

How the digital future is actually a digital present for a host of rail and metro operators around the world.

"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change."

Charles Darwin wrote this in 1859, and whilst he was concerned with evolutionary biology and not rail technology, his focus on the importance of adaptation and change is something at the heart of the major developments currently driving our industry forward. For rail and metro, embracing the evolution of traditional practices to digitally enabled processes and standards is now essential. The industry faces numerous challenges; increased traffic, soaring passenger expectations, changes to existing business models and the entry of hyper-competitive newcomers to name but a few. 'Going digital' can not only provide solutions to these challenges but offer significantly improved outcomes and is now being utilised, to varying extents by operators and their suppliers around the world. Today, we look at the digital transformation of rail, what operators want and need from this, get insights into two major projects in China and Dubai and gain first-hand knowledge on how Bentley Systems, a company at the forefront of this development, is helping its users from planning to performance.

In 2016, Network Rail, the owner and infrastructure manager of most of the rail network in England, Scotland and Wales, announced it was launching its 'Digital Railway Strategy', - a £300m programme, described by its director, Patrick Bossert as moving rail "from the 'paper age to the digital age."

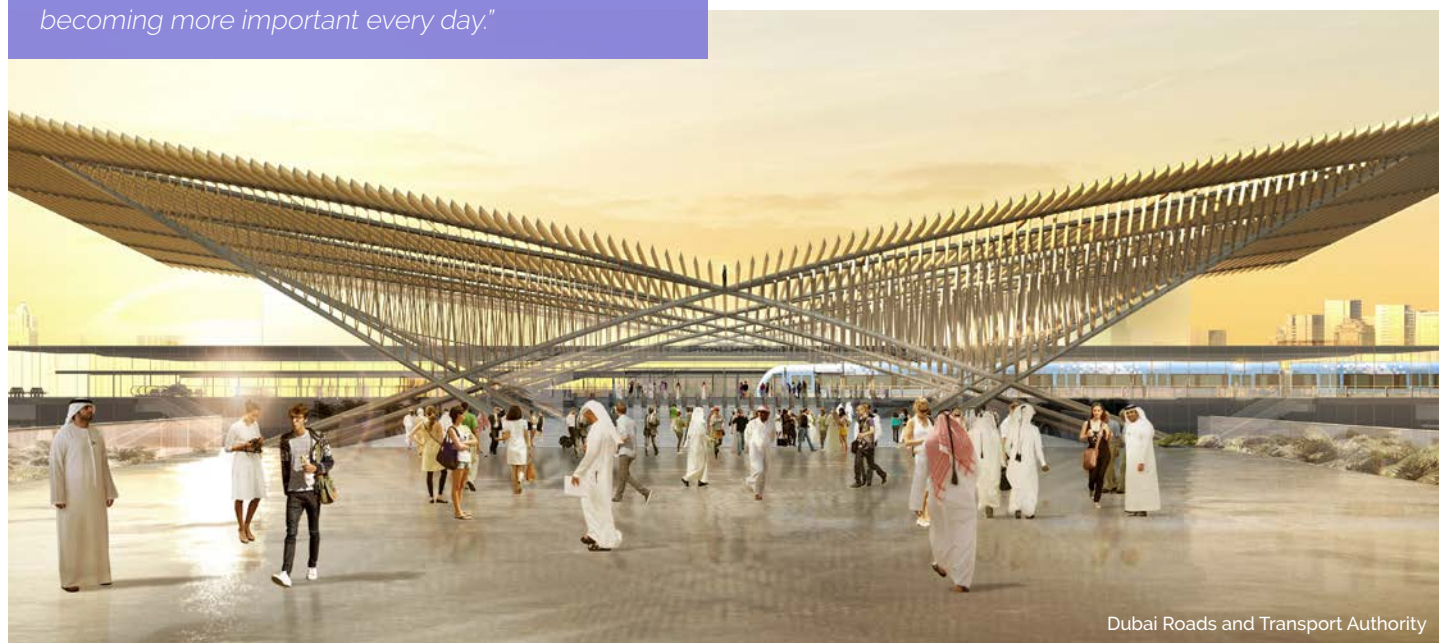
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Greg Bentley,
CEO, Bentley Systems.

For Patrick and his team upgrades to the existing rail network are essential but they can't deliver the increases in capacity and efficiency needed without unacceptable costs and disruption. Instead, the improvements can only come from making the existing rolling stock and infrastructure more productive, which is where digitalisation comes to the fore.

