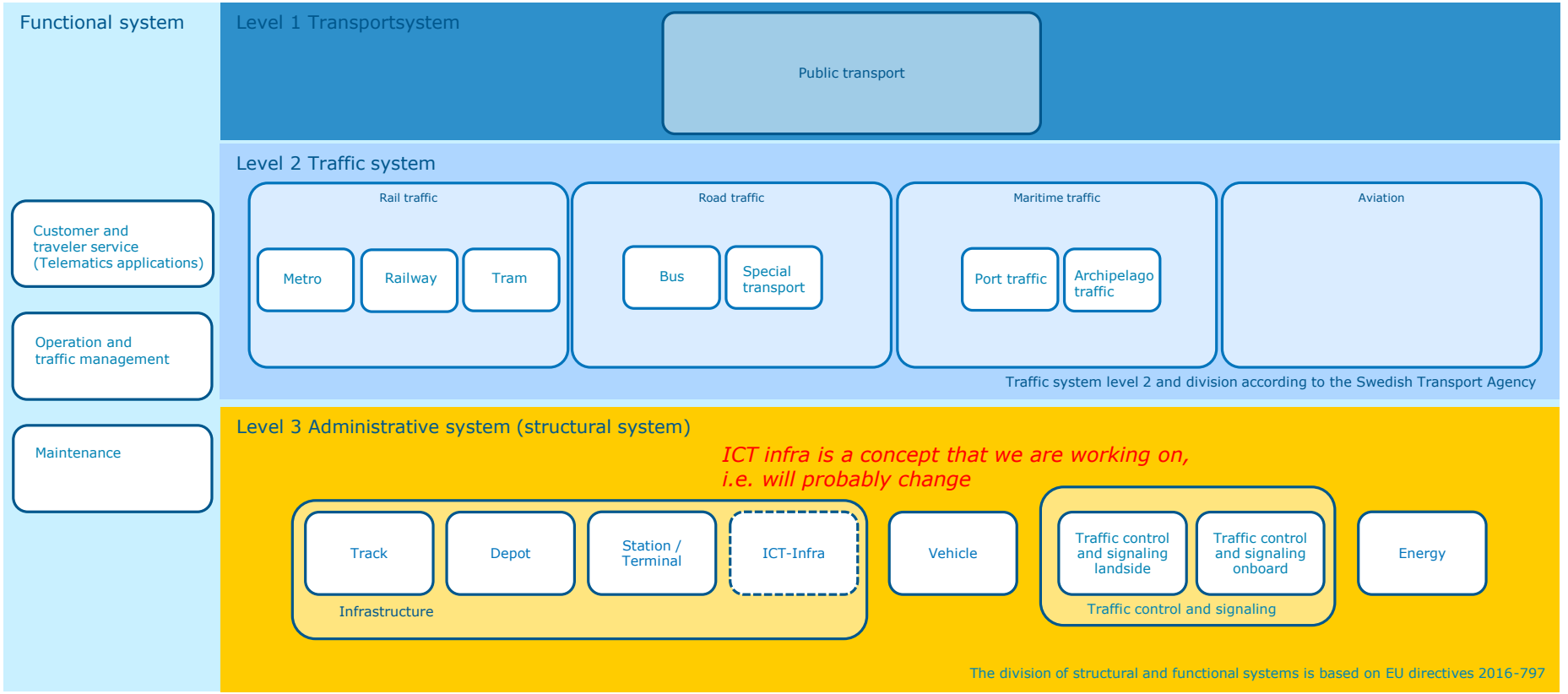
The Region appoints the members of the Traffic Committee.

The Traffic Administration is the administration organisation under the Traffic Committee.

The procured transportation services are presented through three brands

The services are financed by regional taxes and revenues from ticket sales.

The functional and structural systems of the public transport



Infrastructure

- 819 track vehicles
- 2211 buses
- 60 ferries
- 244 stations
- 167 bridges
- 233 km tracks
- 32 depots
- 900 000 m2 properties (126 football fields)

Infrastructure and the value

Assets

- 819 track vehicles
- 2211 buses
- 60 ferries
- 244 stations
- 167 bridges
- 233 km tracks
- 32 depots
- 900 000 m2 properties

Replacement value

- 819 track vehicles
- 2211 buses
- 60 ferries
- 244 stations
- 167 bridges
- 233 km tracks
- 32 depots
- 900 000 m2 properties

Current value

- 819 track vehicles
- 2211 buses
- 60 ferries
- 244 stations
- 167 bridges
- 233 km tracks
- 32 depots
- 900 000 m2 properties

Short facts about our passengers

- 83% satisfied passengers (January 2020)
  Commuter train 79%, metro 85%,
  local trains 90%, bus 81%, boat 97%
- Passengers Waxholmsbolaget 4 million/year
- 900 000 passengers every day
- Special transport journeys 3 million/year
- SL.se 160 000 visitors every day
- SL-app 900 000 unique users every month

Our traffic

- Boardings 2,8 million/day
- 82 % market share in the morning peak in Stockholm
- Bus line 4 has as many passengers/day as SJ
- Every summer Waxholmsbolaget visits 270 jetties
- Revenue about 18 billions SEK/year
- Contracts traffic operators and maintenance 13,5 billions SEK/year
- All buses runs on renewable fuel since 2018

