

i n v e n t o r y s

# Modular Signalling – A Flexible approach for a modern railway network

Presented at INCOSE, London

Tuesday, 22<sup>nd</sup> June 2010

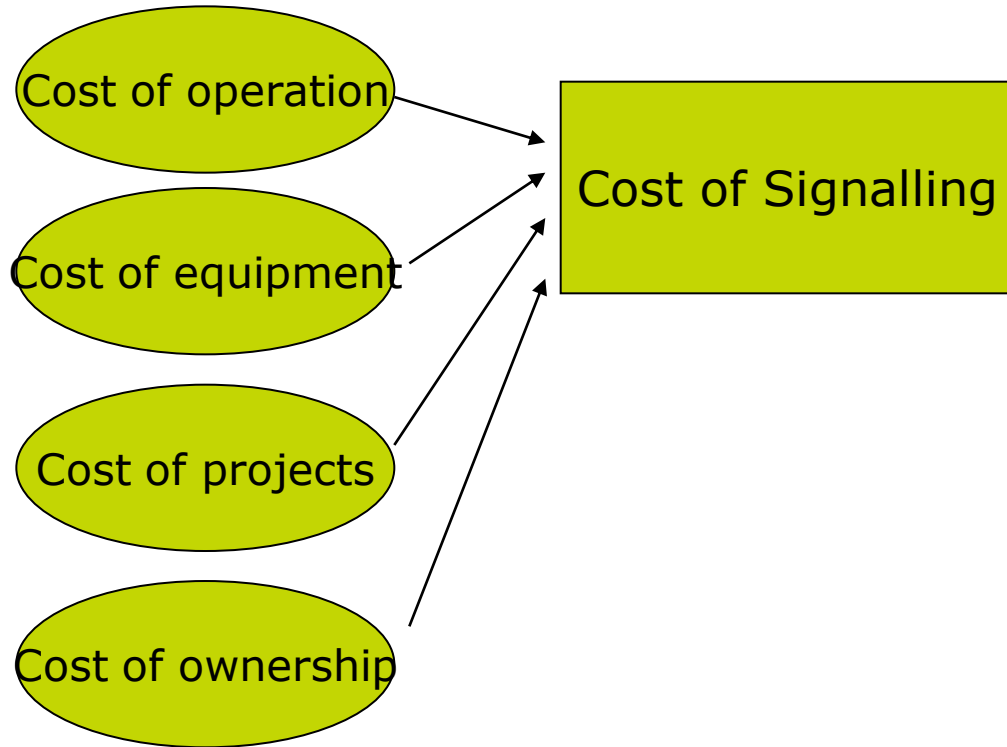
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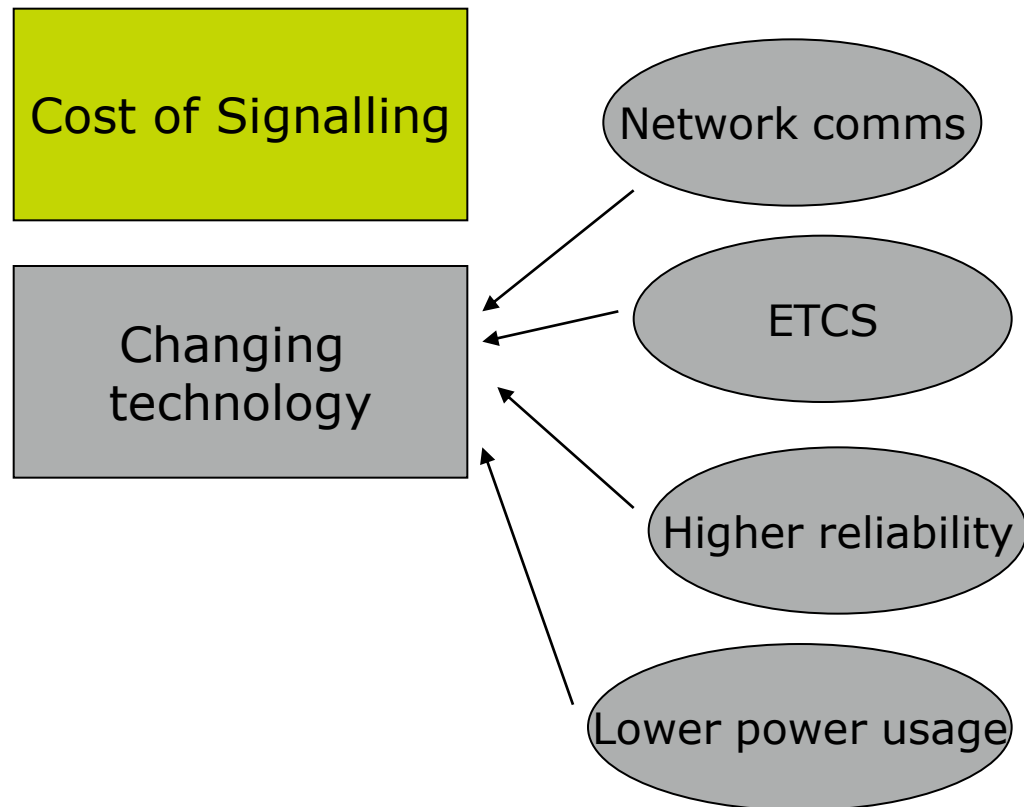
# Presentation Structure