Steve Cockerell, Industry Marketing Director Rail and Road, Bentley Systems has his own clear ideas about going digital; "People talk about a digital future, but in fact it's the digital present and how we deal with it that is becoming more important every day. Rail as an industry has a huge amount to gain from going digital as a result of its complexity. Although a clear focus for many in the industry, I believe it should be



Dubai Roads and Transport Authority

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even higher on people's agenda as its usually problems on rail and transit networks, due to overruns on large capital projects or whilst maintaining or upgrading the network, that affect our everyday lives, and always seem to make the negative headlines in the press."

I ask Steve to point me in the direction of some examples of digital transformation in rail delivering major results, and he highlights two examples, in China and in Dubai.

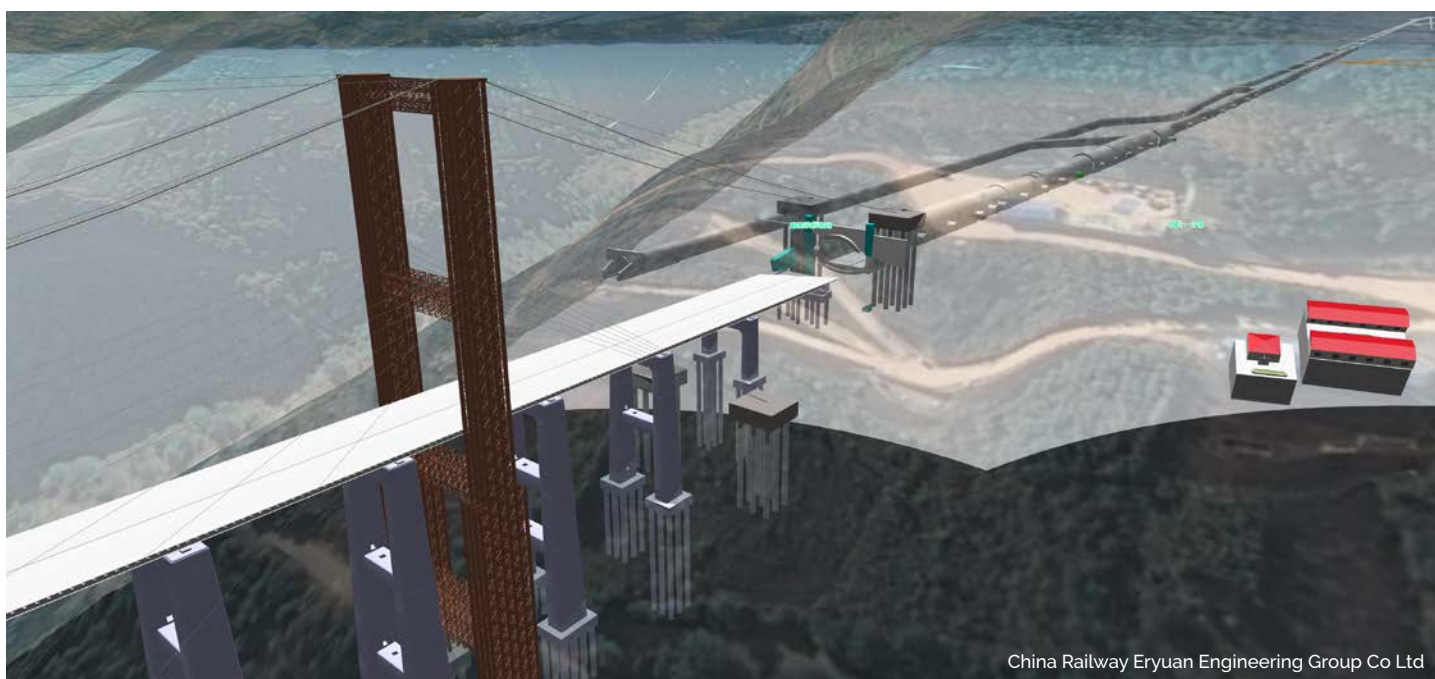
The Dali to Ruili railway is a single-track passenger and freight railway being constructed at a total cost of CNY 25.7 billion in the Yunnan province of Southwest China. During its planning and design, a fully integrated 3D model was developed of this 330 kilometers mega-project. Using Bentley's BIM technology, the design team greatly improved design efficiency and shortened the design time by 1,000 hours. Moreover, using this technology provided the foundation for future 3D design and digitalisation of the Chinese railway. Among many outcomes, the 3D collaborative design of the whole project improved modelling efficiency for geology, tunnels, and bridges, helped standardise rail components, gain efficient control of design changes in key locations, and ultimately ensured the easy transfer of the 3D BIM design model to construction management.