Strategic Challenges

- Global mean temperature
- Population growth
- Travel growth and share of public transport
- Increased expectations and needs
- Aging assets and overall costs
- Components and competence
- Revenues – it’s all about money

Our daily challenges

Our challenge is to increase the capacity

- in the existing infrastructure…
- …and integrate the Stockholm archipelago in public transport
- at the same time as we expand

All year round

Digitalisation and automation

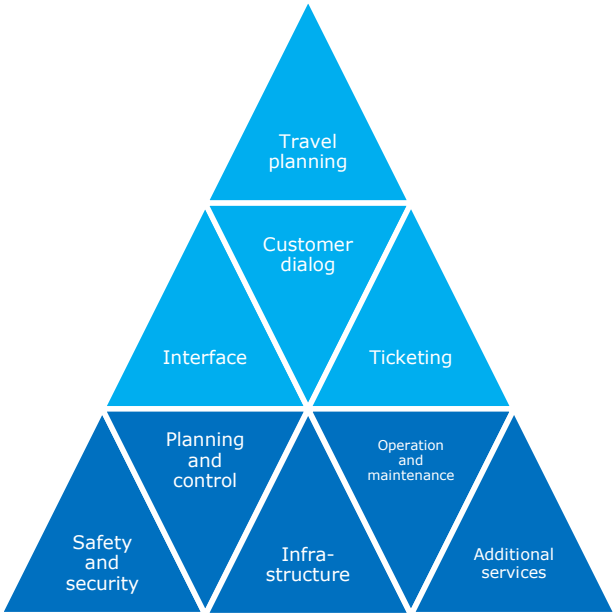
Opportunities and challenges
Public Transport

Digitalisation and automation

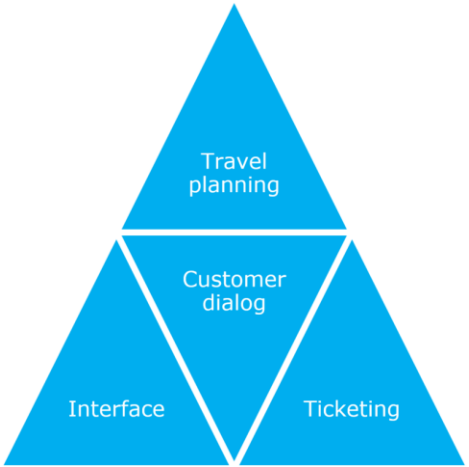
Involves a symbios between technology, people and processes

- Opportunities and challenges for businesses and organizations to introduce new technologies and changed working methods in public transport

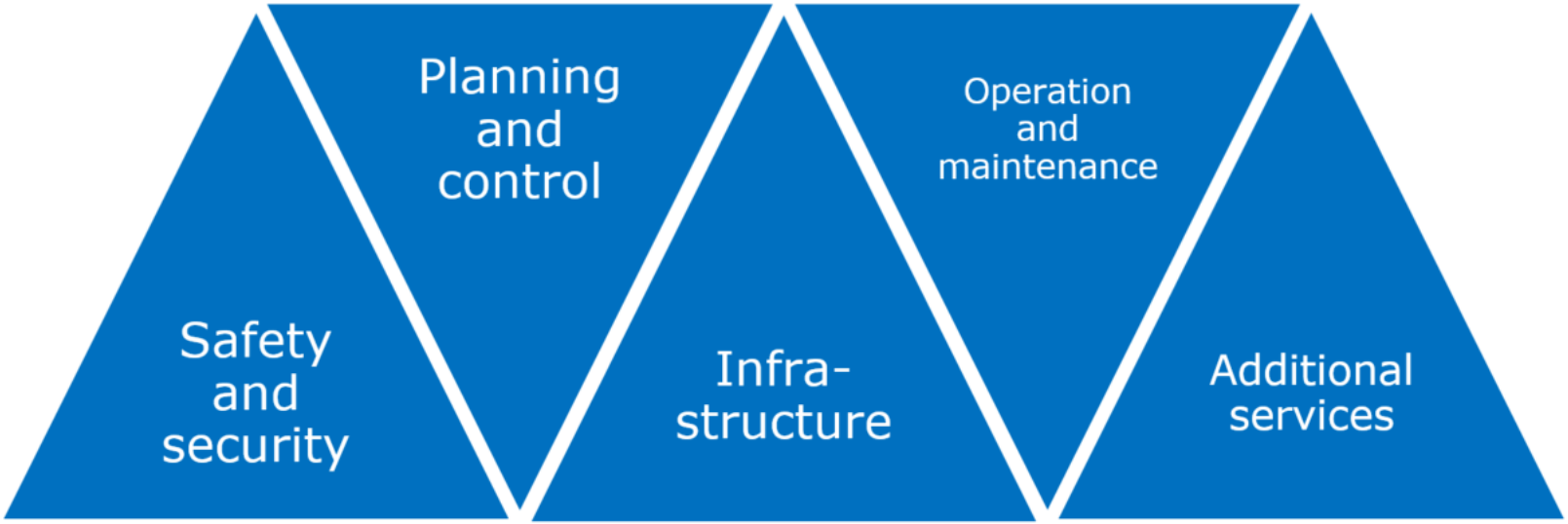
Public transport's digital solutions make life easier for everyone in the Stockholm region



Customer service



Operational support



Automation

The AutoHaul® autonomous railway system Australia has been announced as Western Australia’s top Engineering Excellence Award winner and Sir William Hudson Award finalist.