- What are the drivers for change?
- Modular Signalling lifecycle and requirements management
- What do we mean by Modular Signalling?
- What has to happen to make this work?
- Conclusion

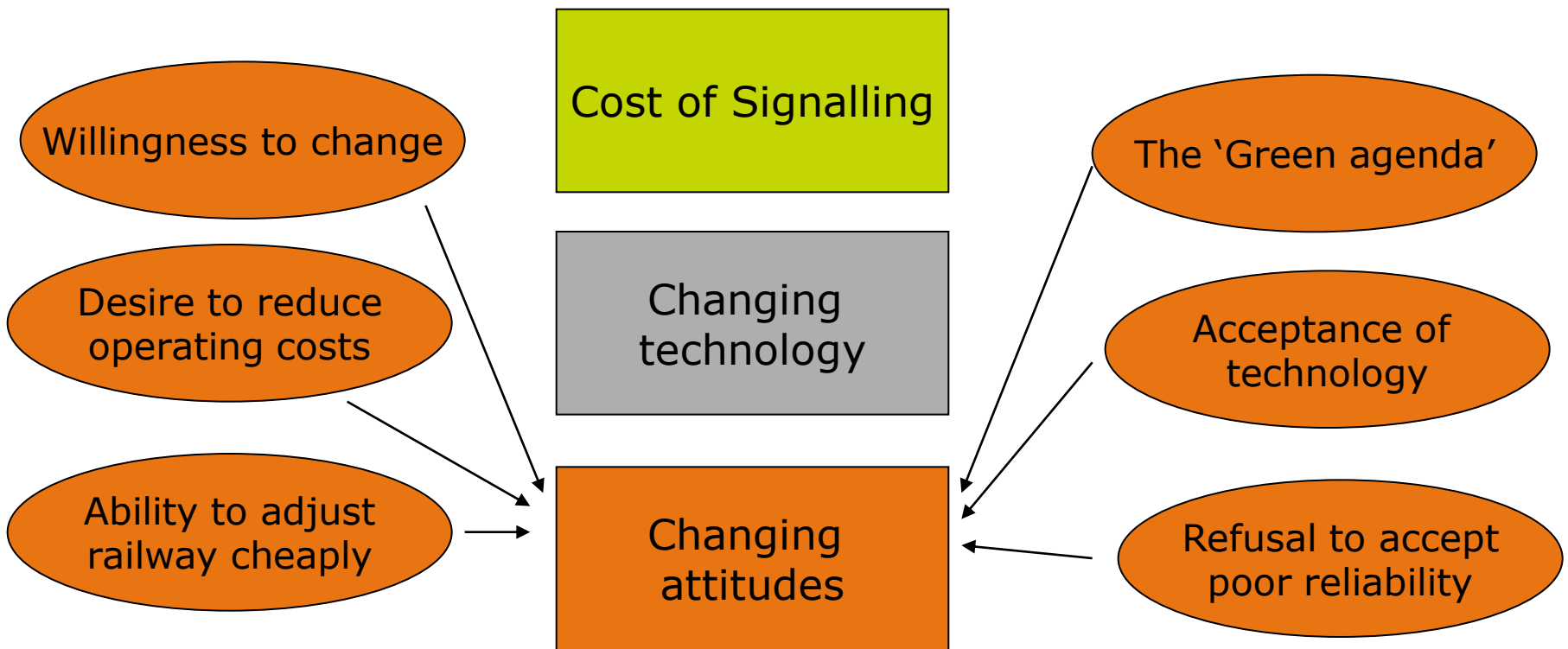
# What are the drivers for change?



