A System Engineering Approach to Major Infrastructure Programme

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EWR Overview

east west RAIL

East West Rail - Purpose

The strategic objectives for East West Rail are to:

- Improve east-west public transport connectivity by providing rail links between key urban areas across the Oxford to Cambridge region.
- Stimulate economic growth, housing and employment through the provision of new, reliable and attractive inter-urban passenger train services in the Oxford to Cambridge region.
- Contribute to improved journey times and inter-regional passenger connectivity by connecting with north-south routes and routes beyond Oxford and Cambridge.
- Provide a sustainable and value for money public transport solution to support economic growth in the area.
- Meet initial forecast passenger demand and consider and plan for future passenger demand, making provision where it is affordable.
- Maintain current capacity for rail freight and make appropriate provision for anticipated future growth

East West Rail - Route

East West Rail - Scope

The project includes the following main works:

- Construction of a new railway between Stewartby and Cambridge including the construction of new stations and car parks at Tempsford and Cambourne.
- Improvement works to the existing railway between Oxford and Bedford and the approach into Cambridge, including works to ensure adequacy of stations for expected passenger demand.
- New structures and works to existing structures including viaducts, tunnels, bridges, cuttings and embankments.
- Improvements to or closure of level crossings and the provision of suitable replacement crossings where required on safety grounds.
- Works to manage interfaces with existing highways and public rights of way, watercourses and utilities apparatus.
- Environmental mitigation to mitigate the impacts of our proposals

System Engineering Approach

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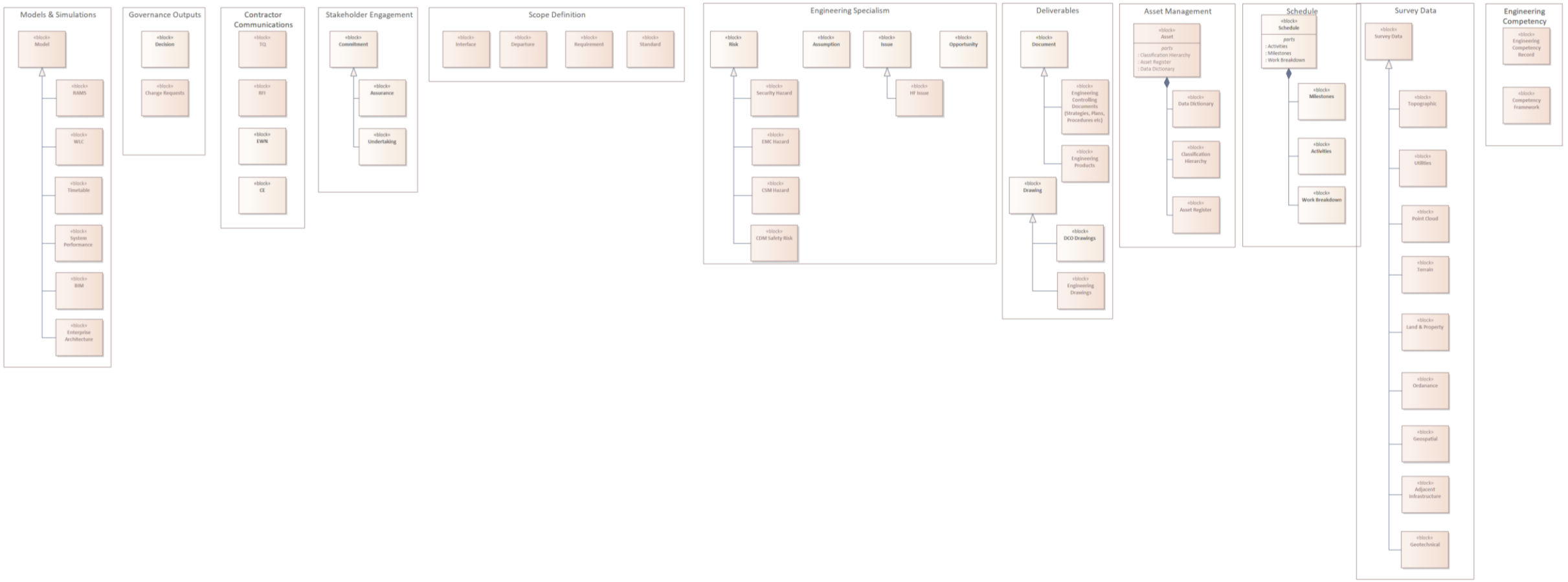
EWR Engineering Data Assets