Described by Rio Tinto as the world’s largest robot, AutoHaul® is the first fully autonomous heavy haul railway system in the world. Trains up to 2.5 kilometres long can travel driverless across the world’s largest privately-owned rail network, which traverses some of nature’s most inhospitable landscapes.

The Australian Engineering Excellence Awards (AEEA) recognise Australia’s top engineering projects and the engineering teams behind them.

Following a rigorous judging process by an independent panel of experts, projects from each of Engineers Australia’s nine divisions are selected to win an AEEA. One winner from each division is also selected as a finalist for the Sir William Hudson Award – the highest honour for a project awarded by Engineers Australia.

Engineers Australia General Manager – WA, Susan Kreemer Pickford congratulated all WA winners on their teamwork, innovation, and technical excellence.

“The Australian Engineering Excellence Award winners showcase the outstanding achievement in engineering and the invaluable contribution engineering makes to the economy, community and the environment,” Ms Kreemer Pickford said.

Australian Engineering Excellence Award winners – WA

- AutoHaul® - Rio Tinto
- Groundwater Replenishment Scheme Stage 2 Expansion - Water Corporation of Western Australia
- Agnew Hybrid Renewable Project - EDL, Gold Fields
- Balticconnector Offshore Pipeline - Subsea Engineering Associates Pty Ltd
- Kalbarri Skywalk Structures, Kalbarri National Park - Terpkos Engineering
- EZONE - University of Western Australia - Pritchard Francis Consulting Pty Ltd, The University of Western Australia

https://www.engineersaustralia.org.au/News/media-release-worlds-largest-robot-wins-was-top-engineering-award

