# INNOVATIVE PATHWAYS DELIVER VITAL INFRASTRUCTURE

Auckland's City Rail Link project embraces alliance contracting, digital twins and sustainable development.

The City Rail Link (CRL) project is a 3.45-kilometre (2.14-mile) twin-tunnel underground railway. It will link to existing lines on Auckland's rail network, doubling its capacity and connecting more areas of the city. The project is being delivered through the Link Alliance. This consortium of companies is delivering the design and construction of stations and tunnels, a connection with the existing Western Line, and complex rail systems. WSP is a core member of the project alliance contributing to the delivery of a variety of design services across multiple disciplines.

To understand how this project benefits Auckland and future initiatives, we spoke with Daniel Jurgens, WSP Technical Director of Digital Engineering; Digital Engineering Manager of the Link Alliance.
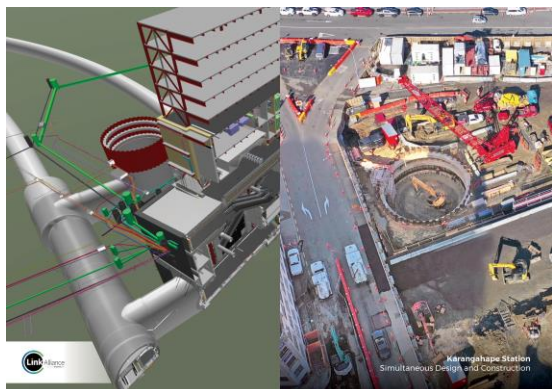
Why is the City Rail Link (CRL) project important to future transport in Auckland?

Daniel Jurgens: City Rail Link is a core project essential to mobility in Auckland—New Zealand's largest and most densely populated urban area—where population growth is projected to grow to 2 million residents by 2033 from 1.5 million today.

Over the last decade, public transport has become more popular with Auckland commuters. In June 2019, the city reached 100 million public transport trips, and about 20 percent of these trips were made by train. That level has not been reached since the early 1950s when trams were at their prime in the city.

CRL will boost capacity and connect more areas of the city to cut travel times, ease congestion on roads and reduce pressure on an overloaded bus system. It will support the city's goal of providing an integrated public transport network.

The CRL project also helps keep the economy moving here in New Zealand, in good times and now during the pandemic.

Can you address the role of digital technologies in the day-to-day progression of the City Rail Link project—especially during the pandemic period?

Daniel Jurgens: One of the key digital enablers the Link Alliance implemented on the CRL project in 2019 is a common data environment (CDE). This term means that all of our project information is hosted on connected data servers in the Cloud, accessed via the internet, as opposed to physical machines tethered to a server in a local office.

This environment enabled the project's globally distributed workforce—430 designers, 30 countries, 16 disciplines—to share live one-to-one digital twin models of the entire City Rail Link project. The result enabled unprecedented collaboration on live files regardless of location or time zone. As it turned out, the CDE was also the perfect environment to provide resilience to the project when the pandemic hit. When the pandemic forced lockdowns across the world, the Link Alliance project team was ready to continue working from home, equipped with laptops, workstations and an internet connection—no reliance on accessing local project servers from within a shared physical office.

Without this CDE in place when the pandemic hit, the project would have come to a grinding halt.

What are the key factors driving the complexity of the City Rail Link project?

Daniel Jurgens: City Rail Link is the largest transport infrastructure project New Zealand has ever attempted, the first metro project the country has ever done, and with the most onerous mandated digital deliverables a New Zealand project has ever had. When it comes to transport infrastructure, nothing completed or underway to date in New Zealand has come close to the complexity of this project.

Including all the construction teams, there are over 1,600 staff working on the project. These teams are from many different locations, countries, companies and disciplines. Many have never worked together before; we needed to find ways to communicate effectively and embrace the notion that we are all temporary custodians of data that is shared and relied upon by all members of the alliance throughout the supply chain and which will ultimately be used to maintain and operate the assets.

In addition to the technical and communication challenges, we needed to resource a project during an infrastructure boom, amid pandemic disruptions, and in a stacked project delivery methodology—with many concurrent packs being delivered at all project stages, some in early design, some areas being issued for construction and other areas already built. Whilst ensuring pioneering digital processes are authored in a timely manner, teams are trained, the quality of our deliverables is rigorously checked, and the output from the alliance is consistent regardless of the team delivering.

How is the alliance team addressing the project's main challenges?

Daniel Jurgens: Applying an alliance-contract model has enabled us to all work collectively as a single entity—that's the first piece of the puzzle. As alliance-contract models are based on shared risk and reward, we all rely on each other to collectively deliver the project, and this set-up enhances collaboration to a point that I have not seen to date on other projects.

The next key step was resourcing the team from the best minds available globally, followed closely by resolving the technical issues in

creating a connected environment where all stakeholders can interact with each other and share data. Once we had the base resourcing and data environment in place, it was all about authoring processes to enable many stakeholders to interact with each other in a controlled manner so that we all understand what the project requirements are and how to digitally deliver them.

The biggest ongoing challenge is finding the right process and balance in communication. Project variables change, and unforeseen societal impacts, such as the pandemic, and processes evolve as the team structures change over the life of the project. We automate as much as we can, run regular training sessions, have dashboards and rigorous quality assurance and quality control procedures, and host coordination meetings online. We are very careful with our communications to the alliance to ensure we don't contribute to "death by email," preferring daily SCRUMs as per the AGILE project management framework.

How is a common data environment and the CRL digital twin advancing sustainable infrastructure development?

Daniel Jurgens: CRL is leading sustainable infrastructure development by utilizing the project's common data environment and digital twin to measure and benchmark sustainability through the Infrastructure Sustainability Council of Australia (ISCA) framework. CRL is ambitiously aiming for an ISCA Excellent rating—equating to a 15-percent reduction in embodied carbon, a 25-percent reduction in energy CO2 emissions, reduced waste to landfill, and reduced construction and operational water use throughout the project's lifecycle. These reductions are baselined against tender-design quantities.

ISCA uses a materials calculator to show reductions in materials and embodied carbon throughout the lifecycle of the project. The calculator "reads" material summaries from the digital twin the design teams are authoring, reporting to dashboards to create a cohesive output on project performance against sustainability targets. This capability enables the effect of design or material changes to be visualized and reported on throughout the design process, to initiate innovation and change as required to meet targets.

In terms of innovation, how might use of the digital twin in the CRL project support future infrastructure needs in New Zealand?

Daniel Jurgens: The project's digital twin hosted in an online common data environment is an absolute game-changer for the industry. We are now able to fill the needs of projects remotely with the best minds available globally— relying less on people journeying to a site office and resulting in best outcomes not only for a project but for individuals and wider society impact.

I envisage this approach becoming the norm— digital delivery methodologies enabling projects to be resourced by geographically dispersed teams working collectively, interactively online, as opposed to large offices requiring the physical attendance of employees.

On CRL we have embraced being temporary custodians of data, we understand that others rely on the reuse of the data we author, and what we are collectively authoring will ultimately contribute to a digital representation of the whole of New Zealand. Imagine when all projects in New Zealand are also embracing these methodologies, breaking down inter-company corporate restrictions and openly providing access and sharing data.

We are quite proud that the project has brought professional development and a technological shift for not only the entire Link Alliance—we are also bringing the New Zealand industry along with us.

This is the way of the future; this is going to change everything over here. In fact, it already is.

Continue for contact information

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