- EWR has a large number of engineering data asset types.
- Data assets are managed using a variety of software tools / repositories.
- Many of the tools used have industry/domain legacy.
- Data assets often need to reference/link to one another

EWR Data Architecture



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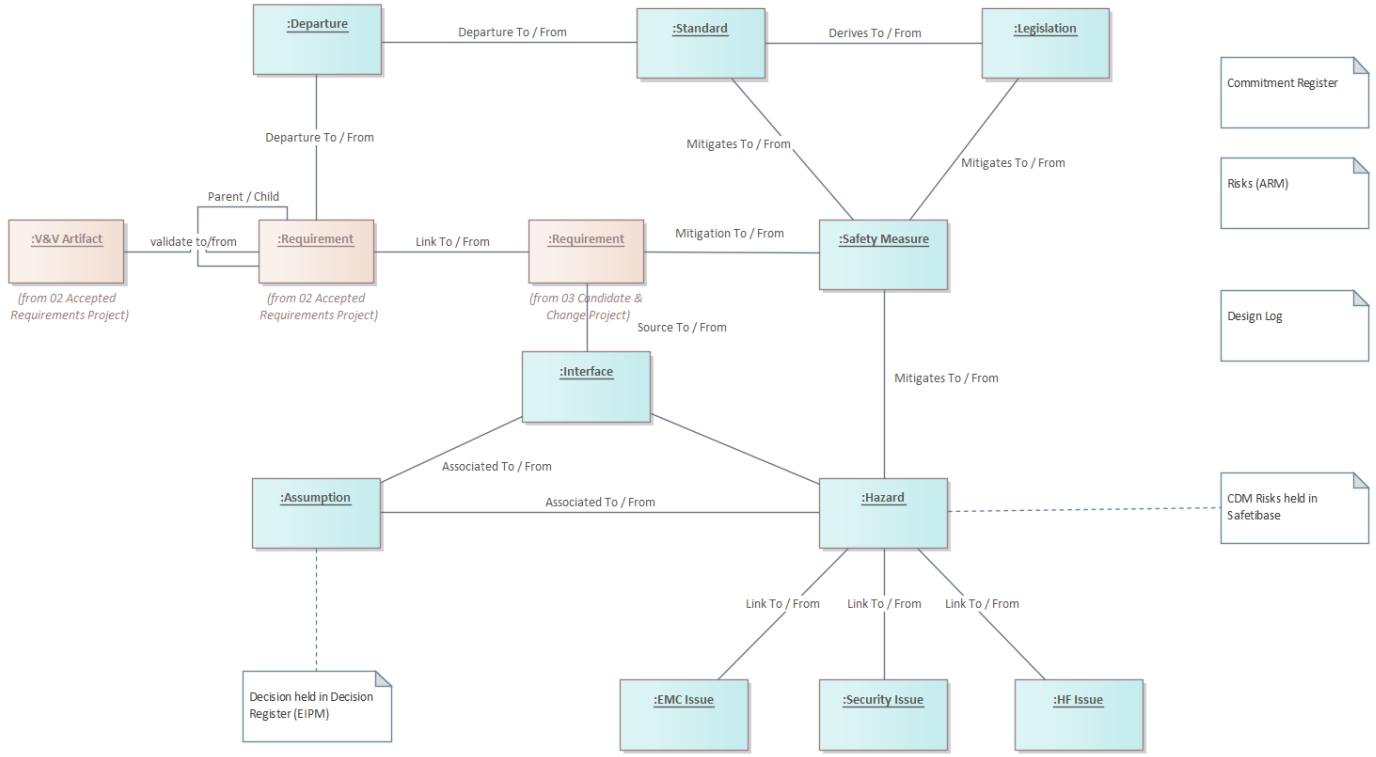
DOORS Schema

EWR is using DOORS Next for managing:

