



# Amey

## Systems-based approaches Case Study: CVL Transformation

17<sup>th</sup> April 2024

**Amey**

*“The current delivery model for complex infrastructure projects is leading to far too many projects running into serious problems”*

*A Systems Approach to Infrastructure Delivery – ICE, Dec 2020*

Complex projects are naturally unpredictable.

This unpredictability has risk associated with it.

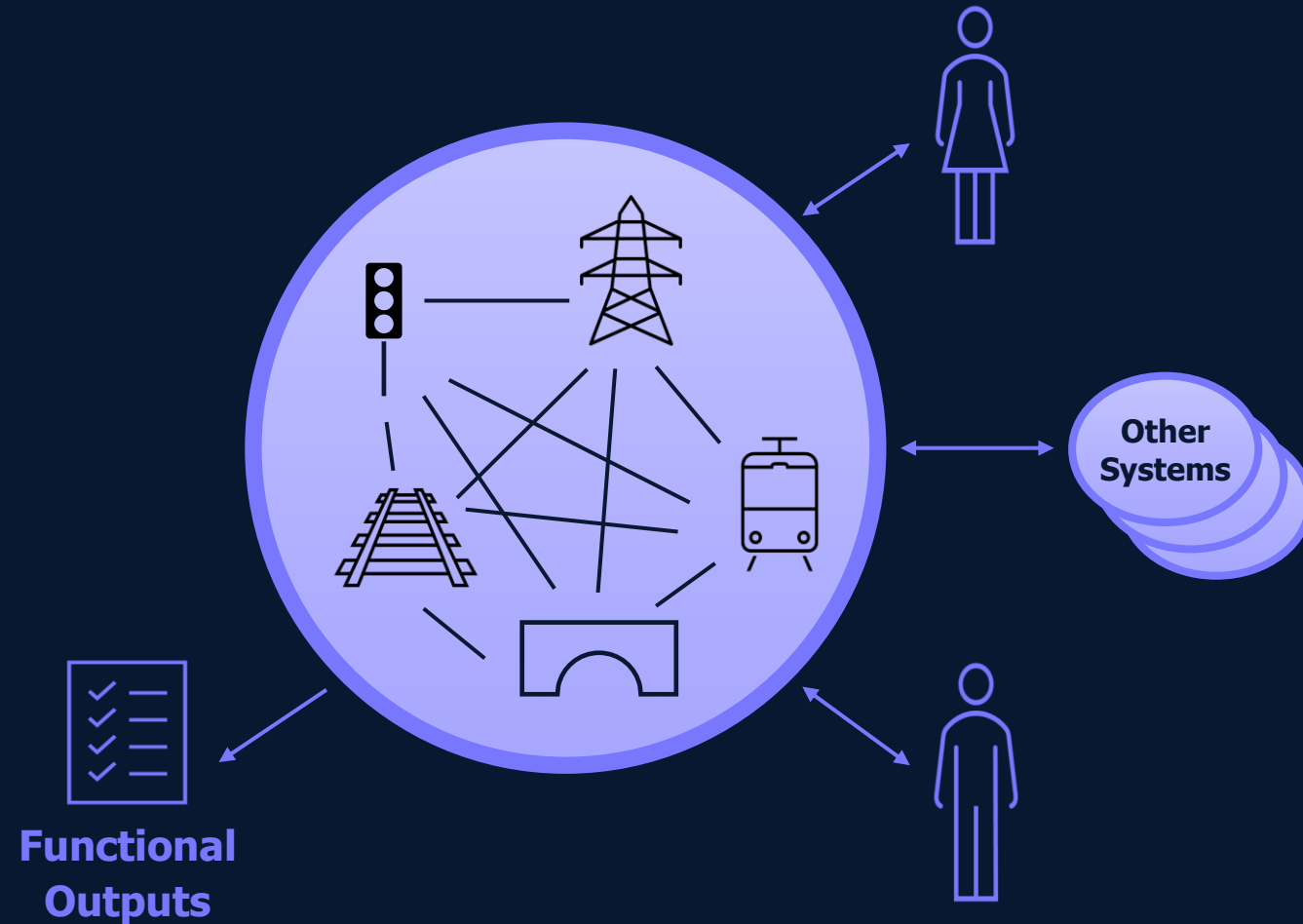
When complexity wins, we allow the project's value or ROI to be reduced:

- Output erosion
- Cost overruns
- Programme delays



A System has:

1. A boundary
2. Output(s)
3. Interfaces and constraints
  - Stakeholders
  - Other infrastructure
  - Environment ...

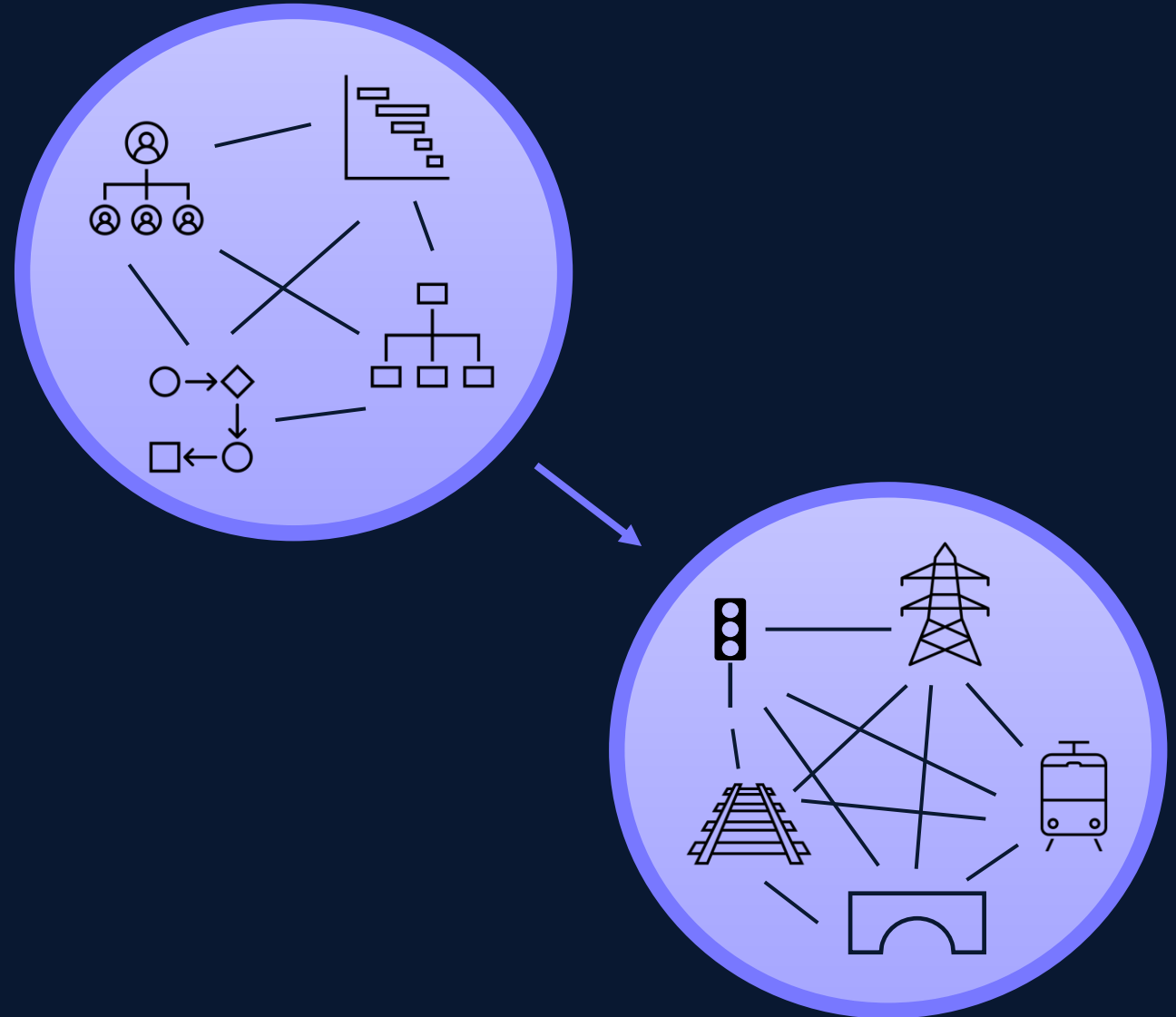


We can also consider our projects as systems.