Stockholm · Spårtrafikkarta Rail Network Map

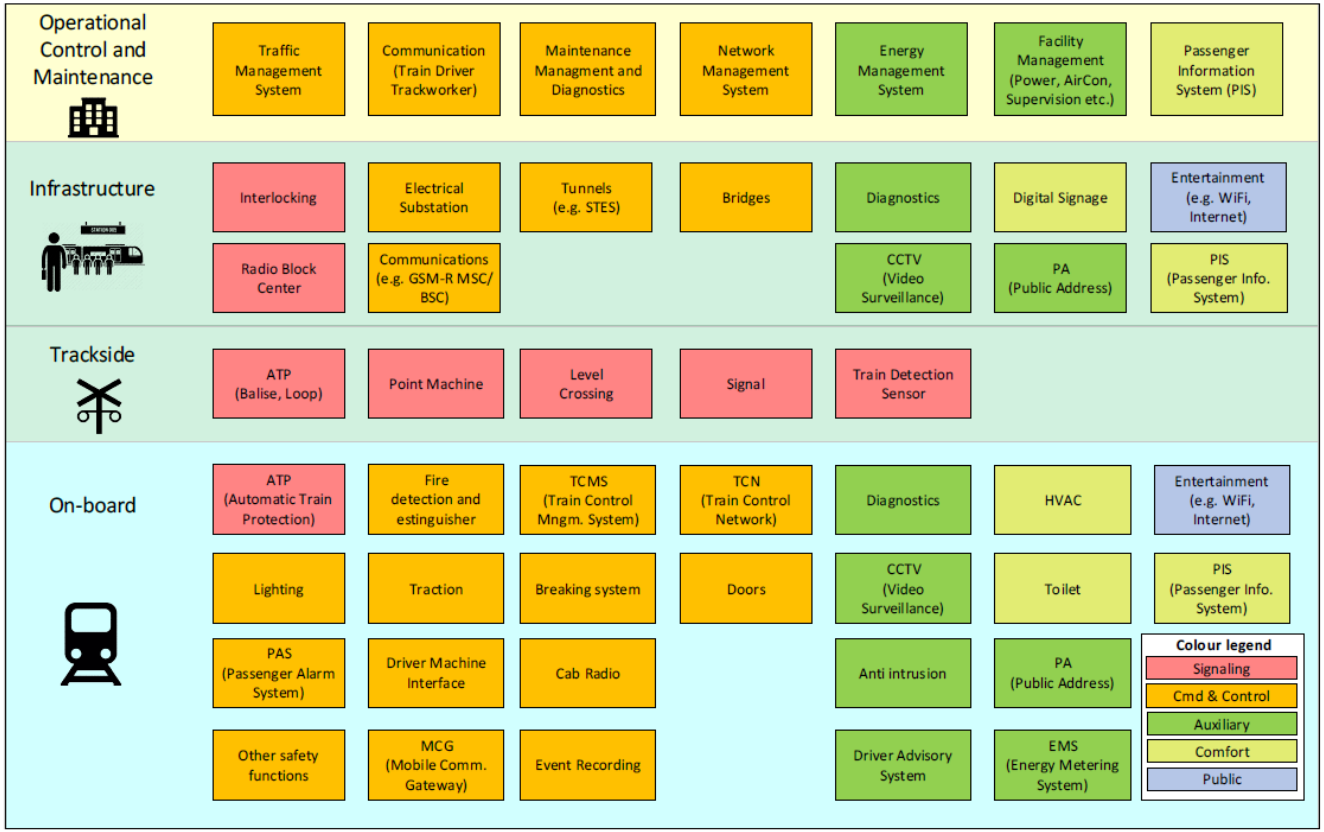


Figure G.1 - Railway Asset Reference Model

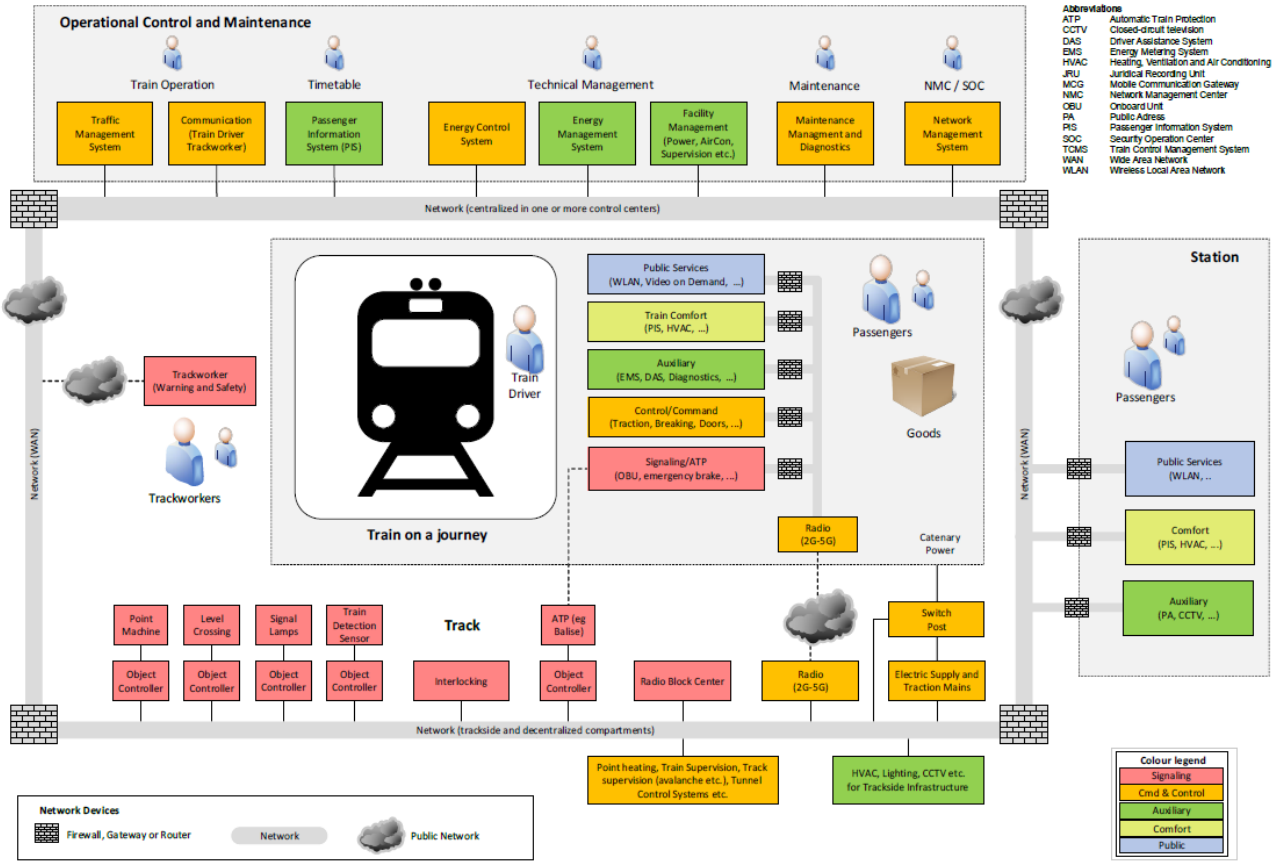


Figure G.2 - Railway Physical Architecture Model

https://www.msb.se/siteassets/dokument/amnesomraden/informationssakerhet-cybersakerhet-och-sakra-kommunikationer/industriella-informations--och-styrsystem/ncs3-gammal-ar-inte-aldst.pdf

NCS3 - Gammalt är inte äldst

En studie om synen på, och hanteringen av, åldrande inom området industriella informations- och styrsystem