- Requirements
- Applicable Standards
- Interfaces
- Assumptions
- Safety Hazards
- Human Factor Issues
- Physical and Cyber Security Threats & Vulnerabilities
- Departures / non-compliances



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DOORS Next Functionality

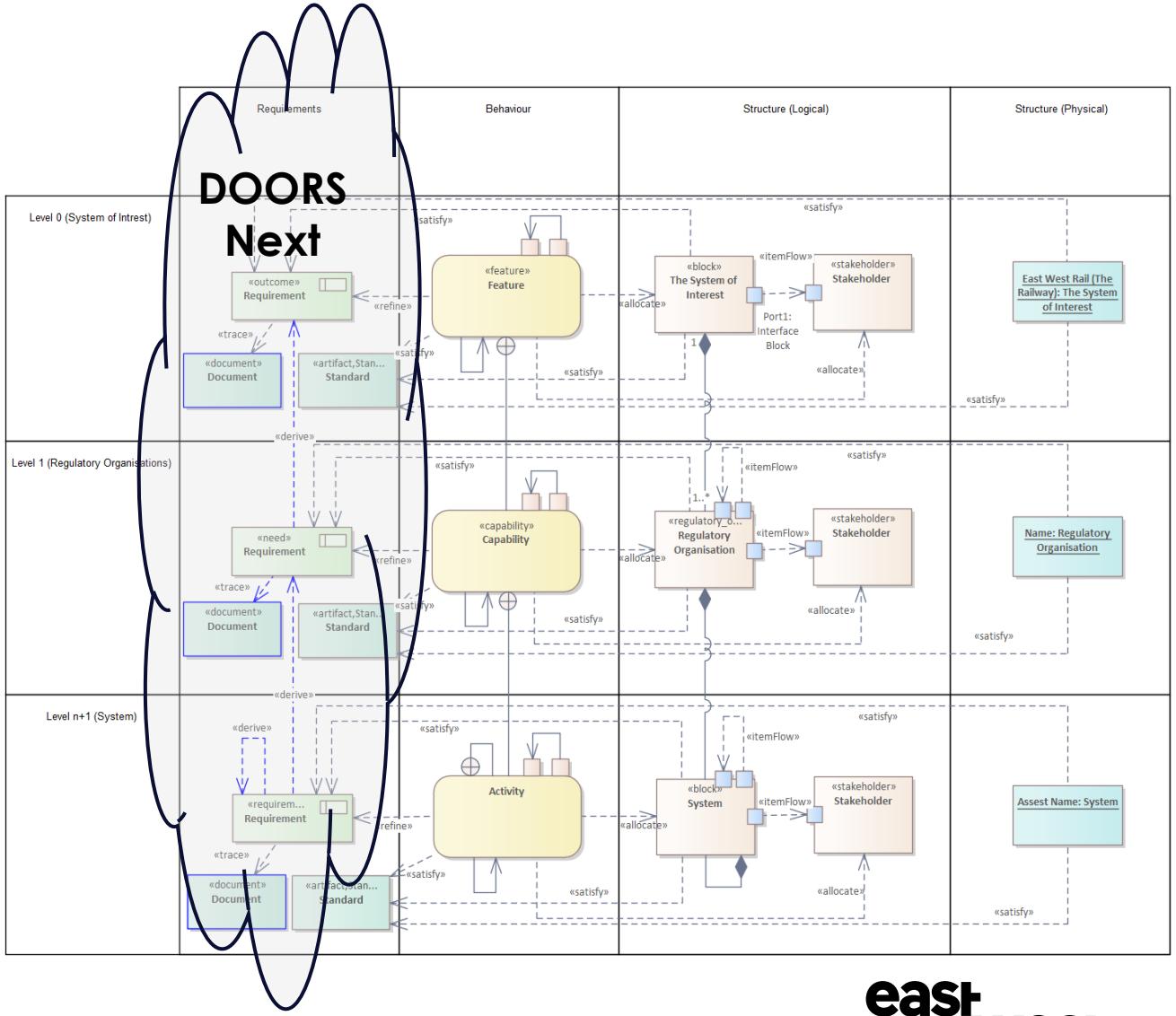
EWR is currently using the following DOORS Next functionality