The project system acts upon our “hard” system to transform its functionality.

As a result we have two complex systems interacting, creating even more opportunities for complexity to win.

Systems-based approaches are those that help us understand and control the complexity.





The Core Valley Lines Transformation is an outcome led, whole railway system transformation:

- **Capacity:** 4tph to the valley heads
- **Performance:** Reduced journey times
- **Environmental:** Zero carbon at the train
- **Stakeholders:** Level access
- **Extendibility:** Enable future on-street running

Being outcome led provides space for continuous innovation throughout the project.

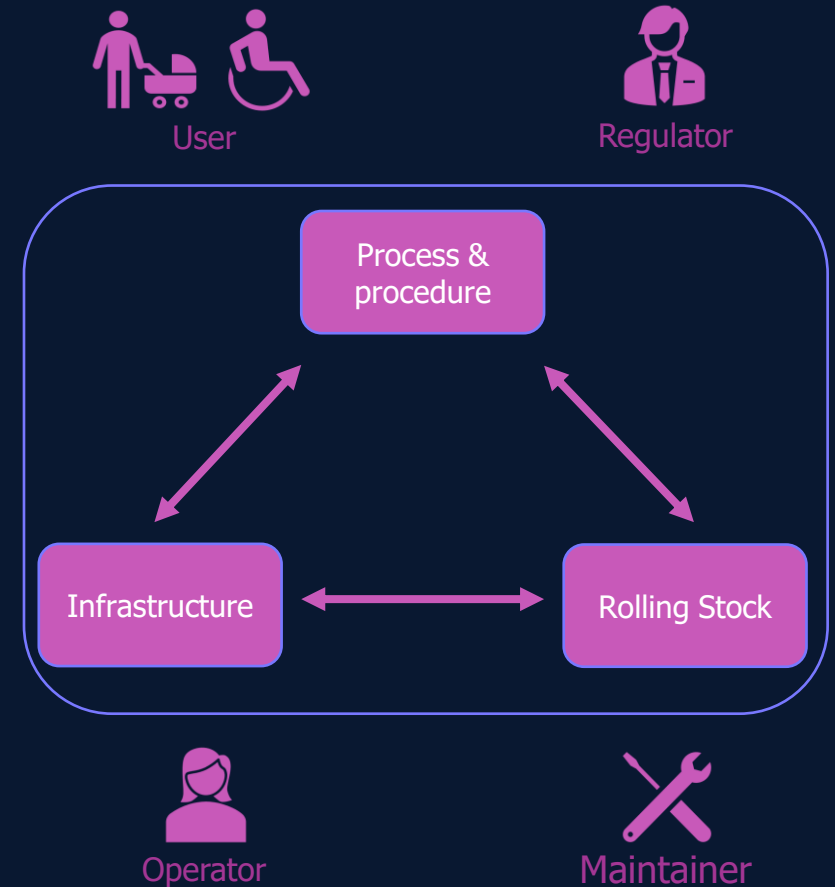


Considering the whole railway as our system:

- Reduces constraints
- Maximises opportunities for novel and innovative solutions

Amey has leveraged this to determine a solution that makes the previously unaffordable Valley's electrification, affordable.

Working with our client TfW, and the wider supply chain, Amey have developed and implemented systems-based approaches to control complexity while delivering assured outcomes.