Whilst in Dubai, the Roads and Transport Authority's (RTA) Rail Agency was created to provide all modes of railway transportation the support needed to help ease congestion within Dubai. Faced with a lack of a single source of truth for information relating to the operation and maintenance of the world's longest driverless metro, it initiated a business transformation program to improve its performance in initiating, planning, designing, managing, maintaining, and operating of all its rail networks.

The RTA focussed first on its "Route 2020" project, a 15-kilometer extension of Dubai Metro's Red Line that includes 11 kilometers of elevated and 4 kilometers of underground sections, plus seven stations. The RTA is the first major entity within the government of Dubai to undertake such a BIM transformation; implementing best practices for configuration management (CM), collaborative information management (CIM), and building information modelling (BIM), all provisioned via a common data environment (CDE) enabled by Bentley technology.

Steve tells me that as part of Bentley's recent Be Inspired Awards program, the RTA said its implementation strategy is focused on enabling better outcomes through better decision making informed by a better quality of information. It conservatively estimates a reduction of 12 percent in time and effort of managing its capital projects and 10 to 15 percent of maintenance costs within three years of implementation.

Despite these projects in China and Dubai being just two examples of Bentley's work in digital transformation, they really are just the beginning, and Steve tells us more about an exciting new development; "Bentley has a proven record of accomplishment in rail, - we've been providing BIM for rail, with specific solutions across the design, build, operate and maintain phases of the asset lifecycle for many years, yet until now, without the digital context, digital components, and digital workflows to tie everything together, I think it is fair to say we haven't fully realised the potential. This is why we have introduced OpenRail. A family of applications and services that will streamline, and advance the planning, engineering, project delivery, operation and ultimately the performance of rail and transit systems for years to come."



China Railway Eryuan Engineering Group Co Ltd

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OpenRail is based on Bentley's connected data environment, comprising the shared services of management tools ProjectWise and AssetWise, configured specifically for rail systems engineering workflows. During project delivery, ProjectWise facilitates the collaboration among distributed engineering teams, coordination of structured workflows, and connected project visibility.

OpenRail applications will include OpenRail ConceptStation CONNECT Edition, now available for conceptual railway planning and design; OpenRail Designer CONNECT Edition, available early in 2018, for detailed engineering and 3D design of track, overhead line, tunnels, bridges, and related civil infrastructure, and AECOSim Station Designer, for the comprehensive modelling of rail and transit stations and platforms.

Officially announced at The Year in Infrastructure Conference in October in Singapore, Bentley Systems' CEO Greg Bentley told the audience more about the origins of the product: "... our railway engineering users have been persuasive in making the case that a railway—more so than any other infrastructure asset—is a system of connected components, meriting a systems engineering approach from the outset. So, rail has become our company priority for putting everything together—industrialising BIM for project delivery and leveraging digital DNA for asset performance."

There are still developments to be made on the OpenRail application journey, or "scheduled stops" as they call them, but it's a fantastic example of the development of the digital railway. I'd recommend you [click here](#) for more details, but one aspect I find particularly interesting and relevant for nearly all of us in the industry is its use of digital workflows. This is data captured or created for one purpose but can be accessed by computer

programs for other purposes, saving time, minimising rework, and improving data quality. Digital workflows can also merge the work of different disciplines for additional advancements in project delivery and asset performance. Each of these workflows represent new opportunities for team members and their work to add value beyond their traditional roles in a project.

And this new way of working is being driven not by vendors, but by owner operators and their supply chains around the world. Steve tells us more; "Rail is a complex industry, networks are large and spread over great distances, the professionals involved already manage large quantities of disparate data. Our users are looking for solutions that can help them increase capacity, availability and performance, while reducing risk. Put simply, they need to do more with the same people, same money and same assets.

This is where digital transformation or advancement really comes to the fore. Going digital can help deliver the 'more' that industry professionals in owner operators and their supply chains need - to improve quality and performance, reduce total expenditure, optimise service, retain and build customer satisfaction, thus increasing demand for rail, and boosting the chances of further investment in it. The possibilities really are significant, and it is fantastic to continue our work with rail owners and supply chains around the world, helping to deliver digital transformations across the entire life cycle - from planning to performance."

To learn more visit www.Bentley.com/OpenRail

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