- Different Artifact types for each data asset type (e.g. requirements, assumptions, interface etc)
- User permissions assigned to artifact
- Use of workflows (by artifact) and reviews
- Use of separate projects areas and link constraints
- Baselining
- Basic status reporting
- Glossary

System Architecture

EWR have developed an Architecture Framework

- Use of Sparx' Enterprise Architecture
- SysML
- Integration with DOORS Next for import of:
  - Requirements
  - Standards
  - Interfaces
- Development of 'rich pictures' within modelled environment



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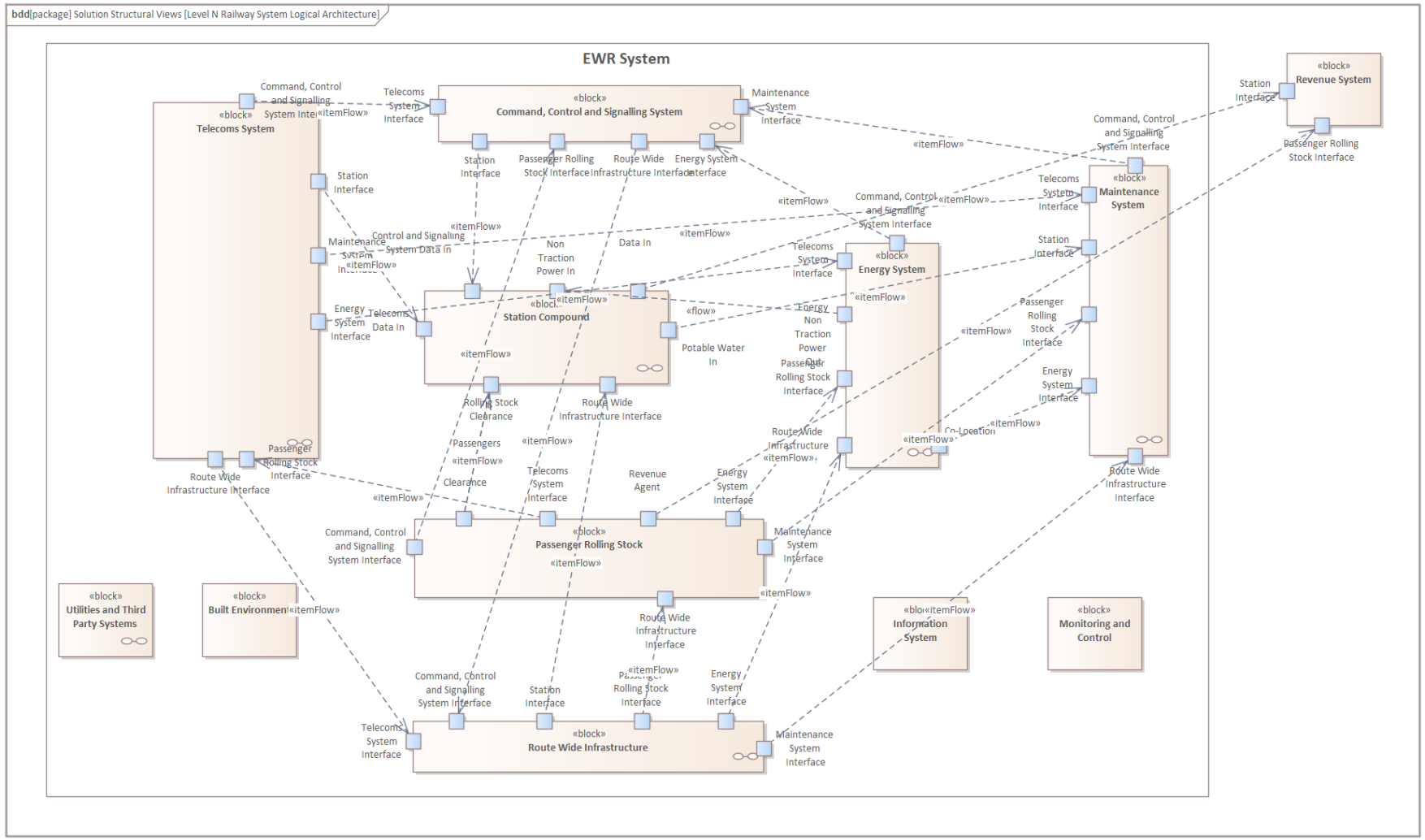
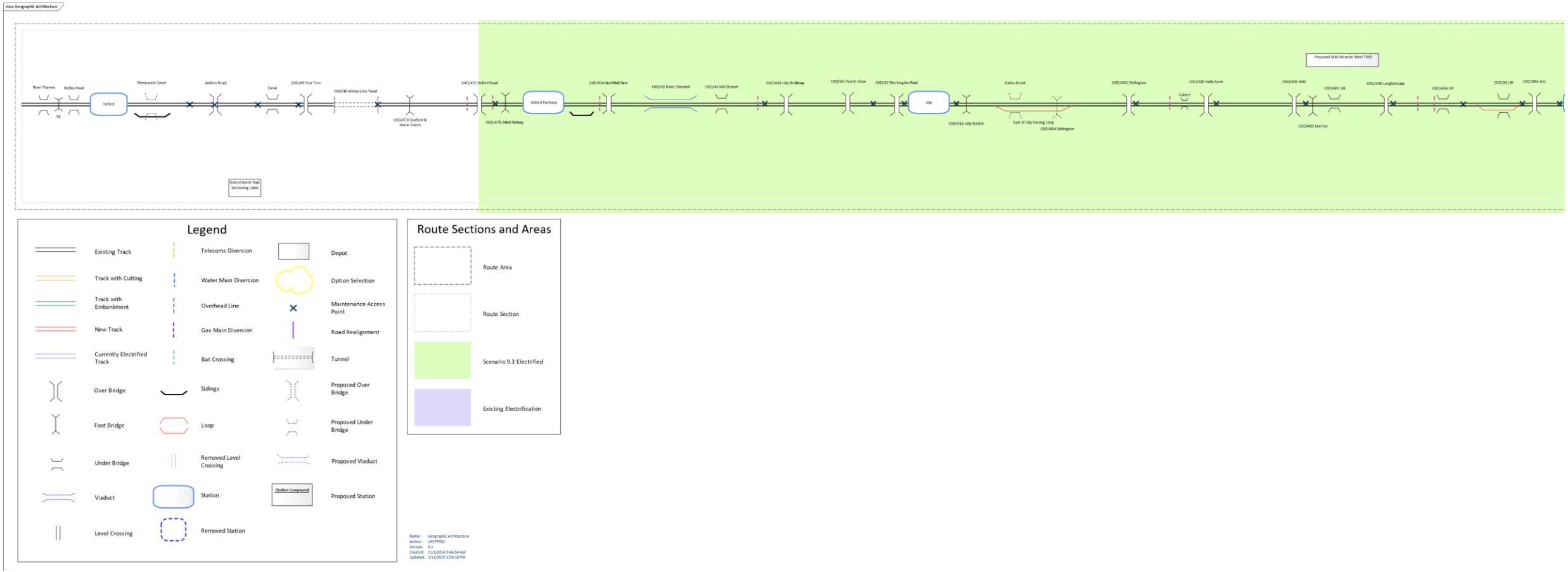
System Architecture – ‘Structural’ View



