

Value through collaboration

Andy Kirwan, from Network Rail, **Jude Carey**, from Irish Rail, and **Rosa Casquero**, from UIC, explain more about the WiSDoM project, which aims to establish a methodology and framework for whole-system, value-based decision-making for asset managers in the international railway sector

Railways have several competitive advantages over other forms of transport. They can move large numbers of people in and out of densely populated urban areas and provide fast journeys over medium to long distances. They are the most environmentally friendly way of moving bulk goods on land and can be timetabled to provide reliable journey times. Railways are also well placed to benefit from digital technologies, including the satellite-based control of train movements, which increases capacity while removing physical infrastructure and reducing life-cycle costs.

While these inbuilt advantages maintain an enduring need for railways and create opportunities for new and better services, they are not a guarantee of success. For many railways, revenues from commuter and business travel sectors have not recovered to pre-pandemic levels and the cost base of managing the railway infrastructure remains high, with large subsidies required for lightly used routes. We are also seeing the effects of climate change on our civil engineering assets, which were already vulnerable to an increasing number of severe weather events. The scale and complexity of these challenges will have a profound and systemic impact on the future direction of the rail sector, raising questions about whether current industry structures are capable of overcoming them.

For almost 200 years, the railways have been organised according to what would now be recognised as business silos - historically, a **highly effective** model based on functional hierarchies and geographical spans of control, with fast decision-making and clear accountabilities. While such an organisational model is able to maintain the status quo and deal with incremental developments, it is less effective in responding to major changes. In such cases, as **Russell Ackoff** and others have argued, improving the performance of individual parts of the system will not necessarily improve the system as a whole: benefits from change programmes may fail to materialise or new weaknesses may be introduced, in **extreme cases** with severe consequences.

The UIC AMWG

Balatonfüred Intercity train in Hungary



The International Union of Railways, known as the UIC, was established in 1922 to promote rail transport, and to facilitate cooperation between its members and the sharing of best practice. The UIC Asset Management Working Group (AMWG) was formed in 2007 to help railway infrastructure managers take advantage of developments in asset management and to import good practices from other sectors into rail.

The group has implemented a wide range of projects, including the benchmarking of costs and performance, an interpretation of ISO 55001 for rail, and, more recently, the potential benefits of big data and artificial intelligence. AMWG members from Austria (ÖBB) and Italy (RFI) were the first national railways to gain certification to ISO 55001.

Pushing the boundaries of asset management

For the next few years, one of the AMWG's (UIC Asset Management Working Group - see box above) priorities will be to develop approaches to meet these challenges. We will build on the work undertaken since the group was formed, but we recognise that we will need to achieve the highest levels of asset management maturity. The **IAM's Pathway to Excellence** document identifies broad criteria for these higher levels of maturity, but makes it clear that each sector will need to set its own level of ambition and establish its own roadmap to achieve them.

Our first project in this area started in January 2023. It is called Whole System Decision Making (WiSDoM) and has participants from 10 national railways. The project is partway through its second year and is due to finish

in September 2025. The overall objective for the project is to establish and validate a methodology and framework for whole-system, value-based decision-making.

To avoid the project becoming over theoretical, we developed the methodology around real-world use cases - problems that require a whole-system approach, such as: how to optimise total expenditure across asset disciplines and operations; how to respond cost-effectively to climate change; and how to accommodate new technologies.

One of the first project tasks, which we expand on in the box below, was to establish an agreed interpretation of value: how do we interpret it, how do we specify its components, and how do we determine value for money?

What do we mean by value?

Contreras railway viaduct in Spain



Given that value is central to the definition of asset management, it is surprising that there remains a lack of consensus about how it should be interpreted. The debate is a hot topic on asset management discussion forums, while the IAM's **Value - the Apex of Asset Management** identifies several dimensions of value, and acknowledges that different interpretations are valid for the various creators and recipients of value.

In the WiSDoM project, we were seeking an interpretation of value linked to the services the railway system provides to its customers and stakeholders. We identified good examples in other sectors where the same debate had taken place and we concluded that the way value was being interpreted in global healthcare by Michael Porter and colleagues could be

generalised for use in most service sectors. Porter defines value as simply the outcomes provided to the beneficiaries of healthcare (patients and wider society) divided by the costs of delivering the outcomes.

$$\text{Value} = \frac{\text{Outcomes}}{\text{Costs}}$$

For railways, the equivalent outcomes are those experienced by passengers and freight customers, and include the wider benefits to the environment and society. Similarly, the costs are those incurred in delivering these outcomes.

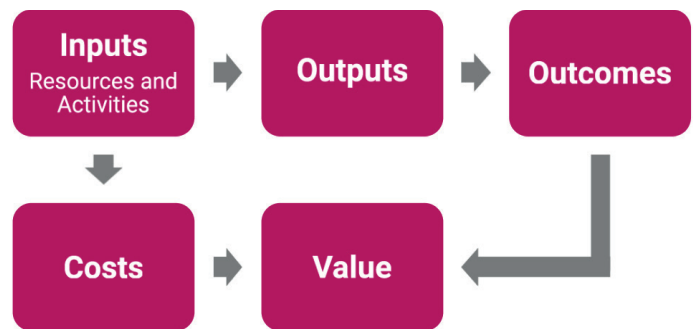
Assessing value for money

The ultimate aim of the WiSDoM project is to help railway organisations to take and implement decisions that maximise value for money. The value for-money framework we have selected for WiSDoM is based on models that have been applied in other sectors. Most of these have their roots in the logic model from the **Kellogg Foundation**. The same structure is also used by the National Audit Office in the UK to assess the **value for money** of government spending.

The value-for-money framework distinguishes between inputs, outputs and outcomes.