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# An example ...

Flexible operation

'Green'

Low maintenance costs

ETCS compatibility an issue

Lost knowledge

In-built condition monitoring!

Expensive to operate

Condition information and statistics not available remotely

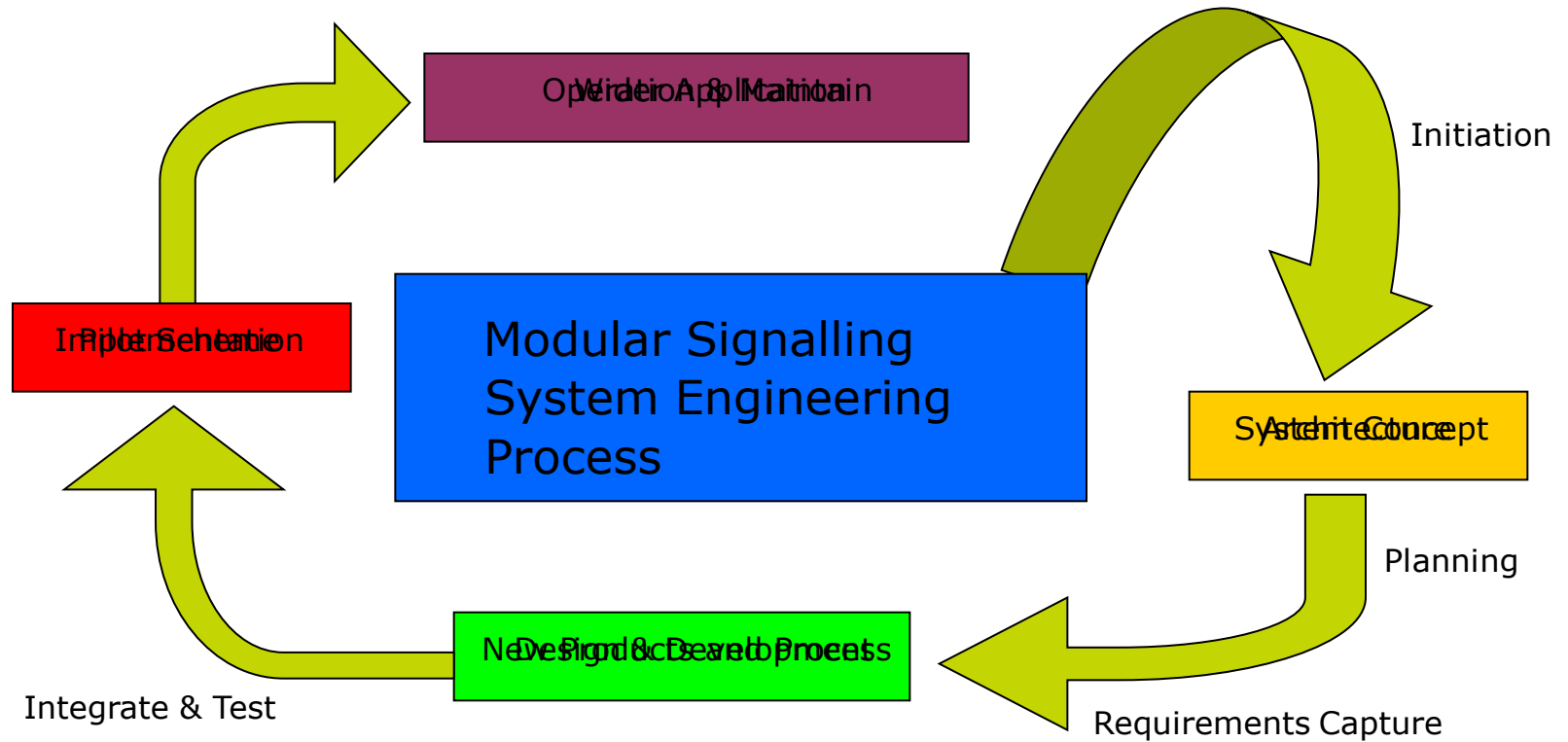
Has to be operated locally

Extended service life

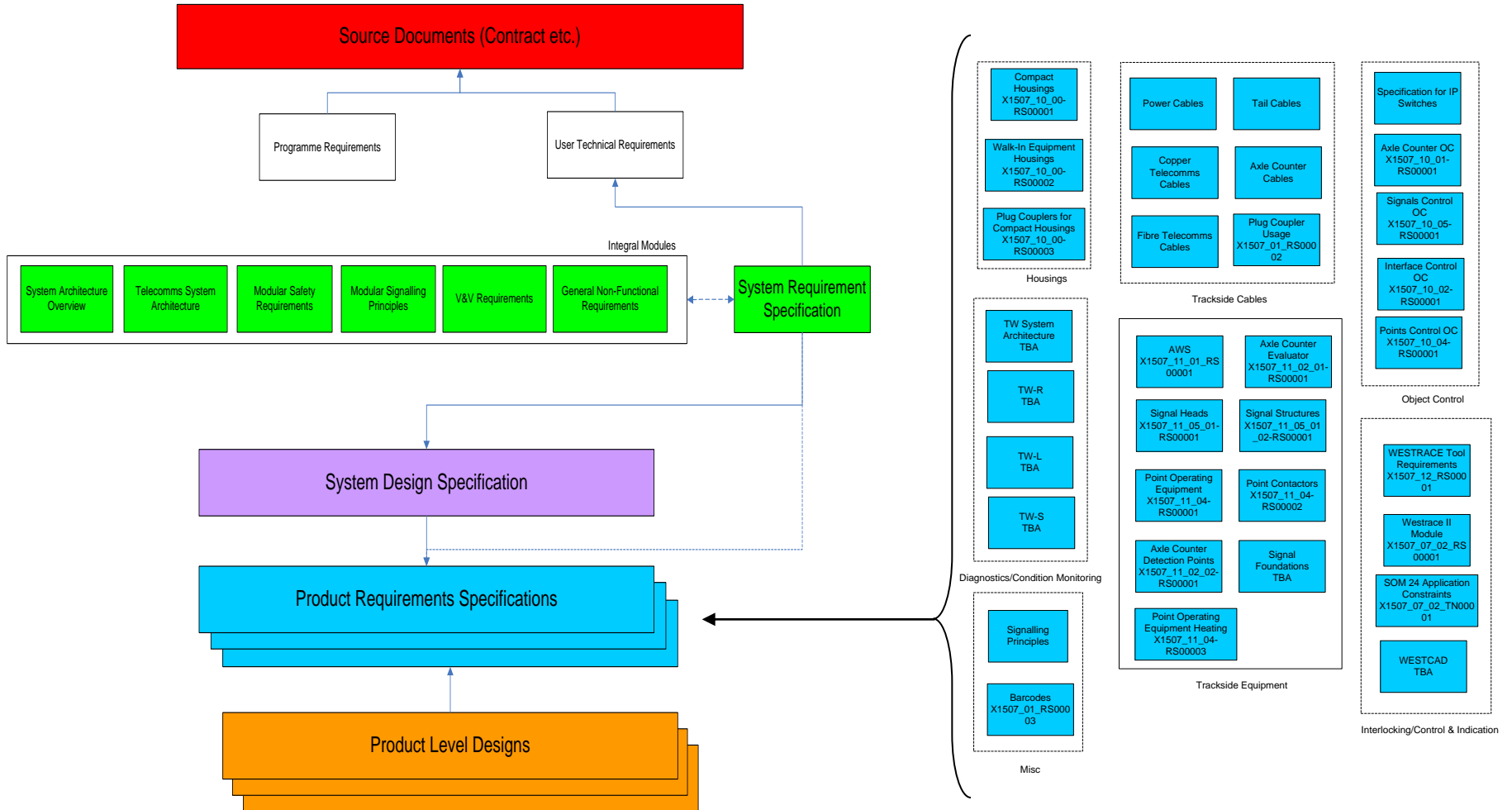