VIDAR HEDTJÄRN SWALING, FREDRIK MALMBERG ANDERSSON, JONAS CLAUSEN MORK

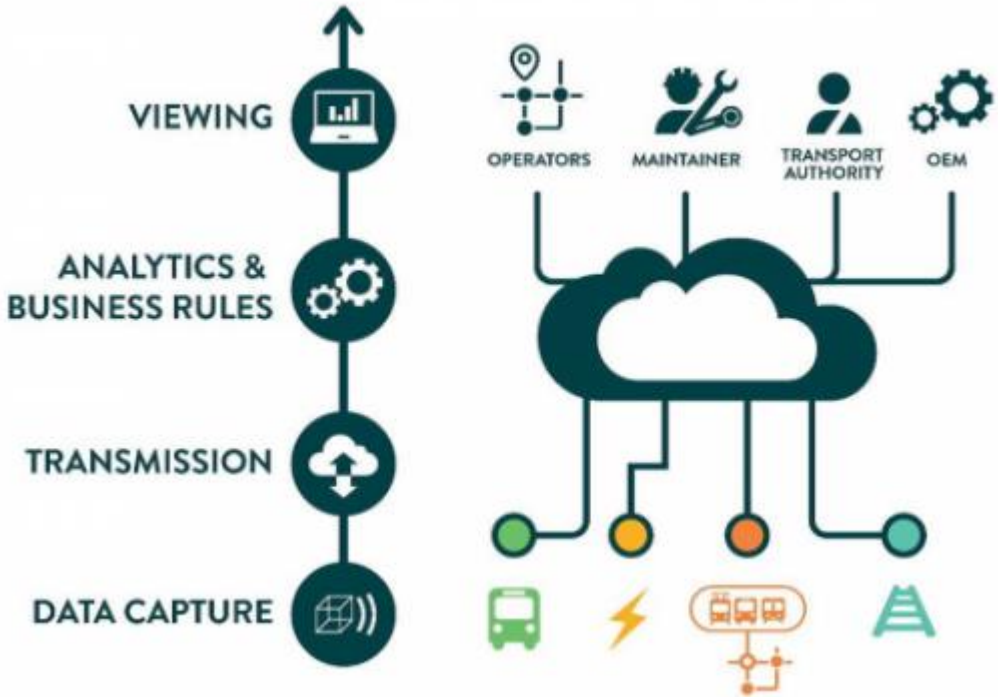
FOI
MSB

FOI-R--4292--SE
MSB 2015-6559
ISSN 1650-1942

September 2016

Maintenance focus

UITP four-step asset maintenance prediction



Data capturing

Quiet Track
POSS

QTMS, Quiet Track Monitoring System

- QTMS, Quiet Track Monitoring System, explore the possibilities with Internet of Things, Machine Learning and AI in order to increase track maintenance efficiency by giving a better understanding of the track conditions of the rail network. The effect is improved comfort with a higher availability and a more reliable service.
  - *Identification of abnormal levels of wear*
  - *Identification of potential rail track defects*
  - *Calibration of the maintenance requirements*
  - *Increased understanding of the interaction between vehicle and the track*
  - *Creates basis for cooperation between operation and infrastructure owner*
- The on train system is mounted on a train in ordinary traffic and consists of microphones and other equipment to measure and analyze the track conditions.
- The central system is being run as a cloud solution and consists of components for storage, graphical interface to show track parameters and to trigger alarms.
- The end user can use the graphic interface to understand and view the track conditions. An asset management system is able to communicate in real time with the central system through open API:s.

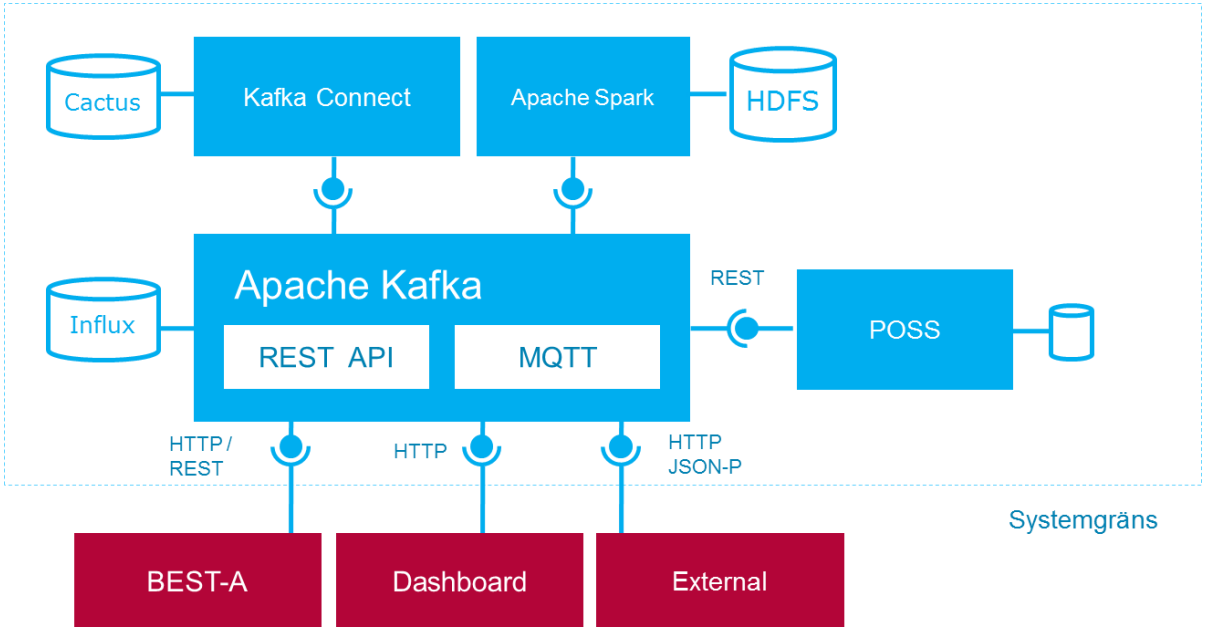
https://www.youtube.com/watch?v=px4K2mdaPgQ

POSS Strukton

"POSS monitors the parameters that affect the performance of essential assets along railways, such as ***switches***, track circuits, level crossings and access detection. The parameters monitored by POSS, include temperature, current, impact, movement, humidity, hydraulic pressure and more."