System Architecture – ‘Geographic’ rich picture



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Future Challenges

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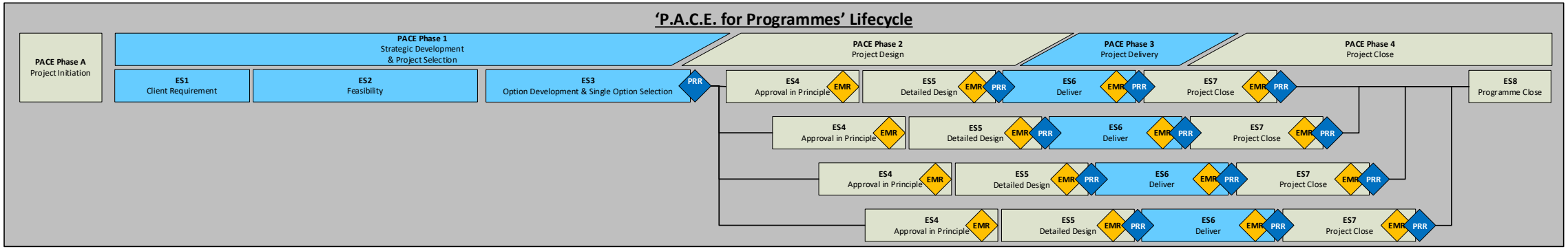
Future Challenges