High levels of safety

Difficult to alter

# System Engineering Process Lifecycle



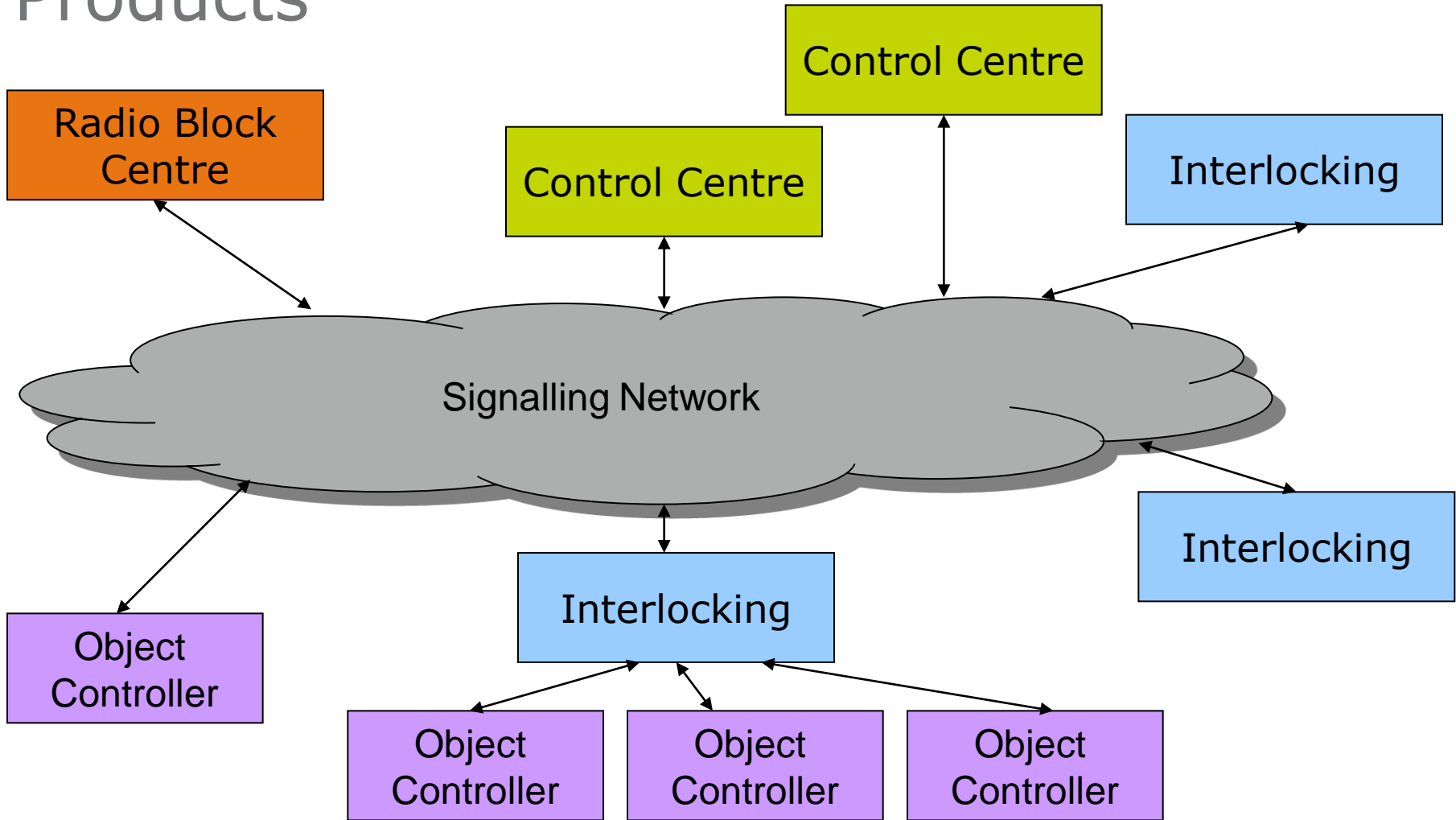
# Requirements Management & Design



# What do we mean by Modular Signalling?

- All equipment to be able to be transported safely without re-testing
- Design for object control will be cost optimised for common deployment scenarios
- Fixed number of standard parts to deliver projects reducing design optioneering
- Automated testing is to be the default means of system validation.
- Equipment Selection shall consider all aspects of the project lifecycle including installation, testing and whole life costs
- Components and architecture designed for rapid installation and commissioning supporting a 24/7 railway
- Partnership of product and process to deliver the greatest efficiencies