https://strukton.com/en/rail/remote-condition-monitoring

High level design of PoC



BEST-A

Asset information management system

- Asset inventory
- Work planning
- Work scheduling
- Follow-up

Based on Maximo platform (IBM)
with some additional interfaces to other systems

Map-function supported by 3D-scanning of the rail network

3D-scanning

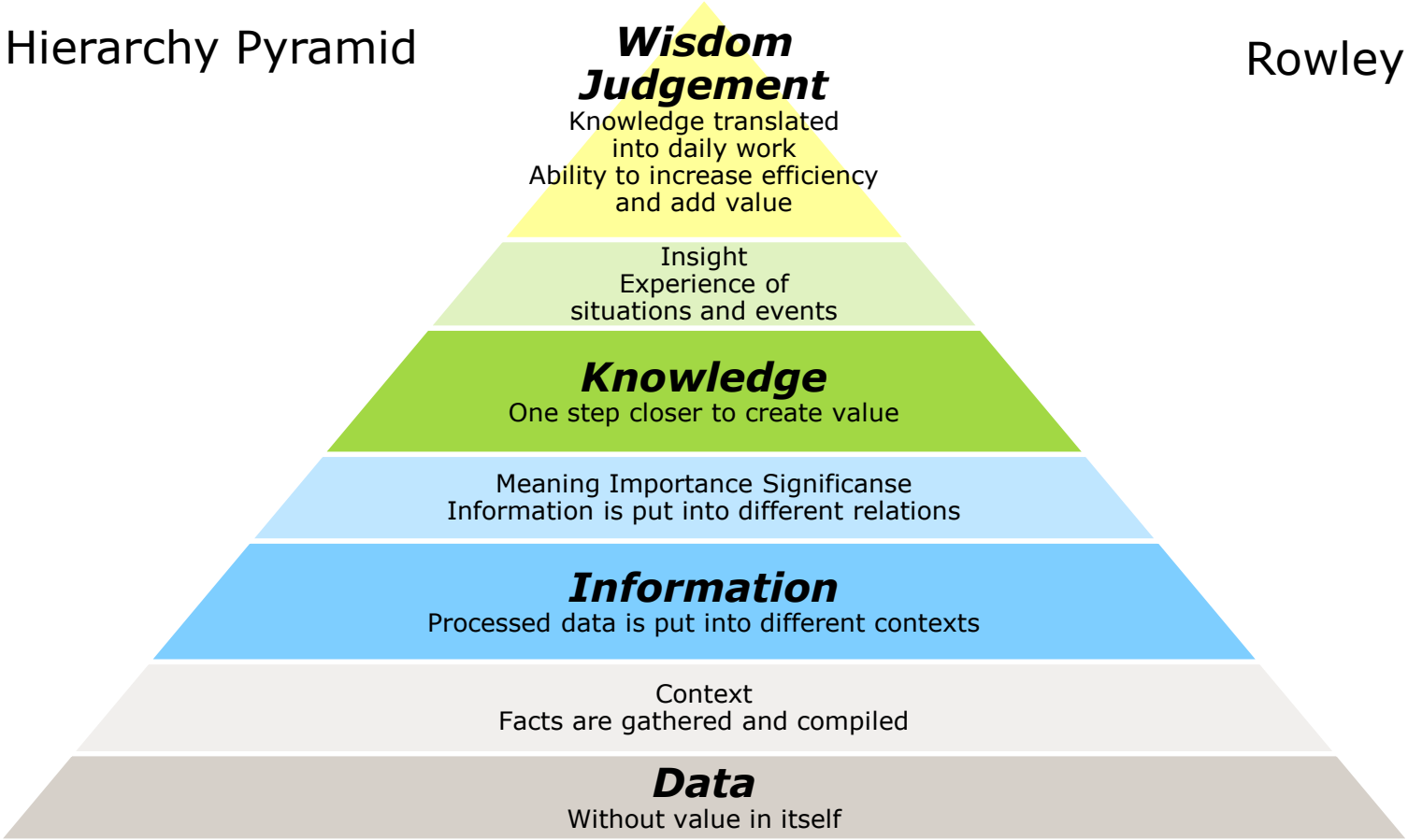
Process

A good process is the key to development

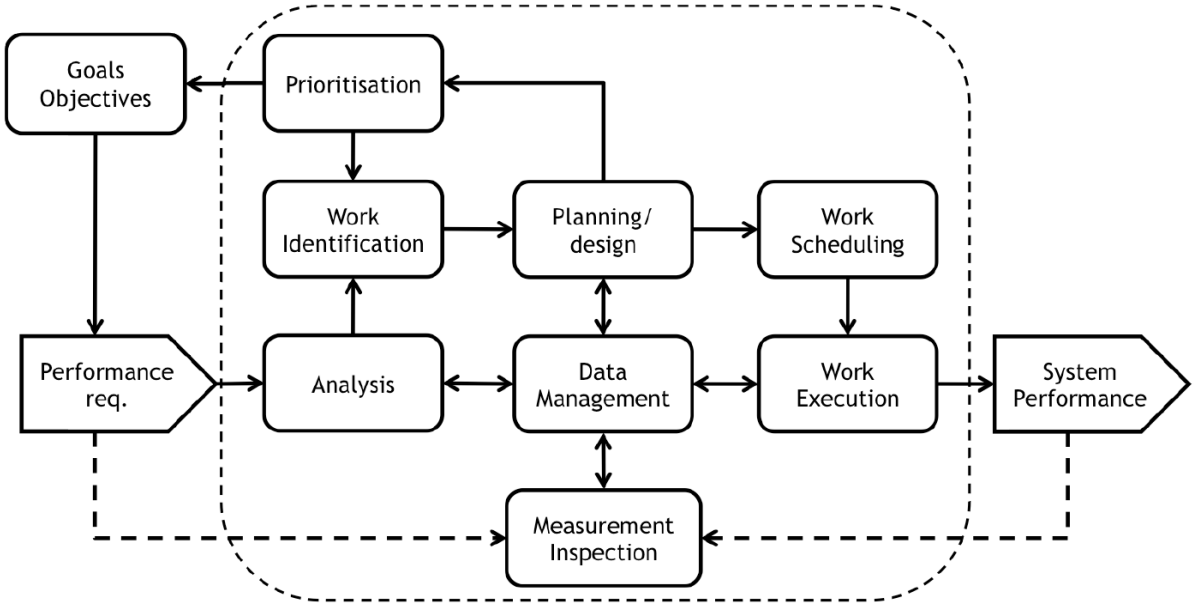
Digitalisierung ist viel mehr, als bestehende Prozesse einfach nur digital abzubilden. Thorsten Dirks, ehem. CEO von Telefónica, brachte es mit dieser pointierten Aussage voll auf den Punkt.