East West Rail is a ‘programme of projects’

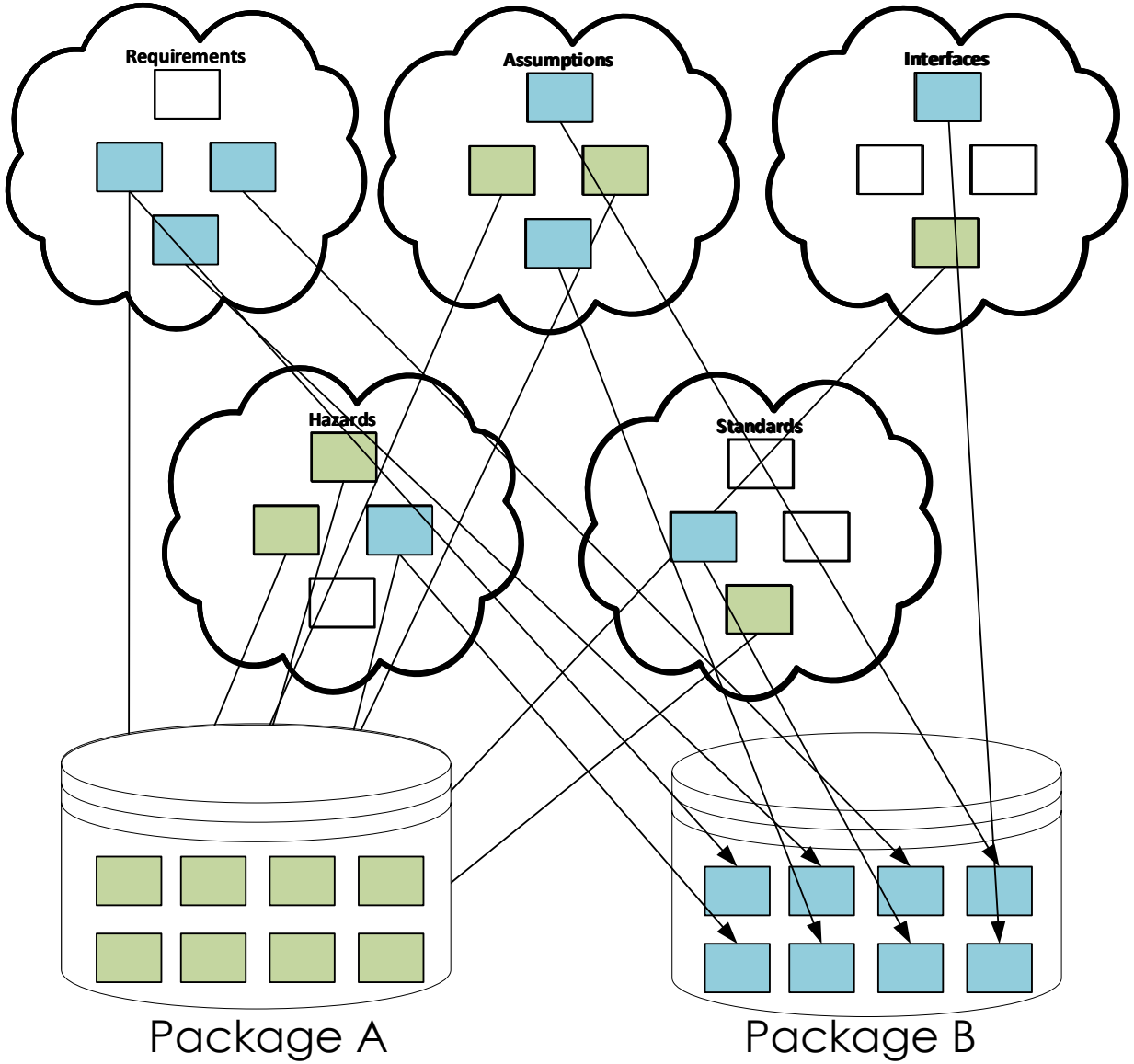
Currently almost all design effort is being undertaken by a single Joint Venture until we have a ‘single option’ solution.