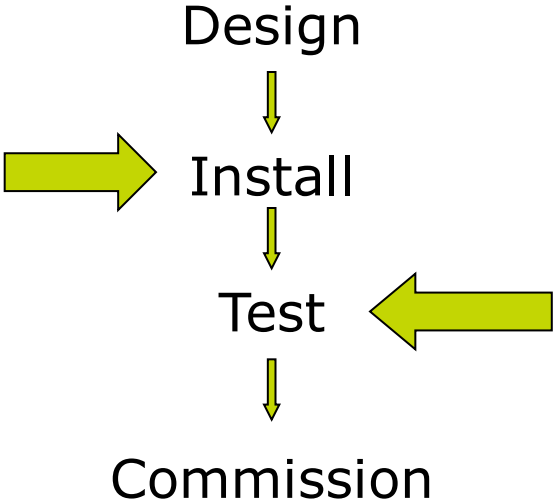
# Products



# Process Changes

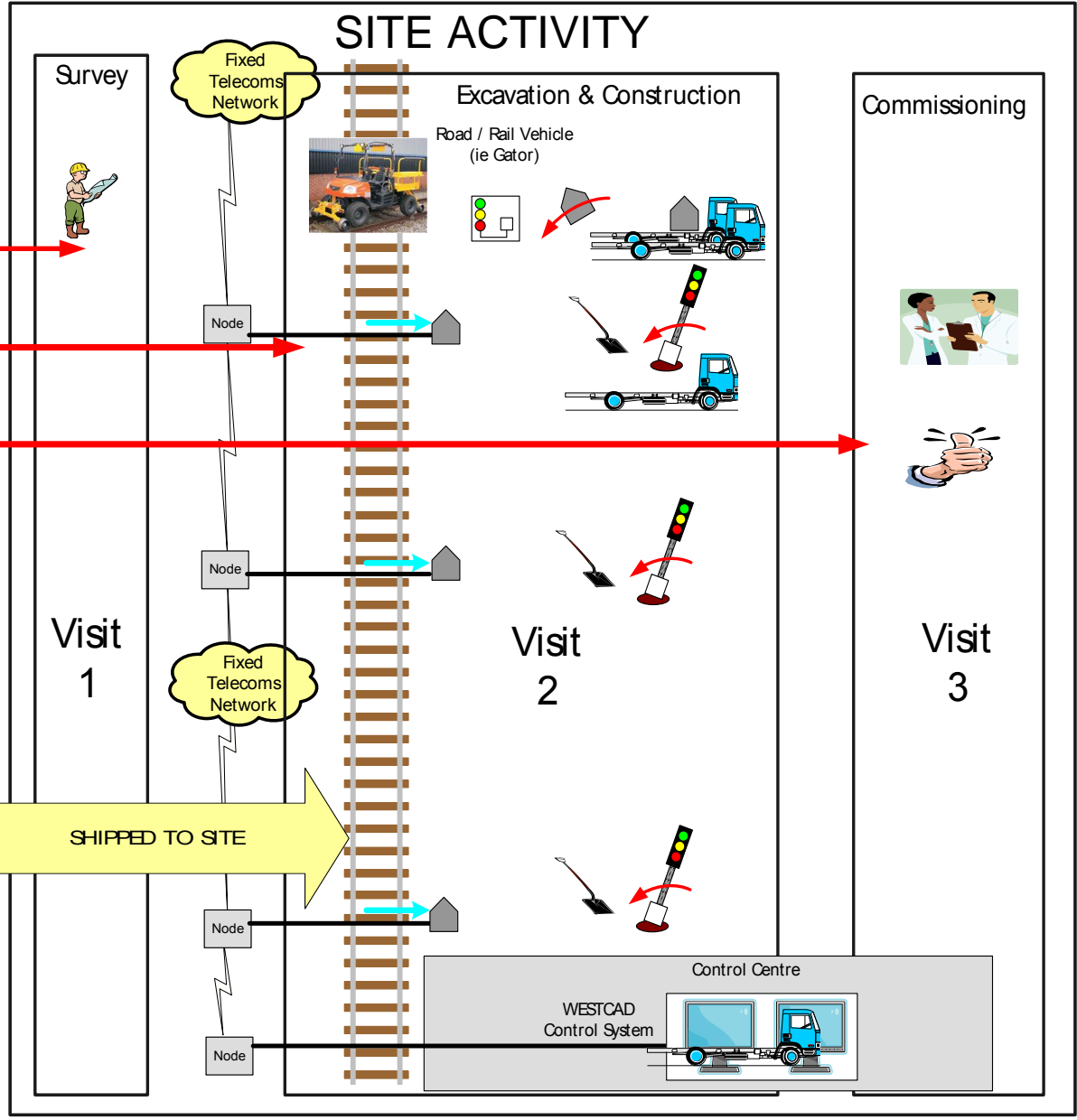