- Outcomes, as described in the box below, are the things that matter to passengers, freight customers and wider society.

- Outputs include the configuration, condition and performance of the railway infrastructure necessary to produce the outcomes, such as reliability and maintainability.
- Inputs are the resources (funding, people, processes, materials, technology) and activities (interventions and operations) that deliver the outputs.



Outcomes that matter

Real-time Transport Protocol (RTP) signals



Our research found few examples where railways had established comprehensive specifications of the outcomes that matter most to their customers and stakeholders. Most have mature corporate scorecards, but these tend to be limited to measurable and mostly short-term indicators of performance. Weightings for KPIs are often subjective, long-term measures are understated, and it is possible to perform well against scorecard measures without necessarily having high levels of customer satisfaction.

Benefiting from the experience of a group of railways, with access to many studies that

have been undertaken on the preferences of stakeholder groups, the WiSDoM project was well placed to provide a specification of the key outcomes. We have identified seven groups of outcomes that we believe represent the core of the benefits provided by rail.

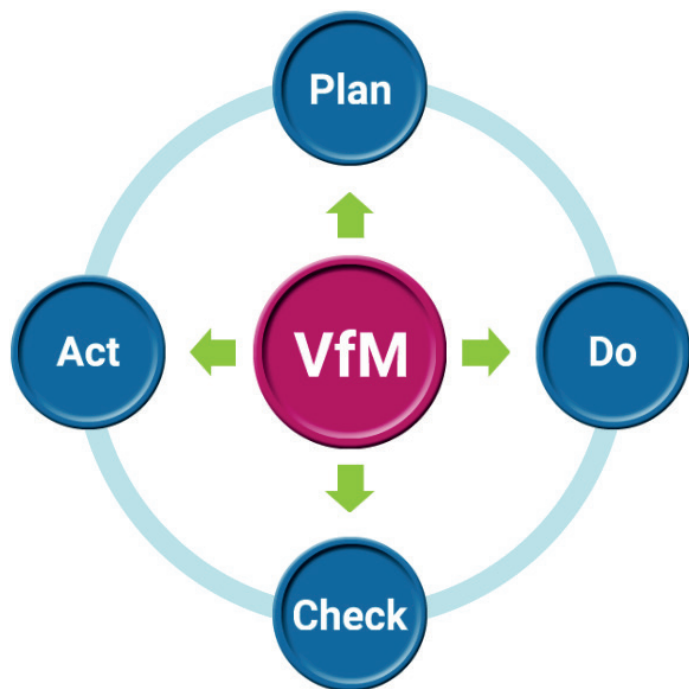
1. Safety and security
2. Train performance
3. Infrastructure capacity and capability
4. Network availability
5. Customer amenity
6. Environmental sustainability
7. Social sustainability
8. Economic sustainability.

Each outcome group is further broken down into outcome components. For example, train performance includes punctuality and cancellations, while customer amenity includes services provided at stations and on trains, such as passenger information and easy access to platforms and trains.

Integrating asset management and value-for-money frameworks

The work we have undertaken so far in the WiSDoM project has given us a clear interpretation of what constitutes value. It has also provided a specification for the value components and a framework for assessing value for money. The next task was to determine how to integrate value-based prioritisation into our asset management framework.

The **UIC Asset Management Framework**, based on guidance in ISO 55002, provides a Plan-Do-Check-Act (PDCA) cycle that has been important in building a common understanding of asset management, and has helped us to communicate the benefits within our own organisations. It is still fit for purpose and will remain a key reference for our future projects.



The integration of value with the asset management framework turns out to be relatively straightforward. The principle is that the 'value test' should be applied at each stage of the PDCA cycle, comparing outcomes and costs in a consistent way, from stakeholder requirements through to the delivery of work on the ground and the operation of the network.

A similar approach is used in **safety decision-making**, where the PDCA cycle is used to prioritise, implement and monitor the effectiveness of mitigations, while the ALARP (as low as reasonably practicable) framework is used to assess whether the costs are proportionate to the safety benefits. Indeed, the safety decision criteria form part of the wider value-for-money tests applied across all outcome components.

Next phase of WiSDoM

In parallel with our work on interpreting and characterising value, we have developed a way of defining and segmenting the railway using System of Systems (SoS) concepts. Through the development and implementation of use-cases, we believe that our **methodology**, combining value with systems thinking, can be applied to some of the biggest challenges and opportunities facing railways. We will learn over the next year whether a whole-system approach is practical to implement and is capable of delivering the significant improvements in decision-making we believe are possible.

A Danish State Railways (DSB) train,
built by Talgo



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Authors bio

Andy Kirwan is a Senior Advisor on asset management and data analytics at Network Rail. He was the author of Network Rail's first asset management strategy and has led method and application developments in areas such as asset investment planning, life-cycle costing, safety, and enterprise risk. He is Chair of the UIC Asset Management Working Group and a member of the Editorial Board for the ICE Infrastructure Asset Management journal.



Jude Carey is Head of Asset Management at Irish Rail and is currently leading its digital asset management transformation programme. He is Co-Chair of the European Commission Prime KPI and Benchmarking Group and a member of the UIC Asset Management Working Group. He represents Irish Rail in Imperial College's International Mainline Railway Benchmarking Group, and is a member of the UIC's project assessing potential use of artificial intelligence for preventative maintenance in rail.



Rosa Casquero is a Spanish civil engineer. She is currently Head of the Asset Management, Infrastructure and Train-Track Interaction unit at UIC. Previously, she worked for Spain's national railway infrastructure manager (Adif) in various track-related positions. In her last role at Adif, she was responsible for the track technology unit, participating in numerous European working groups within the railway committees of CEN and UIC.