Thereafter the programme will split into many individual projects.

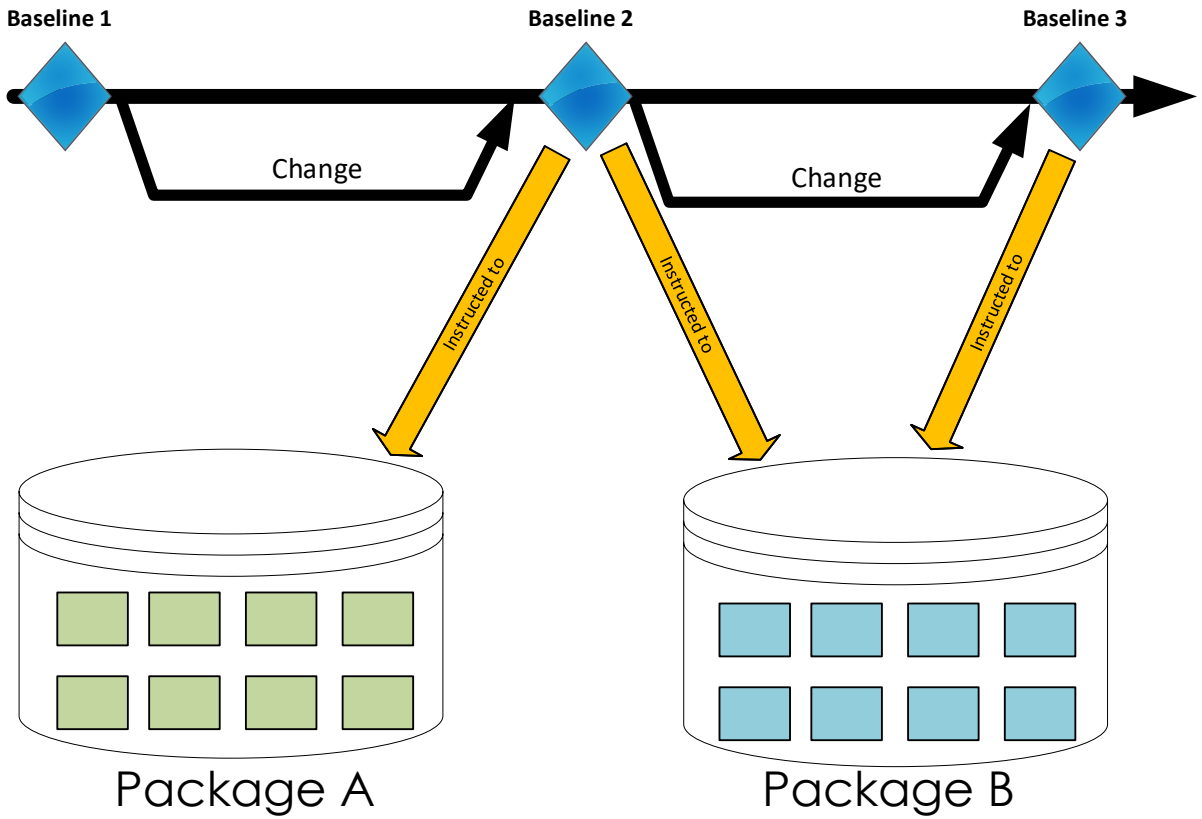
These projects could be civil infrastructure, buildings, rolling stock, systems or business/capability change.



Challenge 1 – Packaging into ‘components’



Challenge 2 – Instructing Change



Future Challenges

Future Functionality

EWR is trialling the following 'advanced' functionality from DOORS Next in preparation for upcoming lifecycle stage challenges:

- **Global Configuration Management** and the use of **'Streams'** to manage changes to baseline
- **'Components'** and artifact **'reuse'** to package data assets into packages of work/projects.
- **'User permissions'** to enable/restrict supplier and 3rd party access
- Advanced features of '**reporting**' to analyse linked data

Thank you

www.eastwestrail.co.uk