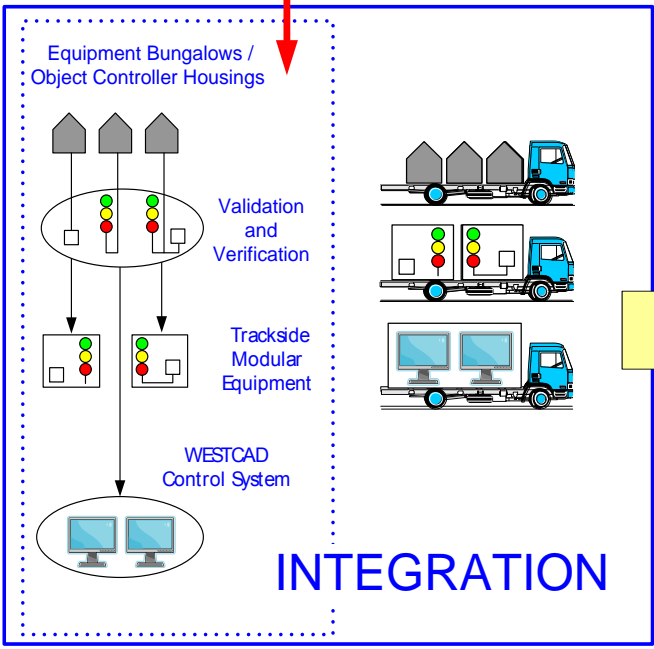
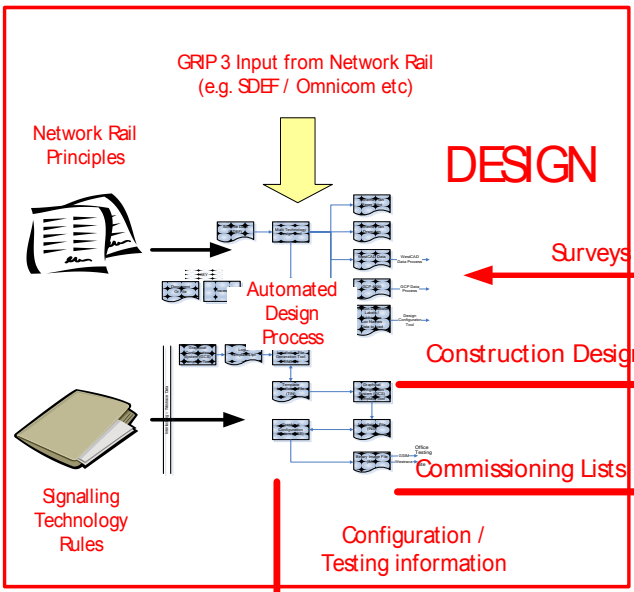
3 Key changes to the sequence of events