DIKW Hierarchy Pyramid

Rowley 2007



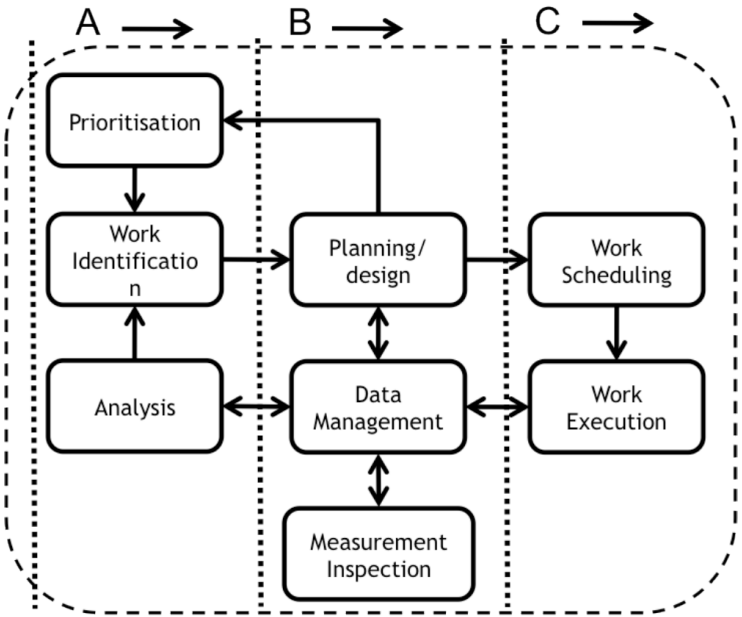
Six-stage model of maintenance



ANALYSING OUTSOURCING POLICIES IN AN ASSET MANAGEMENT CONTEXT: A SIX-STAGE MODEL

Rob Schoenmaker
Assistant Professor, Faculty of Civil Engineering, Delft University of Technology, Netherlands
Jules Verlaan
Senior Lecturer, Faculty of Civil Engineering, Delft University of Technology, Netherlands

