

Is your decision-making on track?

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Arcadis' Pursuit Leader Stuart Pritchard has written the article below about the organisation's strategic approach to rail projects

Options. There are a lot of them in rail projects. We start off with an outcome in mind, for example, improving journey times. But there are many questions about how best to achieve that. Can it be done by altering track geometry alone? Does it require full-scale changes to the signalling system? Is the current rolling stock able to run at maximum speed – and would that achieve the outcome? Are highly disruptive 'big bang' solutions better than minimal impacts over extended durations? Is a costly option which has benefits beyond journey times really justified? And how can we deliver outcomes effectively while minimising embodied carbon?

What's needed is an effective way to understand how decisions impact one another. Many years ago, I had a graphic equaliser on my stereo. When I adjusted one of the frequencies, I could hear in real time how it changed the music. If I didn't like what I heard, I made further adjustments. If only we had a graphic equaliser for engineering projects. Then we'd be able to understand how every design decision we made affected our desired outcomes, all in real time. Well, at Arcadis, we do.

Here's how it works. Engineering projects contain mountains of data. Data that's distributed between designers, suppliers, clients, train operators, contractors and other stakeholders. That data is held in numerous systems, from scheduling software and cost databases, BIM processes and 3D models, through to common data environments and SharePoint. While these programmes all help us work with project data, they don't integrate it across systems and stakeholders. And the distributed nature of a project's data makes it harder to understand what's going on – so making good design decisions is difficult. What's needed is a way to integrate all this data so that:

- The outcomes required by the project are clearly articulated and measurable.
- Deliverables are defined, together with their inputs.
- Workflow is clearly understood – who owns which deliverable at each stage of the programme.
- Real time programme and cost information is available for every design decision.

At [Arcadis](#), we use an “Assured Data-Led” Delivery approach – or “ADL”. ADL structures data in a way which connects design decisions to their impact on the project's required outcomes. Let's look at how we might use ADL.

Suppose you want to improve journey times on a railway, a range of possible engineering interventions could be used. ADL relates data to processes by establishing how each piece of data gets used in each part of the design process. In this case, every design process, every BIM model element, every deliverable would be tagged to show its impact on journey time.

When a designer chooses, say, the track alignment, the impact of that choice on journey time is immediately available. Similarly, the impact of different signalling types or rolling stock specifications on journey time can be made available through ADL. ADL knows how each piece of data relates to journey time – so calculating the overall impact is simple.

Cost is an important consideration. Our target customer outcome is improved journey times. But we don't want to achieve that at the expense of the project budget, so as well as journey time, every aspect of the project data is also tagged with cost information. When we make our track alignment decision, we can see its impact on construction cost as well as journey time.

Finally, let's consider tagging our data with the impact on operating costs. When a designer chooses between a ballasted or ballastless track form, the impact on maintenance costs and customer disruption is available – as well as the impact on construction costs.

We might also use ADL to add data tags about programme, embodied carbon, whole life cost, asset lifespan, flood resilience....the list is endless. What we end up with is a system where the strategic outcomes we need are related to every aspect of a project's design. This allows us to make data-led decisions in real time based on the outcomes the project needs to achieve.

Designers, project managers, and clients can view all these impacts simultaneously using real time control boards. We can quickly analyse options, assessing the impact of our decisions on journey time, programme, cost, carbon, asset life, whole-life cost or just about any other key outcome. This means we

can design to budget while optimising the customer outcomes we achieve.

The modern project environment is complex. It mobilises the expertise of a diverse ecosystem of globally-connected companies. It often involves conflicting requirements. There is always pressure for cheaper, faster delivery, and eye-watering volumes of data are involved. The projects that achieve their goals are those that can manage that complexity and connect it to customer requirements. Because achieving the customer outcomes we set out to while meeting budget constraints means understanding exactly how every decision impacts those outcomes and constraints. That's what ADL delivers.

By Stuart Pritchard, Pursuit Leader at Arcadis



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