## Hangaring

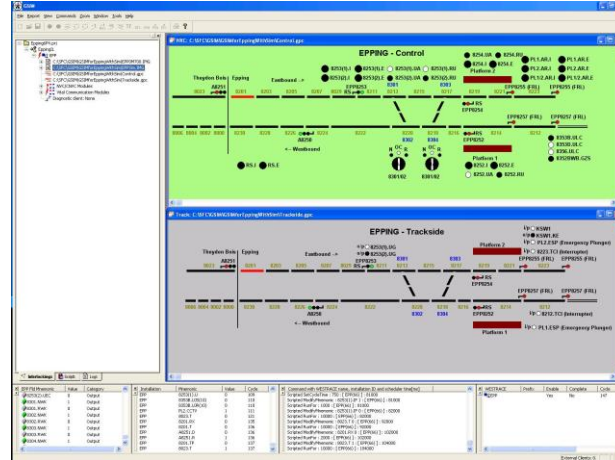


## Pit Stop Possessions





# Enabling technology



- Power
- Civil structures
- Remote Condition Monitoring
- Etc., etc.

# What has to happen to make this work?

- Changed attitudes
  - Contractor side
  - Client side
- Standardisation and simplification of rules
  - Challenging standards – without reducing safety
- Cooperation and collaboration between all parties
  - Open architectures and interfaces – to allow multiple suppliers to work on projects

# Summary & Conclusions

- Modular Signalling used a simple System Engineering lifecycle
- Modular Signalling is a reality
- Many other infrastructure providers are opting to use this technology
- This approach offers the potential to revolutionise the capacity and through life costs of secondary lines
- The detailed requirements capture activity will facilitate the controlled application of many of the products and processes to other signalling schemes, of any scale, complexity or location
- Technology and processes proven in other industries are the key to successful implementation

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