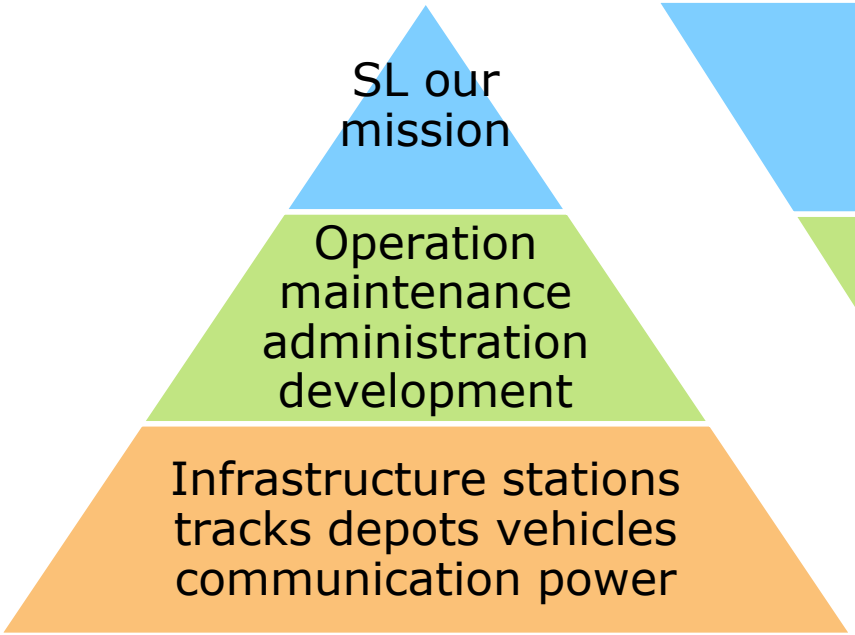
Levels of outsourcing

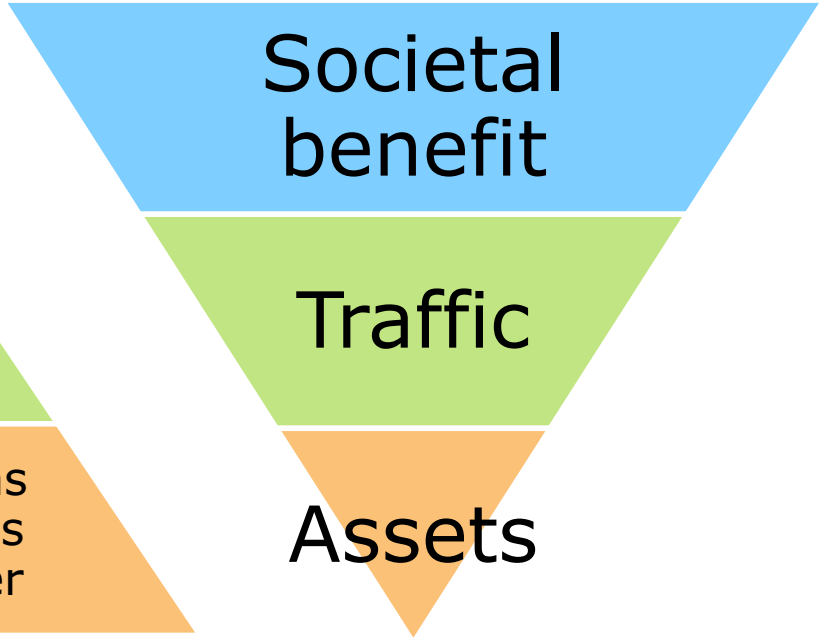


Creating value

Digitalisation and automation as enablers

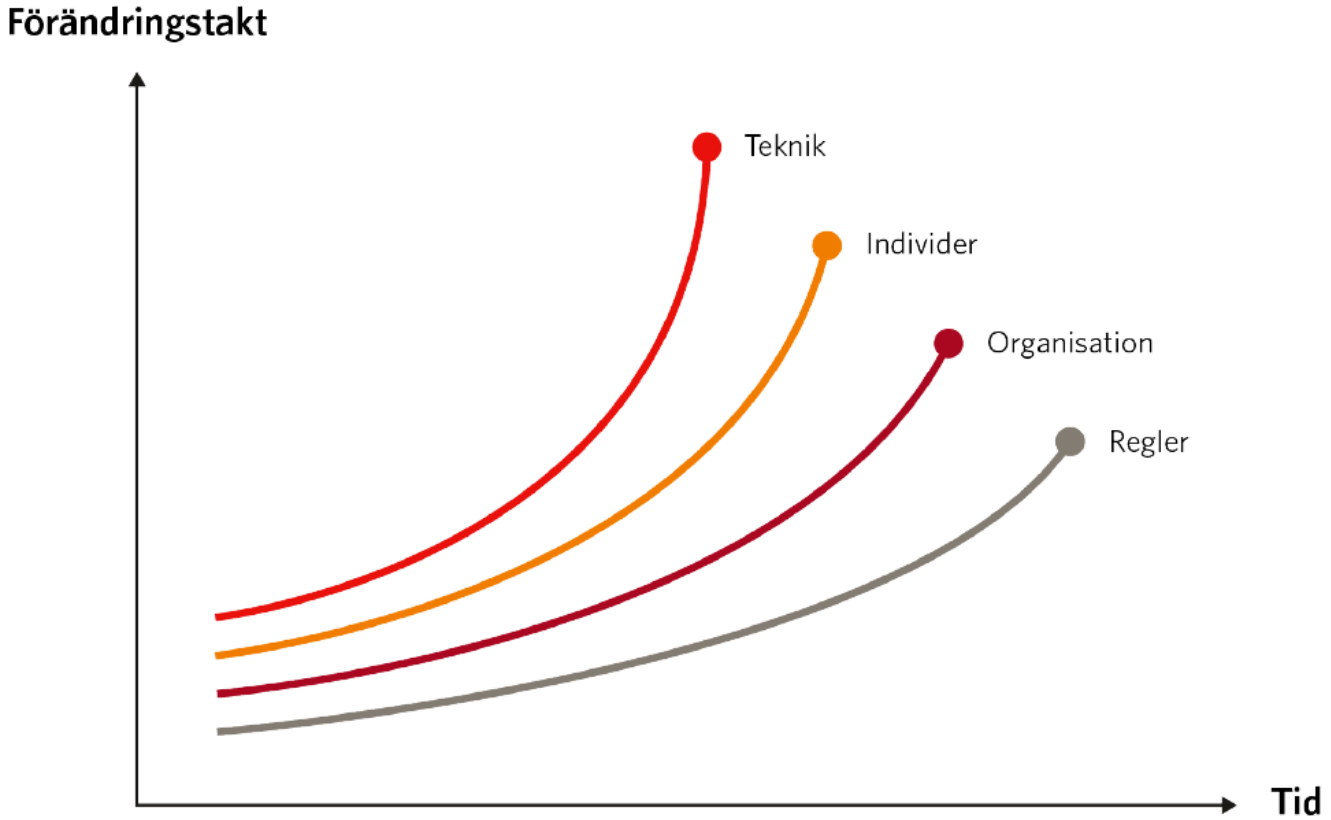
Value for society set against costs





The speed of change

Technology
Individuals
Organisations
Rules



Källa: Deloitte University Press
https://*blogs.sweco.se/att-skapa-ett-hallbart-transportsystem/*

Kristina Löwenberg
Kristina.Lovenberg@sll.se

Robert Lagnebäck
Robert.Lagneback@sll.se

Thank you for your attention

Region Stockholm