## Stadler Class 398 Metro Vehicle

- “Tram-Train” light rail vehicle
- Traction power uses 25kV overhead line & onboard energy system (batteries)
- Capable of on-street, line-of-sight operation, passive provision for DC charging
- Mid-height floor with retractable step



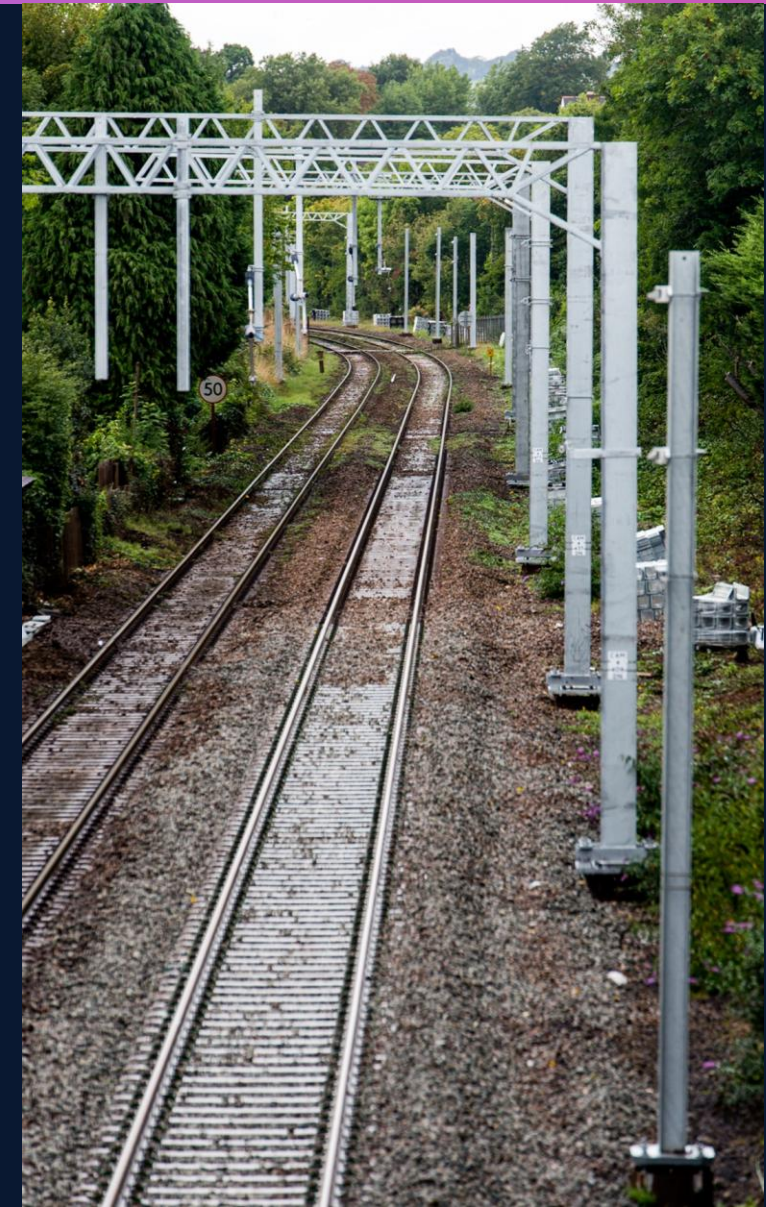
## Stadler Class 756 FLIRT

- Mainline, heavy rail vehicle
- Traction power uses 25kV overhead line & onboard energy system (batteries)
- Diesel Range Extender to increase range
- Mid-height floor with retractable step



## CVL Infrastructure Works

- Discontinuous electrification – 170Km of OLE
  - ✓ 42 Permanently Earthed Sections
  - ✓ 10 Catenary Free Sections
  - ✓ 1<sup>st</sup> in the UK to use RFID to control Automatic Power Changeover of Rolling Stock traction power modes
- New HV traction power distribution system
- Line speed improvements, passing loops and double tracking
- New CVL Integrated Control Centre
- Complete re-lock/re-control of CVL
- Level Boarding works
- New stations and station improvements
- Line of sight re-signalling of the Bay line







Amey has learnt lessons throughout the CVL Transformation allowing us to manage complexity and reduce risk.

The outcome based, self-assured delivery model, enables a focus to remain on benefits realisation and ROI for the taxpayer.

Amey's system-based approach has enabled innovative solutions, achieving the first UK implementation of novel technology application.





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